

GETTING THERE: At 100 miles per gallon!

Popular Mechanics

APRIL 1974
60 CENTS

SPECIAL!
36-PAGE

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GUIDE**
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You must check
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say what they think** Pages 98 and 124



EVINRUDE.

**Because motors,
like people,
shouldn't stand up
in the boat.**



The principle hasn't changed since the day of your first canoe ride.

The lower the weight in a boat, the greater the stability; the less it tends to tip or roll.

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DIVISION OF OUTBOARD MARINE CORP.
first in outboards



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Wring out all you can from your gas. Give it our treatment... STP Gas Treatment.



This One



431C-96E-BH10

**TODAY,
YOU CAN'T AFFORD
A DIRTY CARBURETOR**

20 ways to on your

1 Avoid paying extra installation charges when you order new phone service. Have all the work done at one time. Changing your mind later will mean extra visits and extra charges. So consider carefully all the different colors and styles, how many phones you want and exactly where you want them installed.

2 Ask one of our business office Service Representatives to explain the different types of service offered by your local Bell Company. Choose the one which best fits your pattern of calling. If you don't do a lot of calling each month, ask if "budget" or "limited" service is available in your area at a lower rate.

3 Ask the Service Representative for a rundown on the specific rates and charges you can expect. Find out exactly what the regular monthly charges will be, and what the one-time-only payments are. Find out whether there are options in your area of paying on a monthly basis, or making a single one-time only payment, on certain items.

4 Are you going to be away from home for any extended period of time? A business office Service Representative can tell you, based on how long you plan to be away, whether you could save money by temporarily suspending your telephone service.

5 Moving to a new residence? Ask a Service Representative whether you are eligible for a credit on your bill if you take your present phones along with you to your new location.

6 If you've never had a phone in your name before, or have never established credit, you may be asked to pay a deposit when you order telephone service. But we don't like to keep deposits for long periods of time. In fact, if you establish good credit with us by paying on time, we'll return your deposit to you PLUS interest. Ask a Service Representative to explain the details which apply in your area.

7 If a coin phone swallows your money but doesn't give you your call, you're entitled to a refund. Find a phone that works, dial "Operator" and explain what happened. You'll get a refund in the mail. P.S. We'd appreciate it if you'd also tell the operator the telephone number and location of the phone that's out of order so we can get it fixed as soon as possible.

8 Reach a wrong number on a Long Distance call you just dialed? Don't just hang up. Ask for the area code and the number you reached in error. Then dial "Operator" and report what happened. The operator will have the charge removed.

9 Get a poor connection on a Long Distance call, or get cut off in the middle of your conversation? Don't just hang up and call back. The person who placed the call should report what happened to an operator. The operator will issue a credit for the time your call was interrupted.

10 Error on your bill, with a charge for a Long Distance call you didn't make? Call the business office. A Service Representative will arrange to get the charge removed.

11 Save on Long Distance charges by cutting down on person-to-person calls. It's true you may not be able to reach the person you want on your first try with a station-to-station call. But in many instances you can make two (or even three) out-of-state station-to-station calls for what it would cost you to make that one person-to-person call. This is particularly true if you dial your own calls instead of going through an operator.

12 Dialing your own out-of-state Long Distance calls is the least expensive way of all. If you don't know the number for a call you want to make to a distant city, you can obtain it at no charge to you by dialing the area code (when required) for that city, plus 555-1212, for Directory Assistance. Then dial direct and save. Save time

save money phone bill.

in the future by recording the number in your personal number book. A listing of all area codes can be found in the information pages at the front of your local telephone directory.

13 Make sure you know when dial-direct rates apply before you make your call. They apply on all out-of-state calls to anywhere in the United States (excluding Alaska) if they are completed from a residence or business phone without an operator's assistance. They also apply on calls placed with an operator from a residence or business phone when direct dialing facilities are not yet available.

14 But it's even more important to know the circumstances when direct-dial rates do NOT apply. They do not apply on person-to-person, hotel-guest, credit card or collect calls, or on calls charged to another number, because an operator must assist on such calls. Direct-dial rates do not apply on calls made from coin phones, even those from which you dial the complete number yourself before the operator comes on.

15 While operator-handled calls cost you more than those you dial yourself, there is one exception. If you run into equipment trouble completing a Long Distance call you're dialing yourself from a home or business phone, you're still eligible for the dial-direct rate even if you require an operator's assistance. Explain your problem to an operator. If you need help in getting the call through, or in making a satisfactory connection, confirm with the operator that it will be charged at the dial-direct rate.

16 Dial direct, but save even more by making your out-of-state Long Distance calls within the time periods when rates are lowest. The lower rates for out-of-state calls made in the evening, on the weekends or late at night are described for you in the call guide in the front of your local directory.

17 Don't get caught by surprise, or miss out on the money you can save on Long Distance calls you make within your state. The times when lower rates apply may be different than for your out-of-state calls. Check carefully in the call guide in the front of your local directory for a description of when to save on calls you make within your state.

18 If you're concerned about avoiding added charges on your Long Distance calls in general, don't guess how long you've been talking. Time yourself, so you can finish your call before overtime rates apply. To save even more time and money, jot down what you want to say before you dial.

19 Before you go ahead and place a Long Distance call to a business, check first to see if they have a toll-free number. You can recognize it because it has an 800 prefix instead of a regular area code. If they have one, it's usually displayed in their advertising, or you may find it listed in your own local telephone directory. If so, the call's on them, and you save.

20 The information pages at the front of your local telephone book are a good source for tips on how to place your calls and how to save time and money in using your telephone. Look in the book, and save.

We hear you.



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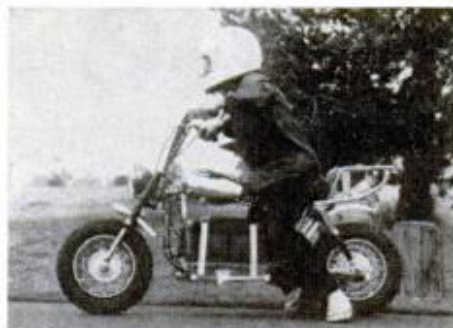
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EVERY MONTH

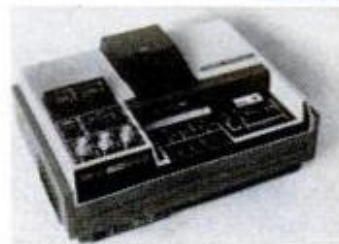
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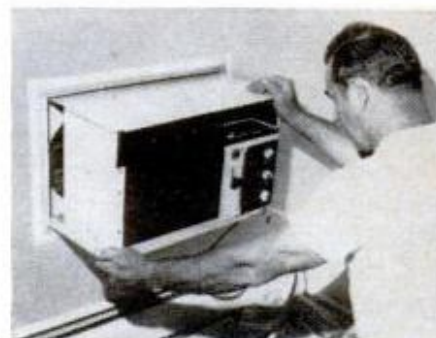
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ON THE COVER: The cycle-car that gives
[50 mpg \(!\) plus sports-car performance.](#)
Photo: David Gooley

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There are times when you just can't smoke. And that's when you should do what six million other Americans do.

Take a pinch of "smokeless tobacco." Place it between cheek and gum and let it rest there. You'll get full tobacco pleasure.

It's easy to see why cowboys are into "smokeless tobacco." And scientists and lab technicians are using it, too. And thousands of others who work with their hands. In places where smoking is out.

Even lawyers and judges are taking it into their courtrooms.

Students and teachers enjoy it in their classrooms.

Three great brands of "smokeless tobacco" are taking hold all over the country.

There's Copenhagen, which has the rich flavor of pure tobacco.

Skoal, laced with winter-green. And Happy Days Mint.

They all give you tobacco satisfaction without having to light up.



**Smokeless Tobacco.
A pinch is all it takes.**

There are times when a guy just can't smoke.

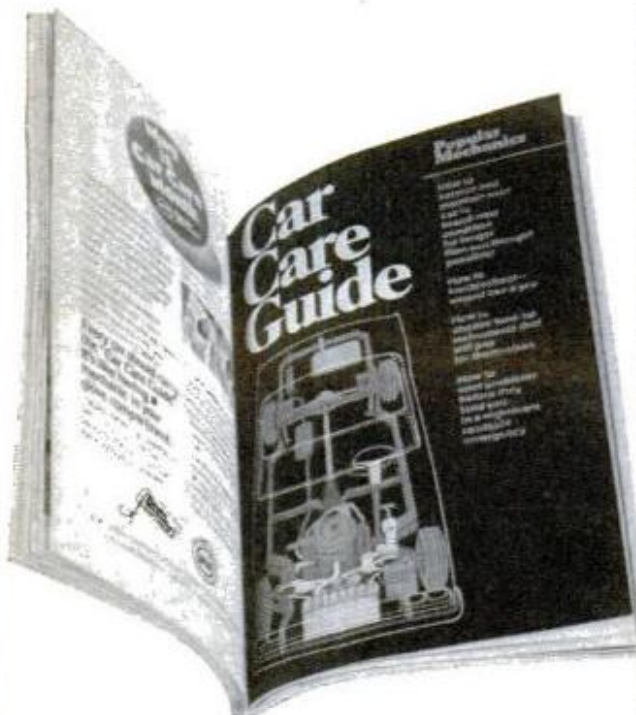


For a free booklet that explains how to get the full enjoyment of "smokeless tobacco"— as well as a few free pinches that you can try for yourself— write to "Smokeless Tobacco," United States Tobacco Company, Dept.P-33, Greenwich, Connecticut 06830.

We're gonna fill you up in May

In the May issue of POPULAR MECHANICS we'll be giving you an 80-plus page bonus with our 1974 "Car Care Guide." Economy tips; engine tuneups; oil changes; cooling systems; suspension, steering and tire care are just some of the subjects that we will be covering.

Our Second Annual "Car Care Guide" is really a service station in print—so don't miss it!



On Sale April 30.

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How to put your hands to work making money

Do you remember what you paid the repairman, the last time you had trouble with your TV, Air Conditioner, or Automobile? Do you know how much it would cost today—to fix your roof, install new kitchen appliances, or change the electrical wiring in your home?

Now, turn it around—and look at it this way: do you realize how much money you could earn today if you were a trained Electrician, Auto Mechanic, or Electronics Technician? And do you realize how many job openings exist in these fields... either full or part time?

Suddenly, it's a wide-open world of opportunity, if you're one of those fortunate people who enjoy working with their hands. If you can choose one of the high-paying fields where your talents are needed and appreciated. And if you can get the kind of career training that today's employers and consumers are willing to pay big money for.

To help you select a field that's right for you, we've listed 14 opportunities on the coupon below. And you are invited to find out what you should know about the field you like best, by simply mailing the coupon.

Free Guidance Booklet

In return, you will receive a free Career Guidance Booklet that describes the opportunities, income, and job security you might expect in your newly chosen field. It will also explain how

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In addition, you'll receive a free "Demonstration Lesson" that lets you see for yourself why picking up the job skills you need—the ICS way—may be easier than you think.

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Please bear in mind, as you fill in the coupon below, that more than 8,500,000 men and women have turned to ICS for career training since 1890. And some 2,000 American firms and government agencies are also using ICS training programs to upgrade their employees. (Among these firms are such names as *Ford, U.S. Steel, Chrysler, Mobil, 3M Company, Alcoa, Pan Am, GE, Motorola, and RCA.*)

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XA732Z

ICS International Correspondence Schools
Scranton, Pennsylvania 18515

Please send me free Career Guidance Booklets and a free "Demonstration Lesson" for the field I have checked below. I understand I am under no obligation.

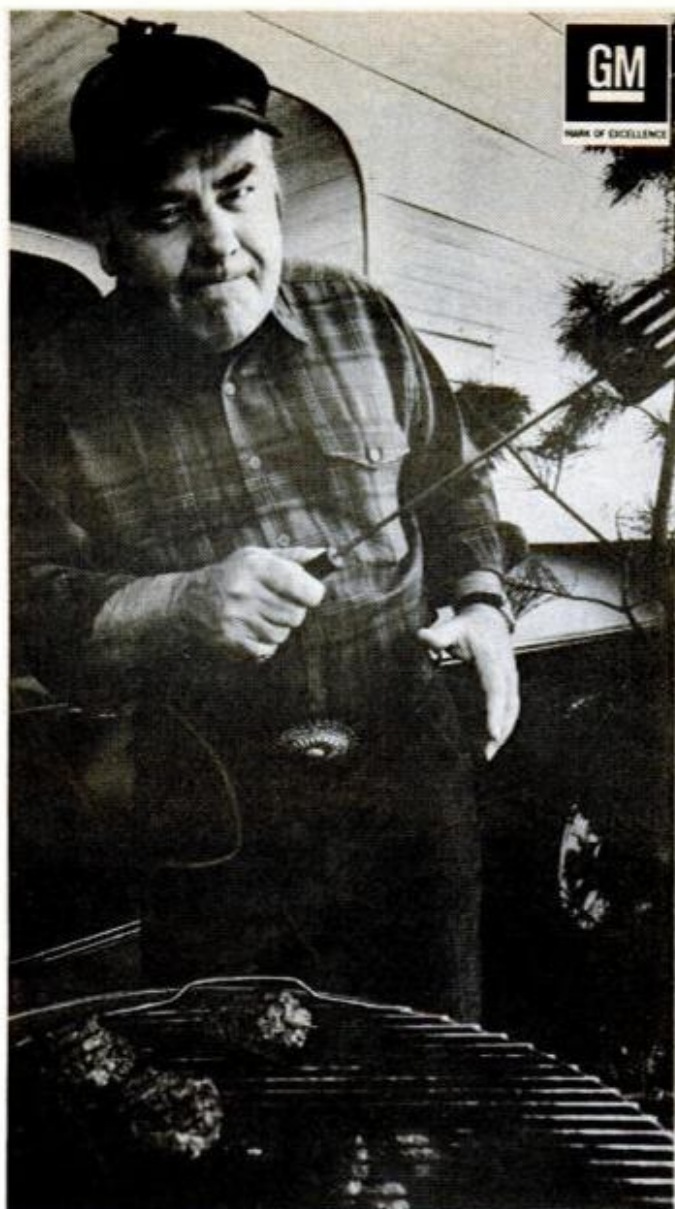
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<input type="checkbox"/> Architectural Drafting	<input type="checkbox"/> Drafting (Mechanical)	<input type="checkbox"/> Engineering Technician
<input type="checkbox"/> Automotive Mechanics	<input type="checkbox"/> Electrician	<input type="checkbox"/> FCC Licensing
<input type="checkbox"/> Auto Body Rebuilding Specialist	<input type="checkbox"/> Electronics Technician	<input type="checkbox"/> TV Servicing & Repair
<input type="checkbox"/> Transmission Specialist	<input type="checkbox"/> Check here for special information, if age 16 or under	
<input type="checkbox"/> Engineering (Civil/ Electrical/Mechanical/ Chemical)		
<input type="checkbox"/> Computer Servicing		

MR., MRS., MISS _____ AGE _____

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Jonathan Winters as the well traveled Ozzie Outdoors

**"Give me the broiling sun.
Give me the scorching heat.**

**But first, give me
Harrison Air Conditioning."**

"I like roughing it. But the summer sun can make it a little too rough. So I never go camping without Harrison Air Conditioning in my cab. Keeps me cool, summer after summer. And even though I'm virile (feel my muscle?), I'm bothered by dust, pollen and excess humidity. But Harrison removes all that. See your Chevrolet or GMC Truck dealer for a demonstration of GM-Harrison Truck Air Conditioning. Because broiling is for steaks, not for people."

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

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

LETTERS

TO THE EDITOR

Already has the "car of the future"

This may come as a shock to you, but I've been driving the family car of the future for well over a year. My car averages 25 to 30 mpg, has front engine, front-wheel drive and front disc brakes.

My "car of the future" also has flow-through ventilation, a quiet thermostatically controlled fan, all-steel monocoque body, MacPherson struts, rack-and-pinion steering and a "cavernous trunk with a wide, flat floor" (but no hard-to-get-at spare underneath).

It also has fully reclining front seats, full carpeting, high beams on the steering column and electric rear-window defrosters and also my rear windows *do* open.

I'll grant *your* car of the future (VW Dasher: *Future Shape for the Family Car*, page 168, Feb. *PM*) has a few inches of additional room here and there, but *my* car of the future cost almost \$1000 less than yours, and for an average cost differential of about \$60 per inch, you can keep all that extra space.

After reading and rereading your article, I have decided that I hold the true trump card. If this VW Dasher is *really* the car of the future, all I have to do is remove my Subaru insignia and attach your VW one!

In all seriousness, perhaps it is time you take a much, much closer look at the Subaru, the car VW obviously has seemed to have copied, *item for item*.

FULTONVILLE, N.Y.

GARY ELL

It's about time . . .

It's about time that the finger was pointed at those who are responsible by negligence for such devastating tragedies as those described in *When Gas Mains Become Blockbusters* (page 112, Feb. *PM*). I have experienced such an explosion, and the fault lay mainly with the gas and electric companies.

I'm in total agreement that if such com-

(Please turn to page 11)

HOW TO MAKE MONEY SELLING HOME-KITS*



ORDER A HOME KIT FOR YOUR OWN HOUSE



YOUR HOME KIT WILL BE SHIPPED TO YOU PROMPTLY



FINISH APPLYING YOUR OWN HOME KIT INSTRUCTIONS ARE EASY TO FOLLOW



SHOW YOUR FRIENDS AND NEIGHBORS



THEY TOO WILL WANT A HOME KIT



BUY DISHWASHER FOR YOUR WIFE WITH PROFITS

SELL YOUR CUSTOMERS ON MONTHLY PAYMENTS

HOME-KITS can be sold on monthly payments. No down payment required. You may select either aluminum steel or vinyl siding. Each new dealer must install a HOME-KIT on his own home in order to gain application experience and in order to have a home to show his prospects. Average dealer cost of a complete HOME-KIT is about 1/3 the national average applied

price. Mail coupon below for a FREE FRANCHISE and FREE DEALERSHIP. You will receive our 48 page DEALERS MANUAL explaining how to apply and how to sell HOME-KITS. Your first HOME-KIT includes free tools and complete instructions. Free advertising furnished to help you sell. You will receive a free sample of the material you select on the application below.

APPLICATION FOR DEALERSHIP

TO: ALUMINUM INDUSTRIES OF ARKANSAS, Dept. M-44, Little Rock, Arkansas 72205
WITHOUT OBLIGATION, please mail me a FREE FRANCHISE and DEALERSHIP to sell your HOME-KITS. I own a home which needs to be re-sided.

I am interested in a Aluminum siding Do-it-yourself kits Send free sample Steel siding Do-it-yourself kits Send free sample Vinyl siding Do-it-yourself kits Send free sample
I would like to be considered for a: PART-TIME DEALERSHIP FULL-TIME DEALERSHIP
Address of Property I own which needs re-siding:

street town state zip

This property is located in what County? county state

My mailing address is: street town state zip

My age: My Present Occupation:

Print your name here as you would like it printed on your free franchise. first name (print) middle name (print) last name (print)

sign here please

Each new dealer must apply a HOME-KIT to his own home before selling the general public. Do not mail this application unless you own a home which would be suitable for an application of aluminum, steel, or vinyl siding. You are under no obligation by mailing this application. No salesman will call on you. Everything will be mailed to you free of charge.

NOTICE

There is no charge for a HOME-KIT FRANCHISE. You must, however, apply a kit of either: Aluminum, steel, or vinyl siding to your own home for a display and in order to gain experience before selling the general public.

*HOME-KITS

A complete covering of either aluminum, steel, or vinyl siding for a home. HOME-KITS are available in 14 different sizes, 3 different materials, and 22 different colors. Free 48 page DEALERS MANUAL explains everything. Each new dealer must apply a HOME-KIT to his own home before selling the general public.



**ALUMINUM
INDUSTRIES**

OF ARKANSAS Dept. M-44

Little Rock

Arkansas 72205

FREE PLAN *How to Start* Your Own Business



Start a steady repeat CASH business in your basement or garage. Earn \$5 to \$8 an hour in your sparetime! Excellent profits in saw sharpening business! Automatic Foley Saw Filer, easy to operate, files combination saws, hand, band and circular saws. No experience needed. H. C. Deibert wrote us: "Since I got my Foley Filer 5 years ago, I have averaged 4 1/2 saws each day since I started."

Every saw you sharpen brings you more customers. "I rented a two-car garage and have all the work I can do," writes Charles H. Smith.

We Finance You

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

Send Coupon for FREE Information

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443-4 Foley Bldg., Minneapolis, Minn. 55418

Send complete information and Time Payment Plan.

Name _____

Address _____

REMOVES RUST

GRIND-O-FLEX FLEXIBLE FLAP SANDING WHEEL

Put GRIND-O-FLEX on your 1/4" drill or bench motor and make your old tools look like new again. Thousands of abrasive cloth flaps per minute remove rust... polish... even sharpen blades. Sand gutters and metal sash before repainting; grind-polish and restore antiques. Use on flat and contoured surfaces; you'll find dozens of household and hobby uses for Grind-O-Flex abrasive wheel.

MERIT ABRASIVE PRODUCTS, INC.

SUBSIDIARY OF WASHINGTON STEEL CORPORATION
201 W. Marville, Compton, Ca. 90224

Order Your 5" dia. Wheel **\$4.90**

Plus \$1.00 for postage & handling. No C.O.D's.

FREE Home Workshop Brochure

PM



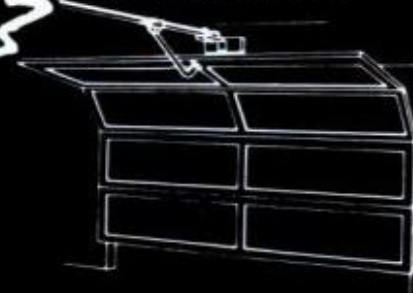
GARAGE DOOR OPERATOR



Buy Mail Order And Save

MODEL CD-5

SPECIAL SPRING OFFER
TO POPULAR MECHANICS READERS
WRITE FOR DETAILS



- 1/3 HP HEAVY DUTY • FULLY AUTOMATIC
- INTERFERENCE FREE RADIO CONTROLS
- INSTANT SAFETY REVERSE • CONVENIENT LIGHT DELAY

NOW you can buy the most POWERFUL, DEPENDABLE garage door operator anywhere DIRECT from the factory by mail and SAVE up to \$100! IMMEDIATE shipment. NO WAITING. Home delivery in 3 days via UPS. The HELP MATE opens and closes, illuminates and securely locks any garage with wood, metal or fiberglass doors up to 20' wide—whether sectional or 1-piece. Requires only 1 1/2" clearance and 2 hours to install using our exclusive Homeowner's Guide. Guaranteed 1 year. Choice of 4 models from \$99.95 budget unit to \$149.95 premium 1/3 HP screw-drive system. Free brochure with limited time special offer sent promptly. **HELP MATE EQUIPMENT CO.** Box 217PM, Baroda, Michigan 49101. Telephone (616) 422-2311.

LETTERS

(Continued from page 8)

panies were more precise and careful in their work, such tragedies wouldn't happen.
WOONSOCKET, R.I. JIM SIMOVINI

Readers can afford 'em

I was glad to see that you finally recognized there is such a car as a Bentley and Rolls-Royce in *PM's Dockside Guide to Imported Cars* (page 82, Feb. *PM*). Why so cavalier about them? The Rolls grille is hardly "ostentatious" as it is basically the same Mr. Royce designed in 1904.

What other car has such classic design that its radiator grille still looks distinctive after 70 years? And to suggest that Rolls-Royces last forever because "they're always parked at the curb—waiting" is ridiculous. There are Silver Ghosts (pre-WW I) still running, and half the number of Rolls-Royces manufactured are still in operation.

I have owned two Silver Shadows. Very little goes wrong with them, 13 mpg, impeccable design and craftsmanship and mini-

mum depreciation. My Shadow recently went 100 mph before the gas shortage made such shenanigans unpatriotic.

Why don't you do a story on Rolls-Royce? All your readers know them, and I suspect many could afford one.

BOCA RATON, FLA.

GEORGE R. KEMP

As a matter of fact, we suspect that many readers have one. Some of the rest of us, though, are still—waiting.

They're really a bargain

We sent you a new-product release on our wide-angle safety goggles which may have already appeared in your magazine.

I must unhappily say we made a typographical error, and the price should have read a modest \$2.95 instead of a way-out incorrect price of \$9.98.

THE STANLEY WORKS
NEW BRITAIN, CONN.

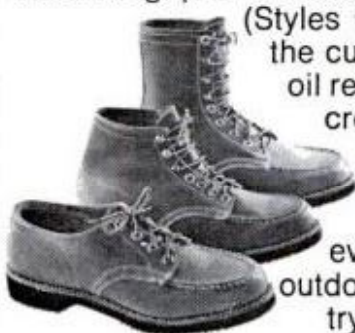
E. C. BENFIELD

*Yup, we did run it (page 120, Jan. *PM*) and we did show the erroneous price. But*

(Please turn to page 12)

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-4-4

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City _____

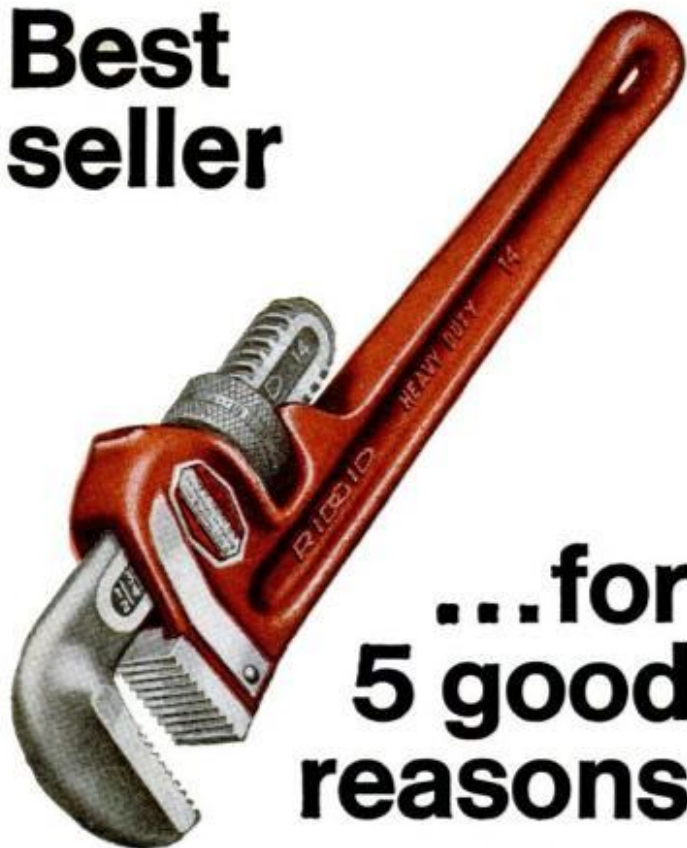
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Emerson Electric Co.

LETTERS

(Continued from page 11)

just think how happy you've made everybody. This is the first time in years anybody has seen anything drop to one-third its "original" price.

Attracts a lot of attention

I built this version of the *Backyard & Bird-bath R.R.* (page 118, Aug. '65 PM), to fit the chassis of a riding lawnmower. It took two years to construct, and I have enough ideas to keep adding for several more years. I am a member of the Zamora Shrine Temple Clown Unit (Birmingham, Ala.) and the Clowns of America. I ride the locomotive on parades.



The riding mower has a 7½-hp engine with reverse, three forward speeds and electric start. A drive sprocket was changed to double the speed. An air compressor was added for the whistle, and a PA amplifier with a tape player for music.

GADSDEN, ALA.

ROBERT A. SCARBORO

Another way to seal

An additional method of sealing (*How to Stop Wind Noise and Water Leaks*, page 146, Dec. PM) involves the use of lengths of rubber hose slit longitudinally and slipped over the edge of the glass. Cranking the window up tightly will force the hose into the weatherstripping. If the slit in the hose is made with a sharp razor blade resulting in a neat edge, the hose will be virtually un-

(Please turn to page 14)

TOM McCAHILL SAYS:

“You can pocket \$5 to \$7 an hour if you’re good enough to fix these things.”

The coming of the automobile built a multimillion dollar service industry in a few, short gas-eating years. The same thing has happened in the electrical appliance field. Manpower is desperately needed now to repair appliances.

But there is one big difference. Anybody with a few simple tools can get started in appliance repair. No expensive equipment is needed.

What is needed is the right kind of training. You can't strike it rich in today's job market with nothing more than muscle. Nor can you hang onto an old-time job skill while an electronic monster with buttons replaces men around you. It's like driving a buckboard down the Jersey Turnpike. The fuzz would locate you fast and send you out to pasture.

If you want an up-to-date job skill with good opportunity—why not take a look at the Electrical Appliance Repair field?

This field is loaded with opportunity because every house in our high speed land is loaded with appliances. There are about four times as many appliances as we have men, women, children and babies in the good old U.S.A. There are over a billion of these electrical gadgets being used, abused and broken. If you know how to do fast repair jobs on them, how much you can earn can well depend on how much you want to earn.

The opportunities in this field are all the better because you can prepare for them fast. There's one short, sweet course you can take right in your own home and it covers everything. I'm referring to a home-training course offered by the Appliance Division of National Radio Institute—one of the biggest and oldest home study schools of its kind.

NRI gives you the whole works. Their training covers basic electricity and how to use test instruments. They cover the electrical and mechanical operation of every type of appliance from toasters and coffee-makers to dishwashers; from vacuum cleaners and automatic laundry equipment to air conditioners and refrigerators. They even show you how to fix farm and commercial appliances and small one-lung engines.

The training is designed to be interesting, practical and fast. You can make \$5 to \$7 an hour extra fixing



appliances in spare time starting soon after you enroll. They give you all you need to know to do fast, profitable repair service. They even include equipment without charging you extra. And the full cost of the training is surprisingly low.

If you are driving a buckboard in today's job market, at least find out what the Appliance field can do for you. NRI sends you a fancy, illustrated book about their training so you can judge for yourself. There's no obligation and they don't send a salesman to pressure you. All I say is get the facts and see for yourself. Send the coupon today while you are thinking about it.

Tom McCahill

AVAILABLE UNDER NEW GI BILL

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| BOOKS ON CLOCKS | |
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LETTERS

(Continued from page 12)

detectable; it will appear to be merely part of the weatherstripping. I resorted to this method in my 1971 Camaro when shimming the weatherstripping failed, and I was advised that it would be quite expensive to readjust the glass.

DEARBORN HEIGHTS, MICH. G. B. WALKER

Nonplus those diodes

In the February articles, *Check Your Battery With a Light in Your Lighter* (page 60D) and *Let Your Family Listen With This Easy Phone Amp* (page 132), you show a picture of a diode and list the marked end, or cathode end, as the *plus* end. The bar or marked end of a diode indicates the cathode or *minus* end, does it not?

SPRINGFIELD, OHIO ROBERT R. MILLER

We did goof in calling the diode's cathode its plus end. Otherwise the schematics are correct—including the plus signs by the diodes in the schematics—according to the authors.

Bright way to spot bubbles

To simplify the frustrating search for air bubbles, particularly on vinyl paper (*How to Hang Wallpaper*, page 78, Jan. PM), dim the lights and place a flashlight so its beam scans the freshly hung wallpaper at a very shallow angle. Sweep the beam across the paper; any air blisters stand out clearly since each bump casts a shadow.

HAMILTON, ONT. G. B. MARSHALL

Car Repair for '74

Just want to congratulate you on your excellent publication, *Car Repair Annual*. When will your '74 edition be out? I don't want to miss it.

JOLIET, ILL. JOHN MAHON

It is out, and you don't need to miss it. If it's no longer available at your newsstand, you can get it for \$1 plus 25 cents for postage and handling through Popular Mechanics, Dept. JL, Box 1014, Radio City, New York, N. Y. 10019. ★★★



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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.

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a way to get the kind of position where you don't have to worry about job security."

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- Electrical
- Chemical
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- Transmission Specialist
- Body Rebuilding
- Diesel/Truck Mechanic

Business Management

- Executive Mgt.
- Industrial/Production Mgt.
- Data Processing Mgt.
- Marketing/Advertising Mgt.

T.V. Servicing

- Color T.V. Technician
- Stereo-Hi-Fi Specialist
- CATV-MATV Specialist

Electronics

- Electronics Technician
- FCC Licensing
- Computer Servicing
- Communications/Broadcasting

Electrician

- Master Electrician
- Electrician
- Check here for special information, if age 16 or under

Accounting

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- Architectural

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THE BICYCLE SHOP

BY EUGENE A. SLOANE

Slipping in high gear

The high gear on my bike slips. I have a 10-speed Simplex gear system. I have already tried adjusting my rear derailleur.
—Daniel Norton, Houston, Tex.

By "high gear," I assume the reader means smallest gear; by "low gear," I assume the reader means the largest diameter (most teeth) gear. So I assume you are having a problem with your smallest diameter rear gear.

It could be that the cable is too tight; in other words, you pulled too much of the cable through the derailleur and locked it in place so that the derailleur cannot move sufficiently far to the right to pull the chain over onto the small gear. If such is the case, push the gearshift lever all the way forward, unscrew the derailleur cable locknut and let just enough cable slide through to take out the tightness and to permit the derailleur to move sufficiently far to the right to permit the chain to move accurately onto the little gear. You may have to readjust the small gear adjustment on the derailleur to keep the chain from moving too far and getting caught between the small gear and the chainstay.

You could also have a worn gear with little "hooks" at the rear of the tip ends of the teeth, which throw the chain off every time you shift down to it. Have that particular gear removed and a new one threaded on your freewheel, or buy an entirely new freewheel.

Wants to set up shop

I would like to open my own bike-repair shop. Are there any correspondence courses in bicycle repair?—Dan Stallone, Washington, D.C.

I regularly receive letters from readers of all ages with the same question. There is no such correspondence school. The only way I know to become an accomplished bicycle mechanic is to go to work for a bicycle

dealer. You might also read a good book on the subject, such as *The Complete Book of Bicycling*, modestly written by yours truly, and obtainable through your local bookstore or directly from Trident Press, 630 Fifth Ave., New York, N.Y. 10020 (\$9.95). Of course, working for a bicycle dealer may or may not give you the business and marketing experience you need, but the larger bike companies such as Raleigh, Schwinn, Murray, Huffy and AMF do have this training and Schwinn and Raleigh have a mechanic-training course you might attend at their plants.

How to ride a tricycle

Tricycles for adults are, in my opinion, unsafe. A tricycle I bought made by a well-known American corporation and sold by a major automotive chain store is dangerous, in my experience. It turns over on uneven surfaces no matter how slight an incline and it is hard to corner. This makes these adult tricycles unsafe for the elderly. What can be done to correct them?—E.L. Gillespie, Corsicana, Tex.

First of all, trikes are indeed difficult to master. If you have been used to riding an ordinary two-wheeler, you'll find that any incline will cause you to turn over because the tendency is to lean into the turn rather than away. Also, a new tricyclist does not understand that it is perfectly safe to "steer" the tricycle just as you would steer a four-wheeled automobile without turning it over. You need to forget about balancing and simply steer the beast. I know, I've been through it myself. So what should be done is simply to train an elderly adult in the safe handling of these vehicles before leaving the dealer's shop and I would say this is up to the dealer. But be warned, those of our readers who are about to buy tricycles of any make, that they are all quite tricky to ride at first. Just remember

(Please turn to page 24)

There's a lot of good
between "Winston...

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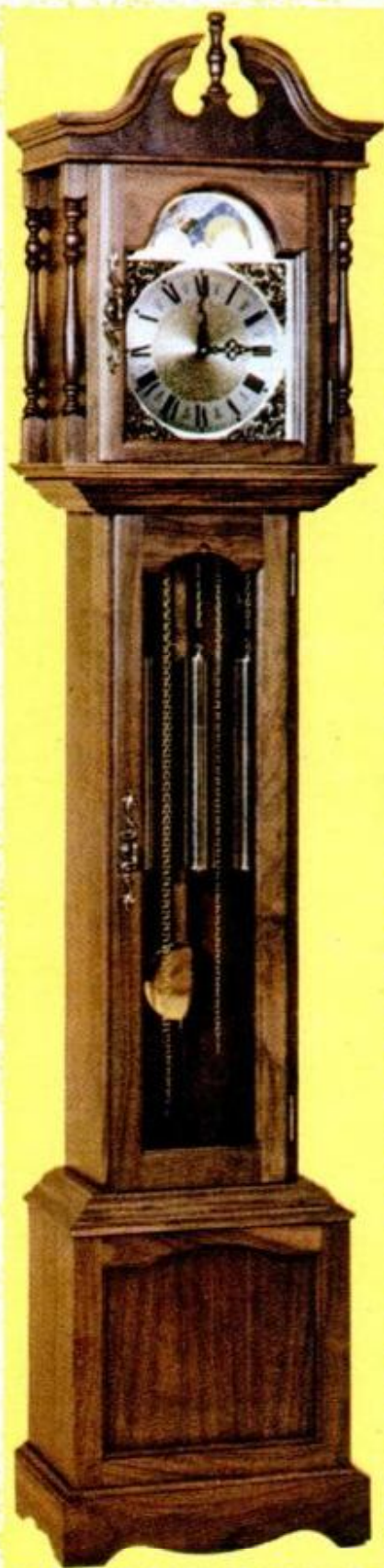
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Model 120
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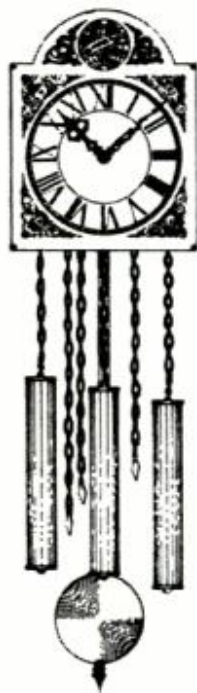
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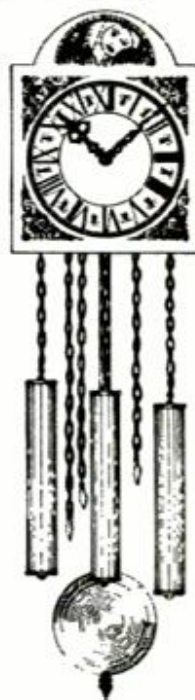
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Emperor's 100-M Grandfather Clock Movement is produced in West Germany by proud clocksmiths who, for over a century have been manufacturing the world's finest movements.

Embossed overlays surround the solid brass dial. The face has a high permanent polish and serpentine hands. You can select from two dial versions. One has the words "Tempus Fugit" (Time Flies) inscribed in black enamel on a shaped aluminum world in the arch above the dial face. The other has the classic Moving Moon Dial with a lunar calendar.

The completely weight driven movement strikes the famous, melodious Westminster chimes on four musically tuned rods; four notes on the quarter-hour, eight on the half-hour, twelve on the three-quarter hour and sixteen on the hour. The hour is struck on four additional tuned rods. The Emperor movement includes weights, solid brass weight shells, brass bob, pendulum and chimes. All plates are solid brass, and pinions are hardened steel. Installation and adjustment of the movement is simple, following the step by step instructions.



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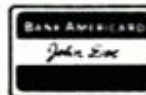
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THE BICYCLE SHOP

(Continued from page 20)

to steer them regardless, to lean *away* from the direction of turn rather than into it as you used to on a two-wheeler, take it very slow and easy at first and go slowly down hills, applying brakes frequently. Brakes on most domestic tricycles are rather inadequate. Ideally, a tricycle should have a rear coaster brake, a rear caliper brake and a front caliper brake, at the very least.

Jam session with 10-speed

My 10-year-old bicycle was recently rebuilt by a dealer. It has a two-speed rear axle made by Sears which is shifted by lightly back pedaling. Shortly after I got the bike back the whole rear axle jammed up after about 100 miles. Three trips to the dealer always resulted in its being jammed up before I rode it five miles out of the shop. Several pieces were replaced but nothing helped and I finally traded it in for a single speed. What was wrong?—Donald Grindle, Palmyra, Wis.

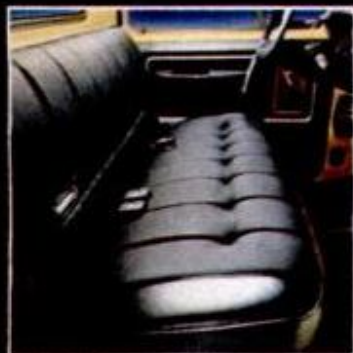
In the first place, Sears does not "make" any bicycle or bicycle parts. I can only assume that you had a Shimano or Bendix rear hub. After 10 years of possible misuse such as possibly not lubricating the hub, which from your description would seem to be the case, I can only assume that the hub was thoroughly worn out and the entire hub should have been replaced rather than rebuilt piece by piece. Internal rear hubs should be oiled with about a teaspoon of No. 20 S.A.E. once every three or four months.

What's the strongest frame?

What's the strongest bicycle frame, Cantiflex or Reynolds 531 double-butted throughout? Also, can you give me the name of the best custom bikemaker in England?—Karel Job, Montreal, Que.

Cantiflex is made by Reynolds and it is basically the same steel, but it is canted toward the ends. I prefer the Reynolds 531 double-butted. They're both strong and it's a matter of choice. There's no such thing as the "best" custom bikemaker in England.

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Most of them are very good and the top ones are simply again a matter of personal preference. You might write Bob Jackson, 148 Harehills Lane, Leeds, LS8 5BD, England.

this column. Look for bicycles with good aluminum alloy components, such as Campagnolo, Crane (Shimano), and frames made out of Reynolds 531 single or double-butted tubing. Of course, this is a very rough guide.

The ultimate bicycle

In your book, The Complete Book of Bicycling, you said you "have finally found the only bicycle I can live with—the best one money can buy (but not the most expensive)." What bike is that?—Mike Hites, Phoenix, Ariz.

This enigmatic sentence has resulted in a lot of letters from readers and perhaps I should have said which bike it was. Actually, what I really meant to say was that the best bicycle you can buy is not necessarily the one that costs the most money. At the moment I made the statement, the best bike I felt available was the Louison Bobet Pro for around \$190. This bike isn't made anymore and if it were available it would cost about \$450 to \$500. I'm not going to make specific suggestions for bikes because it would take up too much room in

Better stopping in wet weather

My five-speed bicycle is used in wet weather quite frequently. I'd like to improve its wet-weather stopping performance by adapting a rear disc brake. Unfortunately, the Schwinn Stingray disc brake will not fit my 36-spoke wheel. Is there a way?—John Repp, Dearborn, Mich.

The disc brakes I have seen don't work any better than conventional caliper brakes. I would suggest installing better caliper brakes, such as Mafac "Racer" center-pull, which give me excellent stopping performance in wet weather. However, the size of Mafac brakes should fit your wheel. A 26-inch wheel, for example, would take a different size brake than a 27-inch wheel and a 27-inch tubular rim takes a different size than a 27-inch clincher. ★★★

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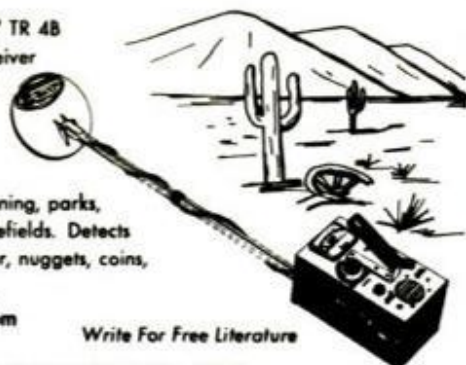
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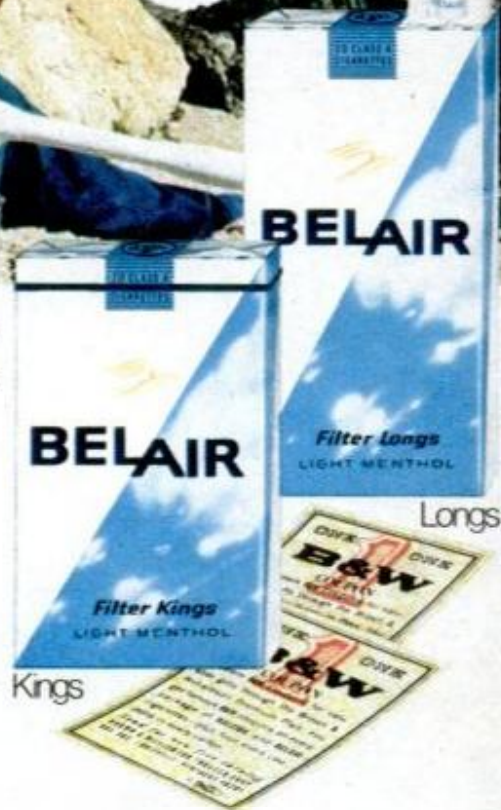
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CAR CLINIC

BY MORT SCHULTZ

Warm-weather icing

My 1968 Plymouth Valiant slant-Six engine has been giving me an acceleration problem that no mechanic has been able to solve despite tune-ups, automatic choke readjustments and new fuel filters. The trouble is at its worst when the weather is cold, but also occurs when the temperature is in the 50° to 60°F. range. When the engine is cold, everything works great until the fast idle drops off. Then, when I am forced to stop for traffic or traffic signals, the engine stalls as I start to accelerate. Once the engine warms up, the problem disappears. Can you tell me why?—E.A. Hinrichs, Madison, Wis.

What you describe are classic symptoms of carburetor icing. Although the temperature outside of the carburetor may be 50° or 60°F., the temperature on the inside where atomization takes place is far colder. This causes ice to form in the carburetor, blocking the flow of fuel to the engine as you accelerate. The ice melts as engine heat attacks it—that's why the condition disappears when the engine gets warm. The solution for your engine may be to pour in a can of fuel-line deicer when you fill the gas tank in winter, autumn and spring while atmospheric temperature is in the critical range.

In a sweat

The bottom part of the trunk lid of my 1966 Thunderbird always has much condensation on it. This causes a constant moisture condition in the trunk that ruins rugs, keeps luggage damp and produces a musty odor. I have been to every Ford dealer for 100 miles around, but no one has been able to help me.—A. M. Petro, East Gary, Ind.

The amount of moisture gathering in your trunk, the way you describe it, indicates there is a water leak. Check the wheel-well drain holes first to make sure they aren't plugged. Inspect the drain holes at the rear edge of the deck lid—they, too,

may be plugged. After this, make a thorough check for a water leak by removing the floor mat and side trim from the trunk. Using a hose, spray water on the trunk lid and back window for several minutes. If the water leak is not uncovered, examine the floor pan for any small holes that would allow the rear wheels to throw water up through the floor pan. Seal all holes with automotive body sealing compound.

Puzzled over pitman

I have a 1973 Vega that developed a drumming noise, so I took it to the dealer who told me the pitman rod was bent and that I must have damaged it. I knew I hadn't, so I took the car to another dealer who said the pitman rod was not damaged, but was too near the oil pan. The drumming noise, however, was being caused by the exhaust pipe. Now I'm worried about the danger of having the pitman rod so close to the oil pan. What should I do?—Miss E. Frazer, Burlingame, Calif.

Nothing. Your problem has been resolved by straightening out the exhaust pipe situation. The relay rod of the pitman arm does come close to the oil pan, but as long as the rod has not been damaged, the clearance is sufficient.

Should the rod be bent, as it might in an accident, then it could rub a hole in the oil pan. In case of damage, the rod should be replaced.

All about brake fluid

Rust has developed in the braking systems of my 1967 Oldsmobile and 1968 Ford. On the Olds master cylinder cover it says to use SAE 70R3 brake fluid. Ford recommends SAE 1703. I can't find either kind, but was told by an auto-parts dealer that I can use any type of brake fluid—that

(Please turn to page 32)

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they're all the same. Is rust caused by using brake fluids other than those specified?

—Glyn Fontenot, New Orleans

All brake fluids are *not* alike. Some have a silicone base and others have a glycol base. They don't mix. Pouring one into a brake system possessing the other would lower the fluid's boiling point and lead to vaporization, resulting in brake-system failure. You can get the brake fluid specified for your car from an Olds or Ford dealer. A dealer will also be able to tell you of any change in the SAE number occurring since 1967 and 1968.

Conditions that can cause moisture and subsequent rust in a brake system include the presence of contaminated fluid. Fluid stored in a partially filled or open container before use acquires moisture that is transferred to the braking system where it can cause rust. Fresh fluid from a previously unopened container is the only fluid that should be added. Discard unused fluid.

Another cause of rust, especially in a humid area such as yours, is operating a car for a time with a partially filled master cylinder. Moisture may form on the cylinder walls and mix with fluid. Keep the cylinder filled at all times.

To get rid of rust, open all bleed screws and pump out old fluid. Close screws and fill the master cylinder with clean, fresh fluid. Open screws and pump fluid out again. Keep doing this until fluid comes out clean.

No easy solution

My 1969 Chevelle Malibu (41,000 miles) has the 307-cu.-in. engine. It won't accelerate up an incline. Pressing the gas pedal produces a terrific engine knock, but no power. Once the car is moving on a level surface and has reached a speed of 35 mph, knocking ceases and power appears normal. The engine has been tuned exactly to specification, the carburetor has been gone over with a fine-tooth comb and the transmission has been checked and double checked. What now?—Ted Mila, Chicago

Here are several other possible reasons for your trouble, Ted:

Improper distributor timing caused by a worn distributor gear, stuck or sticking vacuum advance, or stuck or sticking centrifugal advance.

A lean fuel condition caused by an intake manifold gasket or carburetor gasket leak, or a leak in a vacuum hose. The vacuum hose may be leaking from a crack or because it's loose at the nipple.

Improper valve timing caused by worn camshaft or cam gears or a stretched timing chain.

A complete engine check, including total advance, vacuum and compression, should be done to give you an idea of where the trouble lies.

SERVICE TIPS

□ **1974 Cadillac owners:** A transmission shift lever of some early-production 1974 Cadillacs that shakes on relatively smooth roads may be doing so because the lever is too loose at the column shift bowl. Looseness results if the plastic insert is missing or broken, or if excessive counterbore depth exists in the lever. The shake can be stopped by having the dealer install a new insert or by adding a washer shim under the insert lip to fit the counterbore.

As a last resort, replace the transmission shift lever with a new one.

□ **1974 Ford and Mercurys:** A squeaking noise from the right side of the underbody of 1974 Fords and Mercurys may be caused by the right-fender apron rubbing against the frame. Have your dealer consult article No. 460 of service bulletin 57 (11-23-73), which instructs him to bend the apron away from the frame just enough to prevent contact.

□ **1971-73 Chrysler Corp. cars:** If your 1971, 1972 or 1973 Chrysler Corp. car or truck has a 318-cu.-in. engine and Carter carburetor, and it has been hard-starting *when warm*, you may be in line to receive a new bowl vent housing package (part No. 3780070) that will help.

□ **Chevrolet** reminds 1963-1974 Corvette owners that the rear-wheel, inner-spindle bearings should be checked for end play and lubricated every 24,000 miles following the initial lubrication after the first 12,000 miles. End play should be from .001 inch to .008 inch. Safety is involved here, so don't put this off. ★★★

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APPLIANCE CLINIC

BY PAUL MANN

Holed up

I recently punctured the lining of the freezer compartment of my Frigidaire. I've been told that a repair is impossible, and I should junk the unit. Yes?—Frederick W. Waknitz, Seattle

Not if you can find the right serviceman. A repair can be made by evacuating the system, sealing the puncture with a compound such as aluminum solder or epoxy, and recharging the system. Done right, the fix should be effective. Several repair men I've asked have estimated the job will cost between \$75 and \$100.

On cords and Dormeyer appliances

I have been searching for a coiled electric appliance cord for an electric coffeemaker. Can you tell me where this type of cord, which used to be available, can be obtained?—Gerald D. Stone, Harrington Park, N.J.

Write Factory Service, Inc., 457 Babylon Turnpike, Freeport, N.Y. 11520. The company distributes Belden electric cords and has a stock of coiled cords.

Factory Service will also interest owners of Dormeyer appliances who have been scrounging for parts. It is one of the few companies that stock parts for appliances made by Dormeyer, which is out of business. You can also order schematics if you need guidance in making repairs.

Sounding off

Our Maytag automatic clothes washer, model A300, works well, but makes a terrible noise when the brakes apply to stop the spin cycle. It is a very loud, piercing screech that sounds as if metal is contacting metal. A serviceman took five minutes to fix the problem, but the noise returned in a month. I applied belt dressing to the drive belts, but that hasn't helped. What's the secret?—Gene Richardson, Pennsauken, N.J.

No secret, Gene. In fact, this is a common problem that Maytag servicemen face. As you implied, the screech is caused by application of the brake to halt spinning. It occurs when the brake needs lubricant. The solution, then, is to lubricate the brake housing; but the screech will soon return, as you know, if the job is not done properly. Lay the machine on its side, take off the lower pulley and pour two teaspoons of gear lubricant, SAE 80, into the housing. Reinstall the pulley and work it up and down a dozen times to distribute the lubricant inside the brake housing. If the job is done right, you shouldn't hear that screech again for almost two years.

Playing a bad angle

Our GE waste disposer, which is 15 years old, clatters unless the swivel-type knives are placed at an angle before starting. Should the pivot or knives be replaced?—Marvin Davis, Tuscaloosa, Ala.

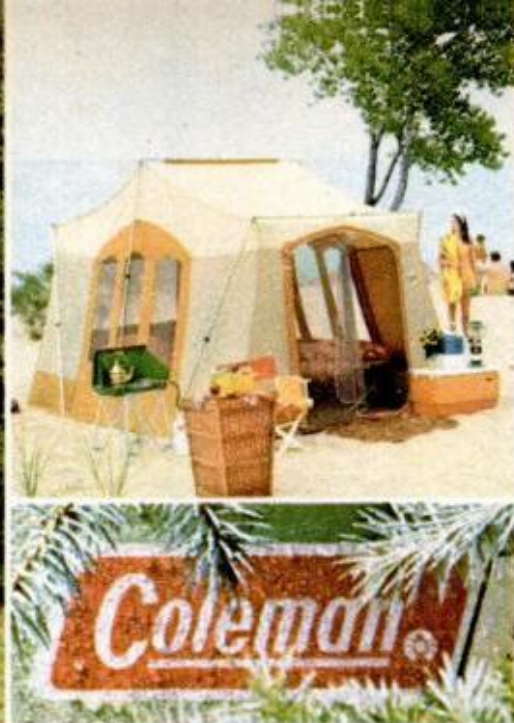
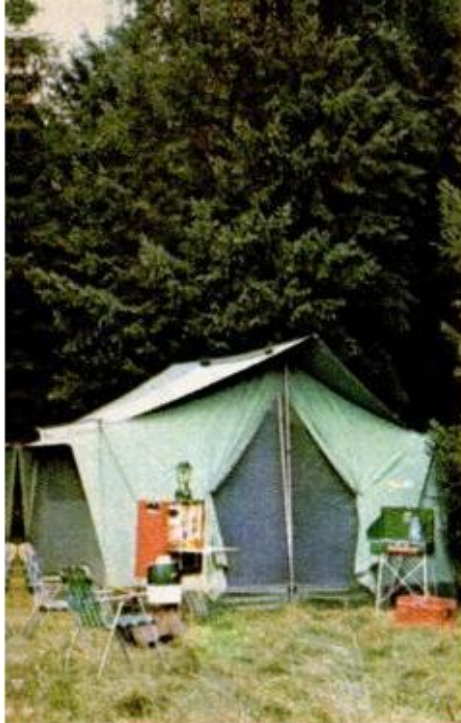
I think the whole unit should be replaced. I also think you should stop sticking your fingers into the appliance to angle the impellers—before you have an accident.

You can't replace the impellers without replacing the complete lower flange, which consists of rotor, stator and flywheel. There are two obstacles standing in the way of this replacement. First, the lower flange for a machine this old has probably been discontinued. Second, if you are able to get it, it will cost you \$80 or \$90. You can buy a new disposer for that.

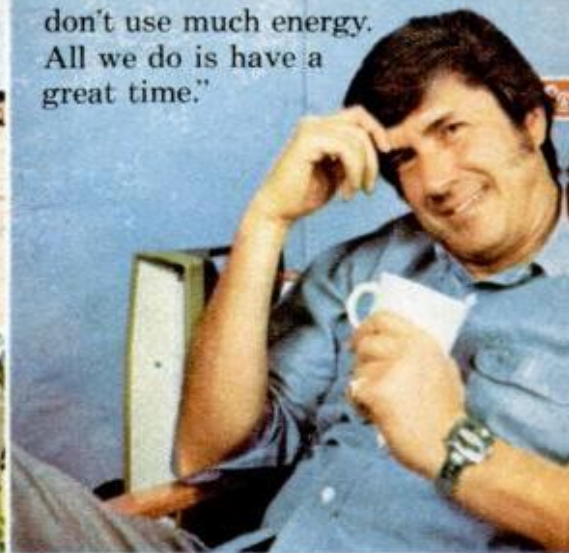
Found: one lube point

A screeching noise from a 12-year-old Hamilton gas-operated clothes dryer is my problem. It starts as soon as the machine is turned on, but lessens in intensity as the cycle progresses. But it is getting worse.

(Please turn to page 41)



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APPLIANCE CLINIC

(Continued from page 39)

The noise seems to come from the impeller and motor, but the impeller was replaced a few months ago. What now?—Stan Dockings, Akron, Ohio

Sounds as though the impeller-motor bearing is starting to freeze up. If you don't get oil on it soon, you will have to replace the bearing or get a new assembly. There is no procedure outlined in service data for lubricating the bearing. In fact, there is not what you would call a lubrication point provided. But here is what to do:

Disconnect the plug, remove the rear panel, unbolt the impeller-motor assembly and slide the assembly out of the housing. Right between the impeller and motor, on top of the shaft, you'll see a small hole that doesn't actually look like a lubrication point—but that's what it can be used for. Apply plenty of SAE 20 motor oil (for 1/4-hp and larger motors), flooding the hole. Connect the electricity, turn on the motor and let it run. The noise should diminish as the oil circulates, then disappear altogether. *Watch one thing:* If you can't move the machine to reach the back panel without disconnecting the gas pipe, you will want to call in your local gas company. It may provide this type of service free of charge.

Reader's tip

I would like to be of service to those readers who have a problem with a Kenmore gas dryer that isn't heating up. Before calling a Sears serviceman and maybe having the igniter coil replaced, they should make sure that the coil is firmly plugged into its outlet. We had the problem not too long ago. The igniter coil had just jiggled loose. My husband simply plugged it back in and secured it with a piece of wire. That easy repair saved us the price of a service call and who knows what else.—Mrs. Alvis Johnson, Dallas

Bravo! And thanks for the help, Mrs. Johnson. I'll take all of this kind of help that I can get. ★★

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.

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A word from Phyllis Diller: I use NAVAL JELLY® rust dissolver on everything we have that gets rusty.

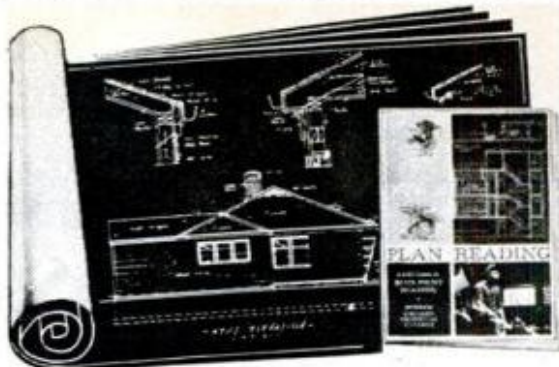
You just brush it on. Then wash it off. Rust is gone. Fang is getting a little rusty. I wonder if it would work on him.



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IMPORTS AND MOTORSPORTS



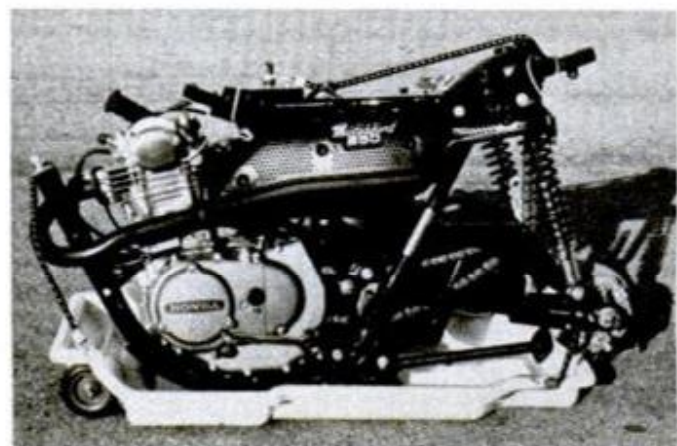
Balanced transportation system

In some places a motorcycle is a vehicle for all seasons. But it's during the spring that most riders come out of hibernation—that's why there's a motorcycle section in this issue, starting on page 77. Two bikes that are not listed among the models for '74 are the Yamaha and Suzuki rotary engine machines (Suzuki's is shown above). They're still experimental.

If you've never mastered the art of riding, Yamaha is conducting its Learn to Ride program again this year. It's a good opportunity to get the basics—free, like the youngster above is doing. For cities and dates, check with your Yamaha dealer. And for booklearning, look back to *My First Year on a Motorcycle*, (page 100, April '70 PM). The story is sure to convince anyone thinking of commuting on a motorcycle to go right ahead! I think a lot of commuters have a bike in their future, and apparently Kawasaki thinks so too. They're building an assembly plant in Lincoln, Neb., just to meet the U.S. demand for two-wheelers.

the subject. The machines pictured here start out as production models but are modified to be disassembled into seven components. Reassembly requires no tools and the electrical system goes together with quickie connectors. The outfit doing the modification job on conventional Hondas, Suzukis or Yamahas (250-cc or less) is Suitcase Cycle, Inc., 3013 Airport Ave., Santa Monica, Calif. 90405. It takes your

(Please turn to page 46)



Suitcase Cycle

If you could disassemble your motorcycle and package it in a suitcase, you could take it almost anywhere—even on an airplane. That idea appealed to TWA Captain Barry Schiff who we have to thank for researching

Announcing the new Datsun 710. The driving man's economy car.

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Graceful new lines, whitewall tires and wheelcovers make it handsome.

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And, of course, the gasoline mileage is the kind you'd expect from Datsun. In fact, our reputation is built on economy!

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IMPORTS AND MOTORSPORTS

(Continued from page 44)



basic motorcycle and for \$250 sets it up (or tears it down!) for suitcase use. It also has a kit that do-it-yourselfers can use to modify their own bikes.

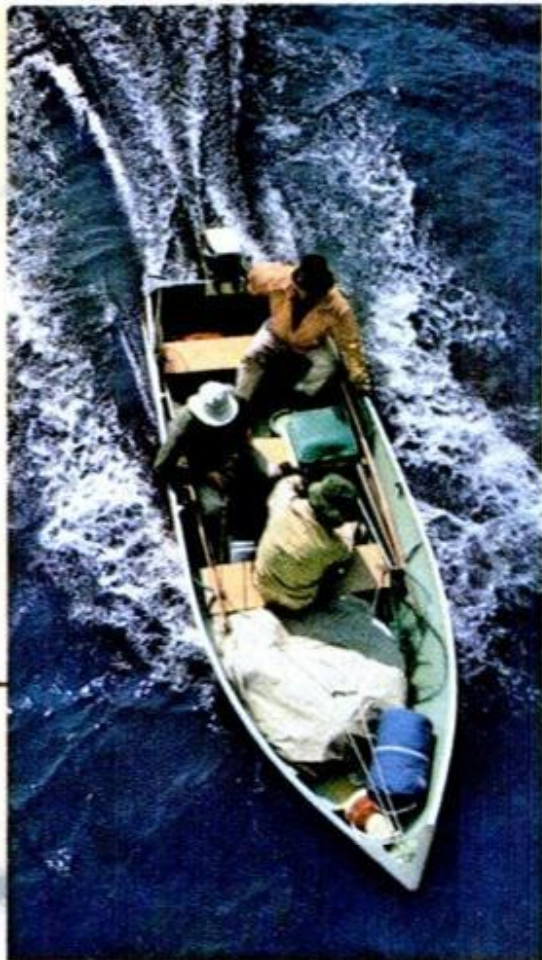
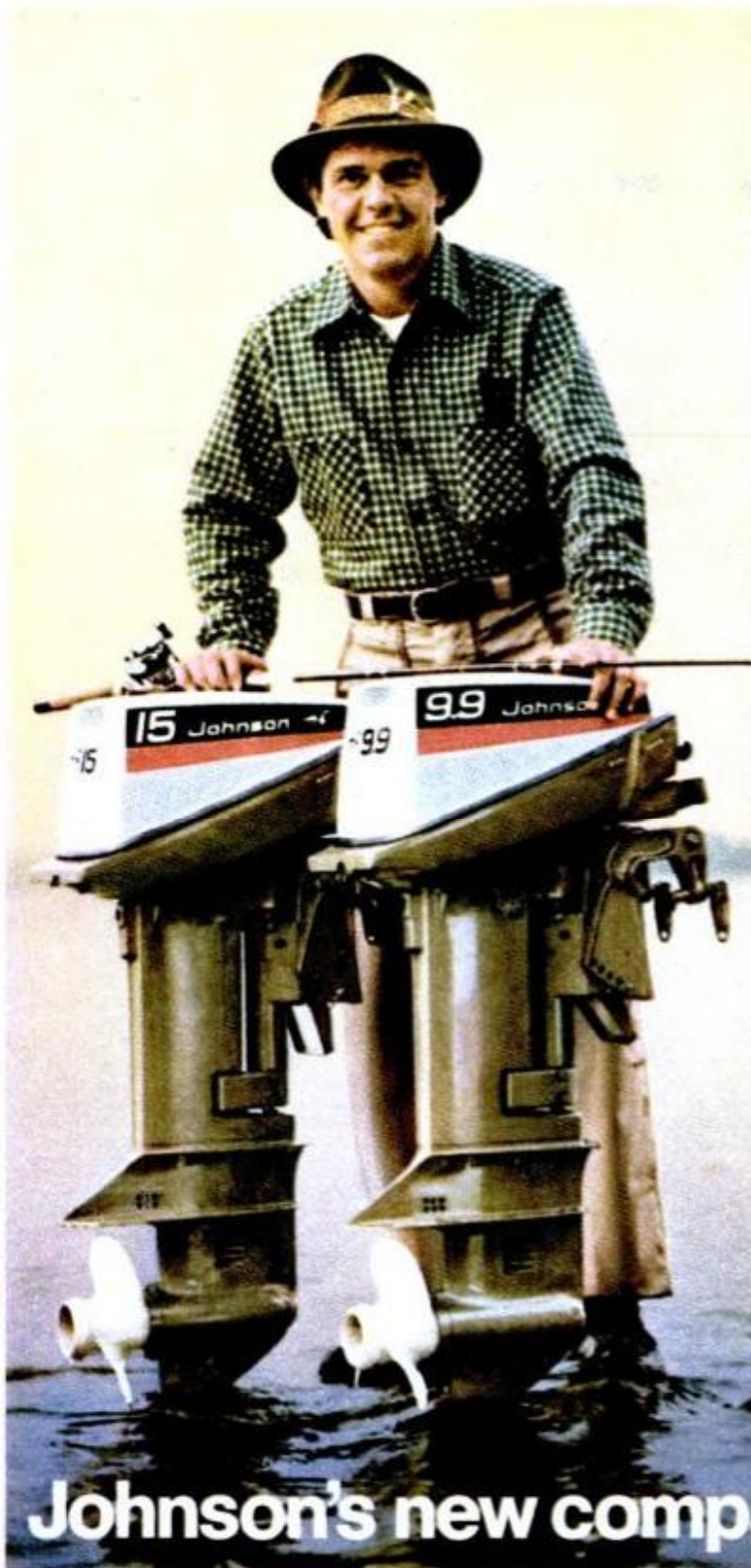
Hop-up pickup

The world's first Wankel-powered pickup is now available in the United States. It's another first from Mazda. The truck uses the same 110-hp rotary engine that powers the recently introduced RX-4 series. The pickup has a six-inch wider stance than the piston engine model it replaces. And the fenders don't have the flared wheelwells just to look stylishly aggressive: The room is needed for the 7.35x14 tires on 5.5-inch rims. They make the other skinny-tired mini-pickups look timid indeed.

There's a choice of transmissions: four-



speed or three-speed automatic. Rear axle is 4.625 to 1 and power-assisted front discs are standard, as are large radiator and oil cooler. The instrumentation is complete, including tach. Steering wheel is thick-rimmed sports type and the usual, slab bench seat is standard. We'd like to see optional buckets on this one! ★★★



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I'd like to give this to my fellow men... while I am still able to help!

I was young once, as you may be—today I am older. Not too old to enjoy the fruits of my work, but older in the sense of being wiser. And once I was poor, desperately poor. Today almost any man can stretch his income to make ends meet. Today, there are few who hunger for bread and shelter. But in my youth I knew the pinch of poverty; the emptiness of hunger; the cold stare of the creditor who would not take excuses for money. Today, all that is past. And behind my city house, my

summer home, my Cadillacs, my winter-long vacations and my sense of independence—behind all the wealth of cash and deep inner satisfaction that I enjoy—there is one simple secret. It is this secret that I would like to impart to you. If you are satisfied with a humdrum life of service to another master, turn this page now—read no more. If you are interested in a fuller life, free from bosses, free from worries, free from fears, read further. This message may be meant for you.

By Victor B. Mason

I am printing my message in a magazine. It may come to the attention of thousands of eyes. But of all those thousands, only a few will have the vision to understand. Many may read; but of a thousand only you may have the intuition, the sensitivity, to understand that what I am writing may be intended for you—may be the tide that shapes your destiny, which, taken at the crest, carries you to levels of independence beyond the dreams of avarice.

Don't misunderstand me. There is no mysticism in this. I am not speaking of occult things, of innumerable laws of nature that will sweep you to success without effort on your part. That sort of talk is *rubbish!* And anyone who tries to tell you that you can *think* your way to riches without effort is a false friend. I am too much of a realist for that. And I hope you are.

I hope you are the kind of man—if you have read this far—who knows that anything worthwhile has to be *earned!* I hope you have learned that there is no reward without effort. If you have learned this, then you may be ready to take the next step in the development of your karma—you may be ready to learn and use the secret I have to impart.

I Have All The Money I Need

In my own life I have gone beyond the need of money. I have it. I have gone beyond the need of gain. I have two businesses that pay me an income well above any amount I have need for. And, in addition, I have the satisfaction—the deep satisfaction—of knowing that I have put more than three hundred other men in businesses of their own. Since I have no need for money, the greatest satisfaction I get from life is sharing my secret of personal independence with others—seeing them achieve the same heights of happiness that have come into my own life.

Please don't misunderstand this statement. I am not a philanthropist. I believe that charity is something that no proud man will accept. I have never seen a man who was worth his salt who would accept something for nothing. I have never met a highly successful man whom the world respected who did not sacrifice something to

gain his position. And, unless you are willing to make at least half the effort, I'm not interested in giving you a "leg up" to the achievement of your goal. Frankly, I'm going to charge you something for the secret I give you. Not a lot—but enough to make me believe that you are a little above the fellows who merely "wish" for success and are not willing to sacrifice something to get it.

A Fascinating and Peculiar Business

I have a business that is peculiar—one of my businesses. The unusual thing about it is that it is needed in every little community throughout this country. But it is a business that will never be invaded by the "big fellows." It has to be handled on a local basis. No giant octopus can ever gobble up the whole thing. No big combine is ever going to destroy it. It is essentially a "one man" business that can be operated without outside help. It is a business that is good summer and winter. It is a business that is growing each year. And, it is a business that can be started on an investment so small that it is within the reach of anyone who has a television set. But it has nothing to do with television.

This business has another peculiarity. It can be started at home in spare time. No risk to present job. No risk to present income. And no need to let anyone else know you are "on your own." It can be run as a spare time business for extra money. Or, as it grows to the point where it is paying more than your present salary, it can be expanded into a full time business—overnight. It can give you a sense of personal independence that will free you forever from the fear of lay-off, loss of job, depressions, or economic reverses.

Are You Mechanically Inclined?

While the operation of this business is partly automatic, it won't run itself. If you are to use it as a stepping stone to independence, you must be able to work with your hands, use such tools as hammer and screw driver, and enjoy getting into a pair of blue jeans and rolling up your sleeves. But two hours a day of manual work will keep your "factory" running 24 hours turning out a product that has a steady and

ready sale in every community. A half dollar spent for raw materials can bring you six dollars in cash—six times a day.

In this message I'm not going to try to tell you the entire story. There is not enough space on this page. And, I am not going to ask you to spend a penny now to learn the secret. I'll send you all the information, free. If you are interested in becoming independent, in becoming your own boss, in knowing the sweet fruits of success as I know them, send me your name. That's all. Just your name. I won't ask you for a penny. I'll send you all the information about one of the most fascinating businesses you can imagine. With these facts, you will make your own investigation. You will check up on conditions in your neighborhood. You will weigh and analyze the whole proposition. Then, and then only, if you decide to take the next step, I'll allow you to invest \$15.00. And even then, if you decide that your fifteen dollars has been badly invested I'll return it to you. Don't hesitate to send your name. I have no salesmen. I will merely write you a long letter and send you complete facts about the business I have found to be so successful. After that, you make the decisions.

Does Happiness Hang on Your Decision?

Don't put this off. It may be a coincidence that you are reading these words right now. Or, it may be a matter that is more deeply connected with your destiny than either of us can say. There is only one thing certain: If you have read this far you are interested in the kind of independence I enjoy. And if that is true, then you must take the next step. No coupon on this advertisement. If you don't think enough of your future happiness and prosperity to write your name on a postcard and mail it to me, forget the whole thing. But if you think there is a destiny that shapes men's lives, send your name now. What I send you may convince you of the truth of this proverb. And what I send you will not cost a penny, now or at any other time.

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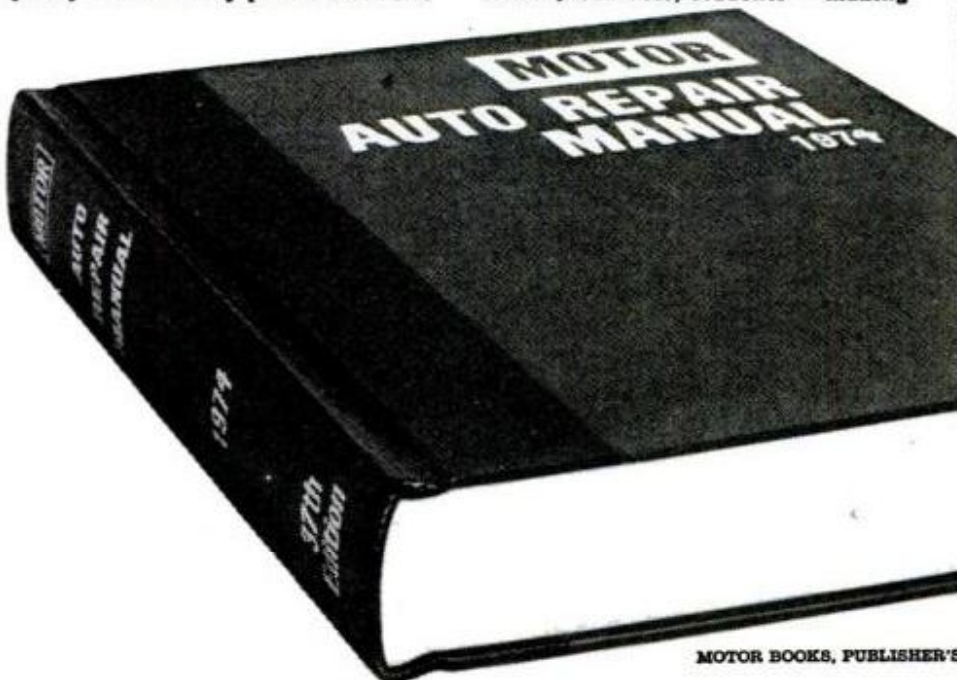
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DETROIT LISTENING POST

Chrysler subcompact coming—finally

Chrysler has finally frozen its drawing-board version of a small car. But changes can be made—and probably will be made—in the clay version. It will take a minimum of 30 months to put the car in production, so the earliest it can hit the streets will be fall of 1976.

Capacity problem for small cars

How many additional small cars can Detroit produce? Industry critics—most of whom have never seen the inside of an auto plant—who are pushing Detroit to increase output of small cars have the notion that changing from standard-size cars to under-size is just a matter of taking the big stuff off the line and substituting smaller cars.

It's not that simple. For one reason, much of the production equipment isn't interchangeable—tools used to turn out big cars can't be used to produce small cars. For another, the thousands of supplier firms that feed car factories must have lead time to produce parts. Under ideal conditions, carmakers have about a 20-percent leeway factor that can be shifted to different-size cars as the market shifts. So if you're talking a 10-million-car year, that means Detroit could run off an extra 2-million junior sizers. With luck.

Big cars can't take small engines

If Detroit can't suddenly shrink the big cars, how about pulling out the big V8s and substituting smaller Sixes and Fours? That would hike gas mileage, one of the virtues of small, lightweight cars. Auto engineers wish it were that easy. But you can't put a Six or Four in a car designed for a V8 without affecting the whole package—safety, handling, performance, economy, the total balance of the vehicle—any more than you can heat an eight-room house with an electric blanket. It just won't work.

Small wheels for Detroit big wheels

GM and Ford executives who qualify to drive the biggest, most expensive cars those companies produce as a fringe benefit of their jobs have been asked to drive small cars at least one day a week or one week out of the month. Not to save gas, but to get a feel of what can be done to improve the small cars. In a related move, GM has ordered a temporary hold on its big-car programs. GM isn't going out of the big-car business, but it's taking a second look at preproduction projects with an eye to retrenching on big cars to make more production capacity available for smaller cars.

Fuel injection for Cadillac

Cadillac has a few test cars around Detroit equipped with electronic fuel injection, indicating Cadillac has drawn the assignment of doing the experimental work on EFI before the item is put on production cars. This isn't GM's first experience with fuel injection. Chevrolet had the item back in the '50s, but not an electronic system. That venture turned sour and GM isn't risking a second failure. If all goes well, Cadillac will offer EFI as an option on a few '75 cars. The price won't be cheap.

New mid-sizers from Chrysler

Chrysler has frequently been accused of being out of the action in styling its cars. GM and Ford set the pace and Chrysler tags along. Always a year or two behind the front-runners. That kind of talk really riles Chrysler, and the company is out to make the critics eat crow. Company people say the first crow comestibles—with more to come later—will be served up this fall when Chrysler brings out its new mid-size machines. "They will be the most innovative, imaginative cars this company has produced since we outfitted Cadillac in the '50s," to

(Please turn to page 52)

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over his head.
He's not going to follow all
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DETROIT LISTENING POST

(Continued from page 50)

quote an agent in product planning, "and GM and Ford will be over here trying to pirate our guys as soon as they get a look at them."

Hands off pollution controls

If you're thinking of disconnecting the pollution control equipment on your car in the hope of improving gas mileage, think again. About two-thirds of the states have laws against tampering with the equipment. But even if you live in a state that lets you pull the plug, you can get in trouble.

The auto companies have been looking at cars "doctored" by professional mechanics who supposedly knew what they were doing and in something like 7 or 8 cases out of 10, the job has been bungled. To a point where cars that were getting 11 to 12 mpg drop to 5 or 6. Even the guys who designed the devices don't like to tinker with them unless they have a million dollar's worth of equipment to measure what they're doing. GM says on most small cars—not only GM makes but others, too—the equipment actually improves mileage.

Two GM projects stalled

Chevrolet is apparently having trouble getting cranked up on the Cosworth Vega. This is the limited-edition car—the original forecast called for 4000 units this year with special engine, special driveline, extra everything. The Cos has been pushed back a couple of times for reasons having nothing to do with the car itself. Recently, Chev has been grinding out so many regular Vegas it has been hard pressed to squeeze the special edition car on the line. The production run this year could be more like 2500 units, instead of the scheduled 4000.

GM may also have to make a cutback on its plan to install air bags in 50,000 '74 model cars. Offered as an option by Buick, Cadillac and Olds to test public interest in the item, the bags just aren't selling. The company originally announced it would put bags on 100,000 '74 cars. That target was subsequently cut to 50,000. At the rate the bags sold the first four months they were available, GM will do well if it sells 20,000 this calendar year. ★★★

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Pick a park

Of the 298 areas in the National Park System, 200 are within 100 miles of a metropolitan center, according to National Park Service director Ronald Walker. That should mean one tankful of gas can bring a lot of visitors to parks they have traveled by or overlooked before. Already half a dozen parks have installed shuttle buses, originally to cut down traffic congestion and overcrowding but useful now to take sightseers

around while saving them gas. Transportation by bicycle, horse, canoe or foot is also available in many parks.

Park signs and booklets are being improved with the addition of the metric system. Distances are now given in meters and kilometers as well as feet and miles—the elevation of the South Rim of the Grand Canyon, for example, will be recorded as 2099 meters and 7000 feet. Foreign visitors should find the markings helpful.

Facilities for the handicapped are already under development in some state parks, and a Missouri Braille Trail, 75 miles south of St. Louis in the Elephant Rocks State Park has been named part of the National Recreation Trail system. The one-mile trail looping through granite outcroppings is wide enough for a wheelchair and has interpretive signs along the path in both English and braille. Knotted ropes edge the trail to assist blind visitors.

Getting the lead out

Because ducks insist on eating spent lead pellets they find in the mud of marshes where there has been shotgun shooting, a number are contracting lead poisoning. As a result, lead shot shells may eventually be banned for duck and goose hunting. So far, the subject seems to be mired in inconclu-

(Please turn to page 56D)

New for off-the-road, the Dodge Ramcharger 1974 has full-time four-wheel drive as standard on a 106-inch wheelbase. Model SE (left) has optional steel roof, trim; standard model (right) wears canvas top, curtains.



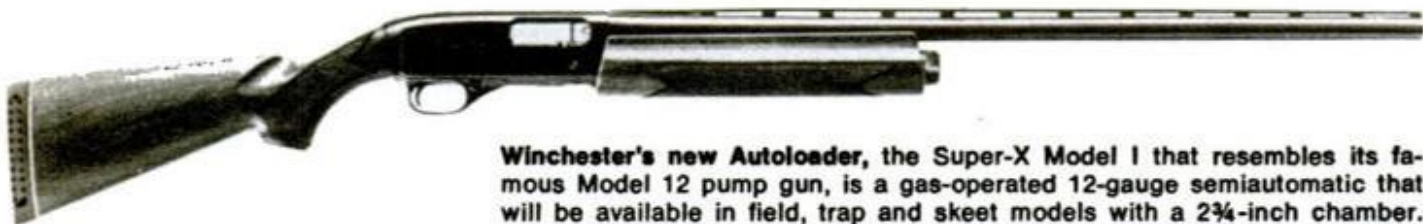
ALL OUTDOORS

(Continued from page 56C)

sive statistics, with claims pro and con for the substitute steel shot fanning the controversy. During a recent test session at the excellent Remington Farms research center in Maryland, however, we were very impressed with the new steel shot loads. From our tests, we predict shooters should have

(Please turn to page 56F)

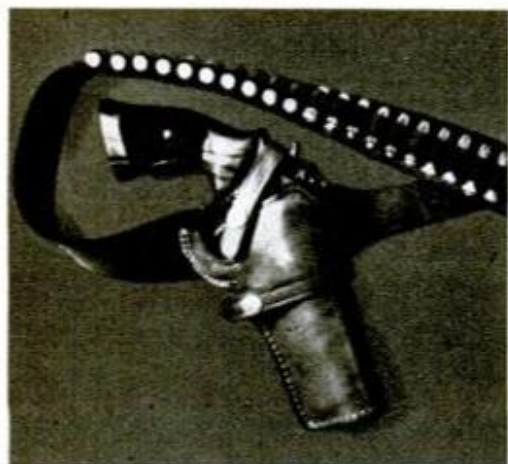
Survival knife, new from Smith & Wesson, has hollow handle for matches, hooks; fits shaft as spear. It's \$50.



Winchester's new Autoloader, the Super-X Model I that resembles its famous Model 12 pump gun, is a gas-operated 12-gauge semiautomatic that will be available in field, trap and skeet models with a 2¾-inch chamber. Stocks of American walnut will be offered in regular and Monte Carlo design, with 26 or 30-inch barrels having various chokes and ventilated rib option. With a five-round capacity, the shotgun has a self-compensating gas system handling both high and low base loads. Field model shown: \$275.



Long-range shooting is the aim of two new models. An unusual 10-ga. auto (top left) is offered by Ithaca for goose, crow, turkey and wolf hunting. Chambered for 3½-inch magnum shells, Ithaca Mag 10 is claimed, nevertheless, to have very modest recoil from the gas-operated action. Barrel is 32 inches; price is \$420. **New Mossberg 800 VT** (lower left) is .222 Varmint/Target heavy-barrel model with mounts for scoping: \$136. Lighter field 800F, \$136.



Leather accessory line of belts, holsters, slings, gear are new by Smith & Wesson.



Selective Speed-Trigger is unique feature of new Beretta BL-2S over/under 12-ga. shotgun from Garcia. For quick doubles, trigger is hinged in the middle and the shooter simply pulls the top crescent, then drops to bottom for second shot. No selector is needed. \$350.





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All with an impressive array of features that make them equally worthy of both street and trail.

The better to pave your way to many an exciting moment.

Kawasaki
lets the good times roll.

ALL OUTDOORS

(Continued from page 56D)

little trouble adapting if it becomes necessary.

RV backseat drivers

By Jan. 1 pickup truck campers in California must have a "signaling device" between truck cab and camper. It can be a buzzer, bell, dashboard light, speaking tube or intercom but not a horn or unmounted hand-held walkie-talkie. Truck-campers with an open window or passage between camper and cab so passengers can communicate won't need the signal. ★★★



New for skin divers is the Aquadive Time-Depth watch. Oil-filled Bourdon tube depth gauge records dives to 200 feet; stainless-steel case has been tested to 330. Features are electronic high-frequency Dynotron Swiss movement, ratchet bezel to mark start of dive, Scotchlite dial. Faces in blue, orange, black with neoprene strap. \$250.



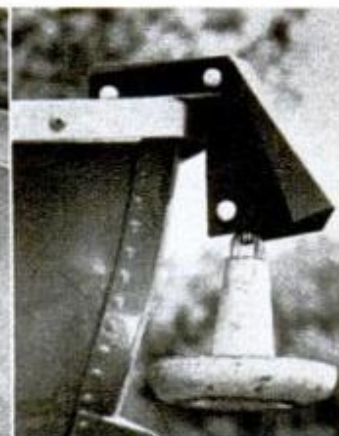
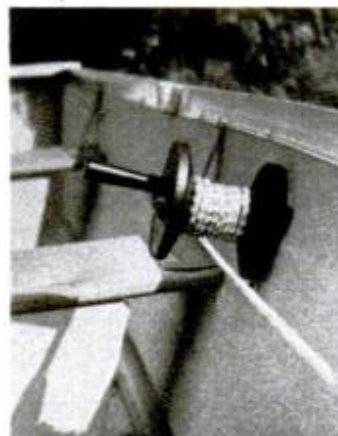
Spare gas for boatman can now be carried in assortment of new portable auxiliary tanks for outboards. Mayfair Safe 'T' Tank (left); \$17 6-gal. Tempo (right).



Direct-drive Ambassador 4000D baitcasting reel from Garcia, a first for line, gives powerful retrieve.



Traction in an emergency is offered by pair of Grabbers from Traction Aid Devices, Buffalo, N.Y., at \$19.95.



Small-boat anchor winch, called Anchoreze by N. A. Taylor Co., has safety latch, 100-foot capacity. \$27.

Color-coded fishing line in 6 to 30-lb. test monofilament from Gladding South Bend lets fisherman lower bait to same depth he sees target fish on his depth finder. Color of line changes every 30 feet in 100 or 200-yard lengths. A color-code decal is packed with spool.



Bottom bumper that resembles a feeding bait minnow is the Cousin II sinking lure by James Heddon's Sons.



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Because we don't want you to look at the Malibu Classic as less car

than the big cars. Just less size.

Outside Malibu Classic.

Malibu Classic gives you more than styling. It gives you character.

Notice the particulars: the grille, the stand-up hood ornament, the coupe's distinctive coach window. But notice, much more importantly, the poise of this car. In the lines. The stance. The attitude projected.

Here is a car, we think you'll agree, as classic outside as it is inside.

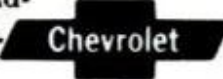
Our third dimension.

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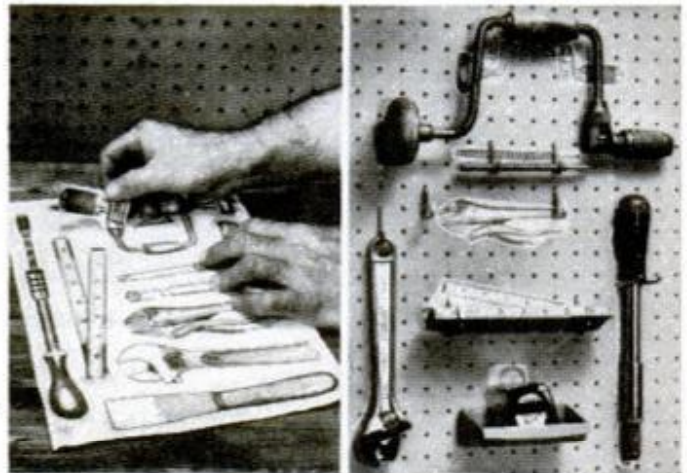
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PLEASE, JACK, I'M DYING TO SEE OUR OLD FRIENDS AGAIN.

JACK! WHERE HAVE YOU BEEN KEEPING YOURSELF?

OH, YOU KNOW—AROUND. LOOKS LIKE YOU'VE DONE ALL RIGHT, THOUGH.



OH, I GUESS SO — O.K.

LATER



ONLY SINCE I GOT SMART AND GOT INTO ELECTRONICS! IT'S A BIG "GROWTH" FIELD TODAY.

SOUNDS GREAT. BUT HOW'D YOU BREAK IN?



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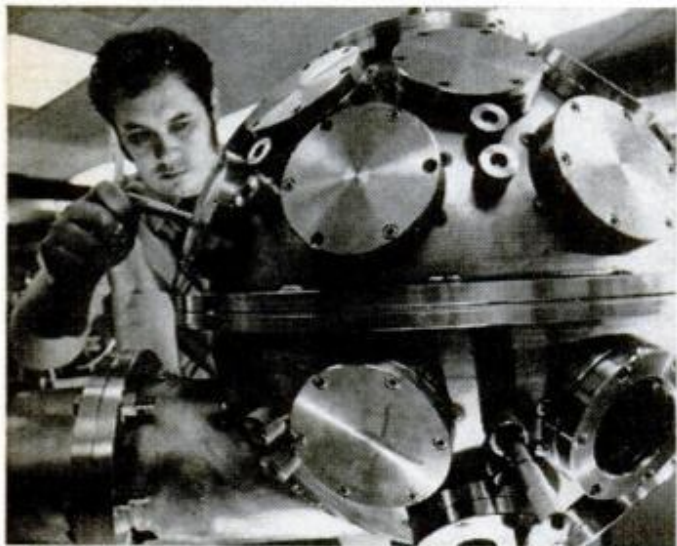
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SCIENCE WORLDWIDE



Even hotter than the sun

Temperatures greater than those at the center of the sun are created inside vacuum chambers at the Columbus, Ohio, labs of the Battelle Memorial Institute. A target of fusionable material, weighing about one 10-millionth of a gram, is placed in a vacuum chamber and zapped with a laser beam, creating a fusion reaction in which atomic nuclei combine and energy is released. The triggering laser beam, according to Battelle scientists, is the world's most powerful, producing from 900 to 1500 joules in pulses ranging from 1.5 to 5 nanoseconds. (A joule is a unit of energy equivalent to one watt applied for one second; a nanosecond is one billionth of a second.)

More speed on synthetic turf

Synthetic turf increases football-player speed and thus may set the stage for higher collision forces and more severe injuries, according to University of Pittsburgh researchers. College players were timed in 40-yard dashes on both synthetic turf and natural grass, and consistently achieved faster times on the man-made surface. Slower players, who were also the heaviest, found the synthetic surface to be the most advantageous.

New research on solar power

A mobile lab to test advanced systems for the solar heating and cooling of buildings is under preparation by Honeywell, Inc., Minneapolis. The lab will consist of two trailers—one to carry solar heating and cooling equipment plus a complete weather station, the other to function as an office and as the building to be heated and cooled by sun power. During an extensive test period, the laboratory will be operated in northern and southern climes. The project is partially supported by the National Science Foundation.

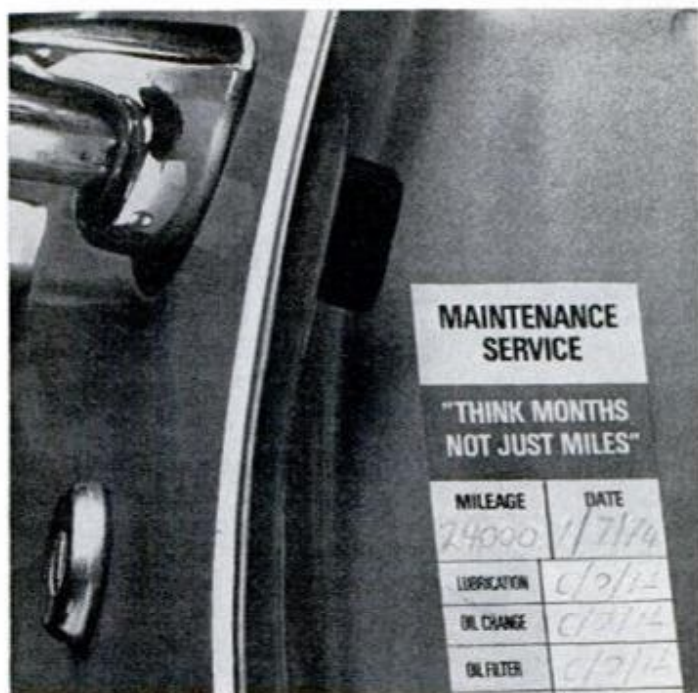


Can a car get 100 miles per gallon?

A car of the future may be able to achieve 100 mpg if research by Andrew A. Frank (shown) proves successful. A professor of engineering at the University of Wisconsin, Frank has equipped a bicycle with a flywheel that permits him to pedal with a steady, constant effort regardless of whether he is going up or down hill. Energy from the flywheel—a 22-pound metal disc mounted on a maple cone—is transferred by the cone to the rear wheel. The cone is in continuous contact with the tire, spinning at about 2500 rpm at "cruising speed." A lever changes the angle of the cone, making it walk across

(Please turn to page 64)

There's an overlooked item about oil and oil filters in the owner's manual that has become more important now that driving habits have changed:



Think months, not just miles

It's funny. You get into habits and forget why they started.

You're probably in the habit, for example, of changing your oil and oil filter on a mileage basis. That makes sense when you're driving a lot and your engine gets a chance to heat up.

But consider this—when you're driving less, there's condensation going on forming water in your crankcase...when that water mixes with certain contaminants, it can form acid. And on today's short trips, your engine may not heat up enough to "burn off" the water.

Check your owner's manual. You'll see that it says to change oil and filter on a mileage basis or a monthly basis

whichever comes up first.

Even though you're driving less, you need the protection of clean oil and a new AC Oil Filter. Up to 12 feet of dirt-trapping filter material works to help keep your engine clean—as important today as when you were driving much more.

Your owner's manual makes it quite clear: Think months, not just miles.

Getting out of that old habit could help save on repair costs later on.

Speaking of habits—it's a good habit to specify an AC Oil Filter at change time.



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SCIENCE WORLDWIDE

(Continued from page 62)

the tire. When the large end of the cone nears the tire, the flywheel slows down while speeding up the bicycle. Prof. Frank's object is to find efficient mechanical ways of coupling a flywheel with an auto's transmission system.



Horses get heart disease, too

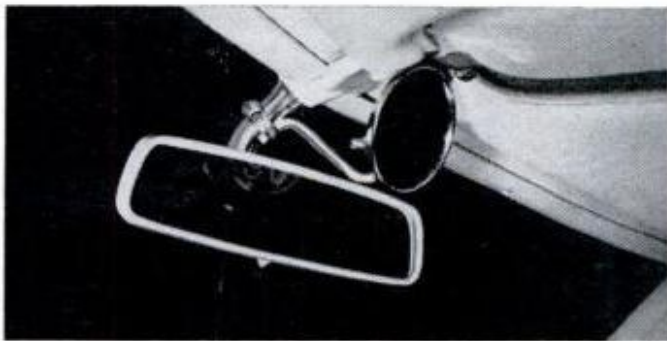
A huge treadmill is helping a group of Swedish veterinarians to study heart ailments in race horses. Sensors on a horse being tested are connected to an electrocardiograph machine and other recording instruments. Then the treadmill is started, causing the tethered animal to walk. The treadmill is then speeded up, making the horse run. Two main readings are taken—the heartbeat rate and blood pressure. The researchers believe that their treadmill setup is the first of its kind in the world.

New telescope will specialize

Plans for the construction of a millimeter-wave radio telescope that will be the nation's most sensitive in its frequency range have been announced by the National Science Foundation and the University of Massachusetts. Astronomers use short waves—so short that they're measured in millimeters—to study faint signals emitted from molecules in interstellar space. Traces of 27 different molecules have been found in recent years, discoveries adding to our knowledge of how stars are formed. The scope will be located near Amherst, Mass. ★★★

HINTS

FROM READERS



Mirror monitors back seat

An extra rear-view mirror helps you keep an eye on children in back without losing your view of the road behind. Fasten a bicycle mirror (you may have to bend its bracket) to existing mirror with hose clamp. —*Kenneth M. Kaufman, Elbridge, N.Y.*



Handy bin for bath vanity

A tilt-out bin means that space in front of a bathroom washbowl won't be wasted. Cabinet's false drawer-front can often be used, making matching no problem. Small size of bin allows use of $\frac{1}{4}$ or $\frac{3}{8}$ -in. plywood for greatest interior space. Make a cardboard mock-up first to get dimensions; a small cutout in back of bin may be necessary to clear bowl. Removable-pin hinges ease installation. Small spring holds bin closed; a heavier one would make it self-closing. —*Gayne R. Ek, Cedar Rapids, Iowa*

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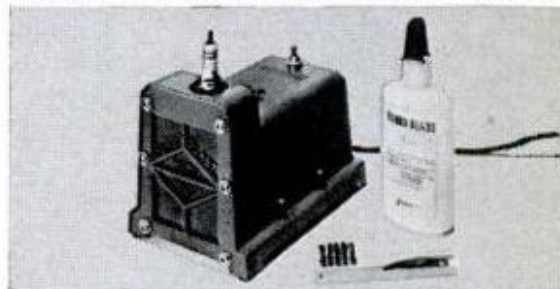
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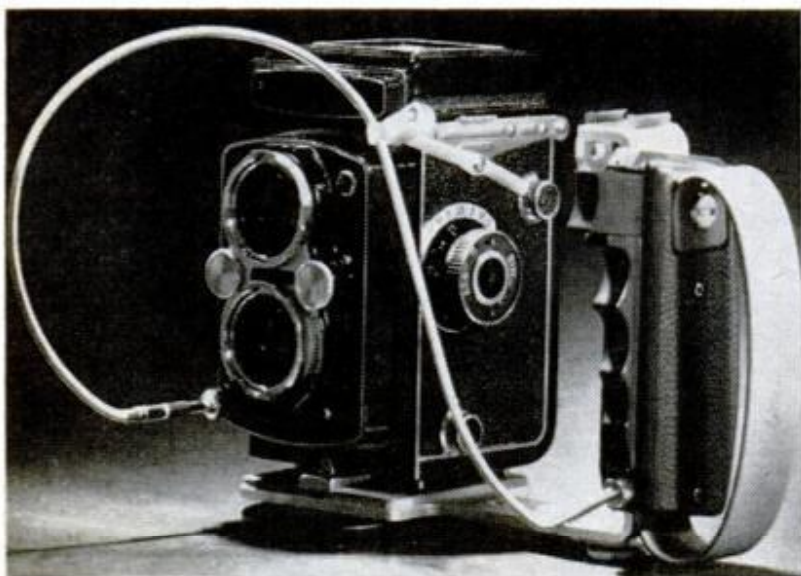
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PHOTO HINTS

FROM READERS



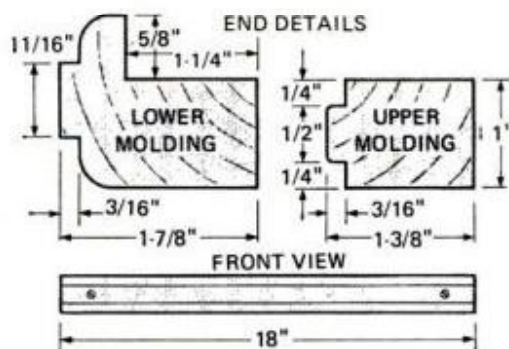
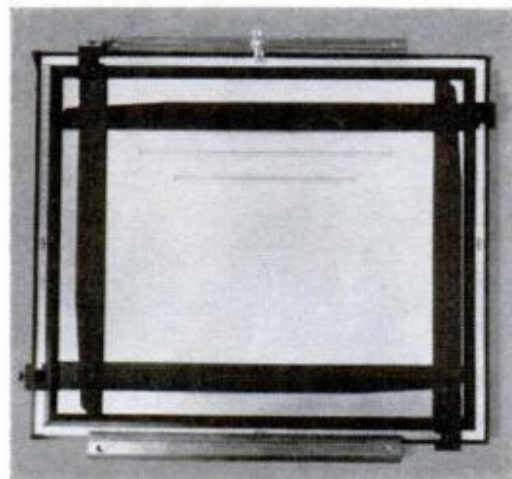
How to restrain a swinging cable release

Cable releases almost invariably swing in front of your lens just as you shoot, but they may bind if you wrap them around the camera to prevent this. An easy way to keep your cable release where you want it is to restrain it with a plastic cable tie, or with one of the plastic ties often supplied with plastic trash bags. On some cameras, the tie will pass through the camera's neckstrap slot or "D" ring; on most others, it can be pierced to fit over the camera's strap lug or some other projection.

—Mike Dickey, Arlington, Tex.

Cheap enlarger dust cover

Keeping your enlarger dust-free can save you hours of print-spotting. But enlarger dust covers are expensive and not readily available as few dealers stock them. Plastic trash bags can do the same job for just a few cents. Here, a 30-gallon trash bag covers my big Beseler 23C. Smaller bags can store chemical trays and other darkroom items.—Charles Maxwell, Vancouver, Wash.



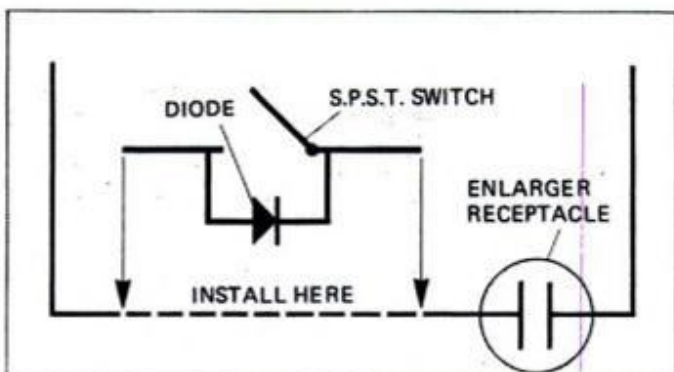
Wall-hang your easel

Two pieces of molding, one turn-button and four mounting screws can solve the problem of storing enlarging easels out of the way when not in use.

The easel actually rests behind the lip on the upper edge of the lower molding; the turn-button on the upper molding (which has no lip) holds it securely. Exact dimensions should be determined for your easel—the ones indicated here are for the 16x20 easel shown. With an easel of this size and weight, the moldings should be attached to your wall's studs; with smaller easels, the moldings can be mounted to a 1/4-inch-plywood back and attached with two screws to a single stud.—C.E. Banister, Pomona, Calif.

Diode dims enlarger

Printing "thin," underexposed negatives requires either stopping down your enlarger lens to $f/22$ (which is not its sharpest aperture), using exposure times too short



to allow dodging and burning-in, or both.

This simple intensity switch can help by allowing you to cut your enlarger's light output in half whenever you need to. It's simply an s.p.s.t. toggle switch placed in parallel with a silicon diode and wired into your timer's enlarger socket. With the switch open, the diode allows only half of each a.c. cycle to power the lamp. Closing the switch restores normal operation. The diode should have a rating of at least 2

amps. at 400 PIV. Polarity is unimportant, since it doesn't matter which half of the a.c. cycle powers the enlarger lamp.

If there's no room in your timer for the switch (finding room for the diode should be no problem), you can mount the switch, diode, and a duplicate receptacle in a mini-box. Remember to connect the box between the timer and the enlarger, not between the timer and the a.c. line.

—Dr. Thomas Singleton, Statesboro, Ga.



Doubled clamp is twice as steady

If your clamp-on photo lamps slip because their clamps are loosening, you can hold them in place by placing another spring clamp over the first one.

—Ken Patterson, Regina, Sask.

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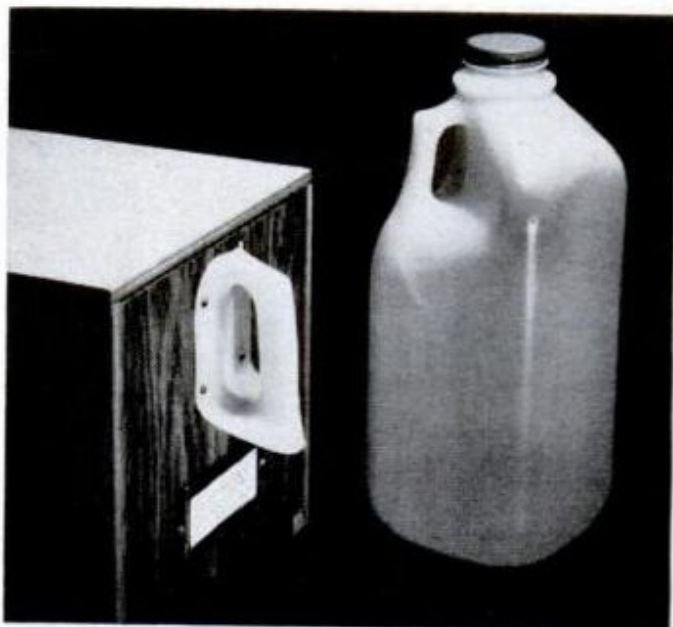
FROM READERS



Paint roller cleanup

A paint roller is easier to clean if excess paint is soaked out first. Only a small amount of water or solvent is needed if the roller is soaked in a quart-size carton. Remove roller from handle for an extended soak.

—Victor Lamoy, Saranac Lake, N.Y.



Drawer pull from jug

A novel but comfortable drawer or door pull can be made from a 2-qt. or larger plastic jug like the one shown, in which juice was sold. The handle is cut out with a sharp knife or scissors, leaving a flat flange on both sides for four wood screws to hold it in place. Edges are smoothed with a knife or abrasive paper.—Burt Web, Skokie, Ill.

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(Please turn to page 64I)



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NEW HOME-IMPROVEMENT PRODUCTS

(Continued from page 64F)



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Vermont Barnboard is kiln-dried white pine distressed and stained to closely simulate weathered barn siding. Available in brown, gray, red, it can be used outside or inside. Random widths from 3 to 14 in. or 12-in. boards and 2-in. battens, 8 ft. long, cost 80 cents per sq. ft., \$1 if fire-retarded. Vermont Barnboard Marketing Co., Box 686, Wilmington, Vt. 05363.



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APRIL 1974 641

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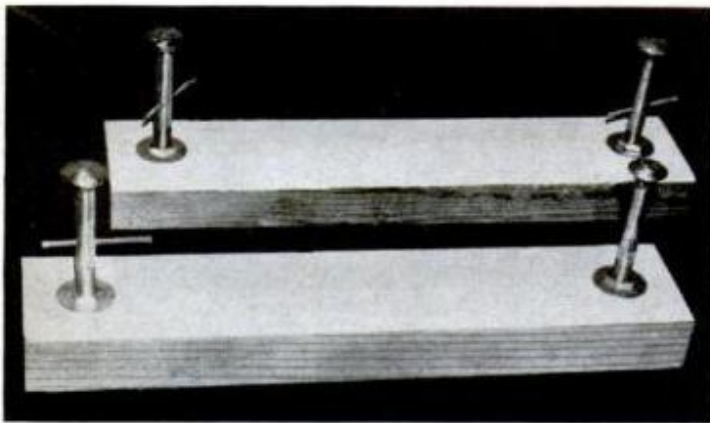
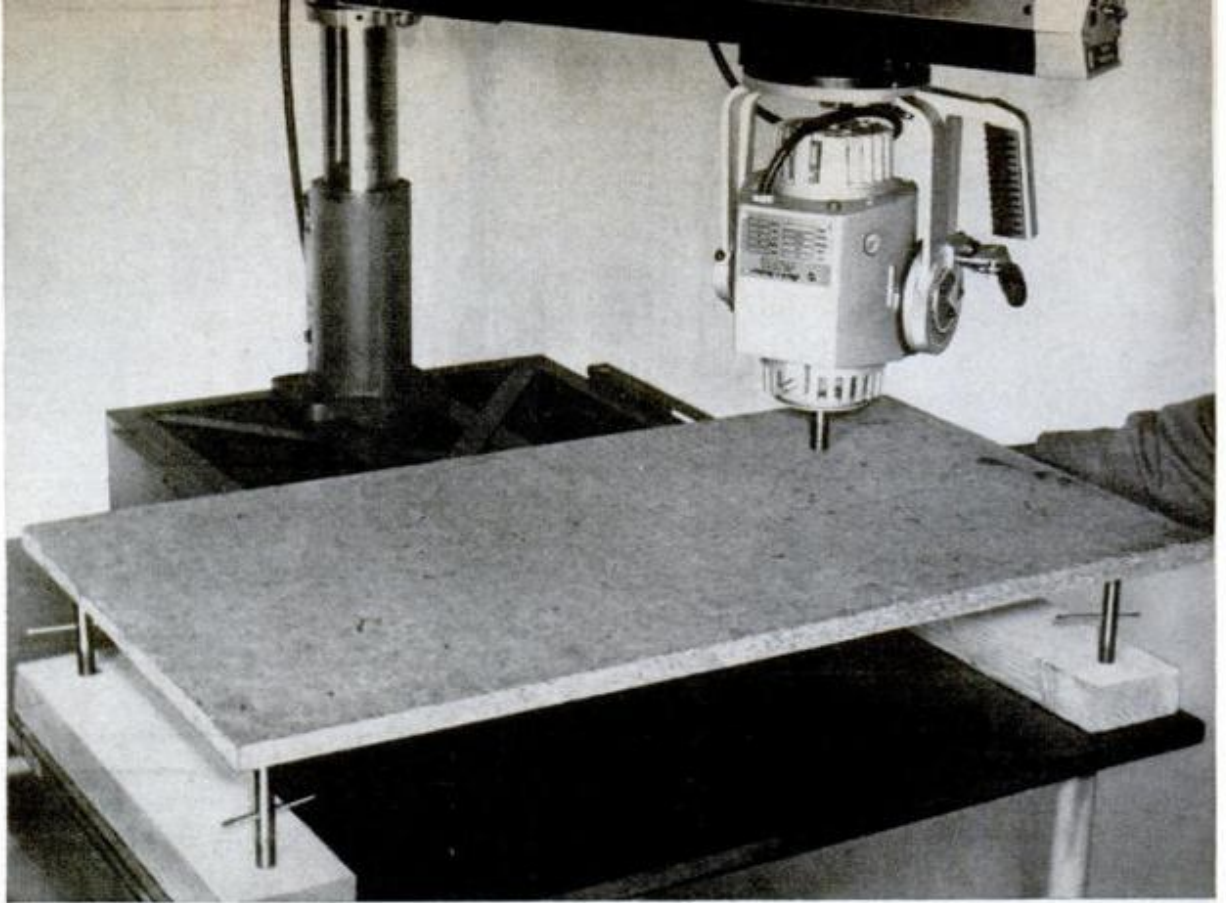
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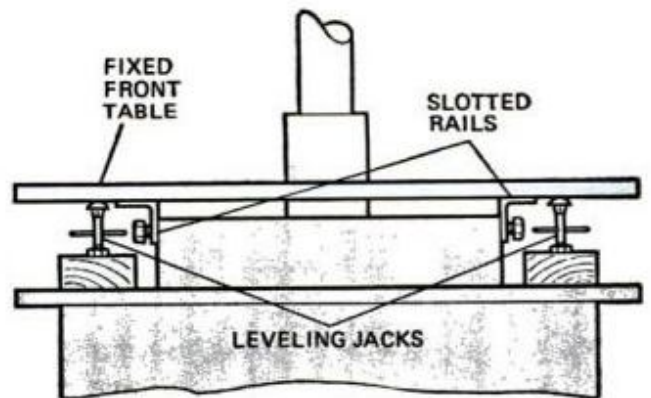
Accessories: electric start/headlights; 36" mower deck; 42" dozer blade; snow thrower; larger muffler; chrome hub caps; and rear tire chains. A solid yard and garden machine.

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Two pieces of 2x4 (18 in. long) have $\frac{1}{2}$ x 5-in. carriage bolts turned into holes at the ends and locked in place with nuts and washers. The cross handles in the bolts are nails—optional but handy.



The importance of a perfectly level table is obvious in the case of a radial-arm saw. If the fixed table runs "down-hill," rabbets and dados will run downhill and vary in thickness from one end to the other. Only when the table surface is level with the saw's overarm will the saw cut rabbets and dados right on the button.

I find the best way to check the table on my DeWalt saw is with these leveling jacks. To use them you loosen the four bolts that hold the slotted rails, set the jacks in place as in the drawing, lock the motor in a vertical position and then move the motor and arm over the entire surface. When the motor shaft lightly touches the surface at all points, the table will be level. A slight turn of the jacks will correct any variance that occurs. ★★★

Jacks quickly level a radial-saw table

by William Waggoner



**Today, a man needs a good reason to walk a mile.
Start walking.**

Warning: The Surgeon General Has Determined
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25 mg. "tar," 1.6 mg. nicotine av. per cigarette, FTC Report SEPT. '73.

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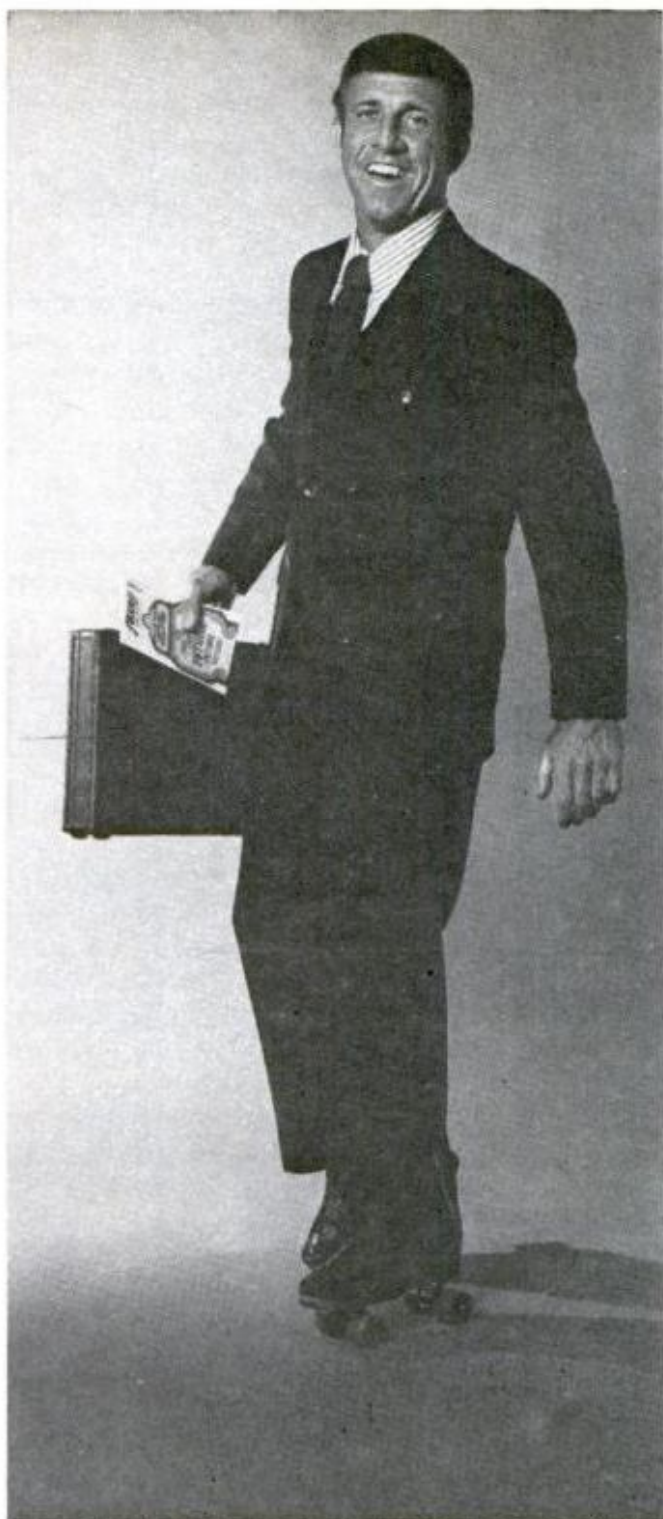
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HOMEOWNERS' CLINIC

BY W. CLYDE LAMMEY

Wallpaper on door panels

I'm planning to wallpaper two rooms and I want to put the same paper on the door panels. The doors are enameled and my question is, if I apply the paper with a flour paste, will it stick?—Mrs. Emily Richards, Nashville, Tenn.

I know of no reason why it shouldn't if the surface is clean. Wash with a mild detergent to make sure you remove any grime and especially finger marks. Then, to make doubly sure, go over the panels lightly with medium steel wool to cut the gloss and give a better "tooth" for the adhesive.

Chipped iron bathtub

Is there some way of repairing permanently chipped enamel on an iron bathtub?—P. Holmetoft, New Orleans

There are several commercial products made for this purpose, some of the consistency of a heavy enamel, others of a somewhat pastier material that can be putty-knifed into the recess formed by the break. Ask for porcelain enamel at your paint store. Before any of these products is used, the break must be thoroughly cleaned with a solvent such as is sold for cleaning typewriters, and it must be dry. Although these air-drying finishes are reasonably effective, none should be expected to equal the durability of the tub's original fired-on finish.

Do vinyl tiles shrink?

A couple of years ago, I had vinyl tile laid in my kitchen. Now the tiles have shrunk and opened at the joints. Some are even loose at the edges. What causes this shrinkage and how do I correct it?—C. O'Hare, Springfield, Mass.

Ordinarily, vinyl tiles do not shrink. I suspect your trouble is caused by inadequate underlayment and a "springy" flooring. If the flooring and underlayment give

when walked upon, the trouble you describe is almost sure to result. The only way you can correct the defect more or less permanently is to take up the tiles and underlayment, re nail the flooring and install adequate underlayment. Tiles are quite easily removed by placing a small plastic bag containing dry ice on each for a minute or so. The extreme cold will make the cement brittle, causing the tiles to pop loose. *Caution:* Wear rubber gloves and never touch the dry ice with bare fingers.

Transplant time

I want to transplant a small crabapple tree, a balled specimen that was planted a year ago. What's the best time, spring or fall?—Jesse Carlson, Moline, Ill.

I would say that early spring is best, as this will provide a full season's growth, with time to establish a root system before the onset of winter. Trim out any interfering growth immediately after transplanting and keep the transplant watered regularly and amply during any dry periods.

Bright spot in a bad spot

I spilled a small quantity of gloss varnish on an asphalt-tile floor. Although I wiped it up as quickly as possible, there's a glossy area remaining. How can I remove it?—Mrs. G. A. Whiteside, St. Paul, Minn.

It's too late, I'm afraid. On some floor tiles, you can use paint remover, but *not on asphalt*. You might as well wax the entire floor, using wax suited to this composition tile. ★★★

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

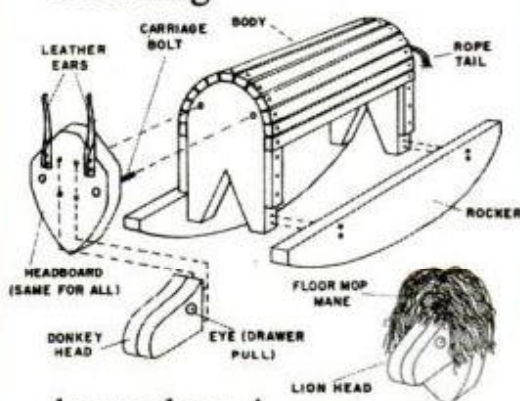
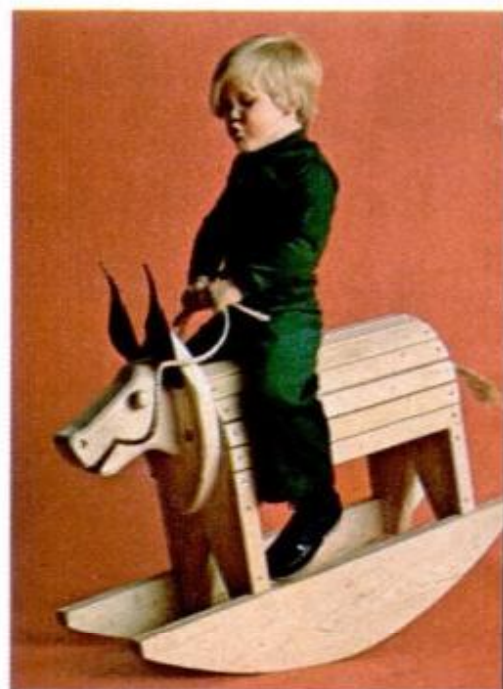
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Extra Milds, 14 mg. "tar," 1.0 mg. nicotine, av. per cigarette, by FTC method; Filter Kings, 16 mg. "tar," 1.2 mg. nicotine; Longs, 18 mg. "tar," 1.3 mg. nicotine, av. per cigarette, FTC Report Sept. '73

Surform[®] tool shaves, planes easier. Free plans prove it.

Now and then a woodworking project can turn you off. Especially if it calls for a lot of planing, filing and smoothing

grater" blade can't clog either; shavings pass right through.

All of this you can prove for yourself. Our free plan set to make these animal rocking toys calls for a good amount of planing, forming and smoothing



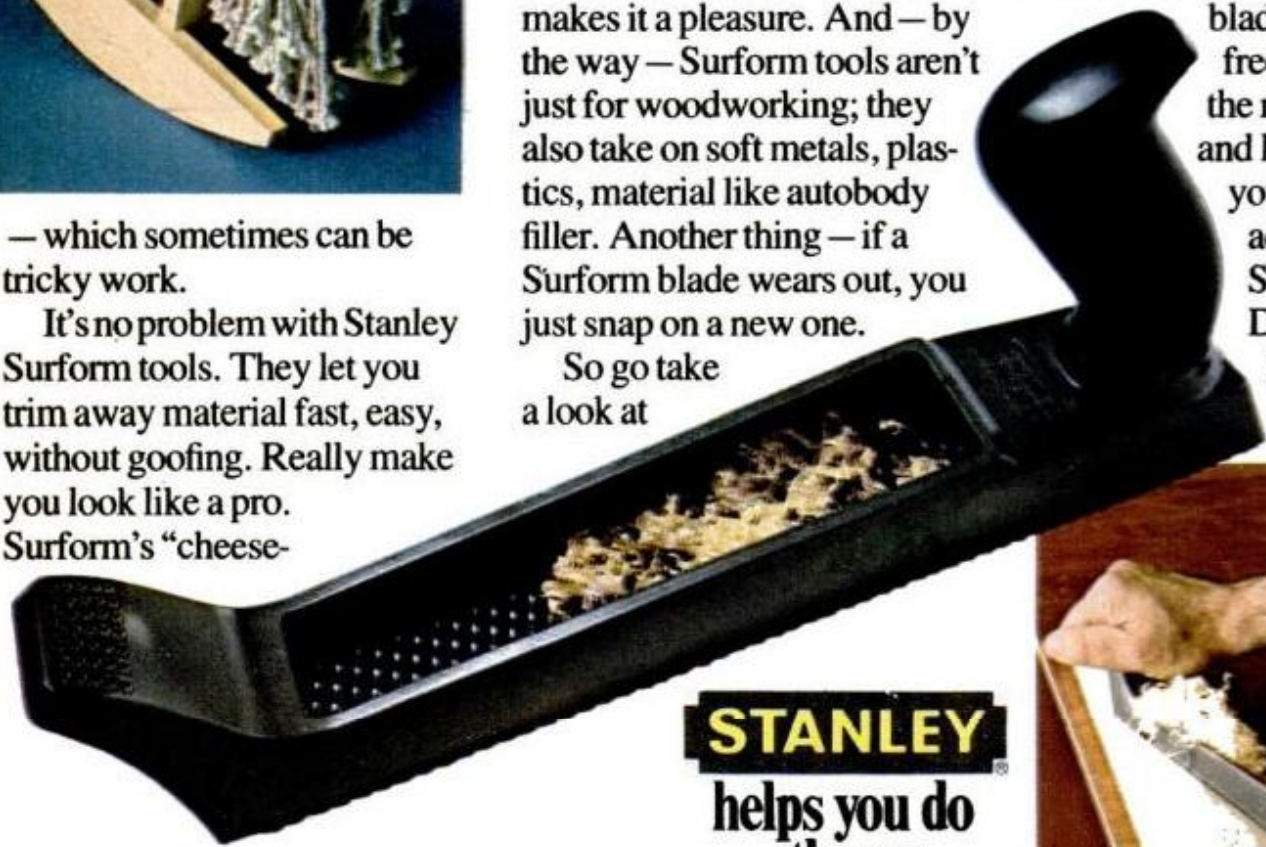
down edges. A Stanley Surform plane or file or even pocket-size model makes it a pleasure. And — by the way — Surform tools aren't just for woodworking; they also take on soft metals, plastics, material like autobody filler. Another thing — if a Surform blade wears out, you just snap on a new one.

So go take a look at

those Stanley Surform tools. Almost any store with a good tool department sells Stanley Surform tools and replacement blades. To get the free plans to make the rocking donkey and lion, just send your name and address to Stanley Tools, Dept. A1, New Britain, Conn. 06050.

— which sometimes can be tricky work.

It's no problem with Stanley Surform tools. They let you trim away material fast, easy, without goofing. Really make you look like a pro. Surform's "cheese-



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Sidecars are back!

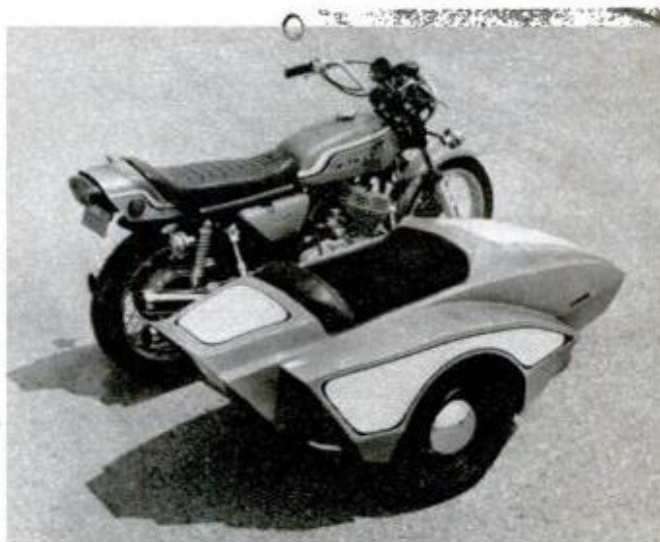
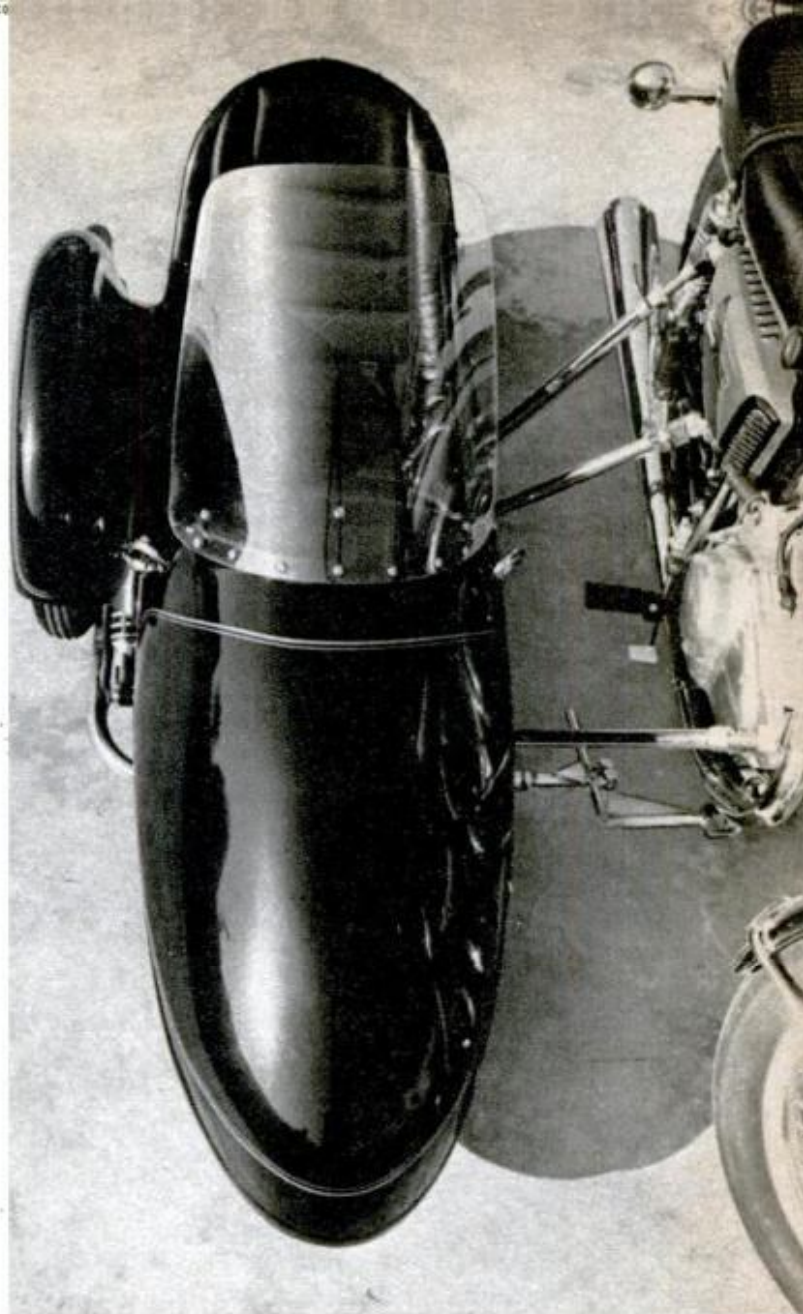
Now they're of fiberglass, lighter and cheaper than they used to be, and they'll still carry people and groceries at a fraction of a car's cost.

by Mike Anson

It's been a while since you've seen one, right? For years motorcycles with sidecars attached to the right side have been a rare sight on the nation's roads and highways. Until recently the functional sidecars were always limited to large, expensive motorcycles and the sidecars themselves were expensive. But not too long ago a "new generation" of sidecars began to appear on the market, designed to complement the popular low-cost, lightweight bikes. Slowly the sales of sidecars have been growing and now the sidecar industry supports several fast-growing firms.

Adding a sidecar to a motorcycle gives the bike an all-new dimension. It changes the motorcycle into a utility vehicle. You can now haul groceries, take the kids to school and when winter comes the bike doesn't have to hibernate in the garage: Bikes with sidecars are stable and steady in rain or snow.

One of the main reasons for the renewed popularity of the sidecar is the low cost. The new sidecars are constructed of fiberglass which is sprayed into a mold. Using this process, a handsome, stylish sidecar body can be mass produced. The fiberglass body is attached by rubber isolation mounts to a rectangular frame of welded steel tubing. Generally, the axle is attached directly to the frame. Suspension for the third wheel



Sidecars made of fiberglass are available from several sources. At top is the Spirit Eagle which has a built-in fender and suspension in a traditional design. The Bingham Mk II has a contemporary wedge shape. Bingham paints it to match your bike.



is usually an extra-cost option. Since a touring sidecar seldom leaves smooth pavement (hopefully!) most experts say a suspension system is not really necessary.

These lightweight sidecars can be attached to motorcycles from 175 cc up and can be fitted quickly. Four adjustable struts connect the sidecar to the bike and after the initial setup, the sidecar can be removed and reinstalled in less than one hour.

Sidecars, statistically, are safer than motorcycles. In England, where sidecar enthusiasm has never waned, insurance rates go down when a sidecar is attached to a motorcycle. The underwriters are apparently convinced that when the family is aboard, a motorcycle rider is more careful. Two other safety factors should be noted here: 1) the motorcycle with a sidecar is more easily seen by motorists, and 2) it looks bigger and motorists have more respect for it. Also a bike/sidecar combination is less likely to be stolen than a solo motorcycle.

The best piece of advice a novice sidecar rider can get is: "Don't ride it like a solo bike!" The relationship between a solo bike and a sidecar is limited to the fact that the

controls are the same. Most experienced sidecar jockeys say they would rather teach a total novice to ride a sidecar. Experienced motorcyclists tend to do the wrong things. Their normal riding habits, which are fine for solo riding, are totally wrong for sidecar riding. Sidecar racer and builder Doug Bingham jokingly calls the sidecar an "expensive kickstand." With this full-time kickstand it is not necessary to put your foot down. In fact, if you do, you may get hurt; caught between the road surface and the sidecar mounting, a foot quickly gets twisted out of shape.

Cornering is a matter of common sense: Brake before the turn and use the power to keep the sidecar stable as you exit the turn. Going left too fast, you can skid just like a car. Right-hand turns are a bit more ticklish: the sidecar wants to come up off the ground. Advice from experts is to go slow. It's like learning to ride all over again.

Adding a sidecar gives the bike rider lots of benefits, but be aware of the side effects. The sidecar will: 1) increase fuel consumption 20 to 30 percent, 2) reduce the top

(Please turn to page 143)



Sidecar rally last October attracted a big turnout of sidecars from the wedge-shaped modern designs to the streamlined traditional. This Second Annual Griffith Park Sidecar Rally in California brought together members of the American Sidecar Assn. for a day. (Out on the road, rider and passenger(s) would wear helmets; canine passenger on the opposite page gets an exemption.) Wedge-shaped Bingham Mk II (top) is attached to modified Honda 750. The traditional steel BMW sidecar (above) hasn't been made for many years. The Spirit Eagle (left) takes the prize for color scheme. For more information about sidecars, write to the American Sidecar Assn., c/o Doug Bingham at Side Strider, 15838 Arminta Unit 25, Van Nuys, Calif.

Half car, half bike, they're . . .



The Unisport becomes a three-wheeler when you plug your motorcycle into the front half.



The Duo Delta, shown below and on the cover, was designed from the ground up by Walter Korff. Machine can be run as a motorcycle or as a three-wheel sports car. Both creations, the Unisport and Duo Delta come from the wild world of wheels that is California, U.S.A.!

Photos: David Gooley and Marc Madow



high-mileage machines!

by Jake Grubb and Wally Wyss

The Duo Delta is a "new-idea motorcycle that seats two like a sports car." That's how its designer, Walter Korff, describes the machine. Legally his Delta is a motorcycle, but it's a motorcycle that can be used as a two-wheeled sports cycle or as a three-wheeled sports car. The cycle has a forecar that can be fitted to the front of the motorcycle with removal of the forks and front-wheel assembly. The cycle remains as the power and traction unit while the forecar handles seating, steering and controls.

The Duo Delta is currently Korff's personal driving machine. It features 750 cc of two-cycle power, full frontal enclosure, bucket seats with headrests, a built-in roll bar, an infinitely variable automatic transmission and Pirelli radials all around. Incorporating fully independent adjustable suspension and a removable sunroof, the Delta boasts a 98-mph top speed and gets an average of about 56 miles per gallon.

A strong racing roll bar is built into the forecar and seating is precisely on the center of gravity so that you sit in the best possible position for good handling. Present surface covering is ABS plastic paneling for what Korff calls "the sculptured look." The underside is of "sled runner" configuration for the practical purpose of parrying obstructions and also for aerodynamics. There is a narrow, chromed bumper at the nose of the forebody that is mounted to the frame on cushioning dampers. It offers frontal protection from minor shunts, while impact from a major collision would be absorbed directly into the backbone frame.

Rack-and-pinion steering, which insures accurate driver control, is installed without the use of a standard steering column. It is a Korff-patented device that incorporates a strong horizontal crossbar which stretches above and over the driver's legs and is junctioned with vertical bars on either side of the body that reach down to each front wheel. This is made possible through a special system of elbows and joints. While

there is a safe, short steering column that connects the steering wheel with a gear that actuates the rack and pinion mechanism, there is no long column with traditional steering box as in a normal automobile.

The Korff system is safer because in the event of a front end collision, the column would not be thrust toward the driver. It also has fewer moving parts and is therefore a more direct method of steering than the standard automotive equivalent.

With removal of the front fork and wheel assembly, the sports cycle can be attached to the forecar in about 10 minutes via the Korff-patented coupler. (Korff has many patents on the machine, foreign and domestic.) The front apex of the cycle frame is attached to a crossbar just behind the seat frame of the forebody. Throttle and rear brake cables simply snap together.

The gas tank, mounted above the engine, is forward of the rear end and on the centerline of the chassis, protected in all directions. Also important is the rear tire which is the farthest extension of the rear end. Given a rear-end shunt, the impact is absorbed through the tire, wheel, and suspension after which it is transferred directly into the strong backbone frame.

The 744-cc Rockwell snowmobile engine puts out 45 hp at 5000 rpm. Torque rating is 52.9 ft.-lb. at a very low 3500 rpm. The engine is not only a real pusher, but is highly durable and conducive to modifications that could provide an additional 40 percent of reliable horsepower.

Inside, the forebody is compact and the upholstery spartan but comfortable. In the middle of the dash, a small oval instrument panel houses the tachometer, speedometer, ammeter, windshield wiper, lights and reverse gear switches. Outside of that, the driver has only the steering wheel, brake and throttle pedals to keep track of.

Brakes, incidentally, are all disc-type. The rear wheel incorporates an unusual method of using the sprocket as its disc with special H&H calipers that clear the chain.

While the H&H disc/caliper assemblies on

(Please turn to page 143)

Gas? Who needs it? Ride a Charger!

by Jake Grubb

The Charger never needs gas. You "fuel" it at an ordinary wall outlet. The electric cycle—named the Charger by its manufacturer, the Auranthetic Corp.—is capable of a maximum 30 mph, with a range of 50 miles on a full charge. Power source is a 1-hp permanent magnet motor and two 90-amp./hr. batteries.

The electric cycle is essentially an urban bike for short-distance commuter use. It's also perfect for plant superintendents, messengers, mail service, maintenance departments, resort areas, mobile home parks and airports. It can be licensed and operated for use on local streets, and is perfect for city dwellers looking for a cheap, clean, quiet form of individual transportation.

In layout, the Charger is basically a motor scooter as opposed to a full-size motorcycle. The frame is a single loop cradle made with 1½-inch mild steel tubing. Rear swinging arm suspension is mounted with motorcycle-type spring shocks. The front forks employ oil-dampened suspension. Brakes front and rear are six-inch-diameter, single leading-shoe drum-type with cast aluminum hubs—substantial for a vehicle of 30-mph capacity. High-rise handlebars compensate for the seat height of 25 inches, about eight inches lower than that of an average motorcycle. Brake levers are mounted at each handgrip. An egg-shaped energy tank houses a compact 110-volt, 15-amp. automatic battery charger. Mounted into the right side of the tank is a two-pronged plug socket with a safety ground. On top of the tank is a voltmeter gauge to show the rider the state of his batteries, a very convenient, well organized package.

Behind a comfortable, black Naugahyde seat is a useful chrome luggage rack. Under



The Charger electric cycle is quiet, pollution-free and, best of all, needs no gas. The \$500 machine is 62 inches long on a wheelbase of 45 inches, is 37 inches high overall and weighs 210 pounds with batteries.



the rack is the rear taillight, mounted on a mud-catching chrome rear fender. Although our test model was without them, production Chargers have both front and rear blinker lights. These accompany fully legal front and rear running lights.

The Charger has a tight, 10-foot turning radius, climbs mild upgrades with modest effort, has smooth acceleration and braking. Without its batteries the Charger weighs only 100 pounds. With the batteries on board, it's a full 210 pounds.

The motor operates at 2000 to 5000 rpm, delivering $\frac{3}{10}$ ths to $1\frac{1}{2}$ hp depending upon throttle application. With a starting torque of up to 300 in.-lb., the motor delivers an immediate power surge that pushes the 210-pound Charger up to 25 mph where acceleration then slowly levels off until you reach top speed of 30 mph.

Total enclosure of the motor, which offers protection against dirt and moisture, is possible due to low internal heat losses inside the KDB powerplant. Double-sealed ball bearings in the motor require no lubrication. An important quality of the permanent magnetic field is dynamic braking. By shorting the armature leads you can reduce speed from full-on to zero almost immediately. You just roll off on the throttle.

The nonpolluting Charger is also noiseless and consumes a minimal amount of energy. Full recharge from a normal 110-volt, 60-cycle a.c. wall outlet takes 12 hours. When being recharged the batteries draw 10 amps. initially and then gradually taper off to a 1-amp. draw at the end of 12 hours. If you go 10 miles on the electric cycle and plug it in the wall on return, it will recharge fully in less than an hour. It's best to recharge before the batteries are completely dead, of course.

Performance is little affected by the level

Voltmeter is mounted on housing that looks like a gas tank but is actually an enclosure for a built-in battery charger. It's a 110-volt unit that's rated at 15 amps. The voltmeter shows condition of battery charge at all times. The motor is mounted behind the battery. It's enclosed to protect it against dirt and moisture. The chain drive is taken directly from armature.



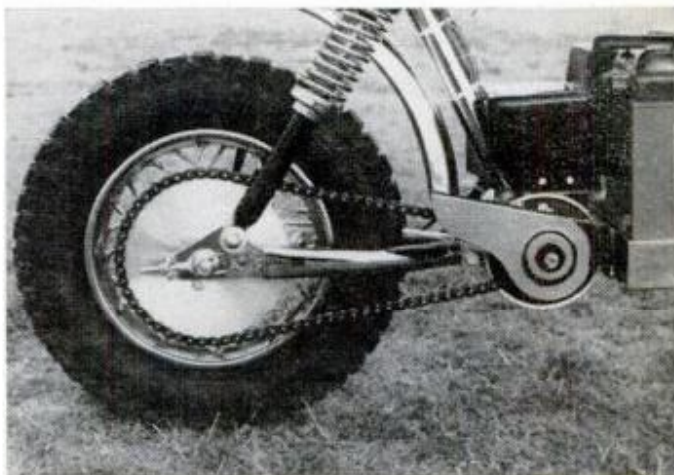
Charger specifications

Body material	Steel
Batteries	Two 90-amp. Electric-Vehicle Deep Cycle, 12-v.
Wheel bearings	Sealed ball bearings
Suspension	Swinging arm
Maximum speed	30 mph
Range	50 miles
Motor	1-hp, 24-v. KDB Permanent Magnet
Shocks	Spring type
Battery charger	110-v., 15-amp. automatic
Price	\$499, f.o.b., Burbank, Calif.

of charge in the batteries. The bike runs strong to the limit of its mileage range, then rapidly dies. The batteries will regenerate slightly after sitting a few minutes and allow another two to three miles of travel. Battery life is rated at 400 deep-cycle charges per 12-volt unit, with a potential of 800 charges.

Auranthetic is continuing its research to develop an electric motor that will partially recharge itself while in operation. On the boards now is a combination a.c./d.c. powerplant with a design whereby the d.c. motor provides power for forward movement while an a.c. motor recharges the batteries during periods of deceleration. This is partially accomplished through a "solenoid turnoff" activated by the backwards deceleration twist of the throttle when you want to slow down. The company expects 70-percent regeneration of the batteries from this system. It does not predict full regeneration, which would be perpetual motion.

The Auranthetic Charger is sold through dealers both east and west of Mississippi. Inquiries should be directed to: Auranthetic Corp., 828 North Lake St., Burbank, Calif.; or Auranthetic Corp. of the East, 706 Adams St., Quincy, Mass. ★★★



Turning hobby to horse

If your bike's a dirt machine you can't ride the road. Here's how to make it street-legal.

by Carl Shipman

If you are interested in more transportation per gallon these days, and own a dirt bike, you may be thinking about using it as basic transportation for work, school or errands.

You will need to make it street-legal and in most cases that isn't very hard. As far as the electrical system is concerned, you can think of a dirt bike as being a street machine on which the nonessentials have been left off.

Most manufacturers of off-road motorcycles also offer street bikes that have those missing parts and can serve as a guide for the conversion. Parts to fit the street bike will usually just bolt on. If not, adaptation should be simple, requiring a few brackets or possibly a couple of welded-on tabs.

If you are budget-minded you should be able to scrounge most of the needed parts from a bike salvage or junkyard. The light bulbs used must agree with the electrical system, but the bases and enclosures don't have to be any particular brand. They just have to fit your bike.

If you examine a 1974 street bike you will see things required to satisfy the law: lights, turn signals, horn, reflectors, rear-view mirror and exhaust silencer. In some states your lights have to work even if the engine quits running, so you may need a battery.

The battery problem is minor on most four-strokes, such as Honda, because they typically come with a battery installed and some even use it for ignition so it can't be removed. Installing a battery is more of a problem with a racing two-stroke which was never intended for one.

First thing is to find out what is already



Photos: David Gooley

installed. Nearly all two-strokes use flywheel magneto ignition which is independent of other "electrics" on the bike.

You need to know if there are any coils inside the flywheel besides the ignition source coil. A sure way to find out is to pull off the flywheel and look. If there is more than one coil then you also have a lighting generator installed.

Some racing bikes leave out the lighting coil. If so, buy one and put it in. Position it so that the curved pole-pieces on each end will not rub on the inside of the flywheel.

Mount the battery, lights, switches, rear-view mirror and reflectors. Parts that go on the handlebar will be no problem, even if you are using different brands or accessory items, because bars are usually of standard diameter. Frame-mounted parts will be less of a problem if they are the same brand because holders and brackets will fit. If

not, a little ingenuity can solve most difficulties.

When you get to wiring, remember that the lighting coils in the flywheel generate a.c. current which is changed to d.c. by a selenium rectifier and then used to charge the battery. The red wires are the battery "hot" circuit. One side of each lamp is connected to the frame ground, either directly or through the wires back to the common ground at the main switch. Control switches are in series with the item controlled.

Some motorcycles bypass the rectifier and use a.c. to operate head and taillights under normal running conditions. If this power fails, an emergency switch is used. With the emergency switch in the normal position, a.c. current is fed to the taillight and through the high-low beam selector to the headlight. If this switch is thrown, these lights draw d.c. from the battery. This causes the battery to discharge slowly, but the emergency safety requirement is met.

For lighting generation, bikes usually have either two coils or a single coil with a tap. When the main switch is in the day position, the head and taillights are off but the rest of the electrics are operable. The low-power tap or coil of the lighting generator is connected to the rectifier.

For night operation, with lights, the high-power tap is connected to both the rectifier and the head/taillights.

If you can buy a factory wiring harness it will save a lot of time. The wires are all color coded. If you make your own, tape "flags" on the wires and label them. To wire the system carefully, double check, install the battery and test it.

Another requirement is a muffled exhaust. Accessory silencers which clamp on the tailpipe will not be adequate. Substitute a street exhaust so you don't offend others and collect citations. Use of the same brand will be easiest, but you can cut off the existing head-pipe fitting of your present exhaust and weld it onto virtually any street-legal exhaust.

If you have knobby tires you should consider having them changed either to a street or universal tread for better traction and safety.

Off-road bikes are generally geared down more than necessary for street use. Adding approximately 15 percent more teeth to the front sprocket or subtracting that percentage from the rear sprocket should get you in the ballpark—if you should want to go that far in the modification of your machine.

Remember that most accidents happen to riders who are not accustomed to the street. Ride defensively and enjoy that good gas mileage for a long time. ★ ★ ★

Street-legal CZ motocross machine is shown running the road (opposite page), and details of the conversion are shown below. The two-stroke CZ, one of the best bikes for off-road competition, was brought to street-legal specifications by Josef Kubicek, a CZ and Kawasaki dealer (South Bay Motorcycles, 2001 Artesial Blvd., Redondo Beach, Calif.). He used Kawasaki components on the 250-cc dirt bike. Below, left, are the front flashers and headlight assembly. The front and rear brake levers were fitted with wiring to actuate the brake lights, and the rear fender (below right) was drilled for taillight; flashers are on bracket. Other components added or changed include the shocks, speedometer, exhaust pipe, tires, carburetor and the gas tank. The gearing is unchanged.



PM's guide to the '74 gas-thrifty, get-there machines



by Jake Grubb

They're get-there machines—now more than ever. Listed below and on the following pages are all the 1974 motorcycles sold in the United States—from AJS to Zundapp. You don't choose a motorcycle for its fuel economy alone; it's just something else to sweeten the deal. You may get only 40 mpg from a heavyweight machine. If that's not enough, there's always a lightweight. Oh, up to about 150 mpg. Let's see: With a gasoline ration of 37 gallons a month, that'll take you . . .

Benelli 750 Sei



AJS

Dirt/competition models: 250 Stormer, 410 Stormer.

The AJS Stormer models—strong motocross machines popular in competitive events—are little changed for '74. (AJS motorcycles—and Norton, Ducati, Moto Guzzi and Premier—are imported by Premier Motor Corp., a Berliner Group Member, Hasbrouck Heights, N.J. 07604.)

ATTEX

Street/dirt models: ATX50, ATX70, ATX125.

The ATX 50 and 70-cc models, introduced to the motorcycling scene last year, will be joined later this year by an all-new, American-made 125-cc model.

BENELLI

Street models: 750 Sei, 500 Quatro, 650 Tornado, 250 Phantom, 250 Supersport.

Street/dirt models: 175 Enduro, 125 Panther, 90 Banshee.

Benelli's European Gran Prix road-racing heritage flavors its line of street cycles, which is more popular on the Continent than in the United States. The Italian machines boast alloy rims, four-shoe front brakes and Marzocchi suspension systems. The new six-cylinder 750-cc Sei is the most spectacular of the new high-powered motorcycles. It's the brainchild of Alejandro DeTomaso, who designed the Pantera. (Benellis are imported by Cosmopolitan Motors, Hatboro, Pa. 19040.)

BMW

Street models: R90/S (900-cc Sport), R90/6 (900-cc), R75/6 (750-cc), R60/6 (600-cc).

The R90/S is new for '74. With a new five-speed transmission, double-disc front brakes, an aerodynamically contoured fairing and modernized instruments for every vital purpose on the motorcycle (it even has a clock), this 900-cc jewel is a machine for the ma-

ture, most demanding cyclist. Horizontally opposed twin cylinder engine and shaft drive are shared by the standard 900-cc R90/6 and the 750 and 600.

BULTACO

Dirt/street models: 125, 250 and 350 Alpina.
Dirt/competition models: 125, 250 and 360 Pursang;
350 Sherpa Trials; 250 Matador MK V; 360 Astro.

The 250 and 350 Alpinas are newcomers to the lineup, as is the 360 Astro short-tracker. This competition racer has hydraulic disc up front. Its horsepower is rumored to be 45 to 50!

COOPER

Dirt/competition model: 250 Motocross.

This new competition dirt cycle features quick acceleration with a wide torque band. It also has integrated hydraulic suspension. The 250-cc, two-stroke single is built by Moto Islo, part of the largest motorcycle manufacturer in Mexico.

CZ

[See Jawa, page 88.](#)

DUCATI

Street models: 750 GT and 750 Sport.

The V-twins from Bologna are superbikes with lots of mellow db's to announce their high-power presence. The Sport model is a factory-prepared cafe racer that tricks more hp from 750 ccs.

HARLEY-DAVIDSON

Street models: FXE-1200, FX-1200, FLH 1200 (full dress), XLCH-1000 (Sportster), XL-1000.
Street/dirt models: SX-350, SS-350, SX-175, SX-125, SR-100, Z-90, X-90 (mini).
Competition model: XR-750 (750-cc Track racer).



Harley-Davidson SX-175

For '74, Harley adds another brute to its collection of muscle bikes: the FXE-1200. It shares the performance of its FX-1200 brother with the addition of an electric starter. All big Harleys for '74 have a built-in "Security System" cycle alarm.

HODAKA

Dirt/street models: Wombat (125-cc), Dirt Squirt (100-cc).
Dirt/competition models: Combat Wombat (125-cc), Super Rat (100-cc).



Hodaka Combat Wombat 125

Hand-assembled Hodakas come in four models for 1974. The bikes in the small-displacement lineup are dependable machines. Simplicity in design and proven engineering make the Wombat a sporty gas-saving commuter, the Dirt Squirt tops for off-road fun, the Super Rat and Combat Wombat strong-hearted performers.

HONDA

Street models: CB 750K4, CB 550, CB 450K7, CB 360G, CB 360, CB 350G, CB350F, CB 200, CB 125S1, CL 450K7, CL 350K5, CL 200, CL 125S1.
Street/dirt models: MT 250, MT 125, XL 350, XL 250, XL 175K1, XL 100, XL 70, CT 90K5, CT 70K3, ST 90.
Dirt/competition models: CR 250M, CR 125M, TL 125K1, XR 75K1, MR 50.



Honda CB-750 K3

Boasting the largest sales volume in the motorcycle industry, Honda has a cycle for seemingly every popular type of recreational, commuter and competition two-wheel preference. Among the most celebrated Hondas are the "world's lightest 250-cc production two-stroke," the CR 250M Elsinore; the CB 750K4 four-cylinder tourer; the

popular street-going CB 350; the agile TL 125K1 trials and the bustling XL 250 enduro. Honda is well-known for bikes with dependable power, ruggedness, extra-safe brakes, tasteful styling and—sweet sound!

HUSQVARNA

Street/dirt models: 250 RT, 360 RT.
Dirt/competition models: 125 SC, 175 WR, 250 CR, 250 WR, 400 CR, 400 WR, 450 WR.

Huskys have lots of wins in international motocross events. Lighter magnesium engines, reed-valve induction, redesigned exhausts and air cleaners are new for '74. Nylon-line control cables are another innovation sure to be copied.

INDIAN

Street/dirt models: ME 74, ME 76, ME 100A, ML 100, ME 125, ME 175.
Dirt/competition models: MM5A, MX 74, MX 76, MT 100.

The Indian name lives again—with a nice lineup of two-stroke machines. The MM5A is the smallest—a genuine motorcycle with a 49-cc displacement and high mpg. The ME 175 is the latest and biggest bike in the line. It should be available next month.

JAWA-CZ

Street models: Jawa 350 Californian, Jawa 250 Californian, Jawa 175 Sport, Jawa Mustang, Jawa Californian with Velorex Sidecar.
Street/dirt models: Jawa 175 Trail, Jawa 90 Trail.
Dirt/competition models: CZ 400 MX, CZ 250 MX, CZ 125 MX.

Known primarily in the United States for high-caliber championship motocross racers, Jawa has a healthy line of street and enduro models for '74. Automatic oil injection, superior gas mileage and modern styling head the pluses for the two-cycle twin cylinder Jawa street machines. CZ bikes are characterized by streamlined looks, improved chassis, durable plastic fenders, sunburst cylinder heads and rim-saver Barum tires.

KAWASAKI

Street models: Z-1 (900-cc), H-2 (750-cc), H-1 (500-cc), S-3 (400-cc), S-1 (250-cc).
Street/dirt models: F-9 (350-cc), F-11 (250-cc), KS-125 (125-cc), F-7 (175-cc), G-5 (100-cc), G-4 (100-cc), G-3 (90-cc), MC-1 (89-cc).
Dirt/competition models: KX-450 (441-cc), KX-250 (246-cc), KX125 (124.8cc), MC-1M (89-cc), MT-1 (73-cc).

Kawasaki for 1974 has a balanced line of quality street, dirt, enduro, competition and mini cycles. The new models—400 S-3, KX-125 motocross, KS-125 enduro, KX-250 and KX 450—highlight Kawasaki's growing

Kawasaki 900 DOHC Z-1



move to specialization in the manufacture of sportcycles. Models such as the 900-cc Z-1 for high-performance touring, the KX-250 motocross for professional dirt competition, the 250-cc F-11 for street and off-road use and the 100-cc G-4 equipped with a five-speed high/low range transmission for commuter and camping use exhibit Kawasaki's achievement in meeting the enthusiasm of all types of cyclists.

LAVERDA

Street models: Three-cylinder 1000 DOHC, 750 SFC Production Racer, SF 750 SOHC, GTL 750 SOHC.
Dirt/competition model: 250 two-stroke ISDT.

Laverda 1000



The 750-cc single-overhead-cam GTL high-speed tourer, the 750 SFC street-legal Production Racer and the 250-cc two-stroke enduro are new for '74. Both the three-cylinder 100-cc tourer and Production Racer feature alloy rims, twin disc brakes up front, handsome upswept exhausts and rugged high-performance engines. Unique to the SFC Racer are its fiberglass racing fairing, tank and seat, special lightweight frame and low-set clip-on handlebars.

MAICO

Dirt/competition models: 501, 450, 400, 250.

Respected worldwide for its four potent screamers, Maico is for the serious off-road competitor. The high-horsepower 450 is ridden fiercely by international champions. In the United States, Maicos are noted for their success in TT, desert and motocross events. The Maico you buy is ready to win. Be prepared.

MONTESA

Dirt/street model: King Scorpion 250 Automix (250-cc).

Dirt/competition models: Cota 247 (250-cc), Cota 123 (125-cc), Cota 25 (50-cc), Cappa 250 VR (250-cc), Cappa 250 MX (250-cc), Cappa 125 MX (125-cc).

The simplicity of its design and a singularity of function should put the Cota trials machines and Cappa motocross stormers among the top contenders again in their respective competition classes this year. The unique 50-cc Cota 25 is a mini-beauty built to introduce young dirt cyclists to the way to "be the best." The 150-cc King Scorpion is an enduro of superior power and appealing styling.

MOTO GUZZI

Street models: 750 Sport, 850 Eldorado, 850 Police Special.

For touring comfort on a big bike the Moto Guzzi is among the best of choices. And if you want to tour with a little more performance, you can buy the Police Special. No badge required.

NORTON

Street models: 850 Commando Roadster, 850 Commando Hi Rider, 850 Commando Interstate.



Norton 850 Commando

The brawny British twins, recognized by their shiny black gas tanks, also come in a candy apple red, metal-flake blue, white and blue stripe, and bronze for 1974. An improved inlet porting and a higher second-gear ratio are new on the Commando. The Norton produces awesome, yet dependable power and, due to its rich racing heritage, handles well at speed. A patented "isolastic construction" smooths vibration. The Norton is a mount designed to please the hard-riding connoisseur.

OSSA

Dirt/competition models: 250 S.D.R., 250 Pioneer Trail-Enduro, 250 Explorer, 250 Plonker Trials, 250 Phantom Motocross.

Specialization in hill'n dale performance continues to keynote Ossa for '74. Competition success of the Plonker Trials and Ossa S.D.R. remind the leisure off-road rider that his 250-cc Explorer or Pioneer Trail-Enduro are of blue-blood lineage. Though these medium-sized cracklers from Espana are not noted for their street savvy, some of the models are licensable.

PENTON

Dirt/competition models: 100 Berkshire, 125 Six-Day, 175 Jack Piner, 250 Hare Scrambler, 400 Mint.

Penton's competition-tuned machines had a new addition for '73, the 250 Hare Scrambler, and they've gone bigger again for '74 with the introduction of the 400 Mint, which gets its name from the Mint 400 off-road race, of course.

PREMIER

Street/dirt model: 125 Enduro

Tough machine at a competitive price. The 125-cc single has street-legal lighting and features like a 21-inch front wheel, Timkin taper bearings, and a five-speed constant mesh transmission.

ROKON

Dirt/competition models: RT-340, Explorer MK-III, MK-III Automatic, MK-IV Standard, MK-IV Automatic, MK-V Explorer, MK-VI.



Rokon RT-340 Automatic

The Rokon trail-breaking cycles are the most unconventional of their kind to be developed. Known for its "infinitely variable" automatic transmission, the new 340-cc RT-340 is the world's first high-performance off-road motorcycle with this feature. Positive acceleration, optimized engine performance, hydraulic disc brakes front and rear, and cast alloy wheels are qualities of immediate notice on this durable machine. A powerful Sachs engine and rugged twin-loop tubular frame add to the Rokon's position as a first-class enduro.

(Please turn to page 218)

They're healing bones with electricity

by John F. Pearson
SCIENCE EDITOR

There's healing power in electricity. This has been established by physicians—in the United States and Europe—who use low voltages to help broken bones to knit.

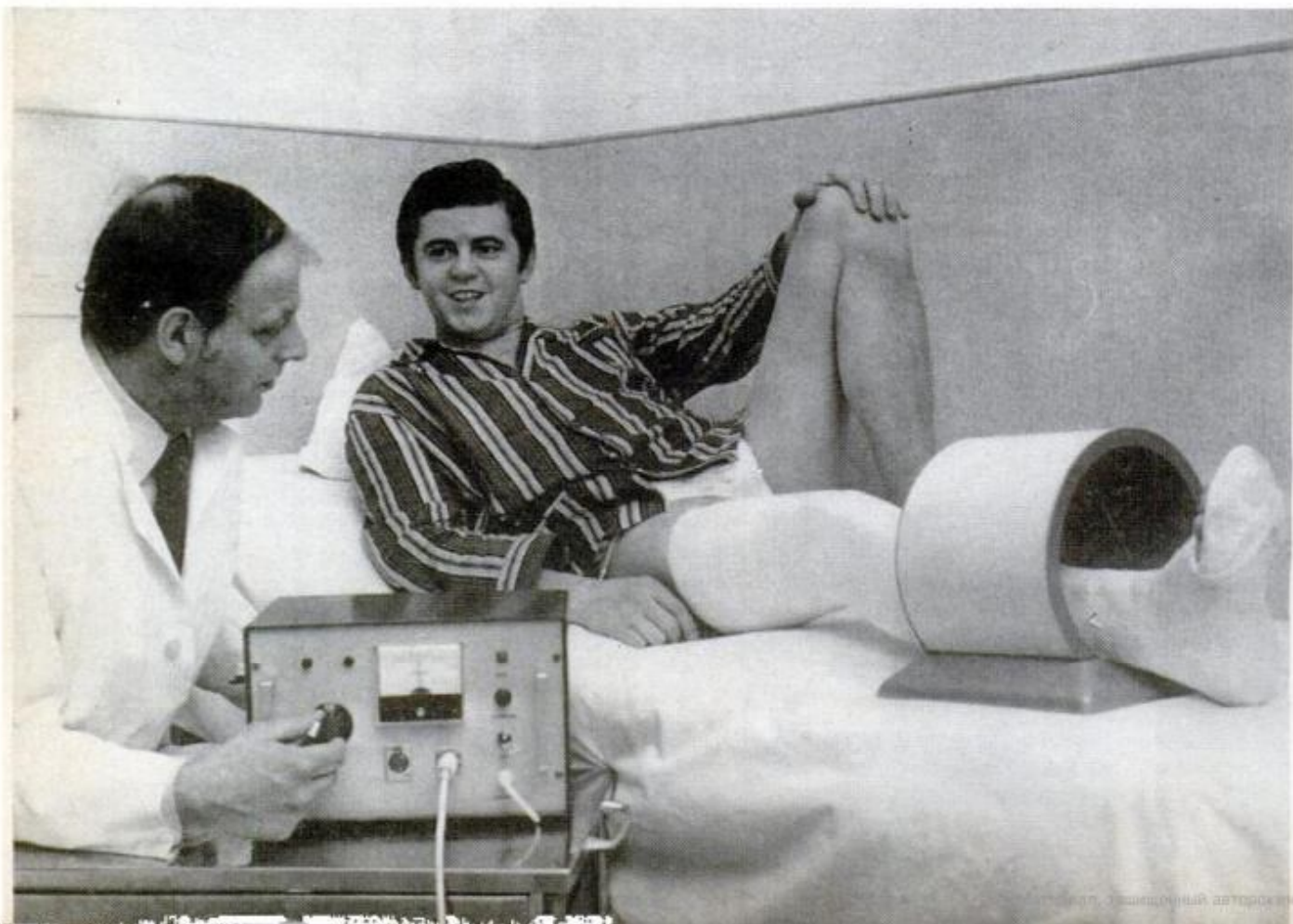
There are fractures that fail to respond to standard treatment or even to surgery. A recent issue of *Medical World News*, a professional journal, reports the case of a New York state woman who had a wrist fracture that did not heal for 17 years. She went through 25 operations, all to no avail, before the fracture finally responded to electrical treatment.

The woman was the patient of Dr. Robert O. Becker, an orthopedic surgeon at a Veterans Administration hospital in Syracuse, N.Y., and a pioneer in the field. Other men recognized for their contributions are Dr. Carl T. Brighton of the University of Pennsylvania and Dr. Leroy S. Lavine of the Downstate Medical Center, Brooklyn, N.Y.

Though there are variations in their techniques, the basic approach is essentially the same. Platinum, stainless steel or silver electrodes are implanted in the bone and electricity is supplied by an external battery. Dr. Becker, for example, attaches a 7.5-volt battery to the cast and then connects it to resistors and field-effect transistors so that it will maintain a current of 10 microamperes.

A slightly different approach is used by a West German team—Dr. Fritz Lechner, director of a hospital at Garmisch Partenkirchen, and physicist Werner Kraus. Instead of using a battery, they apply electricity to the implanted electrodes by means of an induction coil. In the photo below, a patient is shown being treated by Mr. Kraus.

None of the physicians can fully explain why the technique works. It's evident that electrical stimulation promotes the growth of new bone. (This is the only way bone can heal; it does not form scar tissue, the way skin does.) But why bone generation is en-



hanced is another matter. One theory is that bone cells receive signals and are "switched on" when a fracture occurs. This starts the healing process. But after a few months the process may slow down, whether the bone has knitted or not. Electrical stimulation, according to Dr. Becker, may reactivate the healing mechanism.

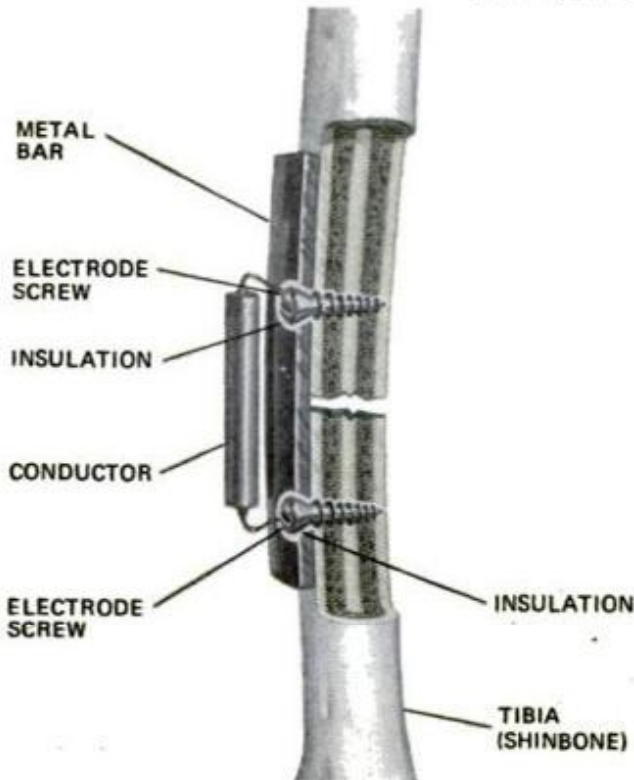
Despite the success of the treatment, Dr. Becker thinks it should not be used for fractures that respond to standard therapy. His view is that the body has its own rate of healing and that unnecessary stimulation could be dangerous.

The German team treats primarily complicated fractures in which the bone has broken through the skin.

"We have treated and cured over 300 patients," says Dr. Lechner. "We also continue to experiment with animals. But we believe that we have found a new way of promoting health in the general sense of the word. We have good reason to believe that this method will eventually prove effective in fighting various kinds of tumors." ★ ★ ★

HOW BONE IS WIRED

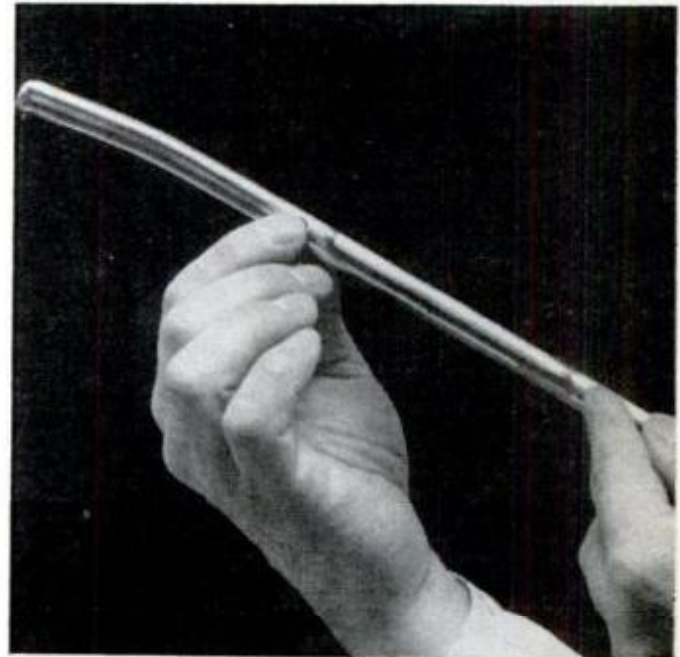
Art: Roy Grinnell



Dr. Fritz Lechner has done some 300 implant operations such as this one. He practices in ski area, sees many broken legs.



Electrode assembly is fixed over fracture (see drawing) by anchoring screws in bone. Hardware is removed after bone heals.



The German medical team uses a long electrode "nail" such as this for the treatment of some types of fractures.

Wind power: Nonpolluting, unrationed, free

Sailboats are slow—but offer satisfactions of a silent sport that requires skill, not gas.

by Bill McKeown
BOATING EDITOR

Boating under sail has received a big push from threatened shortages of gasoline. Both power and sailcraft sales are up this year, but apparently many new boatmen want to try the quiet art of moving with the breeze.

Sailing skills have not changed much in 2000 years, but the boats themselves are very different from those of only 20 years ago. Endless maintenance battles with dry rotted hulls and stretched sails are almost over. Synthetics like Dacron and nylon have replaced cotton sails and manila lines. Wooden hulls now are rare. Fiberglass-reinforced plastic instead is molded into sailboat shapes. A few notable exceptions are made of marine aluminum—such as this year's 70-foot America's Cup defenders and challengers.

Most popular rig now, and the easiest



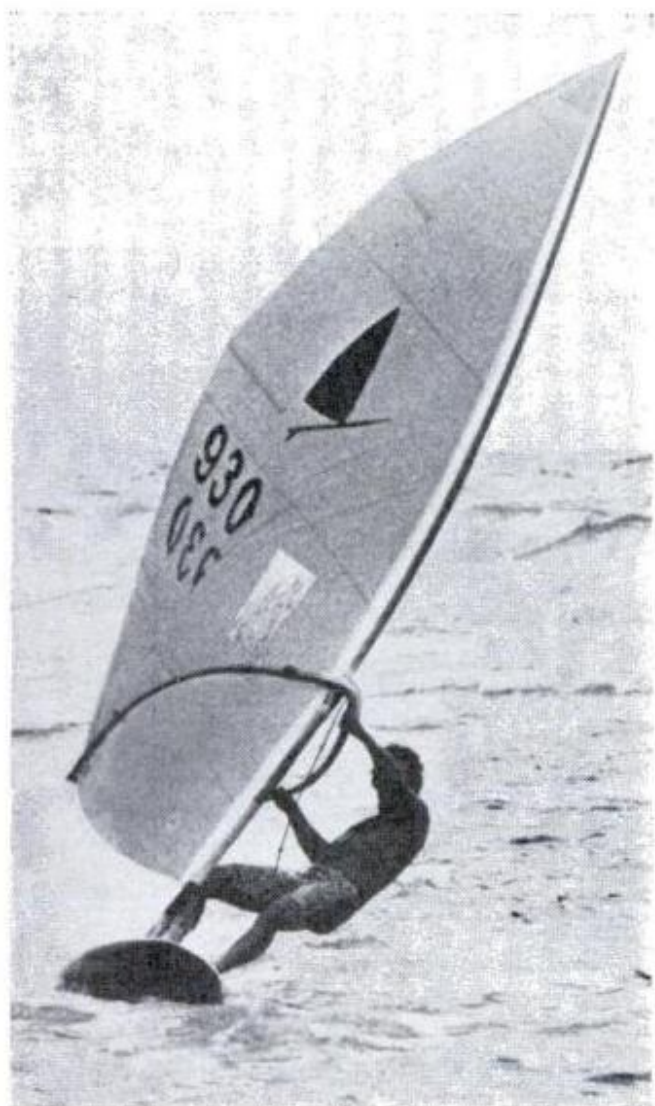
Minifish is AMF Alcott's 75-lb. \$415 mini-copy of world-famous Sailfish, 100,000-model Sunfish, new Force 5.



Motor sailers, like Albin 25MS imported by Larsson USA (above), offer advantages of power and sail, twin cabins and popular midships cockpit in a 25-footer. Dinghy sailing (left) can be a challenge for beginner and experienced helmsman alike. Grumman aluminum 8½-foot model converts from cat rig to oars, outboard.



O'Day Gold Medal 22 (left) can sleep four, power along with an outboard clamped on a transom bracket, draws only two feet with centerboard up. Price: \$3300. Ensenada 20 (below), an even smaller 20-foot example of compact trend, sleeps five, needs only one foot of water, trails easily, sells on West Coast for \$3500.



Windsurfer, a 12-foot surfboard rigged for sporty stand-up sailing, is \$415 from Windsurfing International, Santa Monica, Calif. Shifting weight steers board. Chrysler Musketeer (right) offers high-performance speeds aboard design by Britain's catamaran champion plus trailerable 8-foot beam for day-sailing comfort.





Luger Leeward sailing sloop is 16-foot example of good day-sailer family boat suitable for learning. Craft is constructed from \$800 molded fiberglass kit; home assembly is estimated to save over \$1000. Sloop seats six, has 75-inch beam, draws three feet with centerboard down, weighs 700 lbs. Additional-size kits also offered by Luger.

with which to learn, is a single mast mounting a pointed-top Marconi mainsail plus a jib stepped in a 12 to 15-foot hull with adjustable centerboard or fixed keel. The little sloop is likely to have topsides high enough to keep passengers safely aboard, provide enough action without threatening constantly to capsize, and prove seaworthy in moderate airs and sheltered seas. Smaller boats are not safer or easier to sail. The Sailfish, a sailing surfboard first launched 25 years ago, and all its thousands of successors and imitators, are great fun to sail but easy to flip and require more skill. Tricky also are powerboats and other craft rigged for sail but not designed for wind power. Without keel or leeboards, they are unstable and tend to slide downwind.

Power, however, is no longer scoffed at by sail skippers, and a small outboard to provide an auxiliary push when desired is often stowed aboard.

The lateen sail of sailboards and single triangle or gaff-headed rig of sailing dinghies and catboats is usually reserved for smaller craft. Multimasted yawl, ketch and occasionally schooner rigs are sometimes found on yachts of about 30 feet and up.

Newly popular are cabin craft for slow cruising and multihull catamarans and trimarans for fast planing. Today's sailor can get much more action afloat and less maintenance chores and expense ashore. ★★★

Midship 25 from Midship Yachts, Westminster, Calif., offers easy handling with ketch rig, midship cockpit, optional swing keel to reduce draft from five feet to one for trailering. Sleeps five. \$7995.



Herreshoff Eagle provides pleasures and lines of a character boat with easy maintenance of modern fiberglass. Clipper bow and gaff-headed rig of little 22-foot pocket packet combine with wheel steering, outboard well for auxiliary power, bunks for two. \$7990 complete with sails, ready to go.

New fly gear to fool fish

Thinner lines, stronger rods and reels are among the latest improvements.

by George Linnane

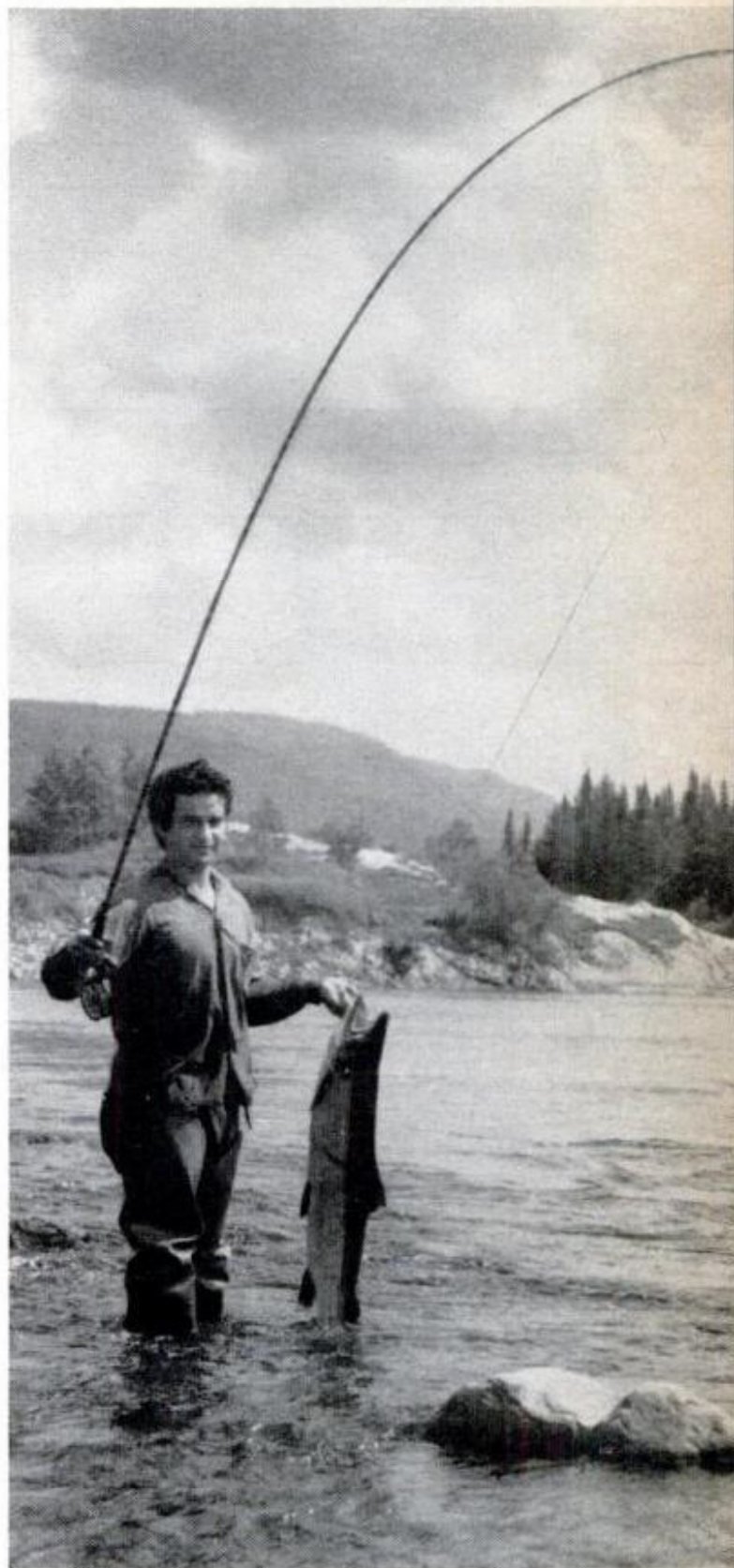
"Fly-fishing only" the sign read in English and French on the bank of Quebec's Matane River. As I watched, a young fisherman pumped back on his rod and a silvery 20-pound missile jumped five feet into the air and fell back in a spray of foam. He was hooked to an Atlantic salmon, king of freshwater fish and a prize that can only be taken on a fly in Canada.

Fly-fishing is the only way to land trout and salmon on some of the finest streams in the United States as well. This ancient art is gaining new life and popularity, aided by the challenging skill required to do it well, plus modern tackle recently developed for the sport. Spin fishing, introduced from abroad 25 years ago, is so simple and productive that it leads by far in angling popularity. But now many fishermen want to graduate to fly casting.

Balanced tackle is one secret to success. Line, rod and reel should match up so they work together for you. Old unstable materials like silk lines and bamboo rods used to make this more difficult.

The flyline weight, not the lure, gets the fly out to the fish. It is seldom more than 30 or 35 yards long, and its performance is the secret of successful casting. Today's flyline is likely to be a translucent synthetic with a comparatively thick and heavy middle but tapering to thin diameters at each end. Shakespeare has developed one of nylon monofilament.

Floating lines have a hollow core to keep them on the surface. One of the most useful is the double-taper type with casting weight in the center and a thinning down toward each end. It lands lightly on the water and presents the fly to the trout without spooking him. A typical line is labeled DT8F which means double taper, weight 8, floating, and is used for dry flies primarily, al-

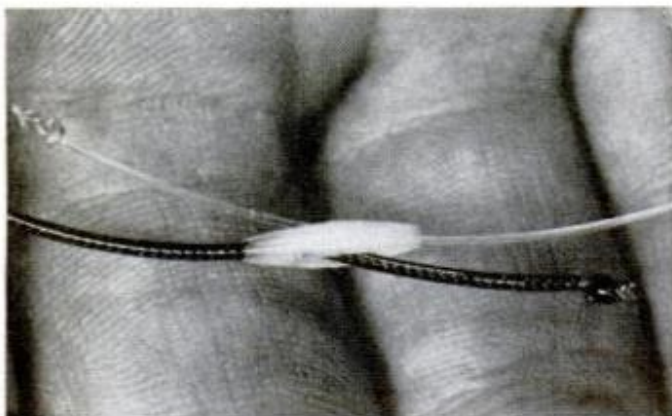


Big catches on light fly tackle are a new challenge for anglers. Only fly-fishing is allowed for landing Atlantic salmon now on Quebec's Matane River, above.

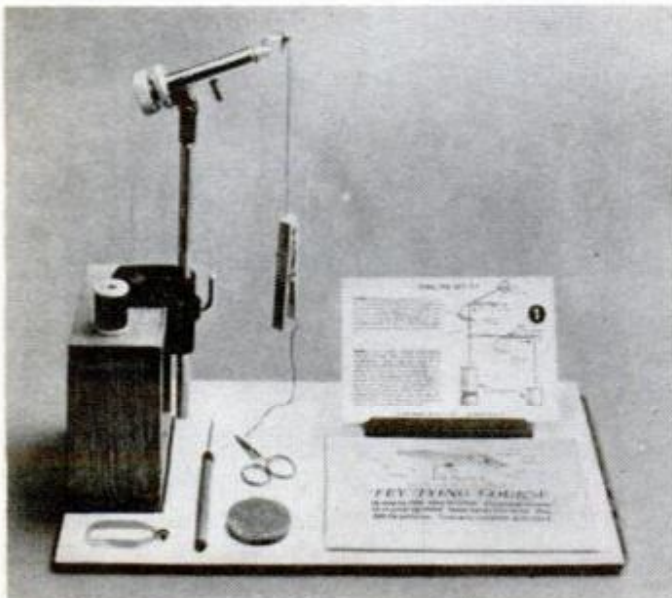
New tackle includes prematched sets, more options



New lines for fly, bait and spin casting have been crowding the market recently. Gladding's Leadcore is color-coded; paste-on chart, left, shows length out.



Leader, casting line are easy to join with Eagle Claw Leader-Link (above), which floats or sinks with line. Fly-tying course for home study, practice (below) has 10 illustrated cards, 200 patterns from Ed Sisty Angling Adventures, 3751 Inca St., Denver, Colo. 80211.

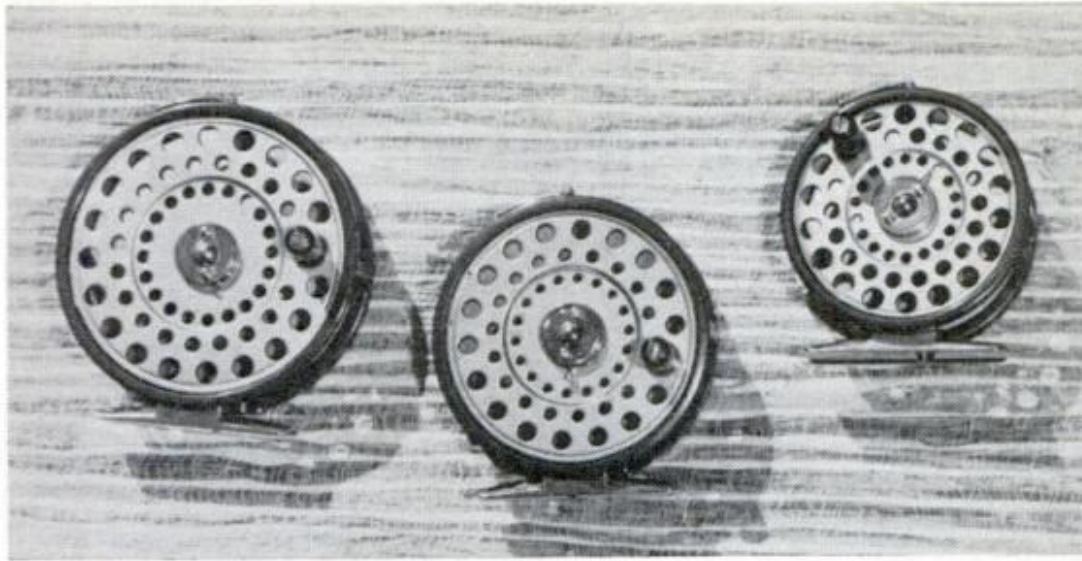


though fishing a few inches under water is also possible. The line can be reversed end for end when worn to extend its life. One floating line, Micro-Foam developed by Courtland, contains tiny globules of gas trapped in a foam body for flotation.

Sinking lines take the fly down where steelheads, shad, bass, pike, muskellunge, salmon and many lake and pond trout feed. It is less useful in fast-flowing streams. Line density and weight help it to sink. One useful taper is labeled WF6S which means the line weight is at the forward end, size is No. 6 and it is a sinker. It should go down fast enough to be effective with nymphs and streamer flies on the bottom. Why not weigh down the fly instead? This is illegal on some waters restricted to fly-fishing, and it is difficult to cast since it is the line and not the lure that propels the fly. Wire or lead strips, however, can be wrapped around the shank of a hook to get it down in a rapid current. Some fishermen carry both floating and sinking outfits, or spare reels of each. Today's new line materials have outclassed silk, which neither sinks nor floats as well and eventually tends to rot.

Rods now available have changed fishing completely, and more developments appear to be on the way. Fiberglass has made it possible to design and construct a precision fly rod that just about equals the best in laminated bamboo for one-third the cost, though custom bamboo rods will continue to be made for well-to-do traditionalists. New glass rods, like Fenwick's, are made to balance the line and reel. Two-piece sections come in various weights and lengths without metal ferrules.

Scientific Anglers takes some of the unnecessary mystery out fly fishing by a new "system classification" that provides matched line, rod and reel combinations suitable for any fish from a bluegill to a tarpon. Other makes offer similar sets. Modern products have far outdistanced the three-piece bamboo models of 30 years ago, and today's \$35 rods of glass rival \$100 custom bamboo wands. The old rods frequently took a permanent set (bend) and tips were so fragile that two were sold with each rod. Now four and even six-piece pack rods to fit in a knapsack, from Berkley, Browning, Gladding, Daiwa, Old Pal, Sears, Orvis, Garcia and others, are able to give a



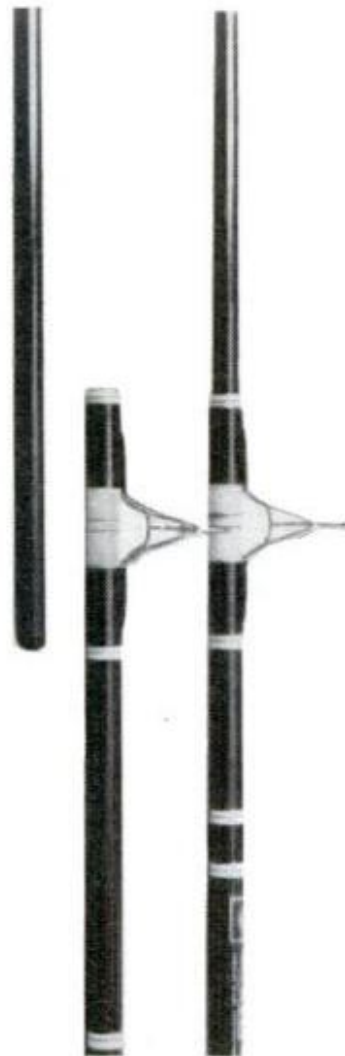
traveling fly fisherman lively action and long life.

Rods of the future may be made out of carbon filament graphite. The material has a remarkable stiffness-to-weight ratio, flexibility and high price. A graphite rod can weigh only 1¾ ounces and cost nearly \$200. Shakespeare and Fenwick produce them.

Leaders rank high as a critical piece of fly tackle. One of the latest is a knotless nylon tapered leader that may be 10-pound test at the thick end and narrow down in nine feet to one pound—an almost invisible cobweb on the water. A more typical trout leader would taper from .020 to a two-pound test .006 diameter at the tip. A level leader of one diameter and perhaps 10-pound test is used for big ones like Atlantic salmon and stripers. Today's monofilament is a long advance from the old-timers' brittle knotted gut leaders that had to be soaked two hours before fishing.

Reels haven't changed too much although, with the new challenge of trying for big fish with a fly rod, drags have been installed on some. Models like the Pflueger Medalist have interchangeable spools for different weight and length lines. ValCraft's Valentine 375 curbs line-fouling with a rotating crank handle. Single-actions, automatics and multipliers are the types made.

Flies are constantly being introduced in new patterns, designs and materials, plus new gear to tie your own for fooling local fish. Yet the Gray Ghost invented in 1924 and the Parmachenee Belle of the 1870s are just as effective today, tied to the terminal end of the newest in tackle. ★★★



Fly reels (top) like the three Wright & McGill Eagle Claw models shown above, now have extra spools, new sizes and adjustable drag. Daiwa's glass-to-glass ferrules are guaranteed. The Shakespeare Wonderrod (right) is a sample of a matched set.



Styling is a knockout, but so is the low roof line!

A nationwide survey based on 579,000 owner-driven miles.

by Michael Lamm
WEST COAST EDITOR

Luscious looks of Matador coupe swept most owners off their feet. It's one of the few all-new faces for 1974. Recessed headlights and oval wheel cutouts make strong focal points. Coupes span 114-inch wheelbase, while older-style Matador sedan and wagon stand on 118-inch chassis.

Photos by the author



"I just wish there were more of them out," laments a Texas administrator, because people are continually staring at the car and running us off the road eyeballing it." This owner, like 57.4 percent of his colleagues, bought the Matador primarily on the basis of looks.

A New Jersey teacher rhapsodizes, "I sincerely feel that the 1974 Matador will become a classic. Its styling is very clean and sporty." A Rhode Island postal clerk: "Styling is the best on any car this year." And a Wisconsin carpenter confesses, "I bought it from a picture!"

Another powerful reason for purchase remains AMC's Buyer Protection Plan. The question is: Does it work? Sometimes yes, sometimes no.

"Under the Buyer Protection Plan," says a Texas roofer, "I received fast, good service at no charge." A Massachusetts sales engineer comments, "I had an oil leak at the area of my timing chain cover. Service was excellent, and the BPP is all they say it is." An Ohio secretary: "I learned with a previous AMC car that they have the best warranty." And an Ohio landscaper: "Garage keeps promises, does good work, is willing to correct when I'm not satisfied, and always gives me a loaner when requested—AMC is the best of them all!"

On the other hand, a Michigan trucker grumbles, "Left the car twice overnight and was not offered a loaner." A New Jersey policeman complains, "My Matador still needs some minor repairs, but these haven't been performed because dealer will not back up his policy of a loaner car. He wants to rent me a car for \$8.95 a day and 6 cents a mile." (What this policeman might not understand is that AMC offers a loaner only if his car must stay in overnight. If minor repairs can be done during normal work hours, a loaner isn't usually offered.)

Handling came in for an unusual amount of praise. A New York accountant: "Handles as well as my previous AMX." A North Carolina retiree: "This car handles exceptionally well on mountain roads with sharp curves. It has good control on interstate highways at turnpike speeds. It corners well and is easy to drive in traffic." A Massachusetts nurse: "I like the way it holds the road and its maneuverability in parking." "Very responsive," says an Ohio postal foreman. And a Florida salesman: "Very stable handling."

We got mixed reactions on general com-



Fuse box nestles neatly inside glove compartment, so spares aren't far away. And glovebox is plenty large.



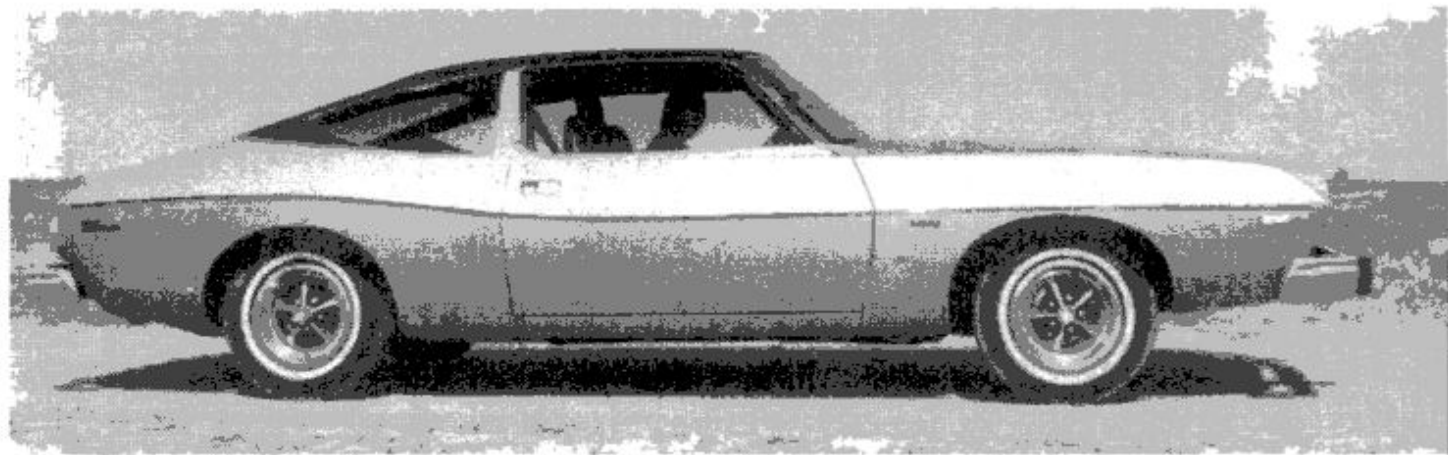
Coupe's big, heavy doors take a long reach, but inertia-reel shoulder harness doesn't restrict the driver.



Bucket-seat upholstery can be unzipped for quick removal, which makes it easy to clean or replace. Below: Rear window rolls three quarters of the way down. The thin pillars allow excellent vision in every direction. Many owners complained that head clearance over the rear seat was low, but indicated they had plenty of room up front. They gave comfort a fine rating.



'... fits my wife, fits me, fits my 1940 garage.'



Rakish fastback profile captures sporty flavor, and Matador coupe has handling to match—so say many owners.

fort. "Very comfortable."—Milwaukee millwright. "No headroom in the back seat."—Wisconsin machine operator. "Relatively comfortable with two up front and two in back."—Massachusetts physician. "Quite comfortable and lots of room."—Chicago doorworker. "Comfortable seating but needs more headroom in rear."—Wisconsin assembly line floater. "Seat belts make it hard to get in and out of rear compartment."—New York radio technician. And, "I'm 6-2 and my wife is 5-2. I can enjoy riding while she drives, and thanks to the individual reclining bucket seats, I don't have to sit with my knees against the dash."

About workmanship: "Built solid; no trouble with rattles." "Workmanship on the mechanical side is okay, but carpeting and interior had stains and glue runs." "Exceptionally good for an American car." "Excellent." "Mine was one of the first built, and it shows signs of hurried workmanship—windshield sealant, trunk wiring, door fit, hood adjustment." "Overall very nice, but carpets seem a bit shabby, and the rear seat doesn't exactly fit in place." "Put together as if somebody cared." Overall, 68.4 percent of our owners rated workmanship *good to excellent*.

We heard a fair number of groans about the seat-belt interlocks. A New York housewife: "I absolutely abhor mandatory seat belts, both for mechanical reasons and because they are uncomfortable." A Michigan anesthesiologist: "My wife hates the mandatory seat belts, but I don't know yet." And an Indiana railroader: "This seat-belt thing is a pain in the rear. I have so much

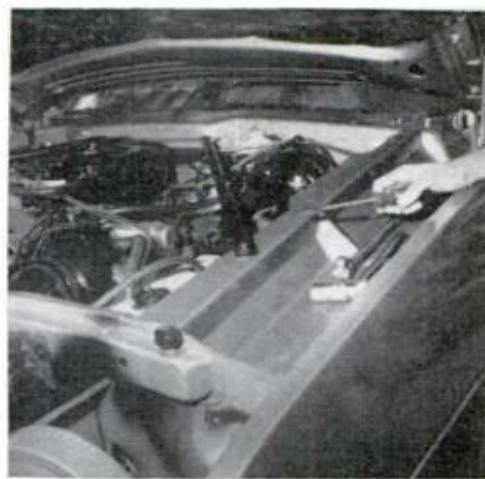
trouble starting the car that I probably *will* have an accident."

We noted a number of complaints about the windshield wipers sticking at the far left side of their arcs. The wiper arm had a habit of going beyond the windshield molding and getting hung up. One owner said that this happened as he was passing a truck, and it was "blind luck" that he made it.

We've since learned from the factory that windshield-wiper hangup has been corrected and that only the very early production models were affected.

When we asked for specific praises, no one seemed bashful. Here's a random sampling: "Outstanding appearance, excellent driveability and handling, quiet." "Roadability—it holds the road like a sports car, with the comfort of a luxury car." "It has class." "It fits my wife, fits me, fits my 1940 garage." "Terrific visibility all around—no blind spots." "Good acceleration even with the 258-inch Six." "A sharp-looking car, and it has the power you need when you need it most." "Trunk space is fantastic—I've packed 12 large bags of groceries in it." "Neat looks and low wind noise."

We also asked Matador owners what changes they'd like to see. Here are some suggested improvements: "More headroom in the back seat." "Trunk wiring should be protected against snags from cargo." "Lap belts for front riders trip people as they climb into rear seat." "Redesign instrument panel so short drivers can see speedometer and high-beam indicator. As it is now,



Spare nestles against right fender well to save space in ample trunk (left). Valleys at either side of engine compartment (center) help strengthen sheet metal and

at the same time offer a clever tool bench. Dashboard looks clean, but short drivers said steering hub obscured the speedometer and high-beam indicator light.

steering hub obstructs view." "More lateral support from the bucket seats, and a four-speed transmission option." "Bring back overdrive." "One interior light is not enough."

Of specific complaints: "Shoddy trim and weatherstripping." "Brake pedal goes almost to floor on application." "Paint could be a little thicker." "I haven't been able to get a loan car from the dealer the two times I've needed one." But actually there were relatively few complaints, and 21.1 percent

of the owners said specifically that they had none at all.

We'll let a Kentucky supervisor fire the parting shot: "Our Matador now has 1900 miles on it, and I feel I should take it back for a checkup. But everything is so good I can't find an excuse to take it in. I had expected a little better gas mileage, but compared with our previous car's 8-9 mpg, this 14 mpg is heaven. I'll have to figure out some excuse to try out the dealer's loaner plan." ★★★

Summary of 1974 AMC Matador Owners Reports*

Total miles driven579,756

Average miles per gallon:

258-cu.-in. Six: Local driving	..14.3
Long trips	..15.8
304-cu.-in. V8: Local driving	..12.9
Long trips	..15.3
360-cu.-in. V8: Local driving	..11.9
Long trips	..14.6

Engines:

232-cu.-in. Six	..... 5.3%
258-cu.-in. Six	..... 12.3
304-cu.-in. V8	..... 60.2
360-cu.-in. V8	..... 20.5
401-cu.-in. V8	..... 1.8

Transmissions:

Automatic	.....98.3%
Three-speed manual	..... 1.7

Series:

Matador	.....46.0%
Matador X	.....22.7
Brougham	.....31.3

Why the Matador?

Styling57.4%
Past experience18.8
Size13.1
Warranty10.8

Specific likes:

Styling63.7%
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Handling48.8
Comfort31.0
Ride29.2
Performance 8.3

Specific dislikes:

Mandatory buckle-up13.3%
Poor gas mileage	.....12.0
Rattles	.....11.4
Inferior workmanship	.....10.2

Number of cars owned:

Matador only	.....55.9%
Two cars	.....37.9
Three cars	..... 4.0
Four cars	..... 1.1
Five or more cars	..... 1.1

Other makes of cars owned:

Ford	.....16.9%
Chevrolet	.....15.6
Plymouth	.....14.3
American Motors	..... 7.8

Comfort opinion:

Good to excellent	.....92.2%
Average to poor	..... 7.8

Workmanship opinion:

Good to excellent	.....68.4%
Average to poor	.....31.6

Had any mechanical trouble?

Yes	.....53.2%
No	.....47.7

What type of trouble?

Windshield wipers	.....14.1%
Oil leaks	.....12.0
Transmission	..... 8.7
Carburetor	..... 6.5
Brakes	..... 6.5

Did you repair it yourself?

No	.....94.5%
Yes	..... 5.5

Dealer repairs satisfactory?

Yes	.....67.9%
No	.....32.1

What changes would you like to see?

More headroom	.....13.6
Change seat-belt system	.....10.0
Better workmanship	..... 6.4
More legroom	..... 5.0
Better gas mileage	..... 5.0

Age distribution of owners:

15-29 years	.....25.9%
30-49 years	.....40.2
50-plus	.....33.9

Would you buy another Matador?

Yes	.....79.7%
No	.....20.3

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

Yardpower roundup for '74

The selection of riding mowers and tractors is wider than ever. More rigs with solid horsepower ratings are available—and several new electrics are making a bow.

by Gerald Kratsch

If you've decided to move up to a riding mower or compact tractor in '74, be prepared to shop around. The selection is broad—and, as you'll discover, prices are steep, especially for the big-muscle tractors.

You should shop for a dealer, too. His willingness—and ability—to provide service are important considerations.

The first thing to decide is whether you should buy a riding mower or a lawn or garden tractor. Then you face questions about size of machine, type of transmission, type of attachments.

Discuss your requirements with your dealer. In addition to the size of your lawn, you have to consider landscaping (trees, flower beds, fencing), and whether you expect to use the machine only for mowing grass or as a multiple-use unit.

According to one manufacturer's recommendations, if your lawn area measures up to 5000 square feet (50x100 feet), a good



The 10-hp Murray tractor (above) cuts a 36-inch swath, has electric start. Five-bushel capacity of grass catcher on the Homelite rider (right, top) means fewer stops to empty the bag. The Gilson tractor has a 16-hp engine, offers dozens of attachments.



hand mower is all you need. From 5000 to 10,000 square feet, a walk-behind power mower is recommended. Above 10,000 square feet, you're in the riding mower class. And at the 20,000-square-foot level (100x200) you should consider a lawn tractor.

If you're physically unable to cut a moderate-sized lawn with a hand or walk mower, there are some well-made 4, 5 and 6-hp riders to consider. Most cut a 25 to 30-inch swath. Most have some of the efficiency features of their bigger brothers, like optional electric start, three or four forward speeds plus reverse, and "no-scalp" mowing. Since they are riding mowers, don't expect them to be garden workers as well. Generally, while they will plow away light coverings of snow, they're not intended for heavy-duty snow removal.

If you're thinking in terms of a tractor, consider how many uses you can put it to on your property. Do you have a sizable garden? Are you in a heavy snow area, with



Gravely, an old name in the field, now offers a new line of tractors topped by the 16.5-hp machine shown above. It is retailed at an average national price of \$2038. **White**—the truck manufacturer—is a new name on outdoor power equipment. The rider shown has an 8-hp engine and cuts 34-inch swath.



ample driveway and walks to keep cleared? If the answers are "yes," and you have a really big lawn, look over the garden tractors that boast 10 or more hp.

Though a lawn tractor (usually 8 hp or under) is designed primarily to cut grass, the garden tractors do a variety of yard jobs. Attachments include—in addition to large rotary mowers—snow throwers, dozer blades, lawn sweepers, tillers, plows, cultivators. Through a power takeoff (PTO) linkage, some of these units can run power saws, paint sprayers, composters and other equipment.

When you've decided whether it's to be a rider or tractor you'll have to consider special features you may want. Keep in



Three riders for medium-sized lawns: John Deere 57 (above), Massey Ferguson MF 5 (right, top) and Allis-Chalmers Scamp. The 7-hp John Deere lists at \$535; the 5-hp MF 5 at \$400 and the 8-hp Scamp at \$675.



mind that, as with automobiles, it's the extras that can torpedo your budget.

Now let's look at some of the features and selling points you'll encounter.

Safety is most important. Look for the OPEI triangular gold seal on or near the mower discharge chute. It means that a sample model of the machine has been tested by an independent laboratory and found to meet all the safety requirements of the Outdoor Power Equipment Institute.

Check out the mower pan. Is it of "floating" design so it follows ground contour, or is it rigidly mounted?

Good speed selection makes the machine more versatile. You'll appreciate having a range of three or four forward speeds plus reverse. With a three-speed machine you do close trimming in first, straight-away

mowing in second and transport in third.

Check tires. Oversized pneumatic tires on rear and pneumatic or semipneumatic up front are easier on the lawn and give a smoother ride.

A grass catcher is great if you prefer not to let clippings lie on the lawn. But check carefully the ease of attaching the grass catcher and find out if a counterbalance weight is required (as with some rear-end catchers). A four-bushel capacity permits you to cover a fair amount of lawn before you have to empty clippings.

How wide a cutting swath? Too narrow means too many passes to get the job done on a large lawn. Too wide on a low-horsepower rider might put too big a load on the engine, causing shorter engine life.

The tractor or rider should have a rather

tight turning radius to enable you to maneuver closely and safely around trees and flower beds. You should be able to make tight turns without any loss of stability. Ask for a test-ride demonstration.

Check accessibility to battery, engine, oil fill and fuel tank. Each should be where you can get at it easily, without tools and a lot of fussing.

Try getting on and off the unit. Is it done easily or are knee-knocking knobs and levers in the way? How's the legroom—are you comfortable in the operator's position? Remember, you'll be in that seat a lot during the season.

You'll encounter a choice of transmission types—gear, variable speed and hydrostatic. The dealer can indicate which is best suited to your needs. Many units have the standard transmission similar to that found in automobiles with gearshifts. These usually have two, three or four speeds forward, neutral and reverse, utilizing a clutch for shifting.

Variable speed combines a standard transmission with a device that permits using several speeds in each gear without touching clutch or throttle. It gives you a wider range of speeds and allows you to change speeds quickly. Hydrostatic offers top convenience and efficiency. There is no gear-shift or clutch. You simply move a lever to go forward or backward.

But versatility, power and engineering refinements come at a price. How much will you have to pay to step up to a rider or tractor?

The cheapest riders on the market cost

Visibility is good from the driver's seat of the Jacobsen GT-14 tractor. It has a 14-hp Kohler engine, variable-speed transmission and a one-piece, welded frame. Its list price is \$1690 without mower.



about \$350. Typical is a Murray rider with a 5-hp Briggs & Stratton engine, three forward speeds and a 25-inch mower. There is no electric start. For \$420, you can get an Ariens Fairway with a Tecumseh 5-hp powerplant. It has four forward speeds, recoil start and cuts a 26-inch swath.

Top-of-the-line riders have 7 or 8-hp powerplants. AMF's premier rider (model 1293) has an 8-hp Briggs & Stratton engine,



Ariens introduces a new tractor line, including this 12-hp model with hydrostatic drive and a choice of 42 or 48-inch mowers. The price is \$1549.95.



Four models of Whirlwind riders—from 5-hp, recoil-start unit to 7-hp deluxe with electric start—are in Toro's '74 lineup. Prices begin at \$420.

ELECTRIC MOWERS

four forward speeds, electric start, and a 36-inch mower. It costs \$680. Yard-Man's top rider uses the same engine, cuts a 32-inch swath and costs \$640.

The gasoline pinch and the growing awareness of noise pollution have given

(Please turn to page 142)



GE Elec-Trak line now includes eight models with the addition of this 8-hp, 36-inch riding mower. It has suggested list of \$695, including mower.



Jacobsen's unit in the electric mower market is the Electra Mark IV (above). Other makers' entries are the John Deere Electric 90 (left, top), the International 95 (middle) and the Wheel Horse E-60 Electric Horse. These units have 32, 34 or 36-inch mowers. Typically, the Jacobsen uses three 12-volt batteries to power two mower motors and one traction motor. A full charge permits more than one and a half hours' mowing.



PM tests three big-muscle garden tractors

The Simplicity Pow'r Max, Wheel Horse D-200 and Bolens HT-20 all boast engines rated at just under 20 hp. But how useful is all that power?



Photos by the author

by Glenn S. Hensley

What's it like to work with a tractor with power to burn and the ability to perform any yard task you're likely to encounter? To find out, I put three top-of-the-line machines through their paces at my home test site near St. Louis.

Comfortably settled in the seat of Simplicity's Pow'r Max, I flipped the key to the "on" position—and nothing happened. A look at the instruction manual gave me the answer: The Pow'r Max will start only if all controls are in neutral. (Incidentally, safety is quite evident throughout the machine's design.)

I put her in neutral, turned the key again and the twin-cylinder, 19.5-hp Onan engine came to life.

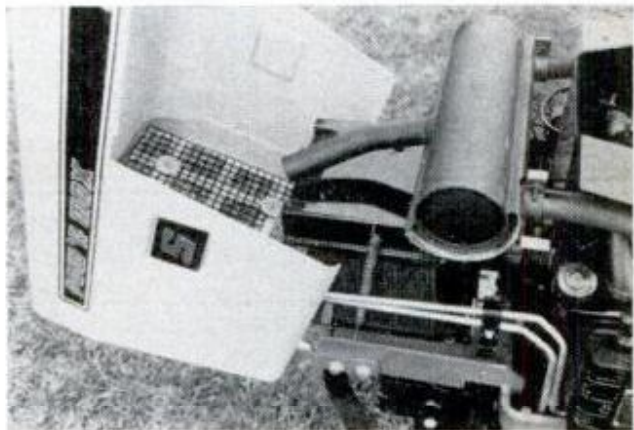
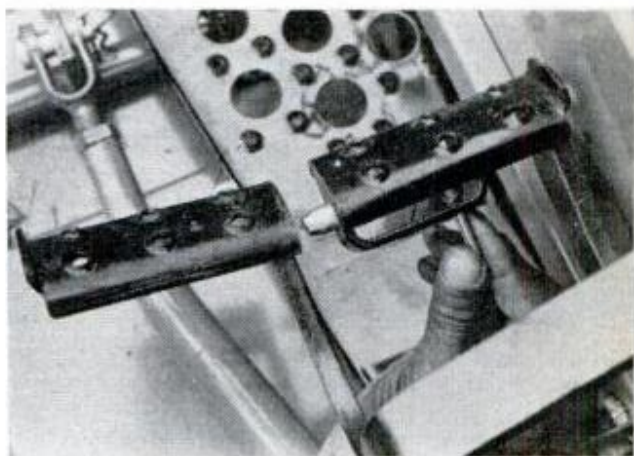
Vibration was minimal as I eased the combined directional and speed-control lever forward. With the three-bladed, belly-mounted mower jetting a steady discharge, steering proved as effortless as if equipped with a power assist.

And power to pull? With hydrostatic drive coupled to a manually shifted, clutched, three-speed gearbox plus limited-slip differential, the machine is probably capable of pulling a tank.

Minor complaint: Electric clutches, fore and aft, do let PTO-operated attachments start with somewhat of a "bang."

Base price of the tractor is \$2799. Add

The Pow'r Max's turning brakes lock together (below) for simultaneous, rear-wheel braking.



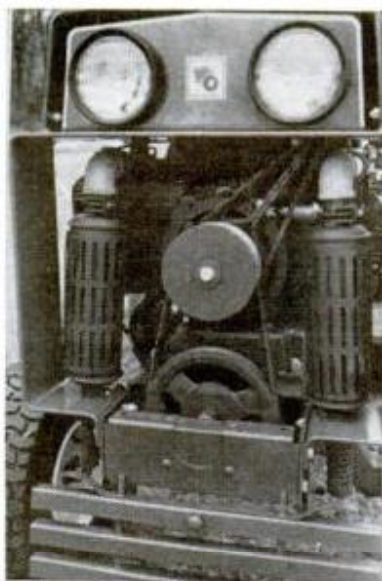
It's a good idea to check battery before engine—and exhaust pipe—heat up, for clearances are minimal. But fueling Pow'r Max, with counterbalanced hood lifted, is no problem.



As the PTO clutch engages, power flows to the triple-bladed mower from the D-200's twin-cylinder, 19.9-hp powerplant. Tractor has disc turning brakes and offers 34 optional attachments.



Instrument panel has light for after-dark operation, includes ammeter, oil-pressure gauge, engine hour meter, transmission temperature gauge. To service PTO clutch and belts (right), just lift out the grille—a simple but good idea. Hood is well supported by heavy bracket bolted to the frame.



\$350 for high flotation rear tires and turf front tires, and \$371 for the mower.

I gave the Wheel Horse D-200 a wild work-out on my rugged, hillside lot. With a 60-inch, 3-point hitch mower attached, this rig chewed up high weeds like a hound devours a hunk of beef. It kept its balance, hunching low on steep inclines, and could be steered with a couple of fingers through the whole routine.

If I were to voice a complaint, it would be that the two levers for controlling PTO-operated attachments are not only small, but they feel quite alike and are spaced only about a half-inch apart. Try to grab the right one in a hurry while attempting to jockey around a rock or stump, and you find yourself fumbling frantically. But more experience with the machine would help overcome the problem.

If you can lay your hands on the fuel, pour eight gallons into the behind-the-seat tank. The big tank lets you work for hours without stopping.

I don't like to fiddle with drive belts. The fact that none is used in the D-200's propulsion system is a plus for me. If you get the impression that I liked the D-200, you're right.

With extra-wide rear tires, the tractor tested is priced at \$3215. The mower (three-point hitch) is \$670 and a 48-inch belly-mounted mower is \$275. (These figures are the average list prices published by Wheel

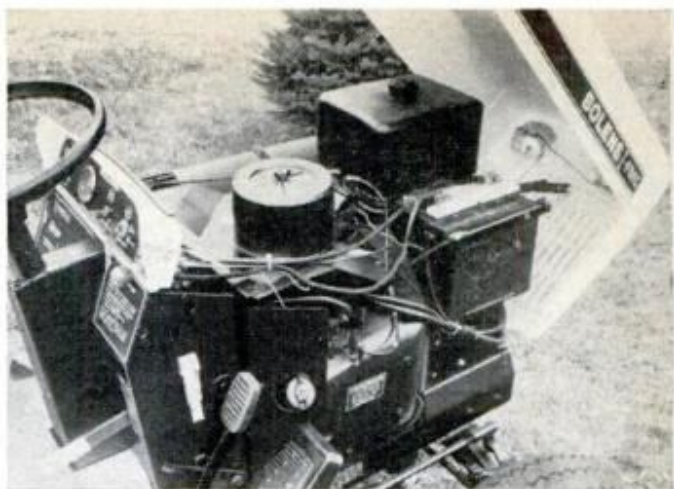
Horse's independent distributor organization.

I was pleasantly surprised by the rapid and ready response provided by the single, shoe-sized pedal for all forward and reverse hydrostatic control on the Bolens HT-20. Down with the toe to go forward. Ease back to find neutral (also the braking position) and down on the heel for reverse.

You soon get the hang of it. After a few minutes of experimenting, you really enjoy easing the tractor—at a creep or cruise—into tight quarters while keeping both hands on the steering wheel. That foot control for speed and direction is like having a third hand. On most tractors this size you almost need a third hand just to stay in command of all hydraulics.

To ease the PTO-driven, 54-inch mower into operation, I had to give a lever to the right of the steering wheel a hefty, two-handed tug. This engaged a belt-tightener clutch, allowing the PTO and mower to accelerate smoothly.

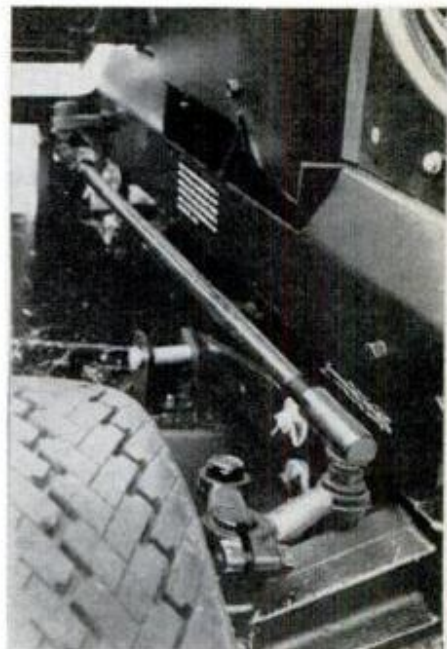
I headed for some high weeds and plowed right in, promptly choking the mower and killing the engine. I should have remembered Bolen's simple mower-height adjustment to allow more space for better trash clearance, at least on my first pass.



Limited hood lift of HT-20 restricts access to tank, so you need a can with a flexible spout to reach the filler vent. No fuel gauge is provided.

Rather than try to make a neat job of it, I went ahead with the remainder of the test, including braking, turns and hillside stability. The HT-20 performed as you might expect a well-engineered machine to respond. No complaints! Like the other two units, the HT-20 would make short work of most landscaping and hauling chores calling for real muscle.

The HT-20, as shown in the photos, lists at \$2510. The 54-inch mower attachment is \$352. ★★★



Steering components on the Bolens rig are rugged and well protected against accidental damage. Power steering is an extra-cost option. Author (left) runs through test with 54-inch belly-mounted mower. Attachments include snowthrowers, rotary tiller, dozer blades, dump cart, rotary broom. The HT-20 is powered by a 19.5-hp Kohler engine.

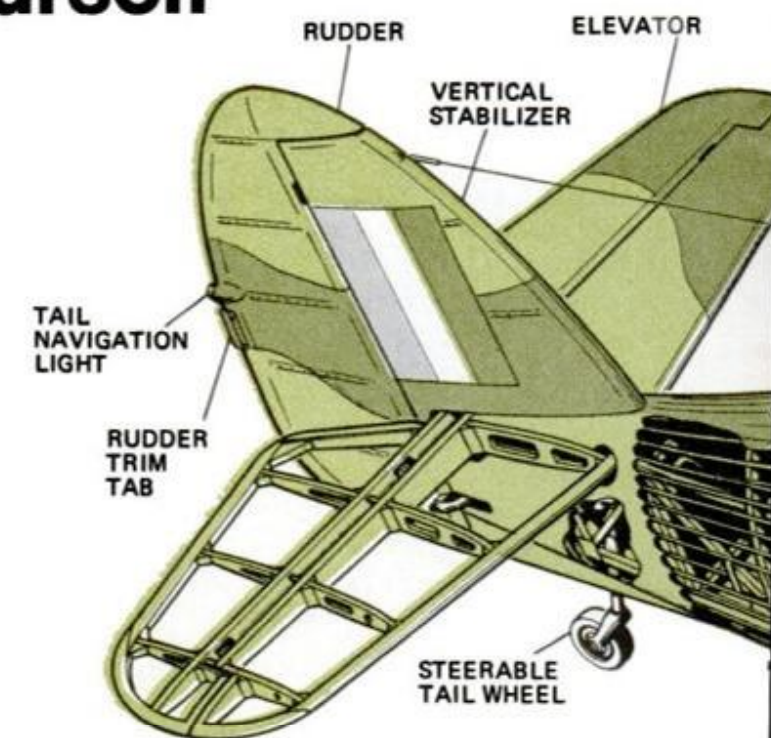
Mini warbird you can build yourself

This scaled-down replica of Britain's famous World War II Hawker Hurricane has the dashing looks of a fighter with the handling ease of a sport plane.

by Sheldon M. Gallagher
and Howard Levy

Photos: Howard Levy
Art: Fred L. Wolff

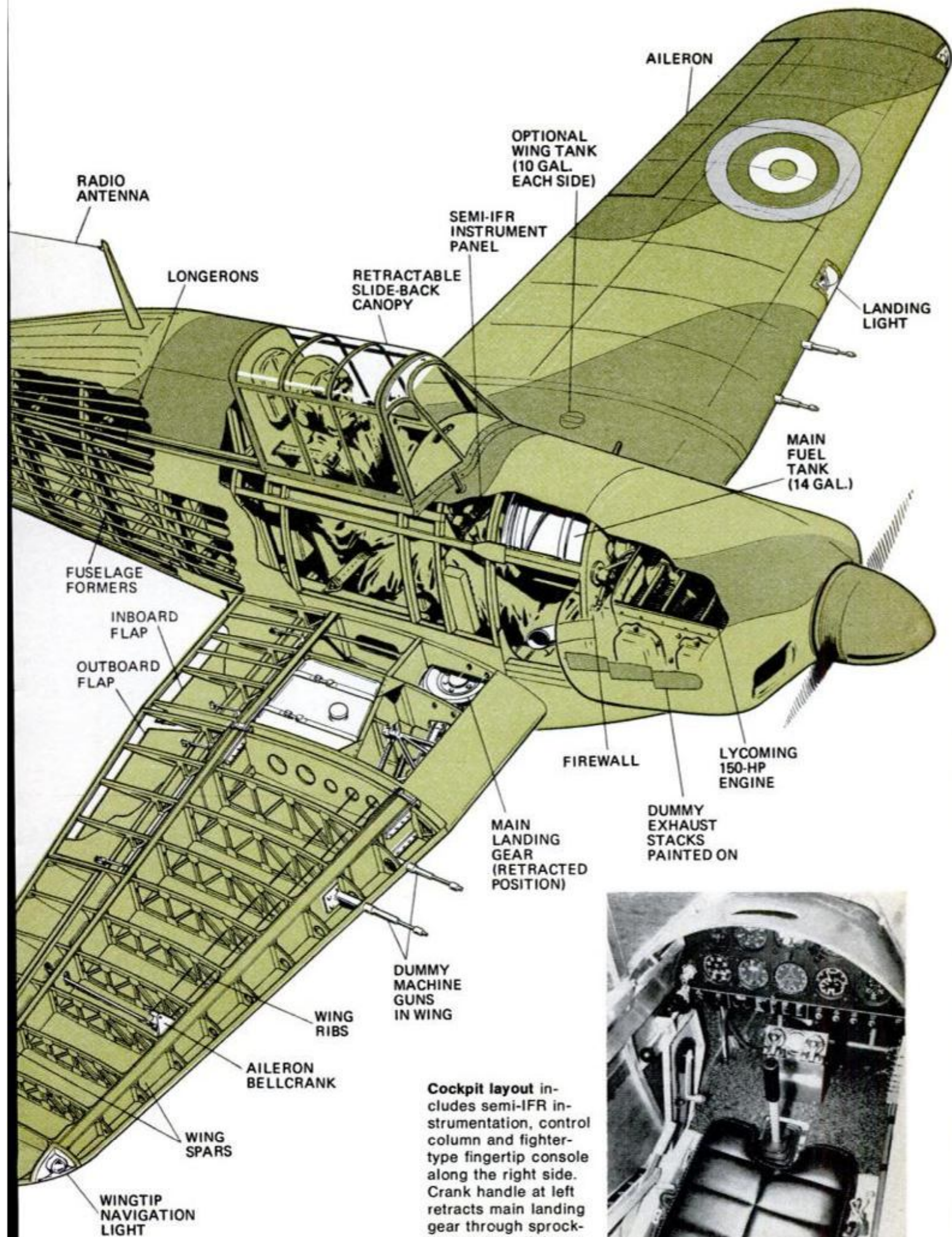
When United Airlines pilot Fred Sindlinger isn't flying passengers across the country, he's doing simulated combat maneuvers in his spectacular little Hawker Hurricane, a $\frac{5}{8}$ ths-scale version of the famous British fighter that, along with the Spitfire, played a major role in helping to rout the Nazis in the savage "Battle of Britain" during World War II. While not quite as fast as the Spitfire, the scrappy Hurricane earned a reputation for ruggedness and reliability that kept it flying long after its more glamorous cousins had to be grounded for repairs.

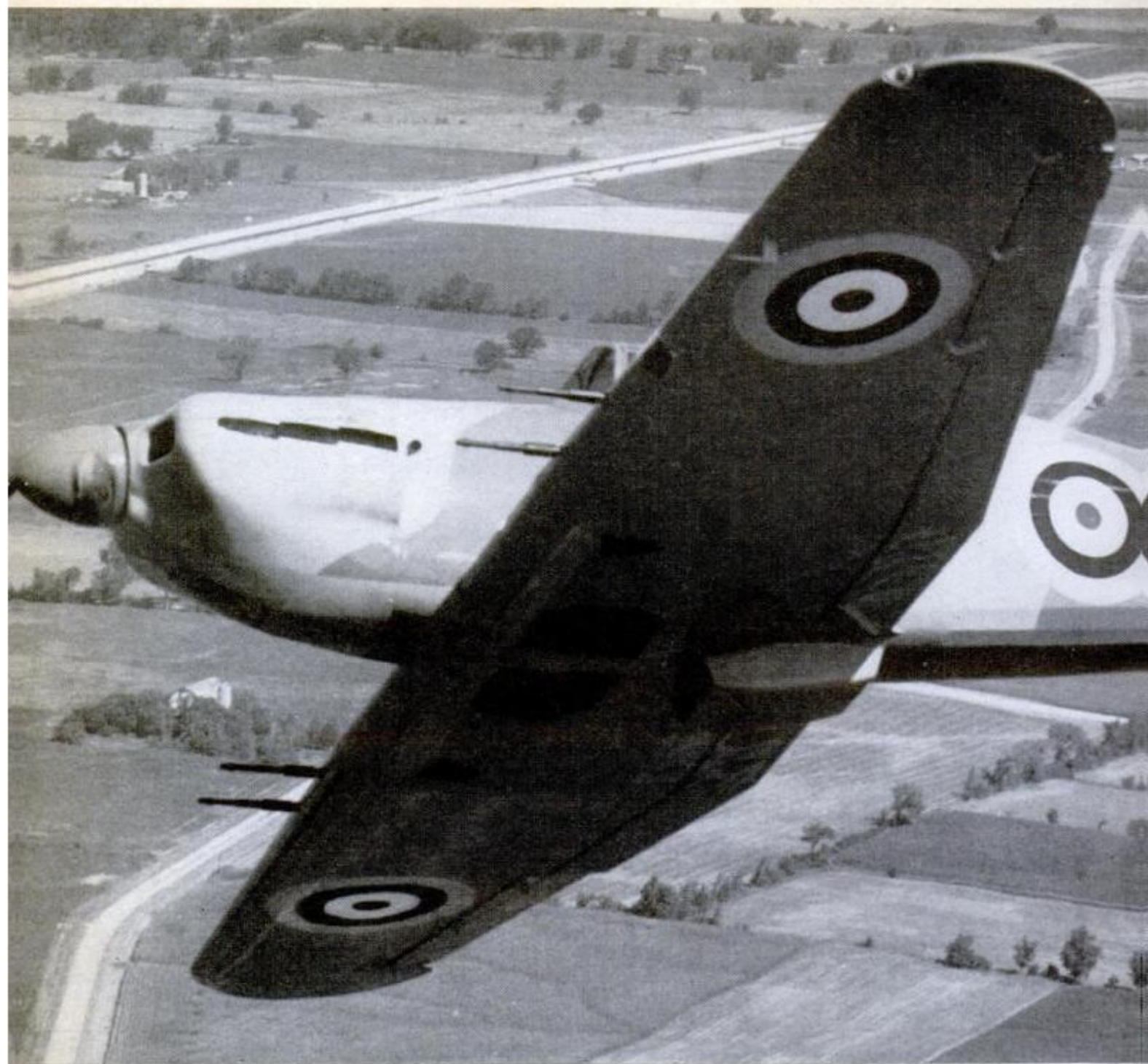


Fred, himself an ex-fighter pilot, chose the Hurricane as an ideal model to pattern his homebuilt after for several reasons. The prototype had unusually thick wings, making it easy to scale down without sacrificing wing strength or having to resort to cumbersome-looking overscale construction. Its large split-type flaps, spanning the entire wing from aileron to aileron, also give the Hurricane tremendous lift, good stability

Off on "mission" against Nazi bombers is this realistic $\frac{5}{8}$ ths replica of famed British Hurricane fighter.





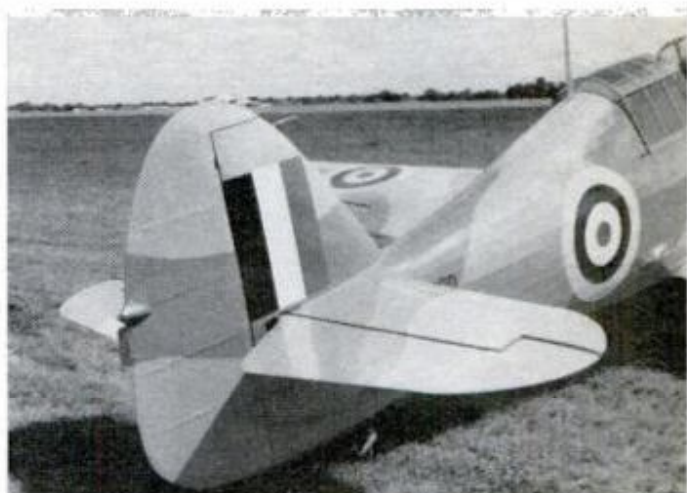
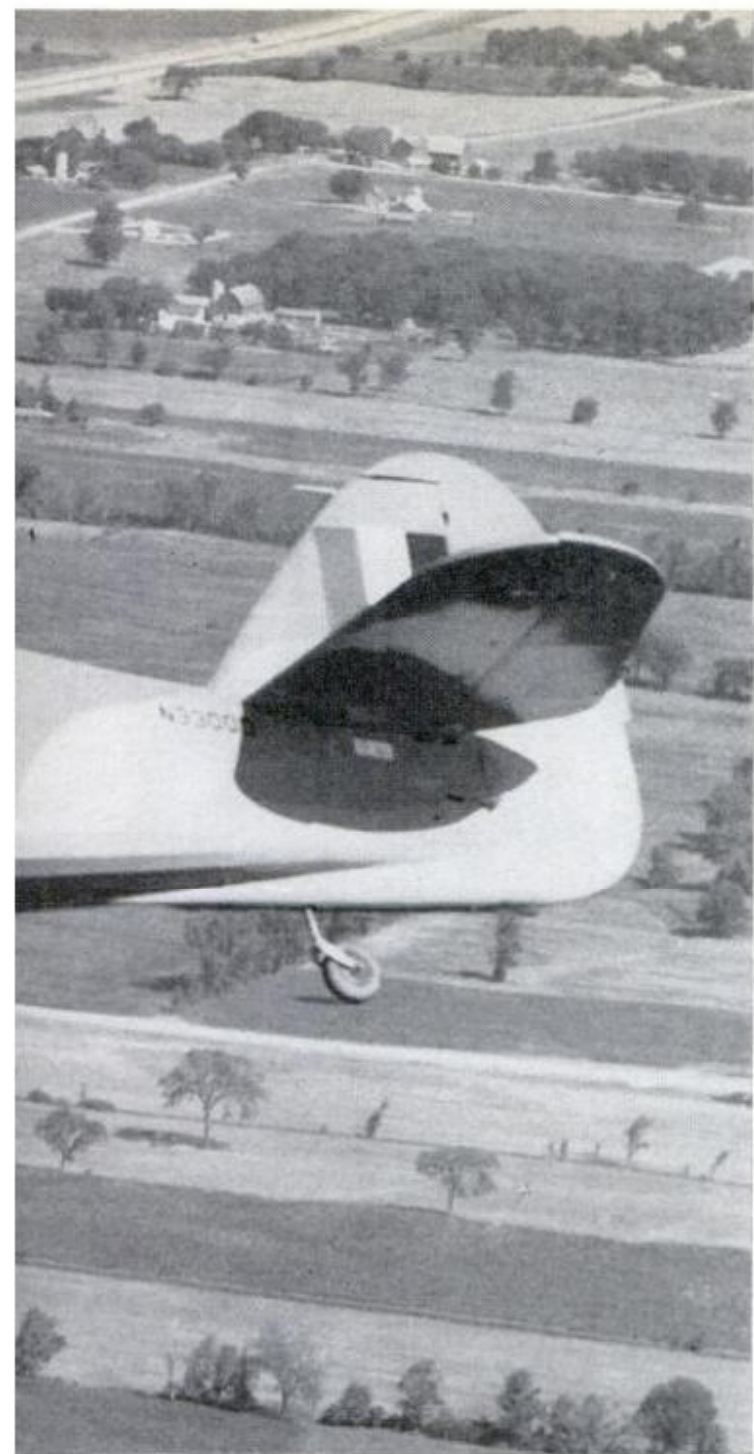


and a low stall speed for easy control. The result is a trim, sporty single-seater combining the dashing looks of a fighter with the docile handling of a Cub.

Semi-aerobatic, the mini-Hurricane is hot enough to satisfy the advanced pilot, while still being safe and forgiving in the hands of the low-time novice. Its 150-hp Lycoming engine provides a top speed of 195 mph, a cruising speed of 175 mph and a rate of climb of 1200 feet per minute. Stall speed is a tame 62 mph with flaps, enabling landings to be made at 65 mph in as little as 550 feet. Takeoff run is 425 feet. For fuel-saving operation, "economy cruise" is 164 mph at 55-percent power on 6.3 gallons per

hour—not bad for a ship of such high-performance characteristics. Maximum range is 550 miles with a 30-minute reserve.

Except for a few concessions to necessity, Fred's scaled-down replica is a faithful reproduction of the original, even to retractable landing gear, fierce-looking wing cannon and an authentic camouflage paint job. One touch that had to be "faked" is the series of three exhaust stacks that appear to protrude along each side of the nose cowling. These are actually painted on, concealing the Lycoming's strictly utilitarian single stacks. The tail surfaces and cockpit are both slightly overscale, also out of necessity—the tail to provide adequate control



area and the cockpit to accommodate full-scale pilots.

Construction of the Hurricane is all wood with plywood skins and fabric covering. Overall length is 19 feet, 8 inches; wingspan, 25 feet; height, 5 feet, 10 inches. Maximum stress limit is 4.4 Gs, both positive and negative. Wing tanks for extra fuel capacity are optional, and the tail wheel is steerable. Empty weight is 984 pounds; gross, 1375. Baggage capacity is 44 pounds. Estimated cost of construction ranges from about \$3500 to \$4000. Complete plans are \$115 from Sindlinger Aircraft Corp., 5923 Ninth St. N.W., Puyallup, Wash. 98371. A 40-page information brochure is \$5. ★★

Large flaps (bottom photo above) give ship a gentle stall speed of 62 mph, enabling it to land at 65 mph in 550 feet. Takeoff run is even less—425 feet. Cockpit and tail (center) are slightly overscale for roomy comfort inside and good stability and control in flight. Otherwise, mini fighter is an accurate $\frac{5}{8}$ -scale replica of the original. Large photo at left on facing page shows sleek, clean lines of underbelly with landing gear retracted. The tail wheel is steerable.

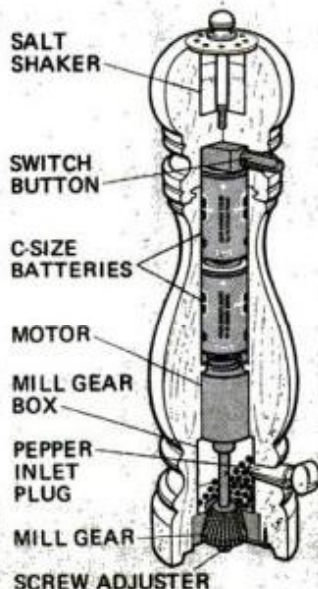
IT'S NEW NOW



With a huff and a puff up the truck comes

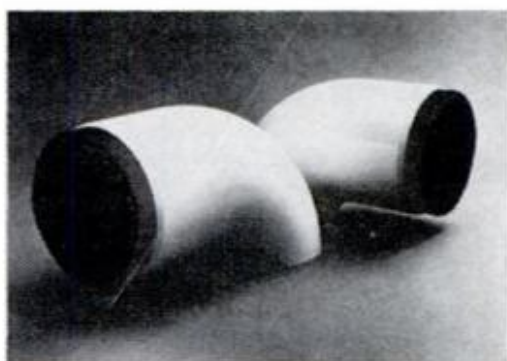
What looks like a truck napping on a pillow is actually a new system for righting overturned tractor-trailers and other heavy objects using huge inflatable air bags. The technique was de-

veloped in England for use in cramped quarters where conventional hoisting equipment can't operate easily. What isn't explained is how they get the air bags under the truck to begin with.



Cordless electric pepper mill offers choice of grind and salt, too

For the lazy gourmet who wants freshly ground pepper with a minimum of effort, this handsome cordless mill works at the touch of a button, adjusts for fine or coarse grind, and carries a salt shaker as well. Wooden parts are made of Keyaki wood, the kind used for the pillars of Japanese temples and shrines. Metal parts are stainless steel. Price of the 10½-in. mill is \$20 postpaid, from Entex Industries, Inc., 1616 East Burgrove, Carson, Calif. 90746.



Speakers with a twist

Not shipboard ventilating funnels or avante-garde flowerpots, these Superbend enclosures house two-way speaker systems with a 5-inch woofer and a 1½-inch tweeter covering a frequency range of 40-20,000 Hz. Aiming at you emphasizes treble; away, bass. \$135 each in black, white or red.



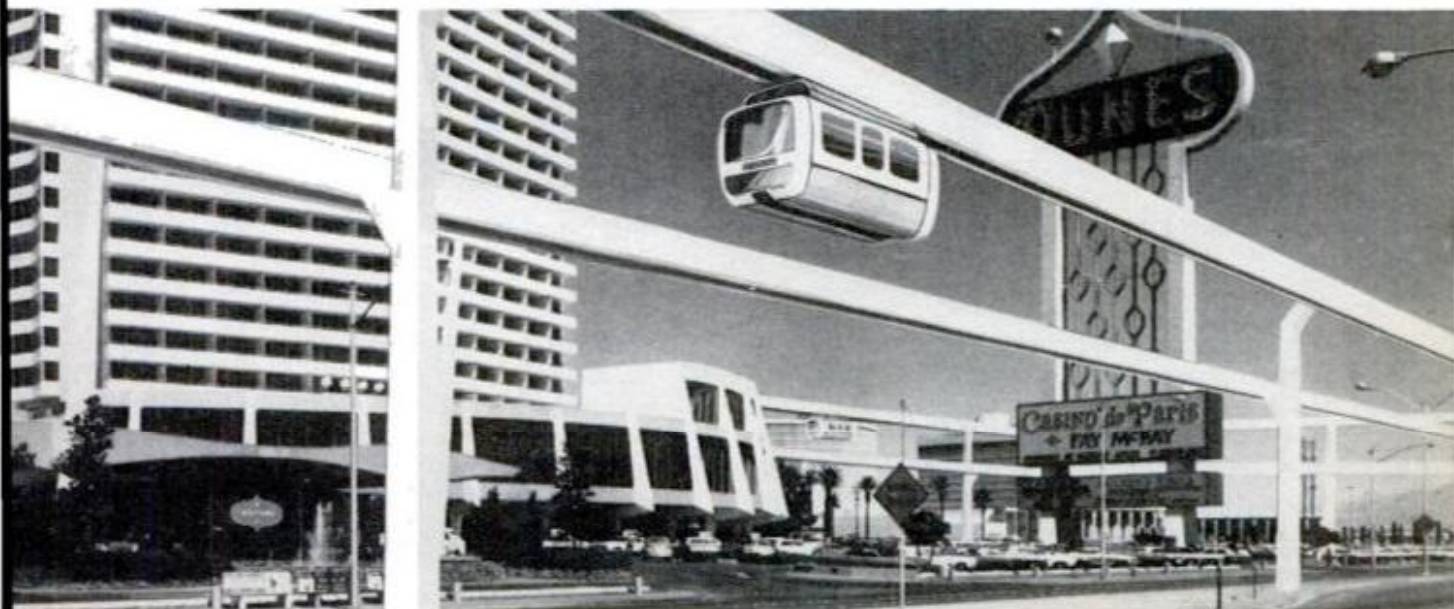
Costly suit of clothes

Ancient jade "death suit" of a Chinese princess who died a century before Christ is among 400 priceless oriental art treasures temporarily on display at London's Royal Academy. The objects are insured at \$40 million.

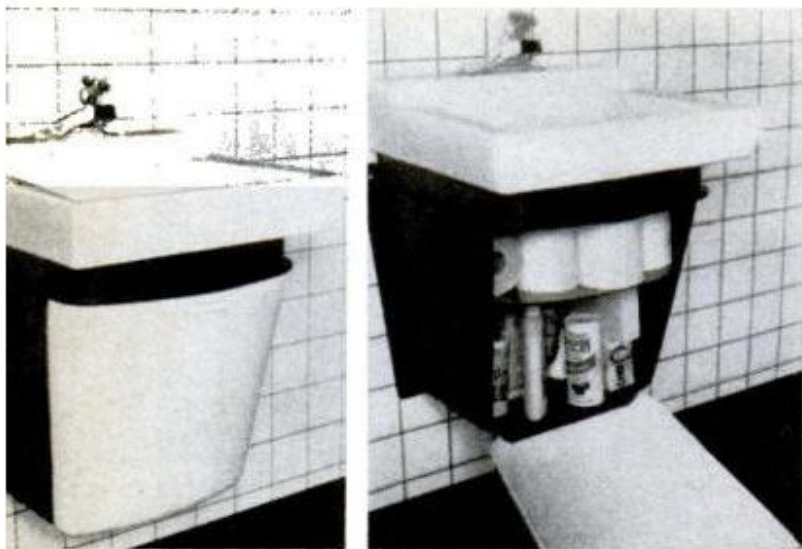


Fast way to go in a 'fun' city

A system of monorail cars will soon speed you directly from the airport to Las Vegas' downtown gambling casinos to help you spend your money faster. The computer-controlled Monocab cars, guided by a central dispatcher (left), take you automatically to any desired destination at the touch of a button.



NOW



Neat cover-up for exposed pipe

Hide-A-Pipe Vanitque not only conceals an unsightly lavatory trap but provides extra storage space for supplies. The molded styrene unit comes in pink, yellow, blue, black or white, measures 16 by 18 by 20 in., fits under most 17 by 19-in. and larger lavatories and installs with six screws. \$25.95 plus \$5 postage from Hide-A-Pipe Co., 510 South Ave. W., Westfield, N.J. 07090.



Lightweight chain saw with new features

Mini Mac 30 (above left) is first McCulloch chain saw to feature automatic bar and chain oiling at less than \$100. It has a 1.8-cu.-in. two-cycle engine and 12-in. bar, and weighs 8.4 lbs. Manufacturer's suggested retail price is \$99.95. Also new is Mini Mac 35 (right). With 2.0-cu.-in. engine and 14-in. bar, it weighs 8.6 lbs. and has a suggested retail price of \$119.95. Both have Mini Mac chain designed for homeowners and other nonpros.



Big head, small office

The big head in the photo at top, above, belongs to Martin Wilkinson, a research engineer at the University of Bath in England who's studying the effects of good and bad lighting in schools and offices. His work requires that he spend much time poking his head up inside a 1/12th-scale model of a typical business office to observe changes in light intensity and placement.

Computer keeps bowling scores

No more squinting down the lanes to see which pins are left standing with Rapid Score, a new RCA-developed computer scoring system. It automatically senses and records pins standing after each ball, calculates the score and displays it on a TV-like screen. Now used in seven cities, Rapid Score signals end of each frame, blocks play until next bowler logs in, also computes tournament or league scores.

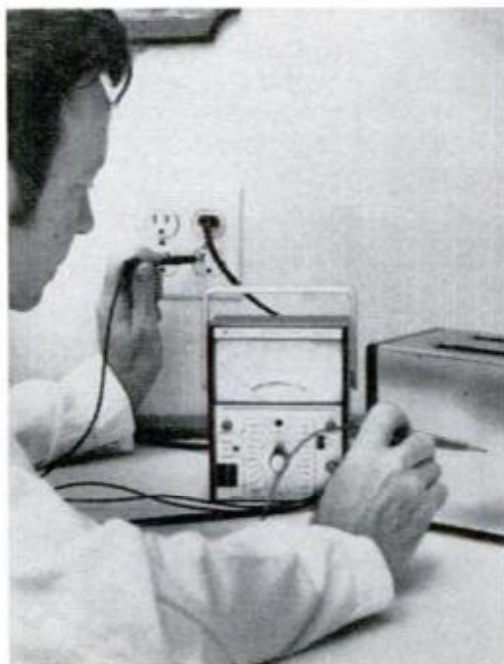


Gloves that rub up a shine on silver

Gloves that contain polish give a shine to silver fast and with no mess. Silversmiths' gloves with tarnish-preventing polish are said to eliminate tarnish for weeks so fine silver pieces can be left out on display. Made by W. J. Hagerty & Sons, Ltd., 3801 West Linden Ave., South Bend, Ind. 46624, the gloves are priced at \$4 at department, jewelry and hardware stores.

New multi-meter is a lot more multi than most

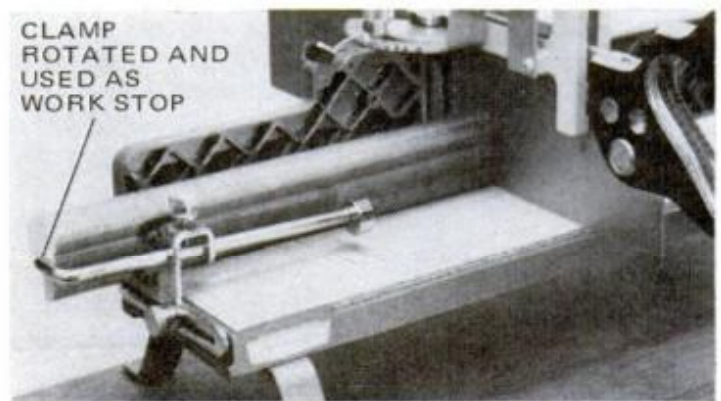
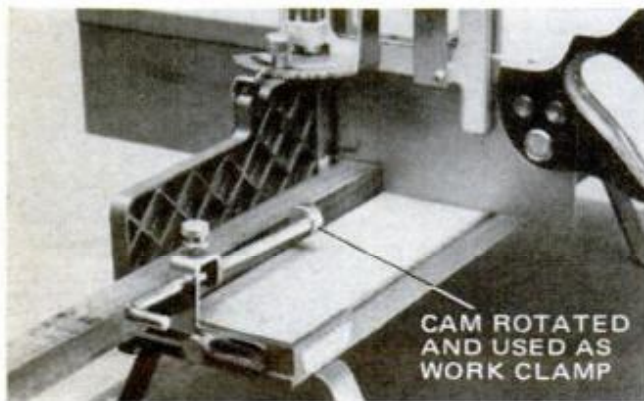
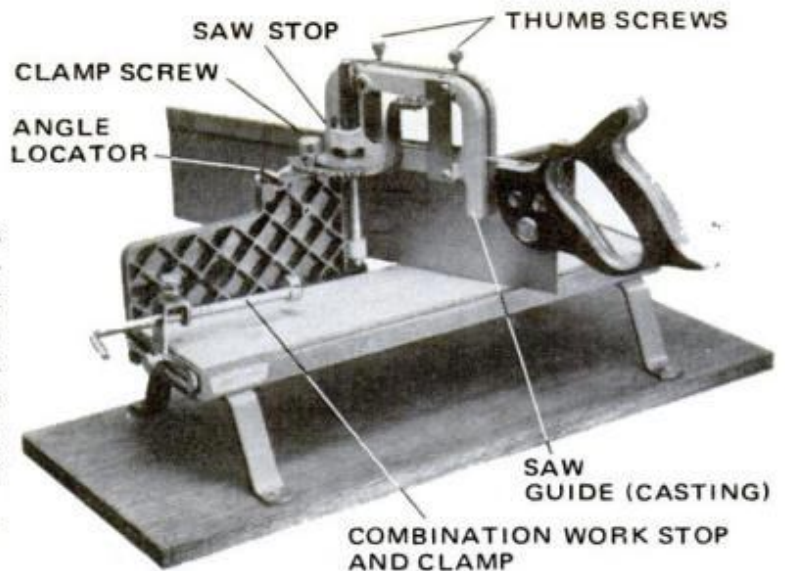
Like any other VOM, this new Triplet 615 measures volts (8 d.c. ranges from .06 to 300 v. full-scale; 6 a.c. ranges from 3 to 600 v.) and ohms. It also measures a.c. currents up to 120 amps. with an adapter. But that's not all. A network that simulates the human body's electrical characteristics measures a.c. leakage to check appliance safety (near right). And for maintaining heating and cooling systems, two temperature scales cover -50° F. to $+1500^{\circ}$ F., with switching for up to three temperature probes (far right). Price is \$130 from Triplet, Bluffton, Ohio 45817.



NOW

Multifunctioned miterbox

Newest Craftsman miterbox from Sears has spring-loaded index for quick selection of commonly used angles, roller-bearing guides that move up and down with the saw, a frame all around the base, a combination work stop-work clamp to hold stock up to 3 $\frac{7}{8}$ in. wide and legs drilled for mounting on a bench or board as shown. Base and back are a single piece of cast iron for durability. Box cuts all angles from 90° to 45° right or left, has depth stop, 3 $\frac{1}{2}$ by 16-in. Kromedge miter saw. About \$35.



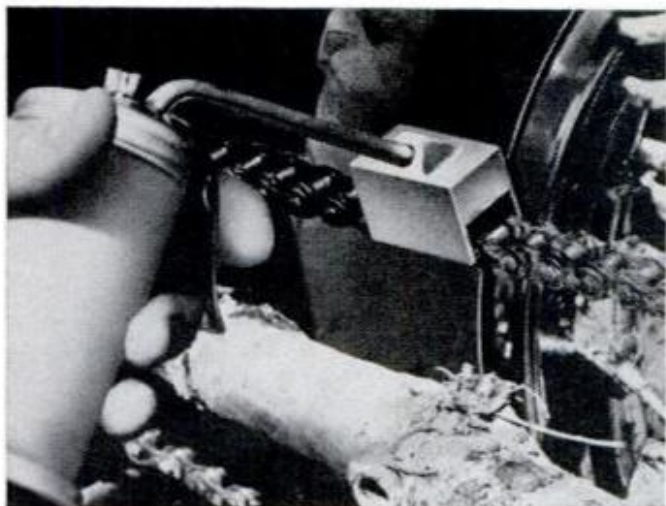
Would you believe—376 miles on a gallon?

It may not go fast, but it sure goes far. Ben Visser, a Shell Oil Co. research engineer of Rosewood Heights, Ill., claims he's gotten 376.59 miles to the gallon in his modified 1959 Opel station wagon. The mileage, said to be a world's record, was achieved by such tricks as removing the windshield to reduce wind resistance and using a single-speed transmission at very low speeds.



Extra camera body for your extra lenses

If you're tired of switching lenses on your SLR or changing film types in mid-roll. Spiratone has a camera just for you—the Spiraflex TTL. Sold only *without* lens, it takes Praktica, Pentax or similar thread-mount lenses to give you an extra camera body. At \$130, it has shutter speeds to 1/1000th of a second and a through-the-lens, match-needle light meter.



Handy oiler for bike and cycle chains

Lubricating drive chains on motorcycles, bikes, snowmobiles and similar equipment is easy with this applicator. It fits on the spout of pump-type oil cans and dispenses oil evenly through a pad as it's slid along the chain. The pad also cleans as it wipes. Kit including applicator, oil can and lubricant is \$5.95. Chainmate, Inc., 2 Grant St., Binghamton, N.Y. 13904.



The wing's the thing

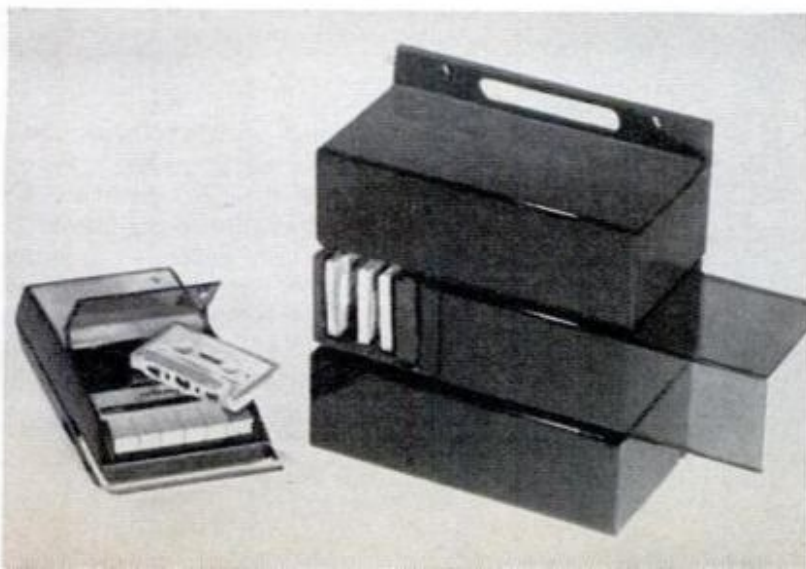
New tilt-wing plane has no rudder or elevator—the wing does all the work. Split at the midpoint, its two halves pivot collectively for climbing or diving and independently to provide aileron control for steering. In flight, wing pivots freely to assume its most efficient attitude. Designed by George Spratt, Wallingford, Pa., craft is said to be spin and stallproof as wing is always at proper flying angle.



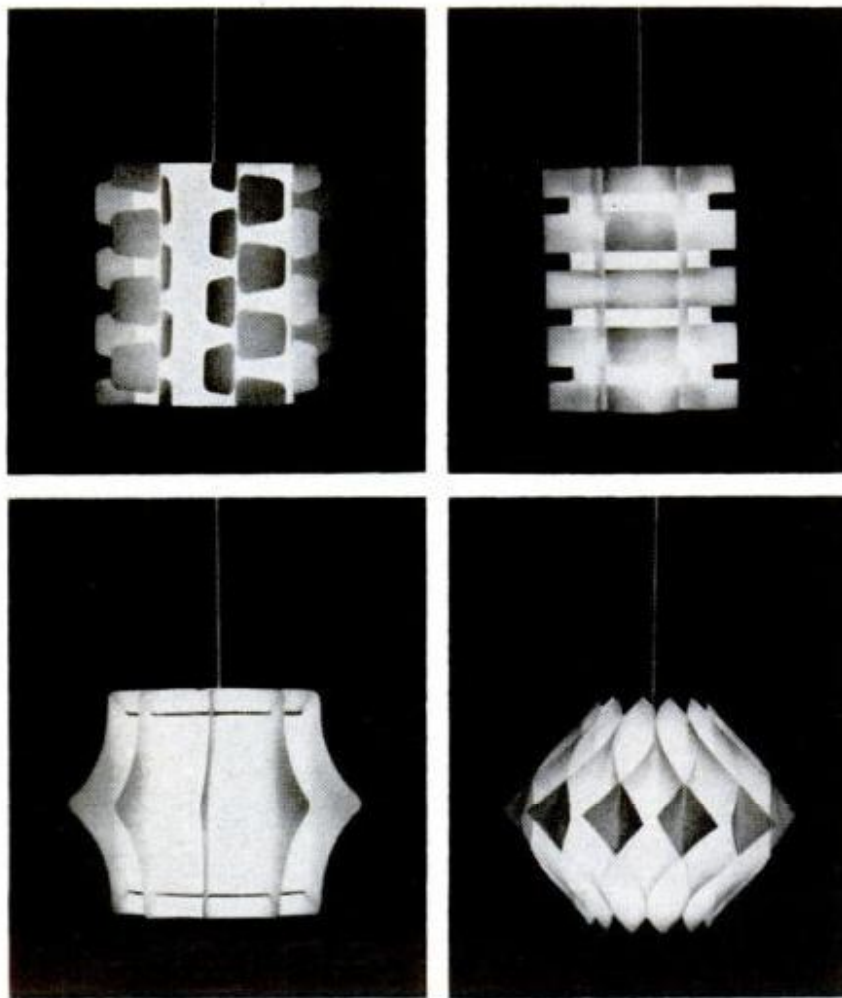
Vinyl adhesive

Golden Harvest vinyl adhesive can be used with all vinyl wall-covering weights; is \$3.59 for one gallon. Krause Milling Co., Box 1156, 611 Wisconsin Ave., Milwaukee, Wis. 53201.

Stuck on where to stick tapes?

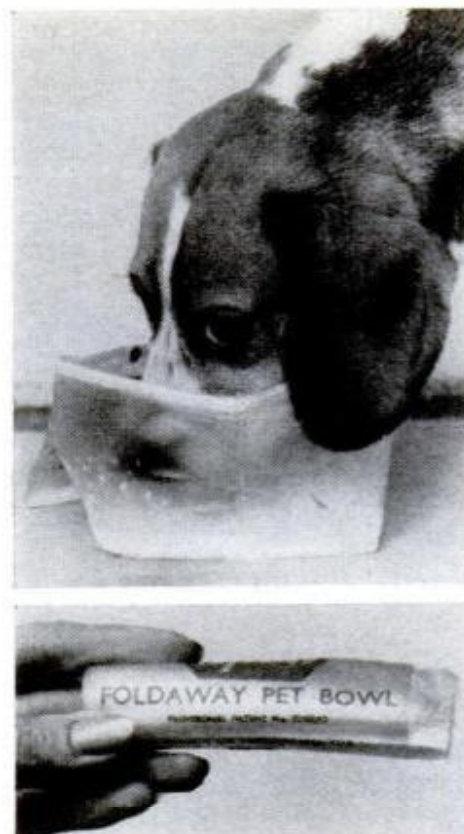


Audio-Stac is a new modular storage system for cassette tapes. Each unit holds 12 cassettes behind a sliding dust cover, and an interlocking feature allows multiple units to be stacked vertically. You can hang them on a wall or use their carrying handle to tote tapes from home to car. \$2.98 each in white or chocolate brown from Stac-All, 1650 West Big Beaver Rd., Troy, Mich. 48084.



Inexpensive modern-look lamps

Contempo swag lamps take about 15 minutes to assemble, are UL-listed, come in red, yellow and white. Prices range from \$10 to about \$13 each, with shade, socket, 15-ft. cord, all hanger parts, at hardware, department, lighting stores. Creative Lighting Co., Box 22128, Cleveland, Ohio 44122.



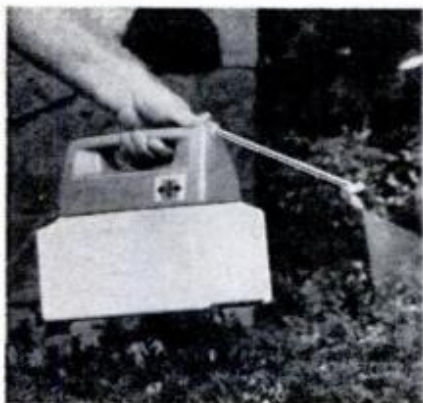
Foldaway dog dish

Everything folds or collapses these days for easy carrying—even dog dishes. This plastic bowl unrolls from a pocket-size pouch to form a feeding container large enough to hold a quart of liquid or pound of pet food, handy for taking along on vacation trips or picnics. Invented in Britain, it's made by Expro Products, Ltd., Eldon Lane, Newcastle-upon-Tyne, England.



Decorated Parsons tables

Popular Parsons table's classic lines meet Art Deco patterns and wood-grain look in 16-in. knockdown accent tables. Black-on-white tables can be grouped for visual impact. Suggested retail price is \$8.88; black table with wood-grain insert is \$9.99. At hardware and department stores. Republic Molding Corp., 6330 West Touhy Ave., Chicago, Ill. 60648.



Adjustable sprayer

A new cordless electric sprayer has a nozzle that adjusts to give fine mist or 12-ft. long-range spray. Nozzle, extension fold away into handle. With ½-gal. capacity, \$29.95; 1 gal., \$32.95, including rechargers. H. D. Hudson Manufacturing Co., 154 East Erie St., Chicago, Ill. 60611.



Typing twins

Looking like "Siamese twins," these dual typewriter keyboards have a single carriage. One keyboard has conventional alphabet letters, while the other offers 92 special math and chemical symbols for typing industrial computations and formulas. The maker is Hunts Enterprises, Ltd., Box 33, Cowley, England.

If two doors are good, why not three?

Combining convenience and efficiency, new three-door refrigerator-freezers give ready access to items such as ice cream and frozen juices, leaving bulk frozen storage undisturbed. Frigidaire adds built-in cassette recorder with AM/FM radio, to replace the kitchen bulletin board; it can also be removed for portable use. Tappan, bottom left, features chilled water dispenser in door. Westinghouse has Power Economizer that compensates for environmental humidity. Prices for these top-of-the-line models range from about \$575 to \$750.





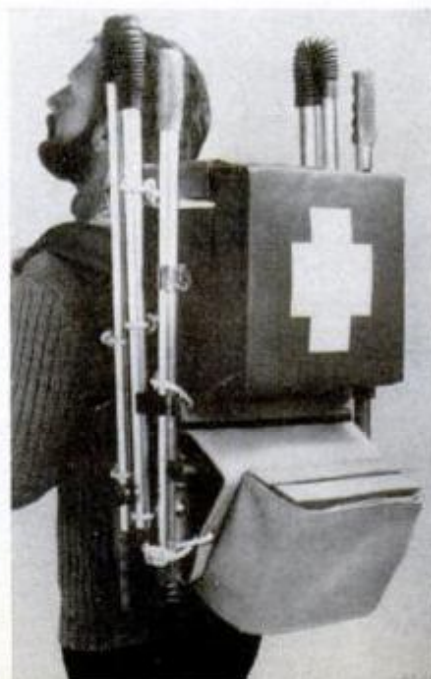
No-fuzz tennis balls

All-weather tennis balls have no fuzz to hold water, no pressurization to leak, so they can't go dead. Washable vinyl-rubber compound is playable to 10° F. Higher bounce makes them excellent for beginners. Suggested retail price for three, white or yellow, is \$3. Tensor Corp., 333 Stanley Ave., Brooklyn, N.Y. 11207.



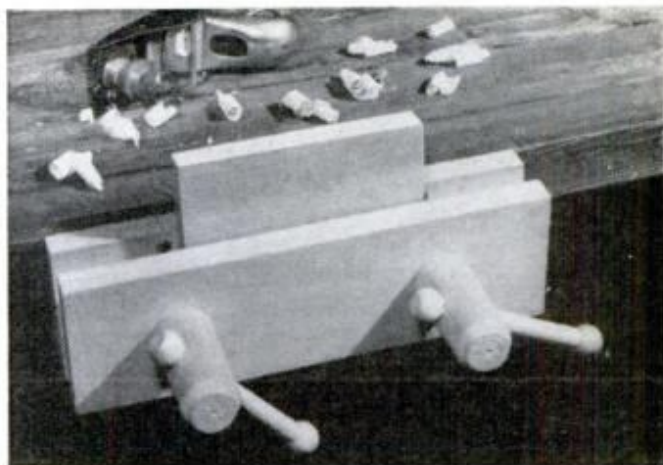
New lifesaving aids for sailors, heart victims, mountain climbers

The sailor sliding down the inflatable chute at top left is trying out a new emergency shipboard escape device under Coast Guard test. It guides seamen into a raft or lifeboat, saving dangerous jumps into icy waters. Middle and lower photos at left show a mobile survival unit for heart-attack victims that's a mini hospital on wheels. It contains resuscitator, defibrillator, pacemaker, electrocardiograph and other aids designed by New York heart specialist Dr. Nicholas A. Pace to sustain life during the critical minutes on the way to a hospital. At bottom is a collapsible backpack stretcher to speed the rescue of injured mountain climbers developed by Chew Pui Wai, 74 Englefield Rd., London, England.



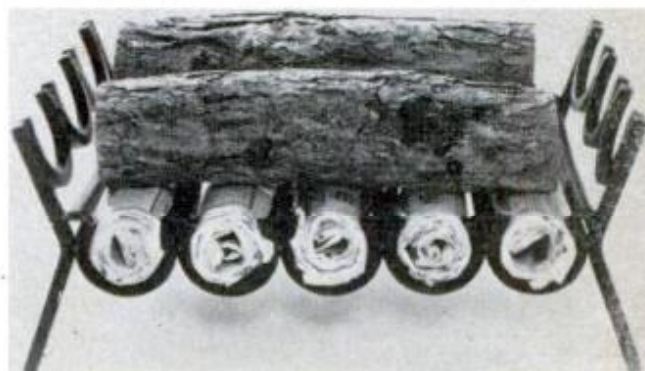
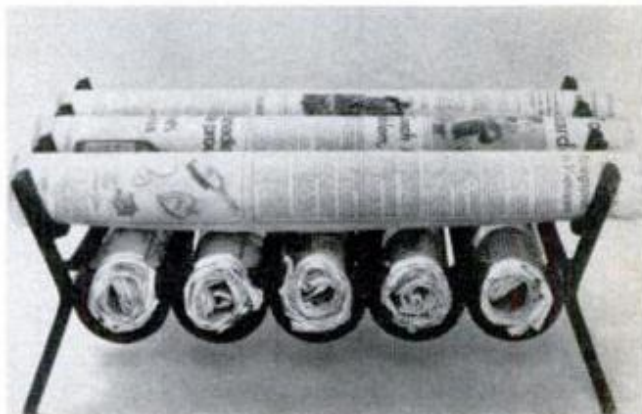
Inexpensive woodworker's vise

This light-duty vise has old-time looks, real practicality and a low price. All beechwood (unfinished), its jaws are easier than metal ones on wood workpieces. The movable jaw is loose to clamp nonparallel work; 12-in.-long jaws have maximum opening of 3 $\frac{3}{4}$ in. Mounts on bench or for use as a gluing clamp or press; \$4.05 plus 90 cents shipping from Brookstone Co., Peterborough, N.H. 03458.



Paper-burning grate with built-in hold-down

A fireplace grate that works two ways, Kindelabra II has scalloped holders for newspaper rolls used for kindling under logs or as a fire's sole fuel. Rolls don't have to be tied. Maker says spacing provides proper airflow to promote even, complete burning. Welded iron grate measures 22 by 14 in.; \$29.95 postpaid (Massachusetts residents add 90 cents sales tax) from the Kindelabra Co., Box 253, Wellesley, Mass. 02181.



Tanklike scouter can swim, too

Able to twist its way over virtually any terrain as well as swim across rivers and lakes, this high-speed armored reconnaissance Scout represents a new concept in military vehicles. Developed by Lockheed for the U.S. Army, it combines the toughness and fire power of a tank with the go-anywhere mobility of a jeep or half-track. Its six-wheel drive and articulated body enable it to romp over rough ground at speeds up to 65 mph, while a hydrojet propels it through water. Armament includes 20-mm turret cannon and .60-cal. machine gun.

PM OWNERS REPORT:



Beautiful— but buzzers bug buyers



Photos by the author

Mustang II's handling brought praise for its cornering ability as well as its agility in traffic and parking ease. Power steering is available but not necessary.

A nationwide survey based on 669,000 owner-driven miles.

by Michael Lamm
WEST COAST EDITOR

Mustang II owners gave all sorts of reasons for buying. A South Carolina accountant exulted, "For style and economy—it's one car whose styling is different; not carried over or borrowed or added to."

"I wanted a small car with luxury appointments," explained a Michigan high school principal. "Looks, price, economy."—Utah machinist. "Safer than other small cars," said an Ohio manager. "I had a 1967 Mustang that I like very much."—New Hampshire librarian. *



Three-door hatchback (shown) and notchback coupe come in five models: Mach I, 2 + 2, and two-seater, plus Ghia and hardtop. Folding rear seat is standard in all hatchbacks.



Full one-piece, fiberglass-reinforced molded plastic front ensemble eliminates body joints. Unit construction uses isolated front subframe to carry engine and trans.

An Ohio practical nurse: "Because of its smaller size, appealing looks, price and good gas mileage." An Oregon teacher: "I wanted a car that didn't look like the other small cars—VW, Datsun, Vega, etc. I wanted one that looked like a big car but had small size and luxury." And a California typist confessed, "Because it's sexy—like me!"

What do Mustang II owners think of their dealers? "I made an appointment with the dealership to fix my stall-outs," comments an Ohio steelworker, "and they fixed it that same day at no charge." A Texas claims adjuster admitted: "The dealer had an easy job, because the car sold itself and the salesman only had to take my money." A California meat cutter observed, "When a dealer sells you a little car for \$5100, he's always very nice."

"I ordered the optional digital clock but never got one."—California electronics worker. (Those who did get these clocks say they keep better time than the old type.) "Service is better than average."—Chicago engineer. "Dealer gave me the

runaround about fixing my leaky transmission. This was warranty work, of course. Ford has a way to go to find no unhappy owners."—New Jersey salesman. "My fuel pump went out at 4900 miles. Dealer paid for the tow and fixed it in 90 minutes, so I'm more than satisfied."—California chemist.

On the topic of workmanship, there are these quotes: "Outstanding, almost defect-free, few ghost noises." "Excellent." "Same quality as Thunderbird." "Some chipped paint, but nothing else was wrong." "Great." "Doors don't shut as easily as they should."

"Very satisfied with quality." "Perfect—no problems at all—seems very sturdy." "Above average, both chassis and body; no malfunctions."

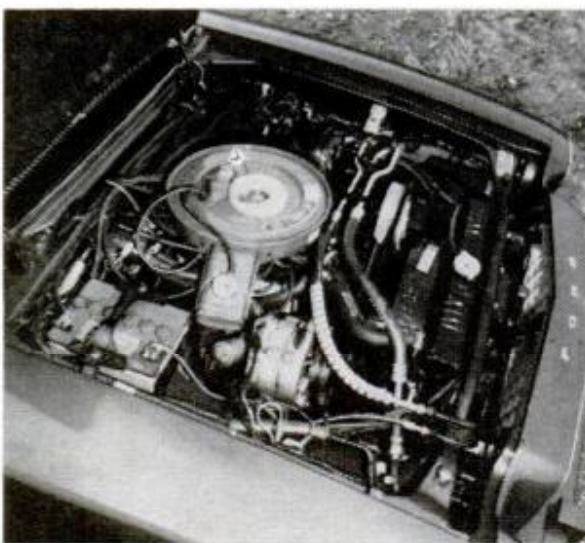
How about comfort? "The back seat is a joke." "Sufficient for two people; rear seat for short trips only." "I'm 6-4 and would like a little more headroom." "Extremely comfortable; passengers impressed." "Two plus two what?" "The floor hump in the back seat gets in people's way, and it's a bit

Counterbalanced hatch gives access to lumpy floor area. Bumpers are covered in urethane.

Impressive instrument panel (far right) in Mach I includes tach, three working gauges.

Owners tend to load their Mustangs with options, resulting in tight engine compartments, sluggish performance. Ohc Four and V6 are available.

Central console bin (far right) is accessible from front or back seat. Lack of padding, cramped quarters made rear riders complain.



cramped, but you expect that when you buy a small car."

One loud, prolonged gripe—the mandatory seat belt-ignition interlock. "The new safety devices can really be a hassle. I realize they are important, but if the belts get the least bit tangled, you're stuck. I once spent 30 minutes in front of a store trying to get my seat belts untangled. It feels kind of dumb explaining to people that your car won't start because your belts are tangled."

Similarly: "I found the shoulder harness uncomfortable so I cut them off!" "I hate to be harrassed by a bunch of buzzers." "Seems stupid to me that I have to buckle up to start the car, then unbuckle to get out and deice the windows, then buckle up again before I take off." "The interlock is a real pain in parking lots, car washes, etc." "Please tell me how to bypass the seat-belt interlock."

And even more: "Shoulder harness cuts into my neck; very uncomfortable." "Even

with the front seats all the way forward, it's really a chore for tall people to get into the back seat. They have to duck under the top half of the shoulder harness."

Pros and cons on performance included these: "Four-cylinder engine is very sluggish from 0-30 mph." "No guts . . . how about Ford's 351 Cleveland V8 as an option?" "I listed 'lack of power' as one of my complaints, because it takes a little extra effort to merge and pass on expressways. But anyone who feels he's been ripped off because of this lack of power just didn't look closely enough. I was buying an economy car, not something to race." "Mine has awfully good pickup." "Lacks power, especially trying to climb steep hills." "I like the snap of the V6 engine."

Most owners appreciate the Mustang II's handling ease. A Maine bookkeeper: "Holds the road well in crosswinds." An Indiana credit manager: "Handling ability similar to European cars." An Ohio accountant: "Rides like a larger car and handles like it

Summary of 1974 Ford Mustang II Owners Reports*

Total miles driven	669,320	Specific likes:		Had any mechanical trouble?	
Average miles per gallon:		Styling	61.5%	No	55.2%
2.3-liter Four:		Handling	56.0	Yes	44.8
Local driving	18.1	Economy	41.7	What type of trouble?	
Long trips	21.7	Ride	24.8	Transmission	16.0%
2.8-liter V6:		Comfort	23.4	Carburetor	16.0
Local driving	17.2	Size	17.4	Engine runs on	14.0
Long trips	20.7	Specific dislikes:		Heater	7.0
Engines:		Seat-belt system	18.8%	Did you repair it yourself?	
2.3-liter Four	53.3%	Poor gas mileage	18.3	No	96.9%
2.8-liter V6	46.7	Lack of power	12.4	Yes	3.1
Transmissions:		Poor workmanship	6.4	Dealer repairs satisfactory?	
Automatic	53.3%	Number of vehicles owned:		Yes	56.1%
Four-speed manual	46.7	Mustang II only	39.0%	No	43.9
Series:		Two cars	41.7	What changes would you like?	
Basic Mustang II	35.3%	Three cars	14.8	Seat-belt interlock	14.9%
Mustang Ghia	25.3	Makes of other cars owned:		Better mileage	7.7
Mustang 2 + 2	17.6	Ford	29.5%	More trunk capacity	6.7
Mustang Mach I	21.7	Chevrolet	16.5	More rear legroom	6.2
Two-seater	No replies	Mustang	12.2	More horsepower	6.2
Body style:		Mercury	10.1	Age distribution of owners:	
Notchback coupe	56.4%	Pinto	8.6	16-29 years	50.7%
Hatchback coupe	43.6	Comfort opinion:		30-49 years	31.5
Why the Mustang II?		Good to excellent	39.4%	50-plus	17.9
Styling	52.7%	Average to poor	58.9	Would you buy another Mustang II?	
Economy	45.6	Workmanship opinion:		Yes	79.1%
Size	23.0	Good to excellent	39.4%	No	20.9
Past experience	11.5	Average to poor	28.6		

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

has power steering." An Alabama student: "It handles good in the corners and holds the road real good, and the brakes are fine." "Handles like a heavy car on the road."—New York salesman.

Gas mileage came in for consistent praise from owners, even though a high 18.3 percent listed it as their biggest complaint. Most of those had been told by salesmen that they could expect 25-30 mpg, whereas actual averages ran 17-21 mpg. The Mustang II's 17-21-mpg average is the best for any American-made car we've surveyed in the last three years. We haven't posted mileage like that since 1971, when Pintos were getting 22-27 mpg, Vegas 21-25, and Gremlins 18-22.

If Mustang II owners could re-engineer their cars, what would they change? "Put the old 289 four-barrel back in!"—Mississippi computer programmer. "Nothing—I love it just the way it is."—New Jersey secretary. "Redesign the heater so the driver's legs don't roast and the passenger's don't freeze."—New Jersey coast guardsmen. "Add more trunk space and subtract buzzers and no-start devices."—Illinois worker. "I'd try to get a smoother ride."—Florida secretary. "I sure would like the side vent windows back."—Florida airman. "The ashtray is in a poor spot for a manual-shift car; I'd move it."—Arizona electrician.

"It looks too much like the Pinto."—Georgia corpsman.

We always leave space on the backs of our questionnaires for general comments. These often tell more than answers to direct questions. We have room this time, so here are a few.

A Minnesota locomotive engineer writes, "I had an engine vibration that couldn't be stopped. Called in Ford Customer Service, and response was excellent. They sent engineers out twice and called Dearborn once, but no solution. I felt the engine was out of balance and asked the dealer to trade for a car of equal value. This was done with no problems."

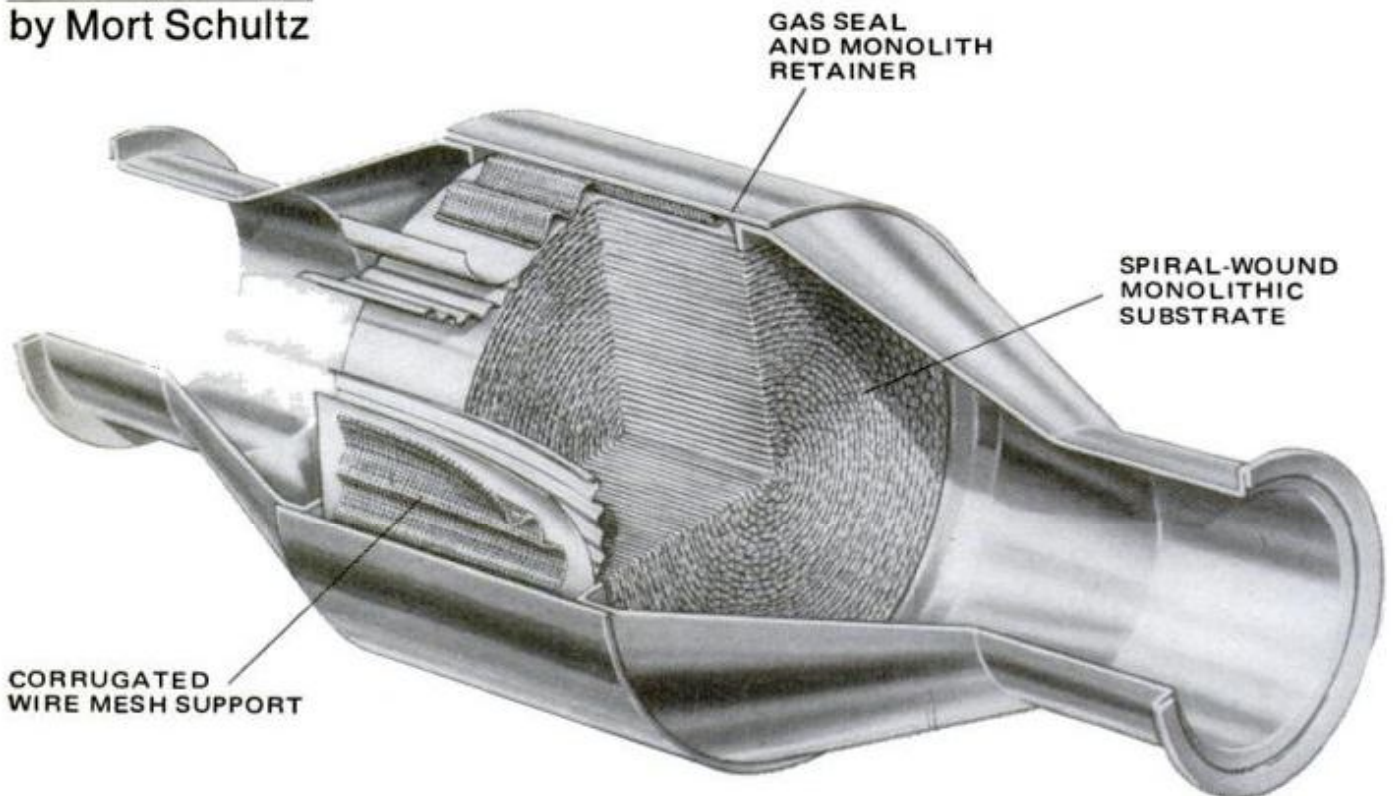
A Virginia EPA employee: "I would simply comment that I could not be more pleased with my Mustang II. I traded in a VW in good shape. No regrets. VW can't touch the Mustang for responsive steering and comfort. I am especially pleased with the styling, inside and out. A friend who owns a comparable Vega is amazed at the Mustang II's more luxurious interior."

A California forklift operator: "I wanted economy as well as a sporty little car. I got more than I expected. Very nice, very solid, feels and rides smooth like a big car."

A Michigan factory worker: "I haven't found a girl yet who doesn't like the car." Most owners, evidently, are pleased. ★★

How to live with emission controls

by Mort Schultz



In the catalytic converter that will be used on 1975 models, dangerous carbon monoxide and hydrocarbons are converted to harmless carbon dioxide and water when the two pollutants come in contact with the paladium or platinum catalyst in the core.

Clean air and human health should be top priorities in a sane society. Sadly, too many people, some in the highest positions in government and industry, advocate eliminating auto emission controls as the best way to save gasoline. What about eliminating airconditioning, automatic transmissions and excess weight? These are the luxuries, not emission controls.

The extra fuel that emission controls cause an engine to consume is the price we must pay to breathe cleaner air. The fact that the devices do use additional fuel cannot be argued. Such things as retarded spark settings and new camshafts that allow intake valves to remain open for a longer time, and engines set up to idle at higher speeds to avert roughness see to that. But how much gas do they really use?

According to the Environmental Protection Agency, antismog devices cause an eight percent increase in fuel consumption, which means that if your car gets 13 miles per gallon, it would get 14 miles per gallon without pollution control equipment.

It's vehicle weight that is the main contributor to poor gas mileage. A 5000-pound car gets roughly half the mileage of a car weighing half as much.

It would be criminal to reverse the progress made since 1960, especially since catalytic converters promise to reverse the gas-consumption tendencies of pollution controls. The converter is the latest development in pollution control, and most 1975 model cars will be equipped with one. General Motors claims that the catalytic converter will improve fuel economy by 13

percent. It will also permit 1975 cars to meet government standards calling for a 97 percent reduction in hydrocarbons and a 96 percent reduction in carbon monoxide from an uncontrolled car.

The 1973 and 1974 cars are emitting 83 percent less hydrocarbons (HC), 70 percent less carbon monoxide (CO) and 50 percent less nitrogen oxide (NOx) than an uncontrolled car, as shown below in Chrysler's chart. A fourth pollutant, particulates, also is declining. Particulates are primarily tiny particles of lead thrown out the exhaust.

They are being reduced because lead is being taken out of gasoline. By 1979, the average lead content per gallon will be only 0.5 gram as compared to the 2.5 grams per gallon of a fully leaded gas.

Auto pollution comes from four different areas: the crankcase, gas tank, carburetor and exhaust pipe. Understanding the systems and how they work is the first step to living with them and keeping them functioning properly. Positive crankcase ventilation (PCV), has virtually eliminated pollution from the crankcase, mostly hydrocarbons. HC is unburned fuel that is pushed past piston rings into the crankcase during the combustion process. Another term for it is blowby, and it gets worse as a car gets older and rings wear.

Blowby must be purged from a crankcase where it would ruin an engine by condensing, diluting oil and causing sludge. Before PCV, vapors were allowed to escape through an open tube extending from the crankcase into the atmosphere.

The closed PCV system draws air into the carburetor air cleaner, and through the filters and hose to the crankcase where it mixes with the blowby vapors and dilutes them.

The diluted gases surge up through a vacuum-and-spring control (the PCV valve) into the intake manifold. They mix with the incoming fuel mixture and are reburned in the combustion process (remember, the gases are actually unburned fuel vapors anyway).

If excessive pressure somehow builds up in the crankcase and gases reverse their flow, they back up through the sealed oil-filler cap and into the carburetor air cleaner, entering the manifold through the carburetor. This may upset the fuel-air ratio and make the engine idle rough.

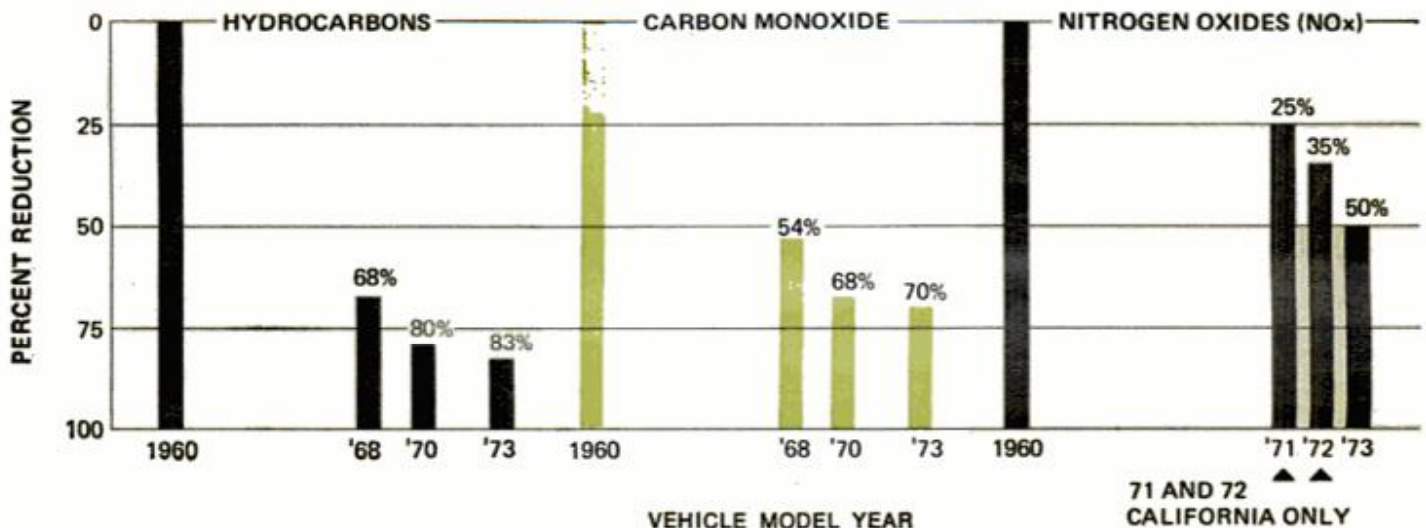
To avert problems with the PCV system, car owners should maintain equipment as outlined in owners' manuals. Hoses should be inspected for tears, filters cleaned or replaced, and the PCV valve checked.

The PCV valve is a very important component. If it sticks, the air/fuel ratio is disrupted and engine idle is affected.

The PCV valve also springs shut if the engine backfires. If it sticks when backfire occurs, unburned blowby vapors in the crankcase may ignite and cause a disastrous crankcase explosion.

Before the 1971 car models (1970 in California), unburned vapors escaped from open vents in the carburetor and gas-tank cap or gas tank. Vents are needed to let pressure out—otherwise vapors would pro-

AVERAGE YEARLY REDUCTION OF EMISSIONS IN THE UNITED STATES



duce an overrich fuel mixture and pressure could damage the fuel tank.

Now, the open vents have been sealed. Vapors are bled off and vented through closed lines to a charcoal-filled canister in the engine compartment.

When the engine is started, fresh air is pulled into the canister by vacuum. It purges the charcoal of vapors, and diluted vapors are drawn through purge lines to the engine for burning.

There are other features that limit the chance of pollution. For example, fuel tanks have been redesigned to prevent spillage. In some, the filler pipe has been extended into the fuel tank, which prevents the tank from being filled to the brim.

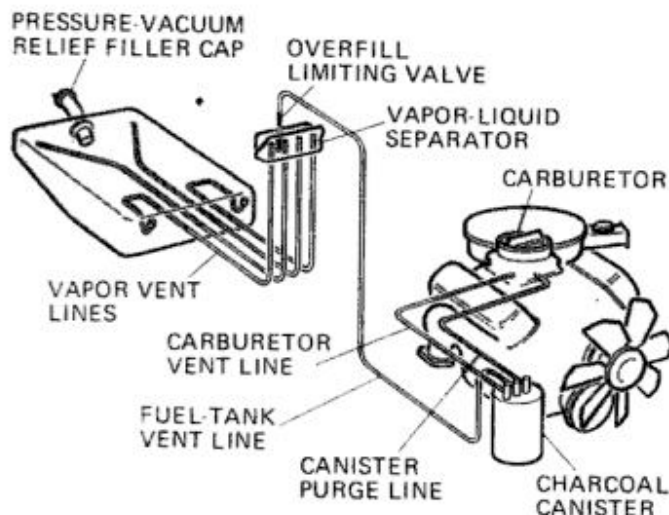
The system requires little maintenance. Replace the filter in the base of the charcoal canister as directed in the owner's manual. This filter traps impurities carried by air. If it clogs, you will usually get a strong gas smell when the car stands idle.

Exhaust gas consists of three pollutants, not one: hydrocarbon, carbon monoxide and nitrogen oxide.

A problem in reducing these emissions is that you control HC and CO by increasing combustion temperature, but as you do, you make more NOx. Oxygen and nitrogen unite at peak combustion chamber temperature to form this pollutant.

The steps that carmakers have taken since the 1968 models (1966 in California) to strike a balance and reduce all exhaust emissions are not always apparent on the surface. You cannot see the internal engine modifications that have been made.

As mentioned earlier, new camshafts have been incorporated to increase valve overlap, which is the interval when both intake



Typical fuel evaporation emission control system shows relationship of vent and purge lines and the charcoal canister. Gravity separates liquid fuel and vapors in the separator, with vapors routed to canister.

and exhaust valves are open at the same time. During this interval, the incoming fuel charge to be burned is diluted slightly by exhaust gases being discharged from the cylinder. This amount of dilution is necessary to control peak combustion temperatures, and therefore the amount of NOx being expelled.

Intake manifolds have been redesigned to provide more rapid fuel vaporization during engine warm-up. Faster vaporization permits the use of leaner fuel mixture, leading to a reduction in CO.

Combustion chambers have also been redesigned to eliminate pockets and close clearance spaces where the combustion flame had a tendency to quench before the fuel mixture had been completely burned. Lack of pockets and increased quench height result in a more complete burning of fuel and a reduction in HC.

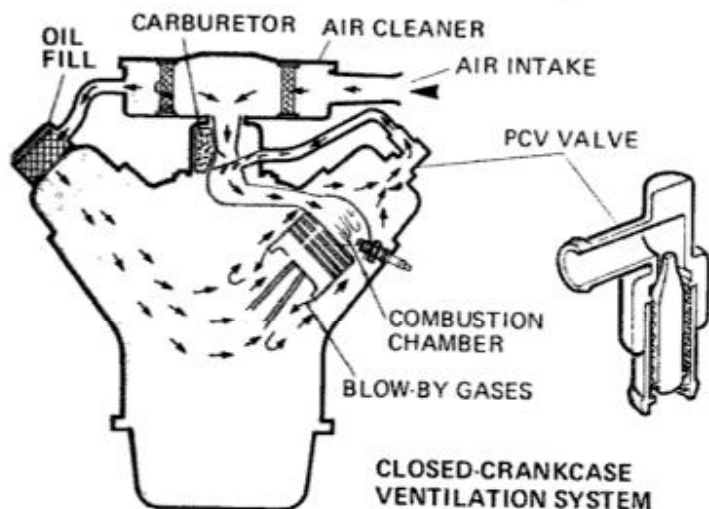
Piston-head design has been modified to reduce compression ratios so that engines can operate satisfactorily on low-lead or no-lead (lower octane) gasoline, cutting down on particulates.

These are beneath-the-surface steps. On the surface, a variety of devices have been adapted, but each is a member of one of the two general systems that have evolved to help reduce HC and CO levels. These systems are air injection and Controlled Combustion (we use GM's name for the system because it is descriptive).

Neither of these systems has an effect on controlling NOx. Devices used in controlling this pollutant are separate and will be discussed later.

No matter which system your car has,

In the closed crankcase ventilation system (PCV), the blowby gases are sealed in and recirculated.



it probably also has a thermostatically controlled air cleaner. This component has been in use by American Motors, Ford and General Motors since 1968, and by Chrysler Corp. since 1971. It cuts HC and CO levels by maintaining a minimum temperature of 100° F. for air entering the carburetor and mixing with fuel.

The assurance that this inlet air is at this temperature when an engine is started allows the carburetor to be calibrated to provide a leaner fuel mixture. The heat guarantees that the lean fuel mixture will burn.

In cars without a thermostatically controlled air cleaner, richer fuel mixtures are needed for starting. A lean fuel mixture won't burn as readily when mixed with cooler air.

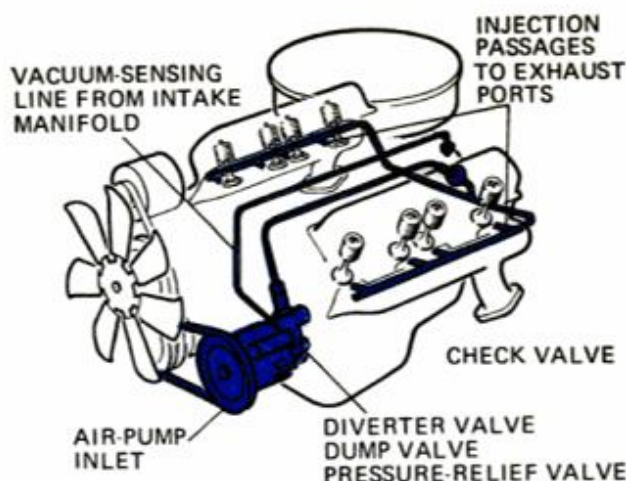
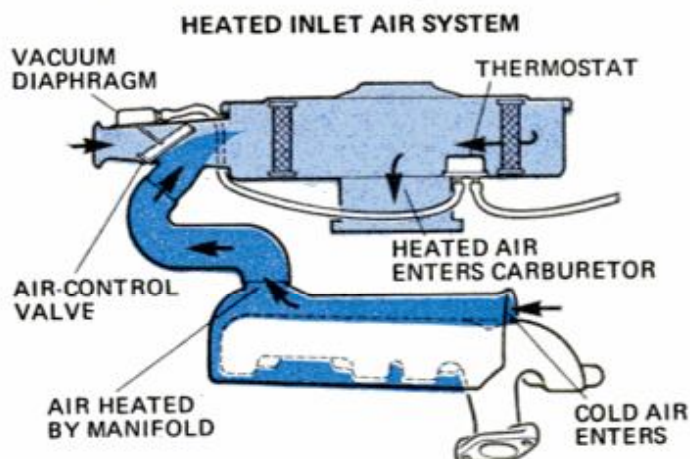
Thermostatically controlled air cleaners are equipped with flapper valves in the snorkel. They are operated by a thermostat (some makers call it a sensor).

When a cold engine is started and air around the air cleaner is less than 100° F., the thermostat senses it and causes springs to pull the valve up. This seals off the snorkel so the carburetor gets air for the fuel mixture from the exhaust manifold.

The air cleaner and exhaust manifold are connected by means of a shroud. Even with a just-started cold engine, air drawn from the exhaust manifold is heated to a minimum of 100° F. As the temperature of the air around the snorkel increases because of engine heat, the thermostat relaxes its grip on the valve, and it opens up. It reaches "full open" when under-hood temperature reaches 100° F.

To assure the leaner carburetor calibration which this air cleaner is made to provide, manufacturers have been required

Typical thermostatically controlled air cleaner keeps combustion air at minimum temperatures of 100° F.



Air-injection system reduces HC and CO by pumping air into exhaust ports for improved burning of gases.

by law to lock the mixture adjusting mechanism of carburetors. This is done in most cases with caps over mixture screws. It is a violation for anyone except an authorized mechanic (one working for a new-car dealer or one who has been given permission by the factory) to remove caps.

The air-injection method of controlling HC and CO has been used most widely by General Motors. The system was tried first in California in 1966 and 1967. During the next three years, some Chevrolets and Cadillacs were outfitted with air injection on a nationwide basis.

In 1972, all six-cylinder Pontiacs and all Buicks with manual transmissions were equipped with air injection. For 1973 and 1974 models, all Buicks, Cadillacs, Chevrolets (except Vega), Oldsmobiles with L-6 engines and Pontiacs with L-6 and 350-cu.-in. engines have air injection.

Ford and Chrysler have taken a more conservative approach toward air injection. Ford's system, called Thermactor, has been used since 1966, but primarily on cars produced for California. Chrysler adopted air injection in 1973 for cars with 225, 360 and 440-cu.-in. engines produced for California.

American Motors has used air injection (the company's name for it is Air Guard) since 1968 on a variety of V8 engines.

The air injection system uses an air pump that injects air directly into the exhaust port of each cylinder. This air, added to the hot exhaust gases, causes further oxidation (burning) of the gases in the manifold before they enter the exhaust pipe. This reduces the amount of HC and CO being discharged from the exhaust.

The air-injection system should have a complete inspection as often as the manu-

facturer recommends. Parts that are critical include drive belts, hoses and fittings, a check valve that prevents hot gases from backing up into hoses and air pump, a diverter valve that reduces the flow of air to the exhaust ports during deceleration (so that backfiring doesn't occur), and the air pump itself.

The Controlled Combustion System strives for a more thorough burning of fuel by means of higher engine temperatures, special carburetor calibrations, more refined ignition adjustments, and spark controls that more closely relate ignition (and, hence, combustion) to driving conditions.

Ford's name for its system is Improved Combustion (IMCO), Chrysler calls its system the Cleaner Air System (CAS), and American Motors refers to its as MOD.

The Controlled Combustion System is complex and uses a number of components to achieve a reduction in exhaust emissions.

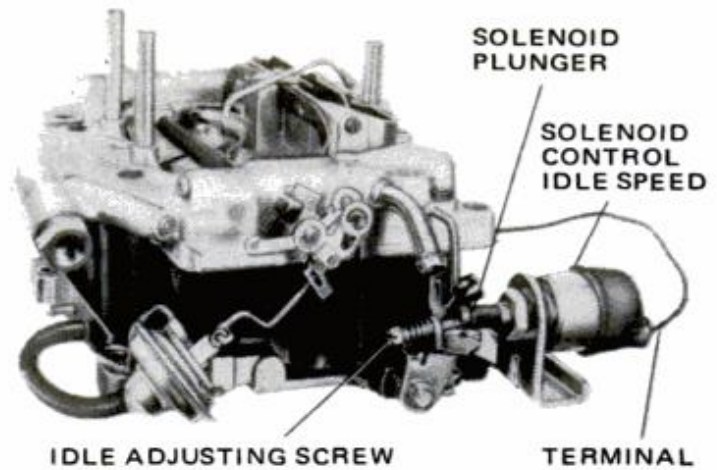
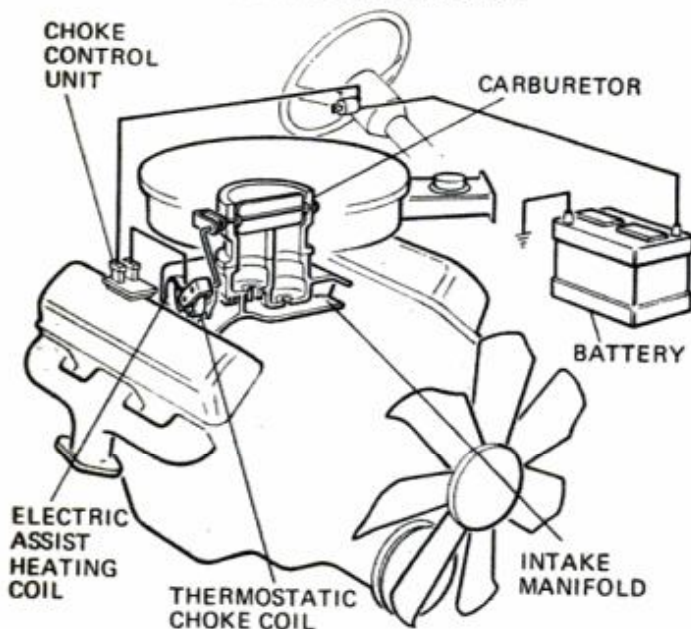
For example, high temperature thermostats (190° to 220° F.) are used in cooling systems for quicker engine warm-up. Engine heat assists combustion, and the faster that heat can be applied, the less emissions.

Car manufacturers have adapted an electric assist choke to further help reduce emissions during engine warm-up. Chokes without electric assist keep plates closed longer, enriching the fuel mixture and raising the level of emissions.

The electric assist choke is a regular automatic choke outfitted with an electric coil. The coil is activated by a current of

Electric assist choke is used to assure that the choke plate doesn't stay closed any longer than necessary.

ELECTRIC ASSIST CHOKE



Idle stop solenoid provides a positive close of throttle when ignition is switched off. This prevents run-on.

three amps. when the temperature affecting the choke thermostat hits 60° F. This causes the choke plate to open quickly.

Another piece of equipment your car may have in its Controlled Combustion System is a vacuum switch that protects the engine from overheating at idle. The retarded timing setting of an engine equipped to reduce emissions can make the engine overheat.

The vacuum switch senses heat and causes manifold vacuum to activate the spark advance mechanism, causing engine speed to increase. The extra speed produces a cooling effect that averts engine overheating.

Some engines with Controlled Combustion have a dual-diaphragm spark vacuum control that retards the spark at idle, but allows normal advance at speeds above idle.

Idle speeds of engines equipped with air injection and Controlled Combustion are higher than engines which are not controlled. Because of this, there's a chance an engine will continue to run when the ignition is shut off. So, most carburetors now have an idle stop solenoid that lets the throttle valve close past the normal idle position when the ignition is shut off.

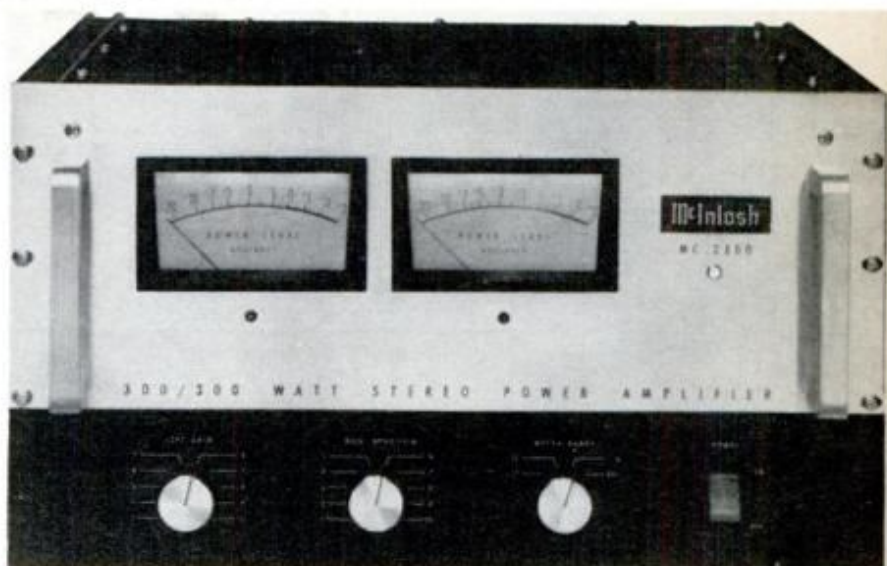
To put the brakes on NOx, 1973 and 1974 engines have a control system called the exhaust gas recirculating (EGR) system.

EGR sends metered amounts of exhaust gas into the intake manifold to dilute the air fuel mixture slightly. This reduces peak combustion chamber temperature, cutting down on the amount of NOx.

The amount of exhaust gas entering the intake manifold is metered through an EGR valve, which should be cleaned periodically. Better that to clean it periodically than turn back the clock on advances in effective automotive emissions controls. ★ ★ ★

Those monster power amplifiers: Not louder but better

by Ivan Berger
ELECTRONICS EDITOR



Massive McIntosh MC-2300 delivers 300x2 watts RMS. Its no-nonsense look is typical of super amps.

Monsters inspire illogical reactions: Mention the new crop of amplifiers that deliver 100 continuous watts or more per channel, and the hi-fi buffs go misty-eyed, while average listeners snort that they'll never listen "that loud."

Both factions have their points, but neither sees the whole truth, which is that superpower will improve your sound—not by making it louder, but by making it cleaner.

If you compare the distortion specifications of a good, low-power amplifier or receiver with one of the monsters' specs, distortion levels will usually be on the order of a half or quarter of one percent for each. Play a steady tone through each amplifier as loud as you can stand it, and they'll sound pretty much the same, too. Yet when you listen to music, there's a definite, if subtle, difference.

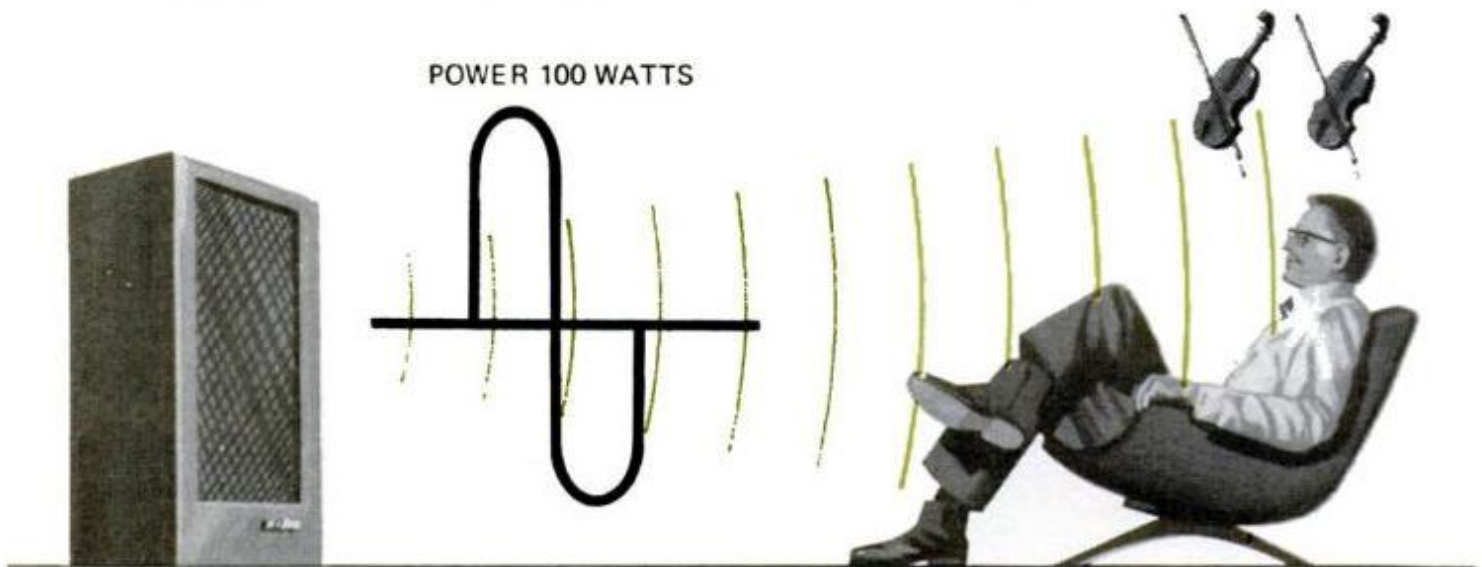
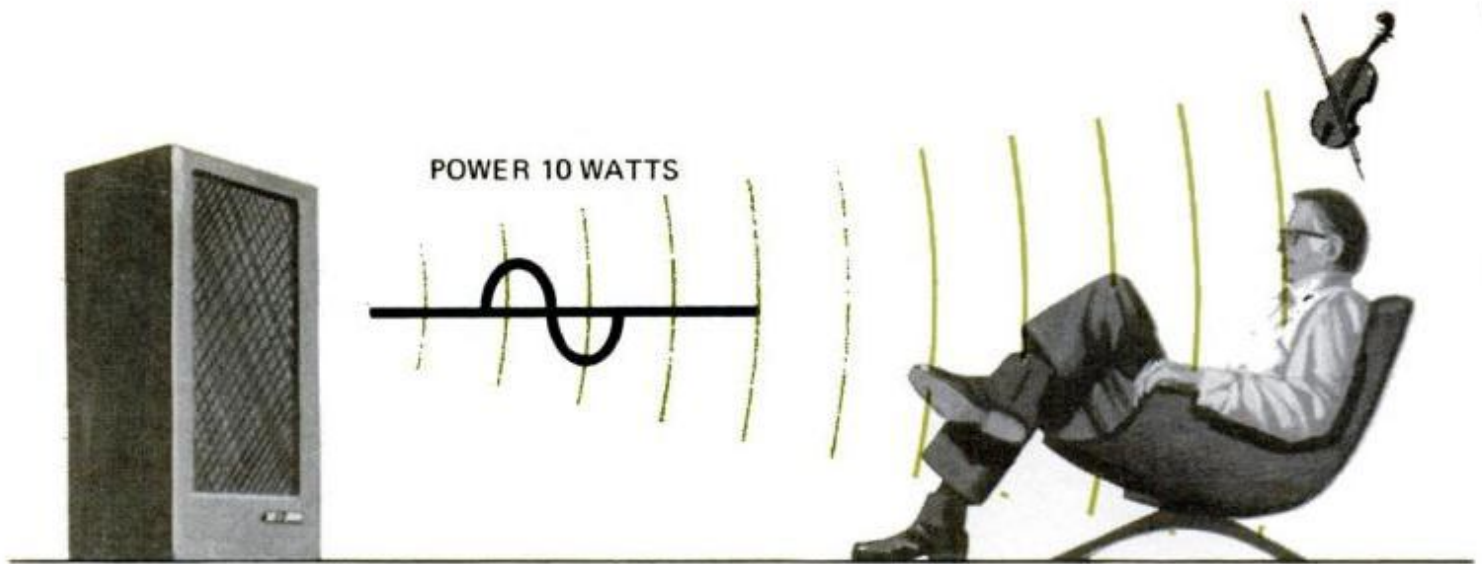
It's not because you're playing louder, either. If you normally listen to music with an average amplifier output of 10 watts from a 20-watt amplifier, you'll probably still loaf along at just about that power with a monster. With a 60-watt amplifier, I find I listen at about 1 watt average for speech, about 10 watts for moderate music-listening levels and 50 watts average only for the loudest music I could pleasurably stand.

The problem is, musical waveforms contain many waves that peak at about 10 times the average power level (see diagram, page 134). When handling those peaks, most amplifiers are no longer loafing. They give the peak wave all the power they can, then clip the rest off, distorting it. (And a few amplifiers, slow to recover from the sudden strain, distort the following wave or two as well.)

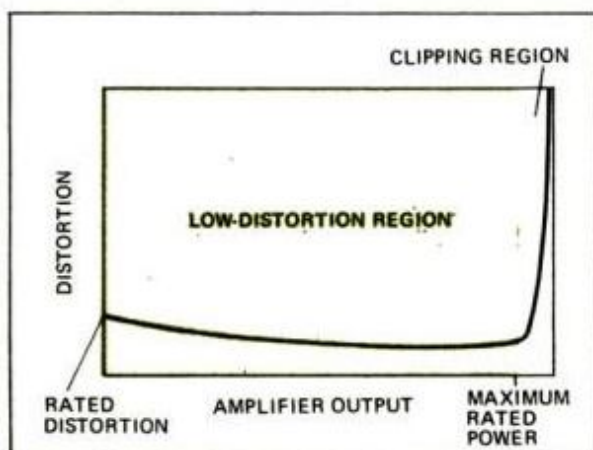
But since most of the waves you hear are clean and unclipped, and the distorted peaks pass by so quickly that you're seldom conscious of them, the difference in clarity and smoothness between medium and monster-power amps is small. However, your conscious perceptions aren't the only ones you have. Those instants of distortion that you don't quite notice still have their cumulative effect on your ear. Listen long enough, and you get tired of listening. That's "listener fatigue."

In general, the minimum amplifier power you *need* would be the minimum required to drive your speakers cleanly to your average listening levels. And the minimum you'd reasonably *desire* would be power enough to play the peak waves cleanly, too.

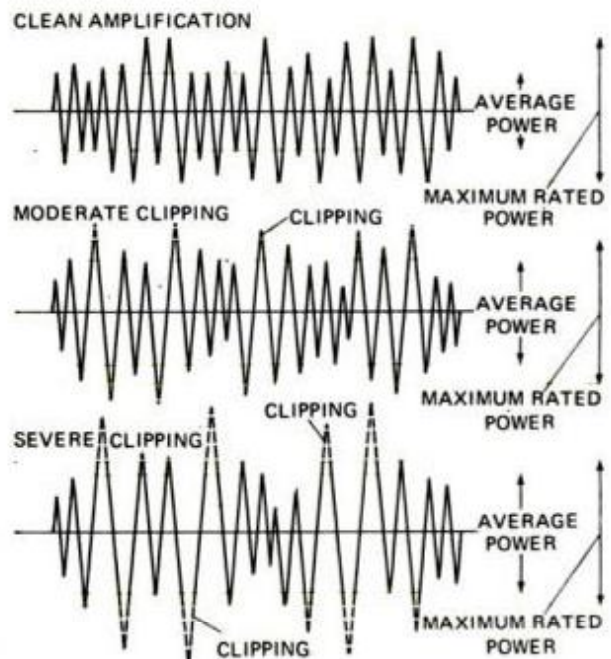
But in specific terms, how much is that in watts? Hard answers, here, are hard to come by, since so many variables are involved. Speakers, for example, commonly



Making a note sound "twice as loud" requires 10 times the original power. Figures shown are for the amplifier's electrical power output—a steady sound output of 10 *acoustic* watts would wipe that smile right off the listener's face and blast him out of his chair.



Clipping occurs when peaks try to exceed an amplifier's maximum power output capability (above, right). The signal may still sound fairly clean—most of it still is and the distorted peaks disappear quickly—but the ear becomes fatigued. Distortion in modern amps (left, above) increases quickly once maximum power is reached.





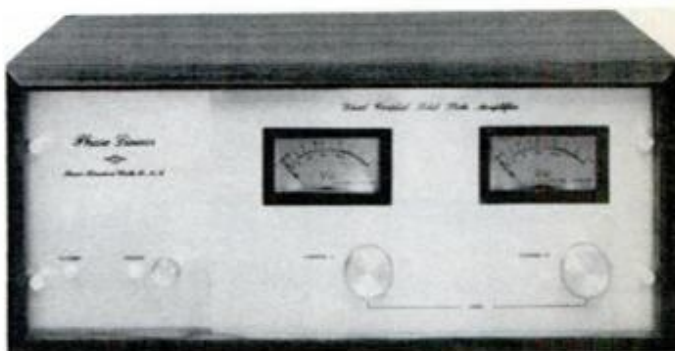
Massive heat sinks are needed on superpower amps. Note those on the rear of this ESS 500-watt model.



Crown DC-300 was one of the first monster amps. Its improved version, the DC-300A, is shown here.



Impressive-looking Marantz 500 puts out 250x2 watts, sells for \$1200, has power-limiting circuit, meters.



Phase Linear 700, 350 watts per channel, is among the most powerful amplifiers sold for home use.

convert electrical power into sound with anywhere from 0.5 to 4 percent efficiency, requiring from 100 watts to 12½ watts of amplifier power to yield one half watt of sound.

This isn't as bad as it sounds, since even one-half acoustic watt can recreate in most home rooms the average sound level of a symphony orchestra at full crescendo in the concert hall. But, again, that's just average power; peak waveforms could demand 10 times as much—up to 1000 watts.

By this point, the math begins to get a bit ridiculous. Assuming the most inefficient speakers available, as we just did, we could triple our power requirements for a room three times average size, raise that figure 50 percent to account for lots of padded, sound-absorbing furniture, and multiply the result by about six to account for the increased power required to reproduce rock music at live-performance levels. Do all that, and you could make a good theoretical case for having an amplifier with nearly 30,000 watts of power!

The reality, of course, is less dramatic. Even if we could use all that power without burning up our speakers—and getting our

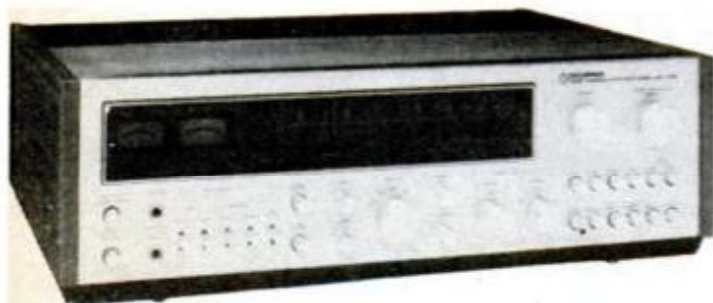
neighbors burned up, too—it's questionable whether we'd hear enough difference to justify its cost. The better your sound already is, the harder it will be for you to hear any improvement on it—and the more such an audible improvement will cost you.

And the danger of burning out or otherwise damaging your speakers is quite real, although it can be avoided. Most of the superpower amps incorporate one or more circuits to protect speakers from damage (several are outlined in the Dynaco review on the next page). And you can protect any speaker by wiring a fuse (*not* slow-blow) in series with it. (With 8-ohm speakers, a 1-amp. fuse will blow at 8 watts, a 1½-amp. fuse at 18 watts, and a 2-amp. fuse at 32 watts. Halving the speaker impedance halves the power level at which the fuse will blow; doubling it doubles the power—in other words, a 1-amp. fuse will blow at 4 watts into 4 ohms, and at 16 watts into 16 ohms). Many speaker instruction books now recommend such fusing. And it's not a bad idea to protect your speakers this way with even medium-power amplifiers.

If your speaker can't handle the power you need for the listening levels you enjoy,

then you need some way of increasing your system's power-handling capacity, either by switching to a speaker of equal efficiency and higher power-handling capacity (or one of higher efficiency and equal power handling so you can achieve your desired listening levels with less amplifier power), or by adding additional speakers (of the same type, so the power will be shared equally among them).

These solutions are expensive. But then, so is the whole idea of superpower. First of all, most monster amps carry monster price tags: about \$2 per watt, as a rough average, with a price range from about \$350 to \$1500. And that's just for the amplifier: You'll also need a preamplifier (roughly \$150 to \$700) and, if you want FM, a tuner (mostly \$100-600, with a few nearing



Sylvania's RQ374B was first receiver to exceed 100 watts (RMS) per channel in stereo; as four-channel unit, it puts out 50x4 watts. Other high-power units are coming from Pioneer, Kenwood, Harmon-Kardon.

\$2000), in addition to your speakers, turntable and tape decks. So the prime customers for these amplifiers, so far, have been those audiophiles whose systems already incorporate separate amplifiers and preamplifiers, though high-powered receivers are now in the offing, too.

Power consumption is also a factor. Even when your new monster-amp is only delivering the same average power you demanded from your old, more modest one, it's drawing more current (the Dyna, for example, draws nearly 100 watts when idling with no signal). And when you hit a crescendo, your lights may dim for an instant (the Dyna draws 11 amps.—about a thousand watts—during maximum-power moments). Still, the rise in your power bill may not be bothersome—or even noticeable.

So the question is not how many watts your sound system could benefit from, but how many watts it's worth your while to buy. And only you can answer that. ★★

First monster amp you can build from a kit

Given the high price of high power, Dynaco's new Stereo 400 amplifier is a big—if expensive—bargain. With 400 continuous watts of output power, its assembled price of \$599 and its kit price of \$449 come out to only \$1.50 and \$1.12 per watt, respectively.

As a kit, Dyna says it's not for the novice, but it's not just for technicians either. Its three circuit boards are preassembled and pretested, and a single, four-color pictorial shows every wire. Dyna estimates 15 to 18 hours' construction time; our man did it in 13. Aside from one point where nine wires came together, assembly was problem-free. But you'll need a sturdy workbench—the 400 weighs 54 pounds.

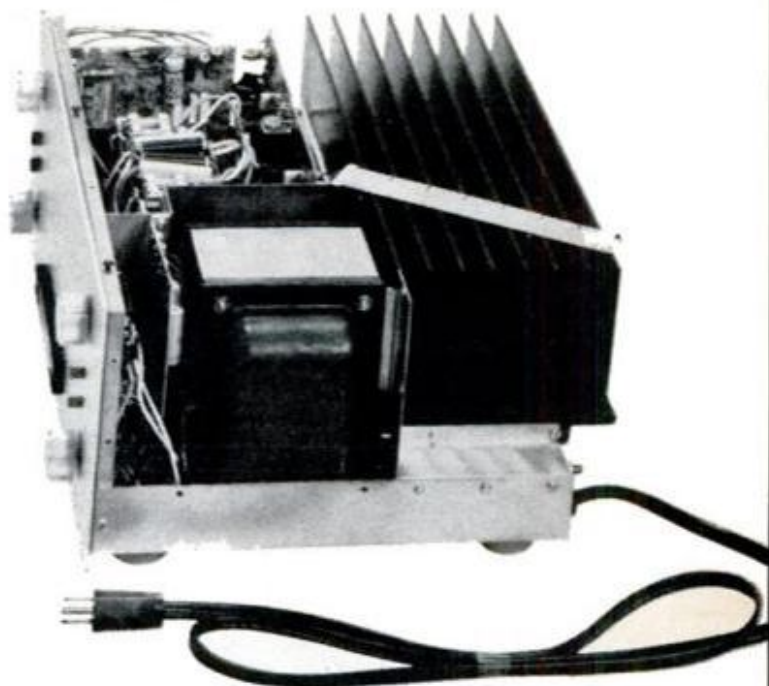
About half that weight is in the power transformer—which is no great surprise, since the 400 consumes up to 11 amps. (1320 watts!) of electricity at instants of maximum power output, and draws 1 amp. (120 watts) even at idle. But don't worry about your electric bill; since only brief peaks use the amplifier's maximum power output, average power consumption will probably be only about 180 watts—or only about 50 percent more than that of Dyna's Stereo 120 played at the same listening levels. (Add a bit more, though, if the 400's clean power tempts you to listen louder.)

All but the fraction of this power that's fed to the speakers must be dissipated as heat, and Dyna provides a 1000-square-inch heat sink with space for mounting an accessory Whisper Fan, should your cabinet lack ventilation.

The Stereo 400 can easily protect itself against the dangers all that heat and power can pose, thanks to eight safeguards: an a.c. circuit breaker, power-supply fuses, ther-



Clean-styled Dyna is massive (note 6-inch ruler, for scale), with heat sinks so deeply finned Dyna warns not to use them as a record rack. Shelf at side of heat sink can hold accessory fan in close quarters.



mal-overload sensors (which shut off the amplifier if the output transistors overheat), volt-amp. limiting for low-impedance-load protection, speaker-line fuses, a d.c.-sensing relay, and a special, power-limiting "Dynagard" circuit.

Most of these, except for Dynagard, are common in superpower amps, but deserve a closer look here. The thermal cutouts, for instance, are mounted directly on the output transistors, for quicker response. The speaker fuses are mounted in the amplifier's front panel, for easy access.

The relay serves three purposes: It cuts the signal off cleanly when the amplifier's turned off, it keeps the speakers disconnected as the amplifier turns on, preventing "turn-on thump," and it disconnects the speakers if it senses d.c. or subsonic signals in the output due either to amplifier failure or problems elsewhere in the system. When required, additional protection is provided by low-cut and high-cut filters.

Dynagard does something unique, providing speaker protection that's directly proportional to the damage potential of the signal. Speaker systems likely to be used with amplifiers like this one can withstand more power for brief instants than they can sustain as a steady average. Dynagard lets the amplifier operate up to full power for brief transient signals, but reduces the power level to a switch-selected maximum if the signal persists. The less the output signal exceeds the preset 20, 40, 80 or 120 watts, the longer it will be allowed to persist. And the higher the average power level, the more Dynagard restricts the peaks.

Lights signal when Dynagard cuts in, but only after the light's been on about a second (which, in my experience, rarely happens) does it cause audible distortion. Even then,

it's less than the clipping distortion of conventional limiter circuits. Instead of clipping off the excess waveforms, Dynagard squashes them; on an oscilloscope, the squashed waves look abnormally round and fat, but never square.

Setting Dynagard to the 20 or 40-watt positions Dyna recommends for home use may seem a waste of all that power capacity, but it isn't. Even without Dynagard, you'd be listening to such low average power all the time; and even with it, you can still get unclipped, 200-watt peaks. Since normal musical peaks, when the average power is 40 watts, will exceed this amplifier's maximum power capability, any overload-lamp indication on musical signals if Dynagard is set to 80 or 120 would indicate the need for a *much* larger amplifier (Dyna's italics).

The proof, of course, is in the listening. My ears tell me the Stereo 400 is considerably cleaner and easier to listen to than either of my old 60-watt-per-channel amplifiers. And that's true even though, encouraged by this amplifier's headroom between average and peak signals, I've been playing it an average of 6 db louder than I did the old ones. As for Dynagard, I probably couldn't tell, most of the time, whether it was on or off; the only significant thing it keeps me from hearing is the silence of a blown-out speaker. ★ ★ ★

Cassette decks go very, very posh

Today the best of them sound nearly as good as reel-to-reel tape machines—and cost about as much, too.

by Ivan Berger
ELECTRONICS EDITOR



Akai GXC-65D (\$350) has Dolby noise reduction, plus Akai's own Automatic Distortion Reduction System (ADRS), flips cassette over to play second side.

The first portable cassette recorders made a lot of sense—but the first cassette decks designed to play through hi-fi systems seemed a joke. Hi-fi buffs could tolerate cassette performance in exchange for its convenience, but could they ever respect it?

Now they can—and do. But it's taken a lot of engineering to make the cassette deck worth the high respect it now commands.

New tapes have been a major factor (see *Those Great-Sounding New Cassettes*, page 86, Nov. '72 *PM*), improving signal-to-noise ratio and distortion, while extending high-frequency response a few thousand Hz. But to make those new tapes do their best, cas-



Peak-level indicator helps prevent distortion in recording by warning you of peak signals too short-lived to show up on slow VU meters.

sette decks must allow selection of the proper high-frequency bias (fed to the record head) and the correct frequency equalization in recording and playback; most decks now do—and BASF decks do it automatically.

Noise reduction was another major advance. With cassette recordings made at one-half to one-quarter the speed of open-reel tape, and on tracks one-half to one-quarter as wide, tape hiss was a major problem. Played through wide-range stereo systems, many cassettes sounded as hissy as an orchestra of pants-pressers. The better a deck's high-frequency response, the more its hiss was audible, too.

Bias and equalization switches
(often combined) allow the use of
standard and chromium-dioxide tapes.

Noise reduction
(most commonly Dolby)
cuts high-frequency hiss
but not high frequencies.

FM-copy switch lets
you use recorder's
built-in Dolby circuits
to decode Dolbyized
FM broadcasts or copy
Dolbyized tapes.



Separate input controls
for line and microphone allow
mixing of voice and recorded
music for slide-show and
home-movie sound tracks.

Timer switch on this
TEAC and one JVC
model keeps unit in
"record" mode with
power off, ready to
record automatically
when a timer turns
power on again.

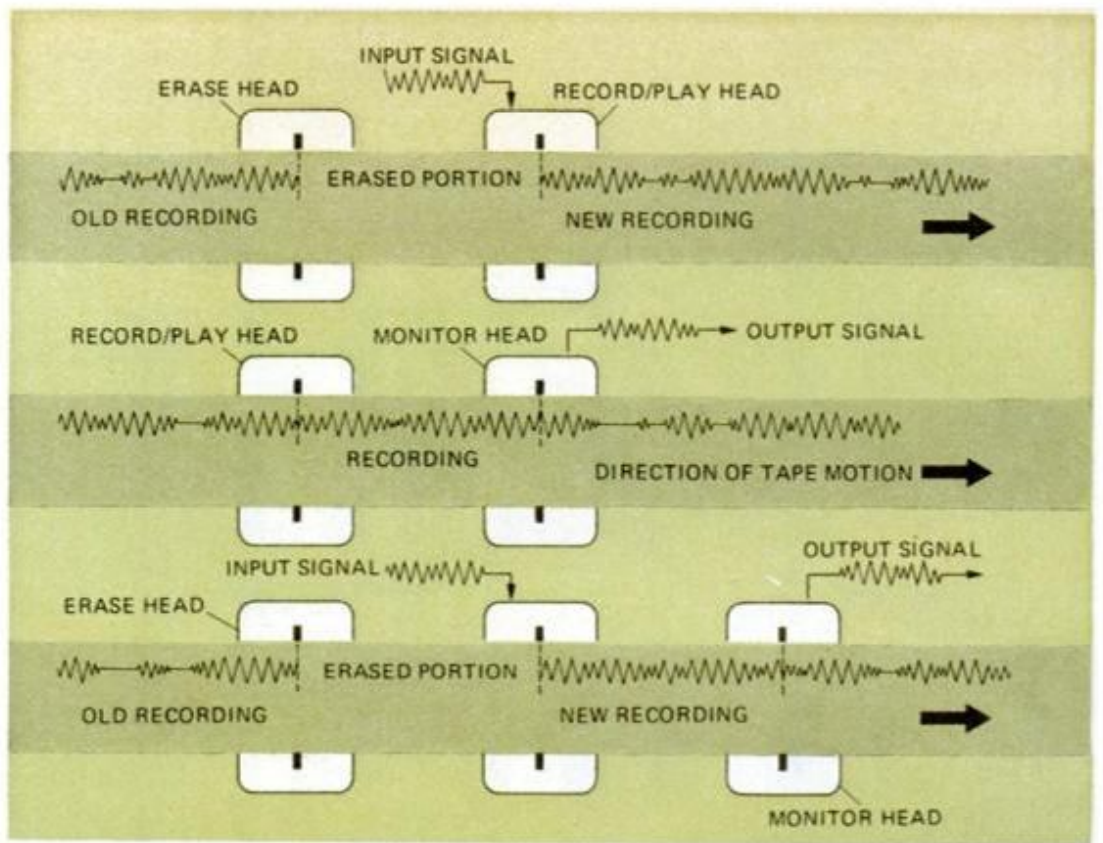
But the Dolby system gave the cassette a valid lease on hi-fi life. Signal-to-noise ratios jumped into the 50-db to 60-db range, reducing hiss to unannoying, if not quite inaudible, levels.

Dolby isn't the only noise-reduction system, though it's by far the commonest. JVC has its own Automatic Noise Reduction System which, like Dolby, must be used on both recording and playback (using it on only one of the two steps will alter the frequency response). It is fairly compatible with Dolby, though not completely so.

Dolby and ANRS boost soft high-frequency tones (but not loud ones) in record-

ing, and cut them back by an equal amount in playback. This in turn cuts back by an equal amount any noise which might have intruded during recording or playback steps. But it doesn't affect noise which might have been in the program material before recording.

Philips' Dynamic Noise Limiter (DNL) system works rather differently—in playback only, sensing the high-frequency signal level. Highs weak enough to be lost in hiss anyway are cut back, but DNL lets through those strong enough to come through clearly. The only DNL-equipped recorder now sold here is the \$1100 Nakamichi 1000,



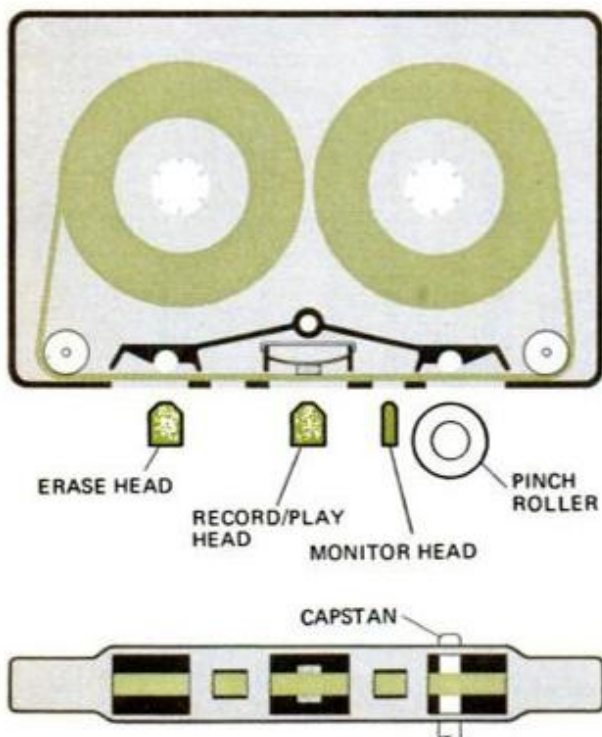
Recording and playback heads if combined into one, require separate steps for recording (top right) and playback (right center). With separate monitor or playback head (right), you can check recording quality by listening as you record.

Monitor/play or record/play? In three-head cassette decks, choice of which head to use for playback depends on its position. Technics deck (below left) uses record head, in front of pressure pad, for highest quality playback; third head is best used for monitoring only. Nakamichi uses its third head for monitor and playback, since it's at the pressure pad, too. (Dual capstans and pinch rollers, dummy head, keep the tape motion smooth.) Hitachi is working on a single head with separate record and play gaps.

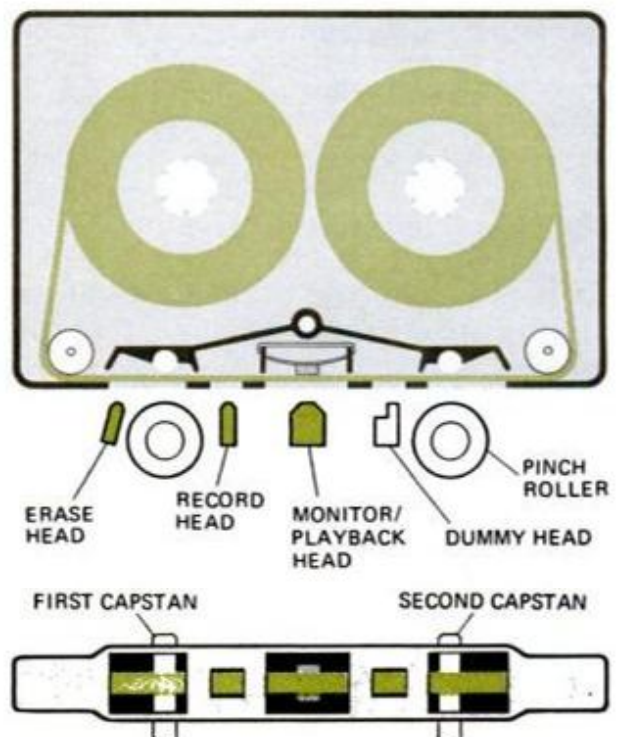
though DNL-equipped Philips decks are available in Canada. But the Nakamichi has both DNL and Dolby to clear up noise in the original source and limit its reoccurrence in recording.

Since Dolby's popularity is now spreading from cassette to open-reel tapes and some FM broadcasts, a few recorders now have

PANASONIC VERSION



NAKAMICHI VERSION



FM/tape copy switches, which let you monitor through the Dolby circuit while recording already-Dolbyized material, or just use your cassette deck's Dolby circuits to de-Dolbyize such material for listening.

Distortion prevention takes an even more complex approach than noise reduction. If you try to record cassettes at levels high enough to be sure your quietest signals won't be buried in hiss, you risk overloading your tape and getting bad high-frequency distortion; both hiss and overload are more troublesome at slow tape speeds.

More "headroom" between the minimum signal that cuts through the noise and the maximum signal that won't cut your ears with distortion has been achieved by today's improved tapes, quieter recording and playback circuits and noise reduction. That helps keep all but fast, transient peak signals from distorting.

Since those peaks can distort and disappear faster than VU meters (which read average signal levels) can detect them,

more and more companies are switching to peak-reading meters or adding peak-indicating lights. Even better insurance comes from monitor-head setups that let you hear the actual recording as you make it (see diagrams, page 140). So far, only a few over-\$400 machines have this.

Frequent peak-level indications tell you it's time to turn down your recording gain—but still don't warn you until a few peaks have passed. A few new machines now come with *limiters* which sense peaks and restrain them instantly. But these limiters—unlike the automatic recording-level controls on cheaper machines—don't affect other signals. And Akai has an Automatic Distortion Reduction system that lowers high-frequency gain in recording when it senses excess levels, leaving the low-level and low-frequency signals alone.

Speed control becomes more critical in a cassette deck, whose more slowly turning parts have less momentum to exert, and whose tape path lies partially inside the

Eight-track cartridge decks are getting plushier, too; 3M's new 8075 (right) takes chromium-dioxide cartridges, has Dolby with FM switch, fast-wind, auto eject, auto repeat and recording pause controls, plus digital tape recorder.

First four-channel cassette deck, the JVC 4C01680 (below right) is equipped with ANRS noise reduction system.

Professional cassette deck—at professional (\$1100) price is Nakamichi Studio Z (below) with Dolby and DNL noise-reduction systems, a limiter circuit, center-channel mike input, optional remove control.



cassette, outside the deck designer's control. An early and still valid approach was to make rotating parts heavier, with more mass at the rim for more flywheel effect. (Some motors are even built inside-out, with outer-rotor armatures rotating around a fixed field coil.) Dual capstans (see Nakamichi diagram, page 140) are sometimes employed to insure absolutely constant tape tension between the heads. And two other approaches—multimotor and servomotor drives—offer interesting bonuses:

Using separate motors for the capstan and the take-up and feed hubs helps keep hub-motion variations from affecting the tape's speed and tension as it passes the heads. And it also results in a simpler, more reliable mechanism that can be remote-controlled. Servomotors, whose speed is constantly monitored and instantaneously corrected by electronic circuits, also allow slight, deliberate speed changes in playback for musical pitch control.

Program search devices have advanced quite a bit since tape counters became nearly universal. Some counters now are connected to a memory; press a button, and the tape rewinds to whatever "zero" point you've preset. Nakamichi's more expensive deck rewinds automatically at the tape's end. Sharp now has an Automatic Program Finder, which scans for the silences between tunes on a tape—if you don't like what you hear, you can have it automatically fast-forwarded to the start of the next tune. Both Pioneer and TEAC will soon offer fast-cue modes that let you hear the "monkey-chatter" from the tape while fast-forwarding, to help you locate the section you want.

For more convenience in recording, many decks now feature bigger, easier-to-read VU meters and mixing controls that let you record from line and microphone sources simultaneously (handy for adding background music to a taped slide-show narration, for instance). Some models from Concord and Nakamichi even include three microphones: one for each channel, plus a center microphone bridged across both. And both TEAC and JVC have models that can be timer-controlled, to tape an FM program while you're out.

None of this quite means the millenium is here for cassette decks. Though they rival many open-reel decks in fidelity, they still don't quite match the best. But they're no longer jokes—just a lot more fun. ★★★

YARDPOWER ROUNDUP FOR '74

(Continued from page 106)

electric riders a boost. There are several new entries. General Electric, pioneer maker of electric tractors, has come up with a rider about equal in power to an 8-hp gas engine. The Elec-Trak ER 8-36 has five forward speeds and a 36-inch mower. Its \$695 price makes it, according to GE spokesmen, "the lowest-priced electric rider you can buy that we know of."

The ER 8-36 reportedly can mow up to three-fourths of an acre on one battery charge. You get full power with an overnight charge; 85 percent of full power is achieved in five hours.

Sears Roebuck and Wheel Horse are also introducing electric riders for '74. The Sears All-Electric has a molded fiberglass body, a 32-inch mower and an all-gear transmission with three forward speeds, reverse and neutral. The price: about \$750.

The Wheel Horse entry, the Electric Horse, has a six-speed transmission and a 32-inch mower. Like other electrics, it gets its power from three 12-volt batteries. An on-board charger enables you to recharge the batteries by plugging into regular 110-volt service. A full charge is attained in about 12 hours.

Other makers of electric riders include Jacobsen, Roper and John Deere. The John Deere Electric 90 has been on the market since 1971.

When you get into the tractor market, you find a wide range of prices—from about \$550 for a "stripped down" 8-hp job to over \$3000 for a 20-hp unit with a lot of special features and capabilities. A typical 14-hp machine with standard transmission and a 42-inch mower costs \$1625. With a variable speed transmission, the same tractor sells for \$1920.

Similarly, a John Deere 10-hp tractor with recoil start lists for \$1115. With electric start this unit sells for \$1230. Also keep in mind that the price of most tractors does not include the mower.

Buying a riding mower or tractor represents a sizable investment. As you shop, be sure to ask about service, availability of parts, what the warranty covers and for how long.

Shopping takes time and effort, but it's a must if you want to get a machine that will meet your garden needs—and your budget, too. ★★★

HALF CAR, HALF BIKE

(Continued from page 81)

each front wheel are hydraulic, the rear brake is mechanical, actuated by cable. A balance bar under the brake pedal distributes two thirds of the energy to the front discs and one third to the rear. The system is synchronized so that all three cinch down together.

Meantime, with the Delta weighing a total of 886 pounds, half of which is in back of the forebody, there is little more than 300 pounds of weight on each front wheel, including the addition of two average-size passengers.

The necessary reverse gear is simply an electric starter motor; it moves the Delta backwards at a swift walking pace. Riding in the Delta, though curious at first, is actually like cruising along in a small British or Italian sports car.

Korff stresses that he wishes to remain an independent research and development engineer. But he'd like to see the Delta manufactured and distributed through qualified licensees. The package is, in fact, available through the Korff Co. for licensing to qualified manufacturers the world over. Inquiries should be directed to: Walter Korff, 449 North Lamer, Burbank, Calif. 91506.

The Unisport was also conceived in California as sort of the ultimate motorcycle accessory. You bolt your motorcycle *into* it instead of bolting it onto your bike.

Controls inside the Unisport are more like those in a car instead of a motorcycle. For instance, there's a half-steering wheel, instead of conventional handlebars. Then there are foot brake pedals and a hand shifter.

The frame is made of steel tubing and there's a stout firewall at the driver's feet. The body is fiberglass. It comes with a windscreen wiper and convertible top for \$280 on top of the base \$1600 price.

Driving the Unisport is an experience, mainly because the front wheels and body can be banked just like the wheels on a two-wheel motorcycle. It's up to the driver whether he wants to bank the wheels or just turn with the wheels upright.

The Unisport also boasts a single nine-inch front brake on each front wheel. The gearshift is hand-operated and attaches to the motorcycle shifter arm.

Riding inside the Unisport is reminiscent of the old bubble-top Messerschmidt.

There's a dashboard with a speedometer, turn-signal indicators, neutral light, starter button and ignition switch. The Bruce Meyers-designed bubble top is side-hinged just like the Messerschmidt.

The builders of the Unisport, Walter and Ray Carston and Grant Ryan, say it is a two-passenger machine but the passenger in back finds it necessary to straddle his legs around the driver in front. This may be okay for short trips but on long ones it's uncomfortable.

The Unisport will be sold through established motorcycle dealers who will be able to install it in less than two hours. The builders, the Unicar Co. in Orange, Calif. (Box 5512, Orange, Calif. 92667) recommend a 450-cc or larger bike. They also point out that there are no structural changes made to the motorcycle so it can be unbolted and used as a two-wheeler at the owner's discretion.

Approximately 50 Unisports per month are being produced. They may look a little odd, but with the energy crunch forcing up the price of gasoline, anything that'll get 50 mpg may start to look pretty good to you as a commuter. ★ ★ ★

SIDECARS ARE BACK!

(Continued from page 79)

speed by approximately 20 mph, and 3) reduce the life of the rear tire by 20 to 30 percent. When you set up your sidecar follow the manufacturer's recommendations as to the proper toe-in and left-hand lean.

With the price of gasoline, insurance and licensing it is no wonder that sidecars are back! You can find out more by writing to the manufacturers of the various models on the market. Here's the list.

Side Strider, Inc., 15838 Arminta Unit 25, Van Nuys, Calif. Models: Bingham Mk I, 125 lbs., \$526; Bingham Mk II, 150 lbs., \$689. Watsonian Monaco, Monza and Palma models, 190 to 215 lbs., \$850 to \$1000. (East coast source of Watsonian models is: Myers M/C Mart, 111 Hancock St., Springfield, Mass.)

Spirit of America Manufacturing Co., 2619 Santa Monica Blvd., Santa Monica, Calif. Models: Spirit Eagle, 150 lbs., \$450.

Thompson Cycle Cars, P.O. Box 2, San Fernando, Calif. Model: Thompson Cycle Car, 100 lbs., \$400.

Centaur FUNgineering, P.O. Box 943, 109 Karen Lane, Martinez, Calif. Model: Centaur GT, 200 lbs., \$700. ★ ★ ★

If you plan to do things around the house, keep this Guide.

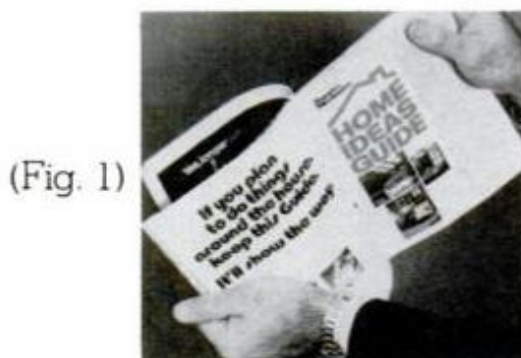
It'll show the way.

The Second Annual 1974 Popular Mechanics "Home Ideas Guide" is a special magazine-within-a-magazine starting with the page on the right.

It's bulging with ideas and hints you'll want to know about, and information you'll want to save for future reference.

Here are a few of the subjects featured:

- Today's housing solution for young families.
 - Remodeling a kitchen.
 - Rebirth of a stucco bungalow.
- Plus articles on air conditioning, bathrooms, insulation, and much more.



To make it easy for you to save this Guide, we've made it a self-contained unit.

Here's how to remove it from the rest of the magazine for easy reference:

1. Bend the magazine's pages away from the Guide's *front* cover.
2. Now, bend the magazine's *back* pages away from the Guide's last page. (Fig. 1)
3. Pull the Guide out. (Fig. 2)
4. Staple, or hole-punch the Guide.
5. Keep it for handy reference.

HOME IDEAS GUIDE



An under \$30,000 house—with enough space to suit a typical American family—is virtually nonexistent today in new-home construction. The best buy for most young couples is an older home in an urban area or in a well-established close-in suburb. And it's often possible to acquire through remodeling far more house than buyers could otherwise afford. On the following pages you'll find dozens of ways you can make your home more exciting—

■ **Rebirth of a stucco bungalow.** The remarkable transformation of a modest home into one of the prettiest on the block shows what can be accomplished through complete remodeling.

■ **They bought the house nobody wanted.** A practicing young architect found a neglected home in an ideal location. You'll see how he made it brighter, easier to maintain and fun to live in for a family of four.

■ **This couple raised the roof.** A shallow hip or gable roof often limits what can be done with the top floor. Here's one case of how replacing such a roof with a mansard style worked wonders inside and out.

■ **The room you need may be in the attic.** Frequently overlooked, an attic offers splendid possibilities as an inexpensive area for expansion.

■ You'll find all these and many more helpful ideas in this year's Home Ideas Guide.

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Popular Mechanics—April '74

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'Move' into a new home by face-lifting the old

Data: Annette Sukov

California-bungalow-style house, typical of those found all across America, before exterior and interior were completely remodeled. To see transformation, turn the page.

Though much has been written about interior decorating, considerably less has been written about *exterior* decorating. Yet the outside of your home is what most people—friends, neighbors, relatives—see most often.

For Mary Goff of Minneapolis, this consideration was of primary importance when she decided to remodel her home (below) after it had been moved from a deteriorating neighborhood to a new site on a street lined with attractive residences.

The hot-water furnace was left behind and a forced-air heating system installed. The natural outgrowth then was to add central airconditioning; it was more economical and effi-



cient than window units and it would not ruin the planned exterior style.

Exterior decorating started with the roof. Because this was the largest unbroken surface and might well last 25 years, shingle quality, style and color were chosen with care.

The roof line was altered in front, a dormer enlarged and hand-split cedar shakes applied to the roof. A wrought-iron balcony was added in front of the dormer, double-hung windows removed and casement windows installed. After a new bay-window section was completed in front, used-brick veneer was applied, and a front terrace also faced with brick. White shutters were used on the balcony and entry windows, and the circular design on the wrought-iron balcony effectively repeated on the front door. ★ ★ ★

Attractive foyer-sitting room (below) is a good indication of the thorough remodeling and redecorating job done throughout remainder of the house. Front wall of the home was extended six feet and a bay window added. White floor tiles, walls, woodwork, ceiling and furniture make spacious area appear even more open, light and airy.







Photos: Les Turnau

**HOME
IDEAS
GUIDE**

New life for an old house

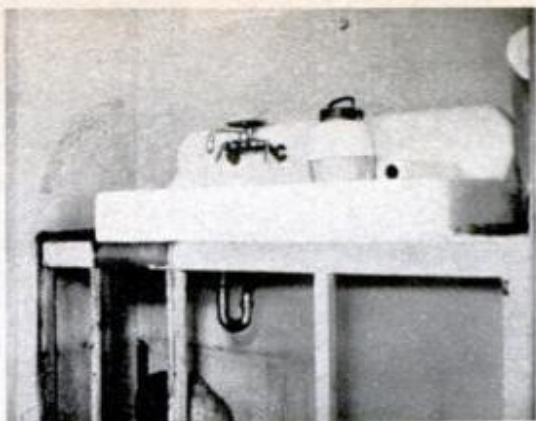


Exterior of 75-year-old home was rejuvenated by replacing old white asbestos shingles with stained cedar shakes.

The 75-year-old Minneapolis house that architect Bob Brantingham bought six years ago bore little resemblance to his remodeled, updated home of today. It had been a delapidated house nobody wanted, but it was a do-it-yourself challenge to the new owner.

An admitted amateur carpenter, Brantingham first replaced the white asbestos shingles with cedar shakes which

were stained. Next came the interior: Old-fashioned plumbing fixtures in bath and kitchen were replaced. Mahogany-colored pine woodwork that gave almost all other rooms a dark and dated atmosphere was, with the walls, painted a stark white and splashes of color provided by paintings, sculpture and furniture. Result: The nineteenth century interior is now totally contemporary. ★ ★ ★



Kitchen was completely modernized after old sink and its open framing (above) were removed. New kitchen (right) has plenty of cabinet space, perforated hardboard for hanging of cookware, good ventilation, recessed lighting in soffit over double sink and plastic-laminate countertop.



Spacious, well lighted playroom (center, left) was made by enclosing porch on second floor. A spiral stairway opened up third-floor attic, was installed for the delight of the children as well as its good looks and practicality. Children's bedroom (left) also became a play area with the imaginative use of wood extension ladders.






Remodeled attic area above is used when owners entertain guests. Ceiling, as well as walls and floor, is covered with fire-resistant carpeting.

A family room in the attic

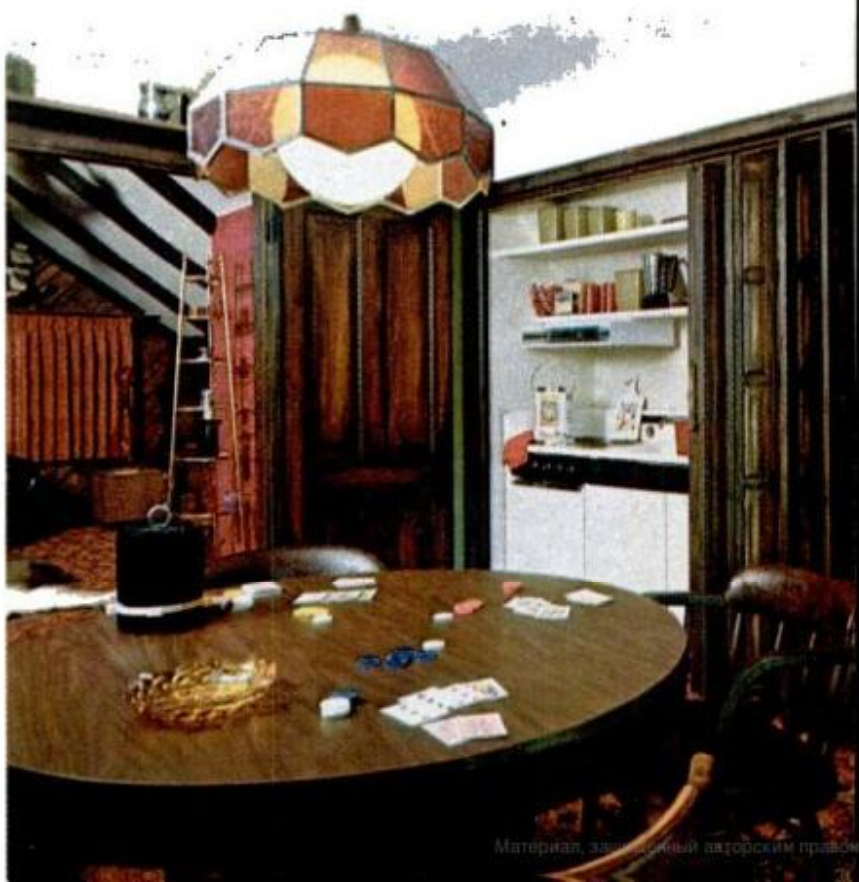
HOME IDEAS GUIDE

Little-used attic space over the garage, left and below, was once used for storage and an "emergency" bedroom. Imaginative remodeling and decorating transformed it into a pleasant, comfortable family room that every member of the family now uses.

Before remodeling, the attic floor was leveled with a steel beam placed under the floor joists. This in turn, in the garage, is supported by lally columns. The rear wall at left was covered with oak paneling in random lengths and widths, and the A-shaped ceiling accentuated with false beams. Doors divide the main area from the kitchen and game area when only one section of the attic is being used. ★★★



Attic bedroom was converted to quick-service kitchen and recreation area (right) containing large game table.



They raised the roof to get more living space

Data: Annette Sukov

Its proximity to downtown Minneapolis prompted Mr. and Mrs. Richard Prescott to buy the 1910-vintage house shown below. Living with a little sawdust and construction debris does not disturb them, so the Prescotts did their remodeling in several stages. First, they removed the front porch, installed sliding glass doors and applied Masonite's X-90 lap siding over the stucco. Then came the most ambi-

(Please turn to page 156)

Original stucco house (below) had A-line roof, small attic space and porch. **Bottom:** After the face-lift.





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Only 2.98

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



(PM 4-74)

Check with Your Ace Hardware Store.



Front of house (above) with third story and new mansard roof added. Family room, under construction at right, will have mansard roof to match. Rear view (below) shows recessed balcony in third story, new dining-room addition, sun deck and family room being added.

CHANGING THE ROOF LINE

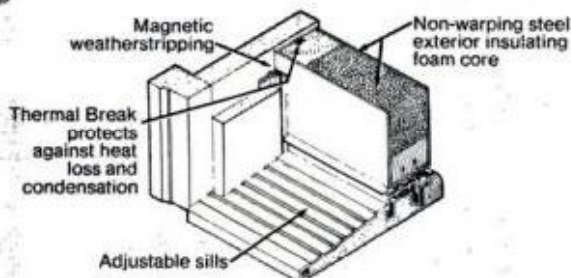
(Continued from page 154)

tious phase of their work: Removing everything above the second-floor ceiling, adding a huge third-floor master bedroom and changing the roof line. The new addition has inset windows on three sides of an asphalt-shingled mansard and a charming balcony overlooking a large back yard with swimming pool.

Deciding to do more remodeling, the Prescotts added a dining room with lots of windows in back for easy viewing of the rear grounds.

When we photographed this handsome home, the current project—but probably not the last for this energetic couple—was the addition of a family room which will lead out onto a sun deck. ★★★





The Ever-Strait Replacement Door. Great appearance is only half the picture.

To begin with, it's a terrific energy saver. Tests have shown that an Ever-Strait door **without** a storm door will have up to 22% less heat loss than a conventional 1 $\frac{3}{8}$ " wood door **with** a storm door protector.

And because the Ever-Strait door is made of two tough, steel skins laminated to an insulating foam core, it will not warp, sag, crack or swell the way a wood door will.

And Ever-Strait will save your energy, too. Available as a complete door system, including jambs and hinges, it can be easily installed in one afternoon by an experienced do-it-yourselfer. For a free brochure on this proven product, write: Ever-Strait Div., Pease Co., Dept. 474, 7100 Dixie Highway, Fairfield, Ohio 45014.

Pease Ever-Strait Doors
Pease Company 7100 Dixie Highway • Fairfield, Ohio 45014

POPULAR MECHANICS PM-BEE! Plan for a radio-controlled model that flies on CO₂. Fuel is non-flammable and odorless. Sophisticated and simple to build! To obtain full-scale pattern from which you can trace off the parts directly, send \$3.49 to **POPULAR MECHANICS, Dept. FA, Box 1014 Radio City, New York, N.Y. 10019.**

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DRIVES NAILS WITH A SINGLE STROKE!

Countersinks wood-toned nails. No filling. No mars,
dents, bent nails or bashed fingers.

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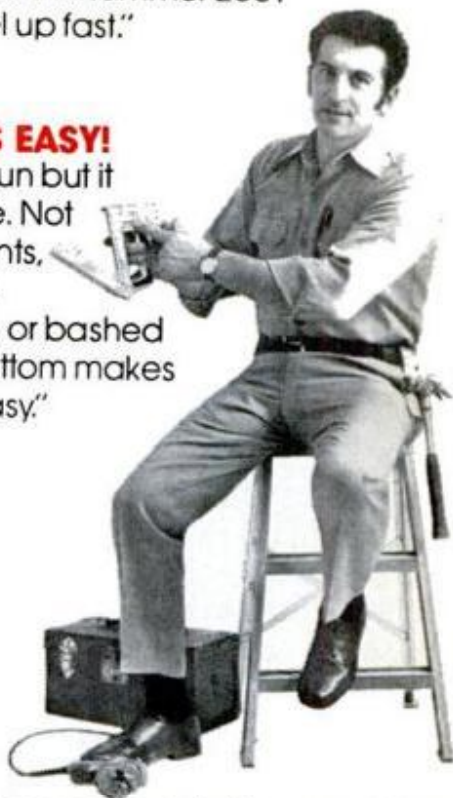
2001 NAIL GUN

"I'VE TRIED EVERYTHING. That's part of my job. Glue, hammer, nails, nail sets, you name it. But, nothing does it like Swingline's Whammer 2001 nail gun for getting a panel up fast."



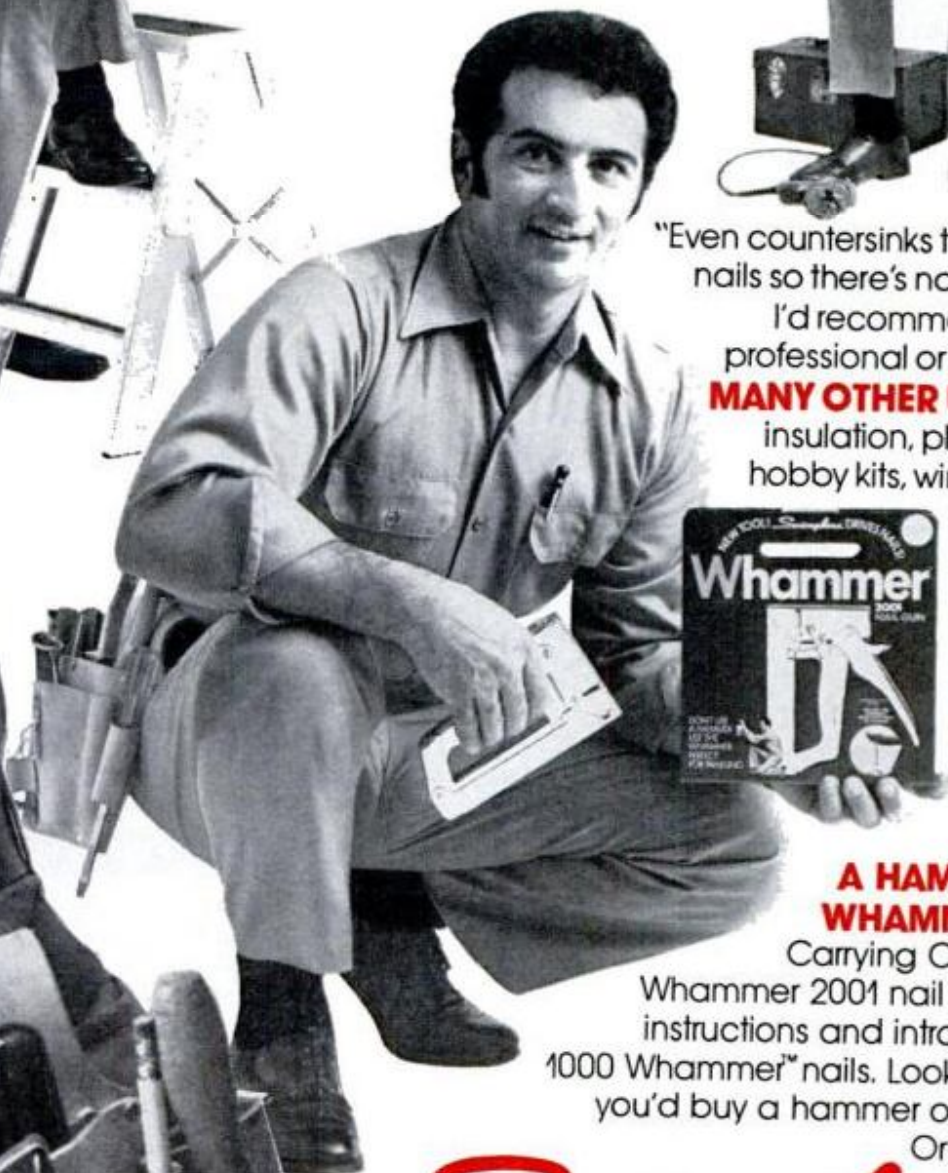
"AND IT'S EASY!"

This tool handles like a staple gun but it drives nails with a single stroke. Not staples, nails! (No mars, no dents, no scratches, and for do-it-yourselfers, no bent nails or bashed fingers.) Swingaway bottom makes loading quick and easy."



"Even countersinks the wood-toned nails so there's no setting or filling. I'd recommend it to anyone, professional or do-it-yourselfer."

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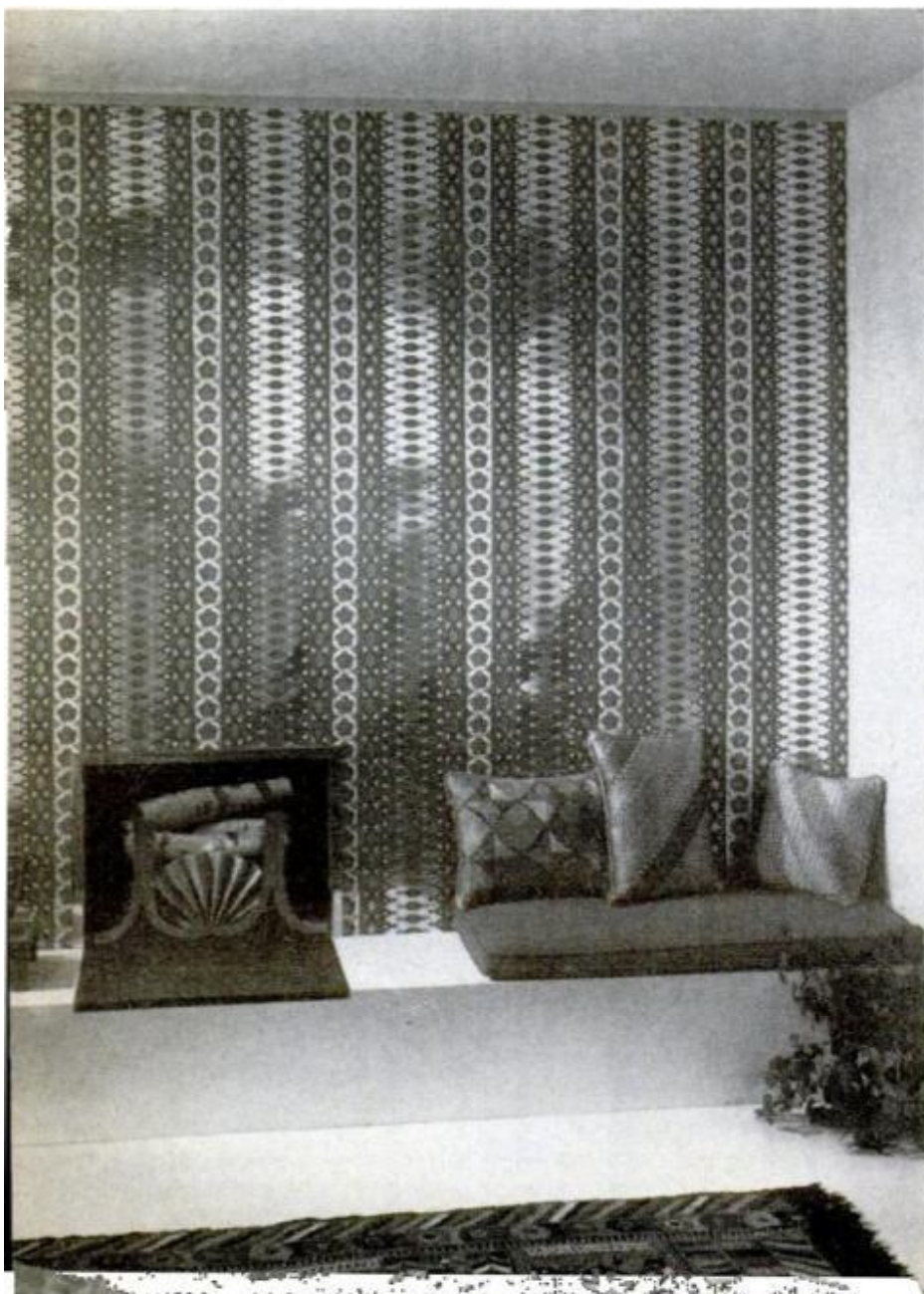
DON'T USE A HAMMER USE THE WHAMMER! Reusable Carrying Case— contains Whammer 2001 nail gun, complete instructions and introductory box of 1000 Whammer™ nails. Look for it wherever you'd buy a hammer or wall paneling. Or write Swingline.

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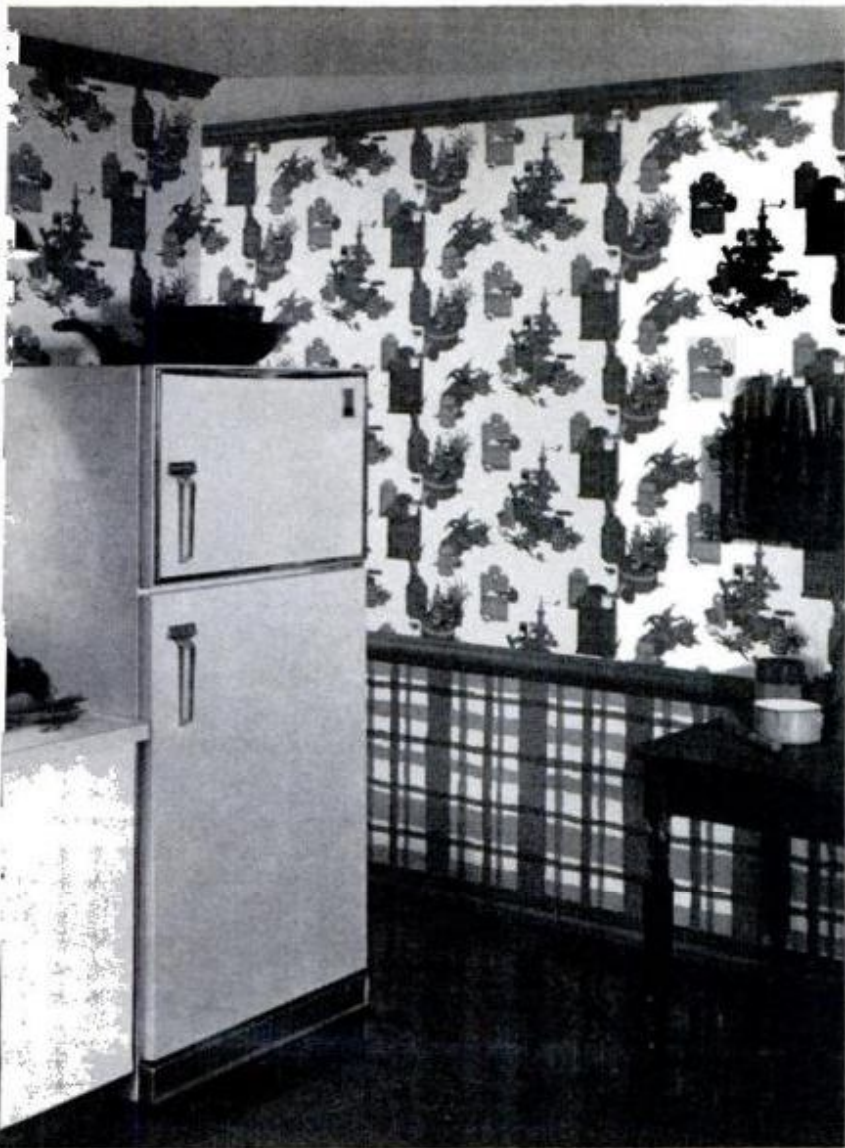
Fabric wall coverings: Pretty. Tough. But easy to handle

Spring-cleaning time is a good time to think about doing some redecorating. The suburban home shown here was recently given such an interior face-lift by its young owners. The lady of the house felt it was time for a change—especially the walls—but the question was, a change to what? Since the recreation room in the basement and the side entryway from the garage into the kitchen were covered with wood paneling, the young couple felt more paneling would be too much “wood”



Fabric-backed vinyl wall covering comes pretrimmed for perfect matches. Floral pattern was used to brighten bathroom (above). Note matching panels of wall covering applied to recessed panels on sink vanity doors.

Easy to apply—or remove, when the time comes—bold-patterned fabric wall covering can provide a one-wall contrast to subtle tones throughout rest of the room. Dazzling contemporary foil-fabric covering (left) enhances the outside wall of the living room.



Cheerful, spirited atmosphere prevails in kitchen (above) where a wood chair rail separates a bold plaid pattern covering the lower 36 inches of the walls from the special kitchen-design covering above. Bonus: fabric wall coverings are washable and mar-resistant.

Something any boy would like: His bedroom and study area enlivened with bold, colorful stripes and sport-figured fabric wall coverings. Vinyl-backed fabric coverings won't tear like wallpaper during application, are durable and easy to maintain.



for their taste. Thus, they decided to paint or wallpaper the remaining rooms. The mutual decision: In the living room, bath, kitchen and their son's bedroom, use lively patterned fabric-backed vinyl wall coverings pre-trimmed for easy application and washable.

The four rooms photographed were covered with Wall-Tex fabric-backed vinyl wall-coverings from Columbus Coated Fabrics. (For more information about other patterns plus a booklet on how to hang wall coverings, write Columbus Coated Fabrics, Dept. PM, 1280 North Grant Ave., Columbus, Ohio 43216. Also see *How to Hang Wallpaper* (page 78, Jan., '74 PM). Each fabric-backed vinyl wall covering shown is an actual woven fabric ironed and stretched for uniform texture, then vinyl-coated to give it weight, strength and a smooth finish. ★ ★ ★

PRACTICAL HELPS for Workshop and Garden



MASTER SHOP GUIDE

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This big selection of pressure-sensitive tool pictures quickly spot where things go. 74 tools are depicted and when applied to workshop tool panels and drawers, you'll know at a glance if anything is missing, or out of place.

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All you need to know to have a beautiful lawn and garden. 20 fact-packed tables and charts, and scores of show-how drawings. Planting and pruning; transplanting and whip-grafting; pools and storage structures. More information than in some books at 3 times the cost.

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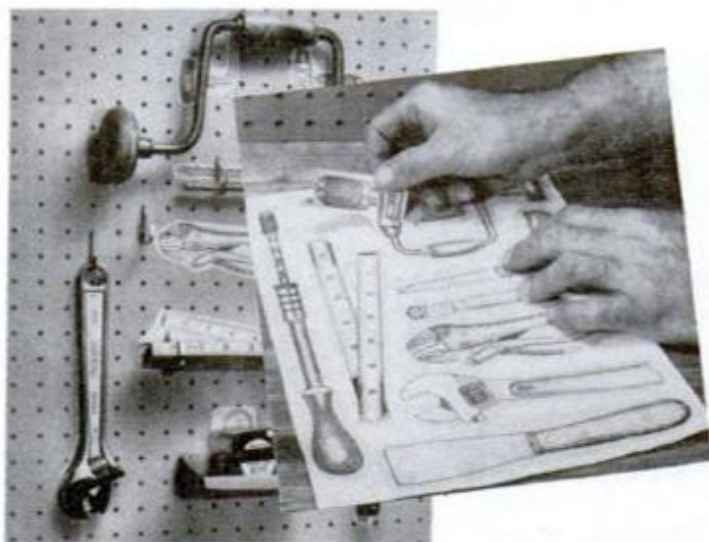
These practical PM products can save you both time and money in organization and buying of materials. The three basic items for shop and garden are so low priced you'll want all three. If you're an air buff, check those biplane plans!



VW-POWERED BIPLANE

Inexpensive to build—flies like a dream. The Scamp fuselage, wings and landing gear are attached to a rugged main beam. Kits of parts are available from the designer. Scamp cruises at 85 mph, has range of 150 mi.

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| <input type="checkbox"/> GARDEN GUIDE | <input type="checkbox"/> BIPLANE PLANS |

Electric wardrobe door

Door is activated by jamb-mounted button that is lighted so you can find it easily in the dark.

Door rolls up into compact cylinder hidden over doorway. Closet light turns on simultaneously.

Most closet doors give less than full access to the space within. Now, an Indiana company has changed that by developing an electrically operated door that's sturdy when fully closed, yet entirely disappears when entrance is desired. Models available are for jamb widths of 48, 60 and 72 in. and an 81-in.-high opening.

The unit has a motor, operating mechanism, housing for retracted door over the doorway and an up-on and down-off light. If power should fail, you can still operate the door. A unique clutch permits manual override without damage to the motor. Door automatically stops if it touches anything while descending. For more information, write Wilmot Industries, Inc., Dept. PM, R.R. 5, Box 365, Elkhart, Ind. 46514. ★ ★ ★





Handsome new exterior features rough-sawn cedar board-and-batten siding that replaced white clapboard of old.

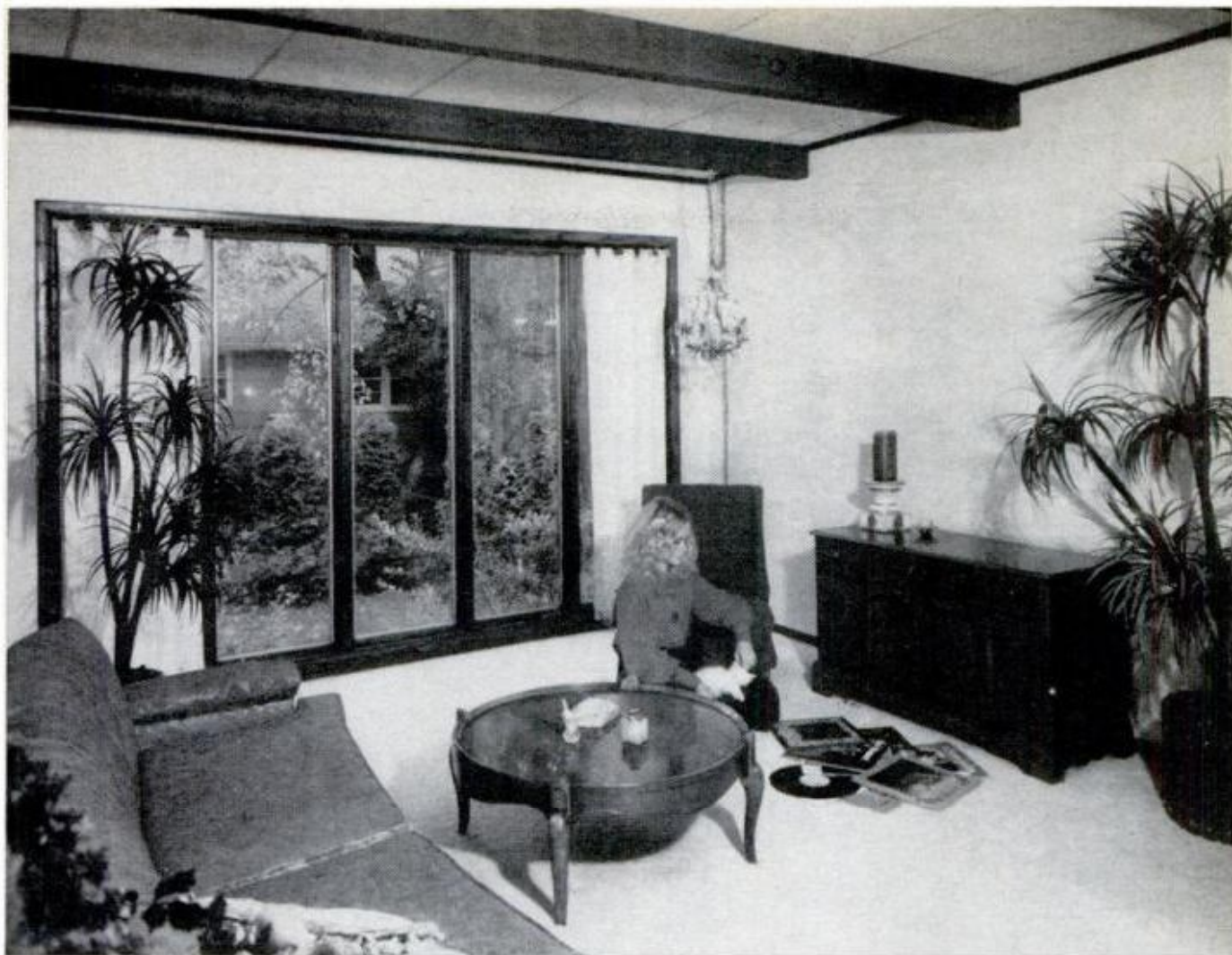


Remodeling ideas— inside and out

With a growing family, Mr. and Mrs. Reno Damuth of Minneapolis had to make a decision: Move or improve their 75-year-old home. They chose the latter course, adding a new patio, family room and bedroom. Doing most of the work themselves, they also remodeled the interior and exterior.

The old exterior of white clapboard siding always seemed to peel and blister shortly after painting. To finish the outside, the Damuths chose rough-sawn cedar board-and-batten siding and asphalt shingle roofing.

The family room, living room and dining-kitchen area were tied together in design by installing dropped ceilings of acoustical tile accented with hollow (false) beams. New living-room windows were extended to floor level for



Living room walls (above) were resurfaced by removing old plaster and installing plasterboard over studs. False ceiling beams and trim around large expanse of window are stained to match.



Family room addition (left) was built at ground level and is only three short steps from the dining-kitchen area.

Kitchen-dining area (below) was remodeled with new wallpaper, floor and ceiling tiles. Paneling and ceiling beams match kitchen-cabinet finish.



maximum view. Family-room walls were covered with an antique elm paneling to give the room a warm, lived-in feeling. Sliding glass doors were installed to give handy access to the patio. A large kitchen window (over the sink) was replaced with a smaller one to gain wall cabinet space. ★★★

A new look

Fin-type 'living' wall unit is visually held together by use of the dropped soffit.

Settling caused the outside wall to crack and ceiling joists to sag in one upstairs bedroom of James Cherry's 80-year-old house in Minneapolis. While repairing the wall, Mr. Cherry decided to convert the seldom-used guest room into a den-sitting room-library where he could relax, read and listen to music.

Because the room is large with a high

Unused bedroom was converted to combination den-sitting room-library at left. Sturdy wall unit, with several shelves for books and speakers, four desk-level shelves for lamp and decorations, and four floor-level shelves for stereo receiver and more books, makes room feel more intimate while supporting sagging ceiling joists.

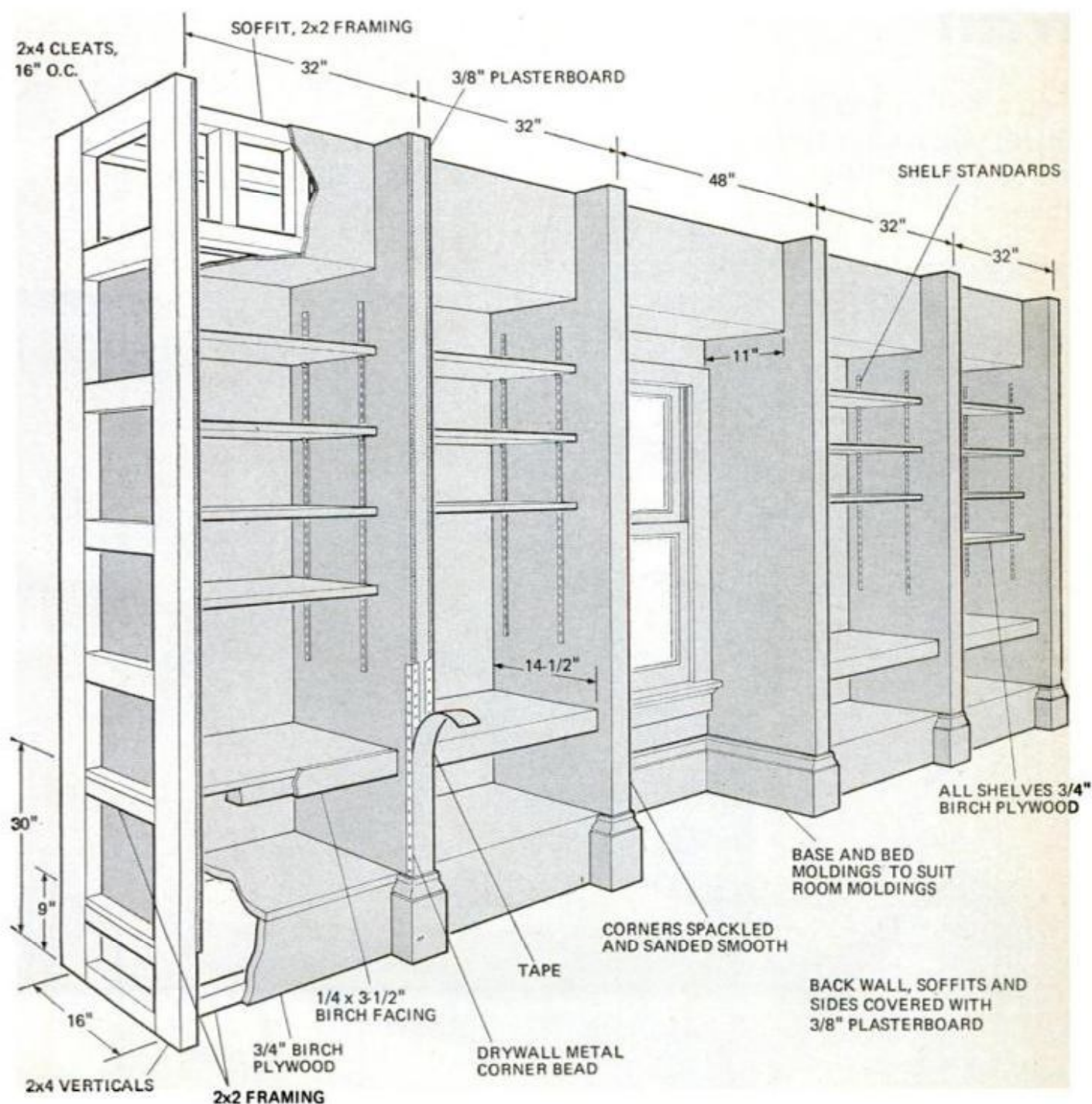


for a tired wall

ceiling, the owner wanted to create a greater feeling of intimacy. He achieved this effect by filling the window wall from floor to ceiling and corner to corner with the bookshelf system shown here. Visually, the change reduces the room in size; practically, it hides that cracked wall and gives support to the ceiling joists.

The wall system designed by Mr. Cherry is based on plasterboard-covered 2x4 frames with shelving in between. For visual uniformity, the dropped soffit was built-in. The design can easily be adapted to any size wall. Desk-level and floor-level shelves project slightly more than bookshelves to lessen the dominance of the vertical fins. ★★★

Art: Fred L. Wolff



Putting an airconditioner through the wall

It's a one-day job that will let you regain full use of that window.

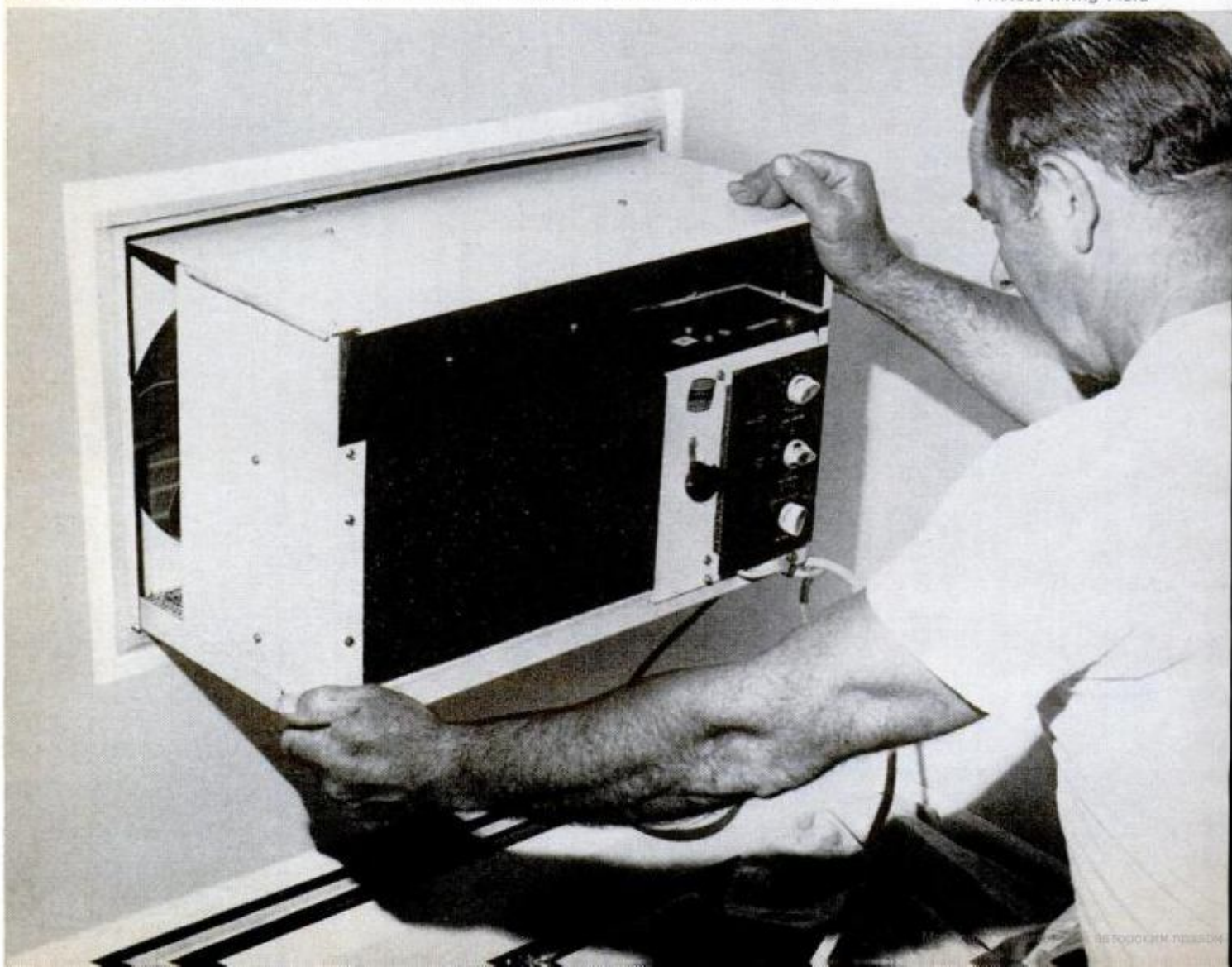
If you are like many new airconditioner owners, you've probably thought about installing your unit through a wall rather than in a window—so you'll be able to use the window. To do this, read the maker's instructions on how to 1) slide the operating unit from the outer housing (shell), and 2) remove the wingboard and side flanges that are used in routine window applications.

Begin the job outside by removing enough siding to make the cutout. To remove shingles without damaging them, slip a hacksaw blade under the shingle and cut off the nailheads. Next, slit and remove the felt to reveal the sheathing.

Using shell dimensions as a guide, outline the cutout plumb and level on the sheathing. Then use a portable circular saw to cut and remove the sheathing. Using appropriate-width

Opening is custom-cut to suit airconditioner. Unit should slide in and out easily.

Photos: Irving Field





Siding (asbestos shingles, here) is removed, sheathing is cut away. If stud is in opening, it too is cut out.



Frame is made on the ground (see drawing below for details), then set flush with sheathing at opening.

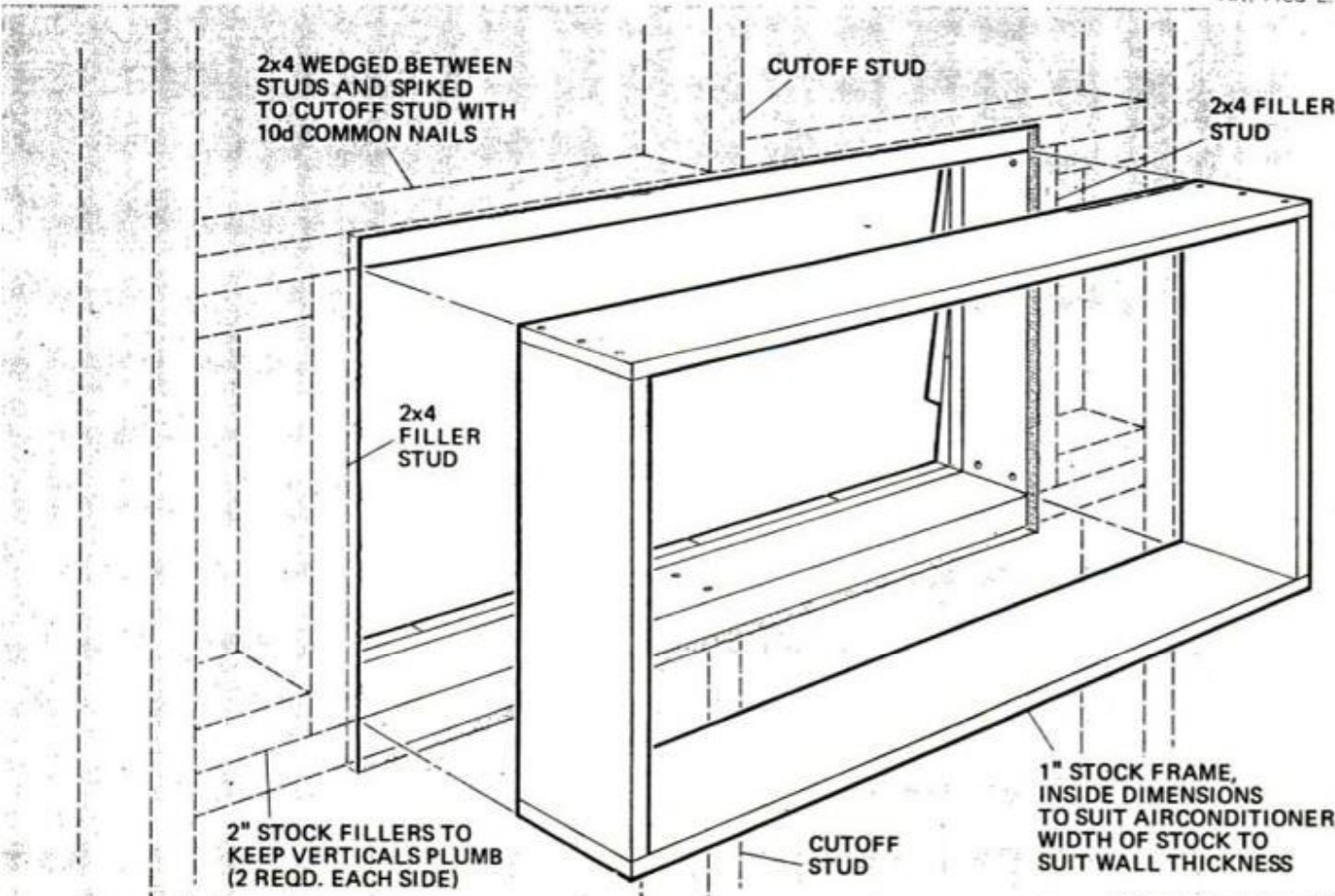


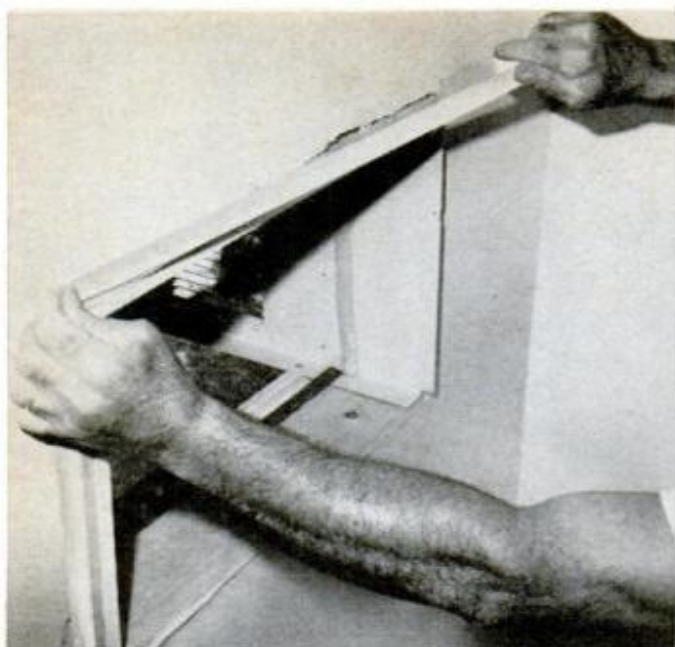
Next, air conditioner shell (exterior housing) is installed, 15-lb. felt is applied and joints are caulked.



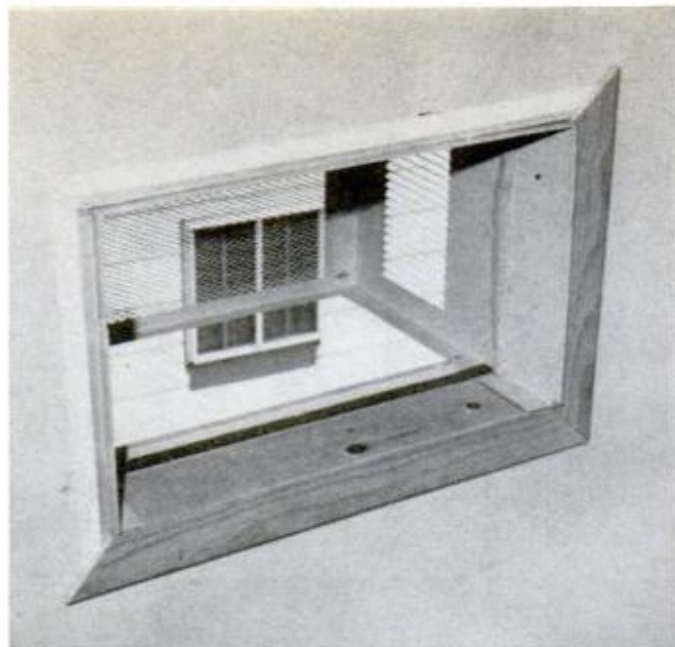
Asbestos shingles are then notched, cut and reinstalled. All ladder work is now completed.

Art: Fred L. Wolff

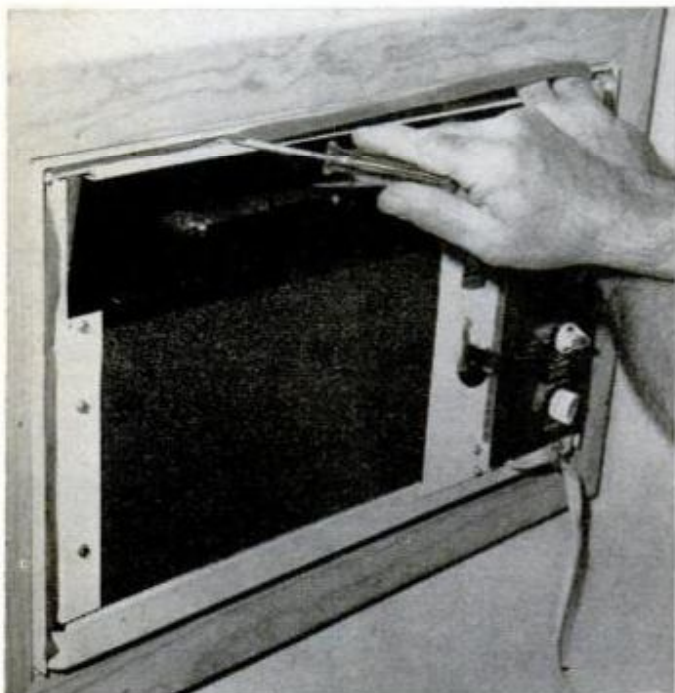




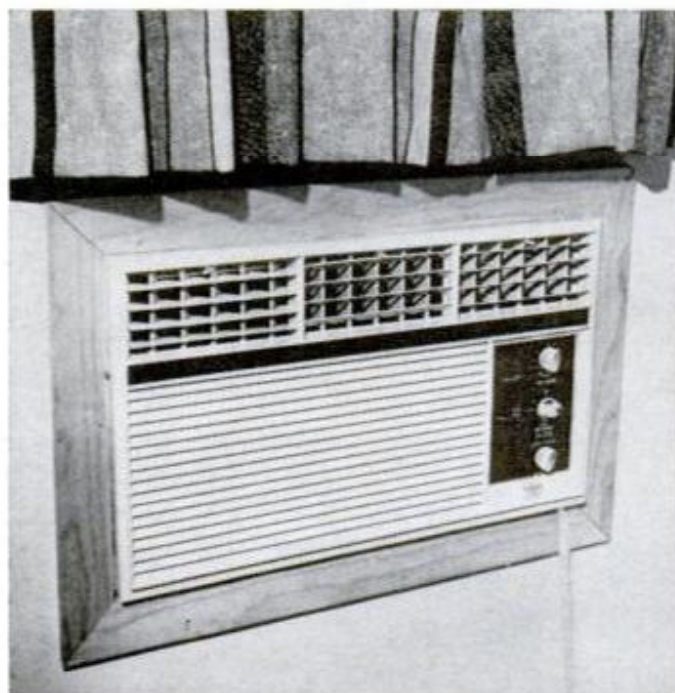
Inside, joints between new jamb and plasterboard are covered with sealing tape to keep out drafts.



For photo purposes, airconditioner is removed to show completed job. Actually, casings are the last step.



Airconditioner is slipped into opening. When it's fully seated, weatherstripping is forced into joints.



Correctly installed, through-the-wall mount lets homeowner use window when he wants to save energy.

1-in. (nominal) pine wood, construct the frame and build it to fit tightly around the unit's shell.

Push insulation away from the opening, remove the thin vapor barrier and then use a sabre saw to cut out studs (and plasterboard on the inside wall). Fasten the jamb in the opening, slip the outer shell into place and screw-fasten.

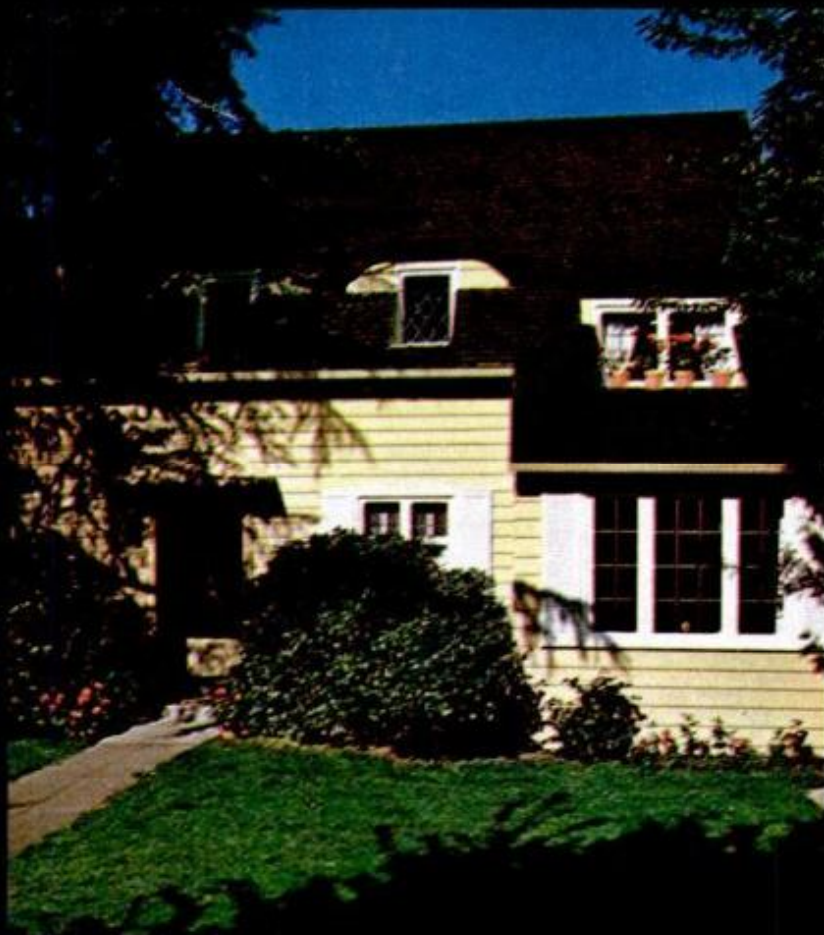
Outside, use a staple gun to replace the felt and seal the unit with caulk. Then cut and replace the shingles. As-

bestos-cement shingles crack easily; lacking a shingle cutter, the safest way to cut them is to repeatedly score them, then snap. Use a carbide drill for nail holes.

Inside, after applying sealer tape, slide the unit into the outer shell and install the casings. Use a screwdriver to stuff insulation strip between outer shell and airconditioner. Finally, slip the grille in place and plug in the unit.

—Brett David

This house was painted dark gray. We stained it light gold.



Stain over old paint? Sure! Providing your house has rough wood siding, shingles or shakes that have been previously painted or stained, far and away the best way to re-finish is with Olympic Solid Color Stain.

Why? Because Olympic Solid Color Stains are so rich in pigment most colors cover with just one coat. And since Olympic Stain doesn't form a thick film, it'll never crack, peel or blister. For beauty, protection and durability, re-do with Olympic Solid Color Stain.



Free color samples. Write Olympic Stain, 1148 N.W. Leary Way, Seattle, Wa. 98107. Olympic Stain. A division of COMERCO, INC.



Basement remodeling ideas you can borrow

A family room doesn't have to look as if it's in a basement. With a little imagination, you can give it living-room warmth.

The run-of-the-mill family room shown on this page is what greeted interior designer Virginia Frankel, AID, when she walked into her client's Long Island home. A collector of rare books and lithographs, the owner wanted the room renovated to fulfill several specific needs. First, it had to house his rare-book collection. Second, he wanted to use it occasionally as a home office. And, if needed, it had to be able to stand double duty as a guest room.

The family room shown was dramatically changed from uninteresting to elegant and vibrant mainly by using rich, luxurious walnut paneling from U. S. Plywood's Weldwood collection. Ms Frankel was so successful in her efforts that the owners now confess to "almost full-time living in the room." When you turn the page and see just how much imagination can do, you'll be sure to agree. The conspicuous

(Please turn to page 174)

1. "Before" photo (above) shows almost-useless window and wood paneling installed halfway up the wall, which magnifies, rather than camouflages, the foundation wall in this split-level basement.

2. Second "before" view (right) shows offcenter triple-mullion and half-wood wall. To see just how the owners of this home upgraded the looks of their family room, please turn the page.



Eight great cures for the common bathroom.

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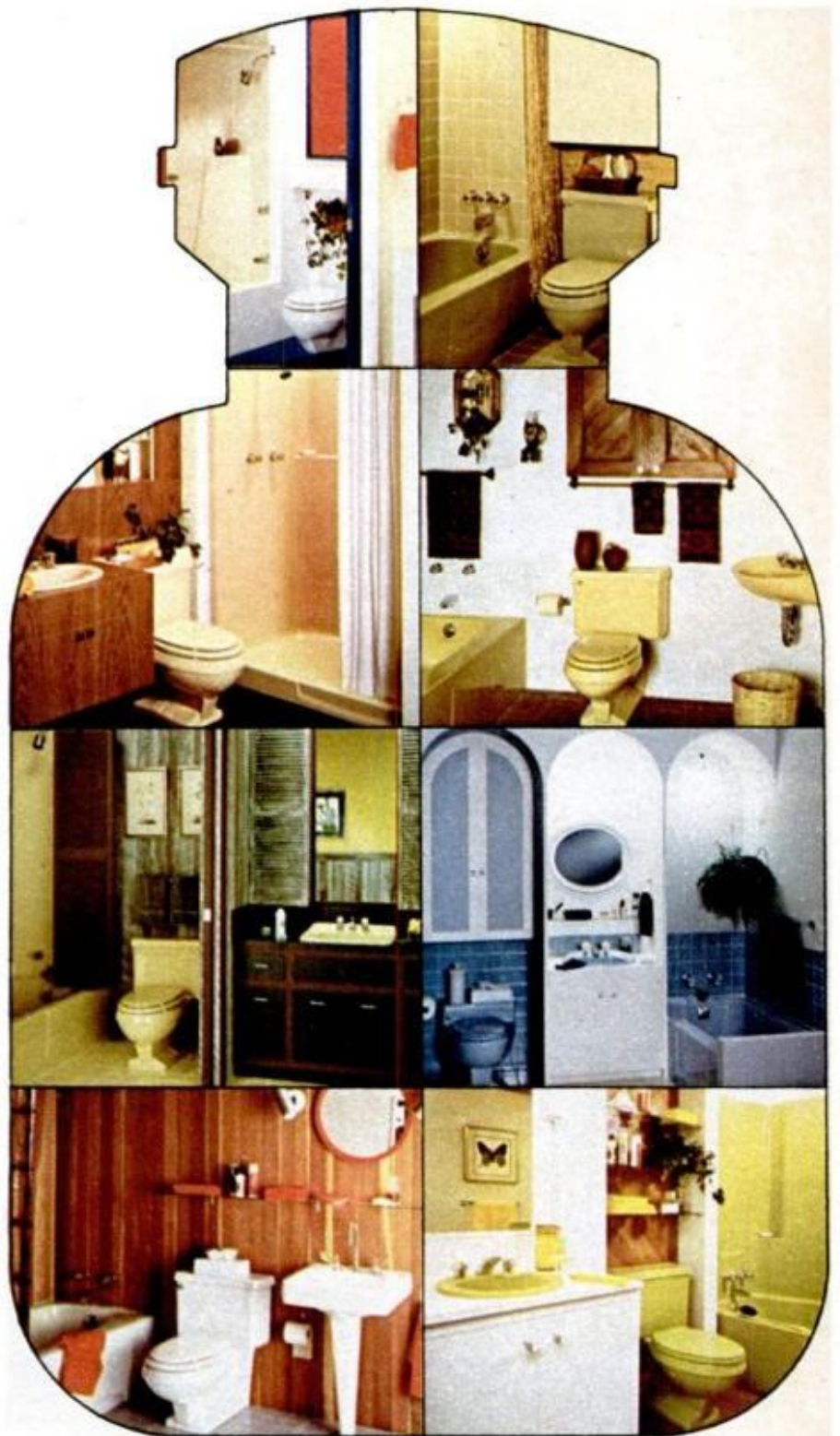
Eight great designs for normal-size bathrooms (5' x 8' and 5' x 10') created especially for Eljer.

They're all in a great new booklet. A guide to beautiful, functional, practical, average-size bathrooms, each designed to fit the average budget.

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Pittsburgh, Pa. 15222



ELJER

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BASEMENT IDEAS

(Continued from page 172)

foundation-wall ledge (see photo 2) typical of split-levels, was hidden by paneling fastened to furring strips installed over the existing wall. Cleverly arranged cafe curtains and drapes are used to hide the ledge behind the sleep-in sofa.

The almost-useless window to the left of the triple mullion was closed in and concealed by installing bookshelves over the ledge; cabinets below this bookcase are fake, intended to carry out the library wall theme. The finished room suits this family's needs perfectly. More important, there are many features here that could easily be incorporated into almost anyone's family room.

3. Same view (above) as photo 1. Rich walnut paneling was installed over furring strips nailed to old wall. Handsome library wall has slanted shelves with recessed lighting for viewing large books, storage cabinets below.

4. Wall in photo 2, as remodeled (below). Creative use of paneling, cafe-curtain arrangement and fake cabinets under bookshelves mask foundation ledge which had been obvious. Window shades are covered to match curtains.



Plymouth Scamp.

**You get what you pay for, plus something you don't:
automatic transmission.**



The Plymouth Scamp is a sensible, economical, six-passenger compact that's also a stylish two-door hardtop.

The Scamp in the picture is something special. It's equipped with a vinyl roof, whitewalls, wheel covers, power steering, AM radio, left outside remote control mirror, 3-speed wipers and electric washers, day/night inside mirror, special sound insulation, bumper guards, special lights, and special trim inside and out; the kind of things you most likely want on a car anyway.

Here's how to get the automatic transmission free. If you buy a specially-equipped Scamp we won't charge your dealer for the automatic transmission. So he doesn't have to charge you.

Of course, when you buy our Scamp, you get a lot more than a free automatic transmission.

Here's what else you get.

You get the kind of engineering that goes into our most expensive Chryslers and Imperials. Engineering

that offers you torsion-bar suspension, Unibody construction, and an Electronic Ignition System.

Scamp scrimps on fuel.

Popular Science magazine recently published test results on '73 cars (with figures adjusted by Popular Science to reflect 1974 model changes and the results of E.P.A. tests). They show that Scamp's "Slant Six" engine can get more miles per gallon than comparable cars like Apollo, Nova, Maverick, and Comet.

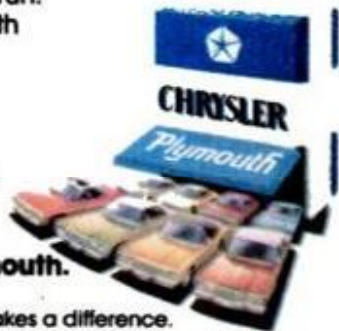
So you see, when you buy a Scamp, you really save in the long run.

Ask your Chrysler-Plymouth dealer about it.

Plymouth Scamp.

One of eight great small car buys from Plymouth.

Extra care in engineering...it makes a difference.



Tune in NHL Hockey on NBC-TV.
Brought to you by Chrysler Corporation.

Mercury vapor lamp burns brighter, uses less energy

HOME
IDEAS
GUIDE

You can install a new post lamp or convert an existing light and take advantage of this energy-saver.

by Robert W. Turek

Member, Illuminating Engineers Society

Photos: David Warren

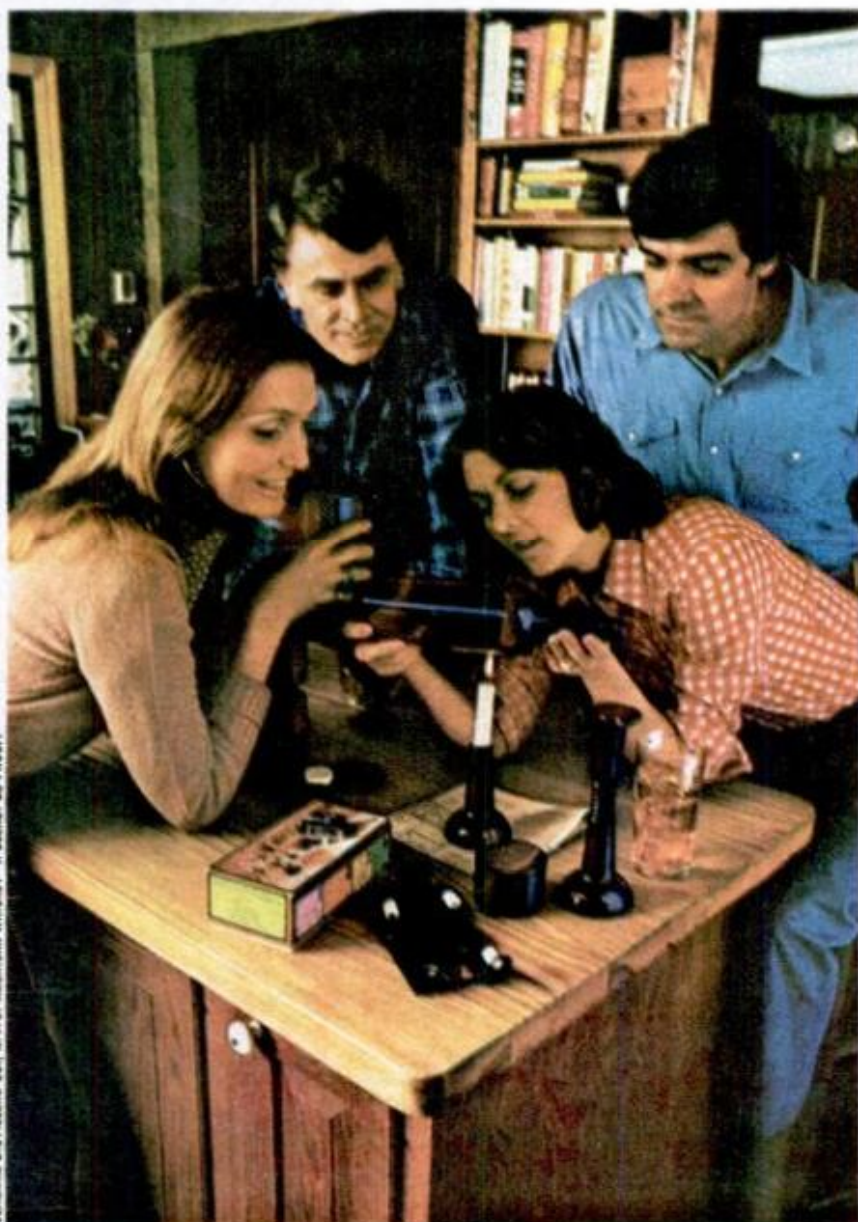
Today, electric post lamps offer the most economical and protective illumination for your driveway, walk, steps and entrances. Thanks to a new mercury vapor bulb, you now can illuminate the outside of your home with a brighter, longer-lasting light that uses less energy.

Compared to a typical 100-w. household-type bulb, a 50-w. mercury vapor bulb lasts 21 times as long and gives off almost twice as much light per watt. A 100-w. household bulb lasts about 750 hours (three months if lighted an average of eight hours a day), but the mercury bulb will burn about 16,000 hours (more than five years at the same daily rate). General Electric is one maker of mercury vapor bulbs.

The new elliptical mercury bulb operates on a 120-v. circuit. But since it requires a ballast, it cannot simply be screwed into a conventional light socket. Several outdoor lighting manufacturers, including Hacco, McGraw-Edison, Artolier and Montgomery

(Please turn to page 179)

America's whiskey and how to enjoy it.



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

We talk of ways to enjoy a bottle of Seagram's 7, and right away, you assume we mean the whiskey.

But lately, a lot of people are enjoying our bottle, just for the bottle.

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And we're delighted. So much so, we're offering a free booklet to help everyone get started in bottle cutting.

But, before you start creating with our empty bottle, do some creating with a full one.

Try Seagram's 7 Crown in a cocktail. Or with soda. Or just plain on the rocks.

Seagram's 7 goes well no matter how you like it. And that's why America likes it best.



Seagram's 7 Crown.
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The Drill Bit Sharpener takes any $\frac{1}{8}$ " to $\frac{3}{8}$ " twist drill bit (excluding carbide-tipped bits). Just put the bit in the correct-sized hole in the top, and in two easy steps, you've got a sharp drill bit again.

Which means you can drill clean, exact holes. With less wear and tear on your drill.

You'll also save money on drill bits you *won't* have to buy.

The Drill Bit Sharpener, from Black & Decker. The only person who needs one is anybody who owns a drill.

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MERCURY VAPOR LAMP

(Continued from page 176)

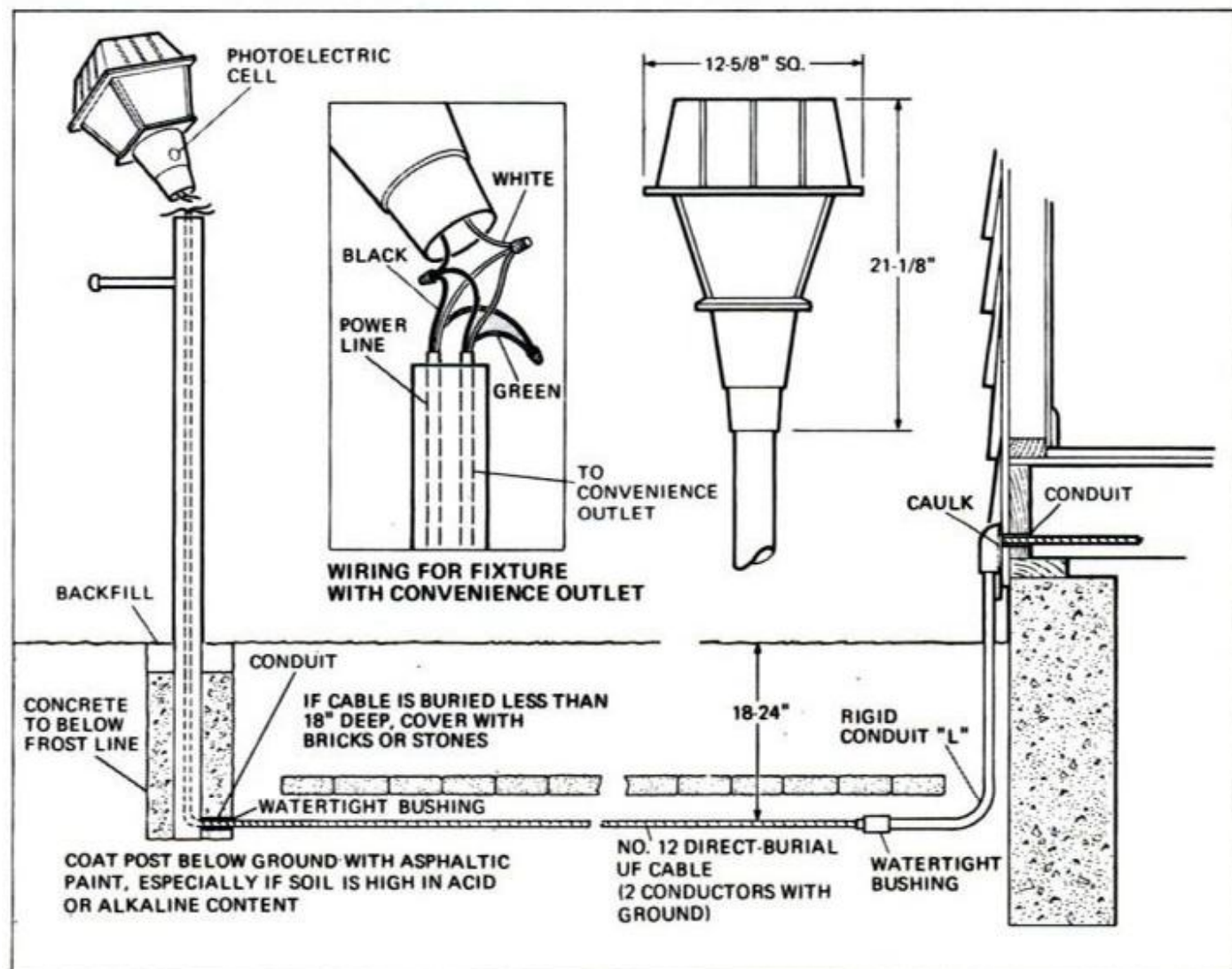
Ward, have designed cast-aluminum post-light fixtures for the mercury vapor bulb. They offer excellent light distribution from an unbreakable lens.

Before installing a new lamp, check with your local building department to assure electrical code compliance. Then dig a post hole—lower than the area frost line—and a trench to the power source, following details in the diagram below. Once the cable is laid in the trench and wired through the post, place the post in the hole, plumb and secure it in both planes with rope and stakes (see page 181). Usually a 45-lb. bag of concrete mix will fill the hole to about 6 in. below ground level. Backfill the hole and trench, and replace sod. Pull a plastic bag over the post top and seal it with tape to guard against mois-

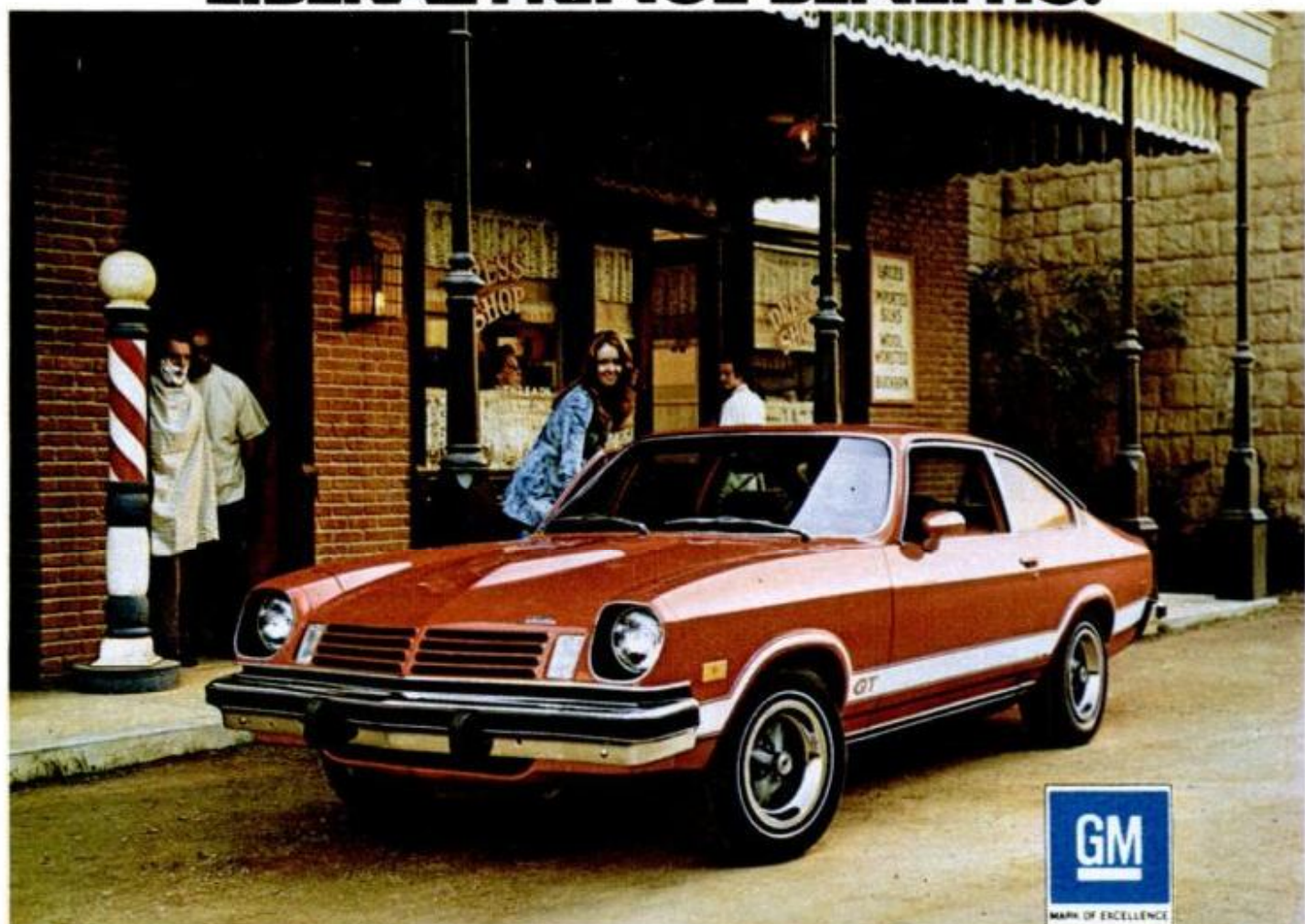
(Please turn to page 181)



Converting a standard electric post light can be as simple as removing and disconnecting the existing fixture head, then reconnecting the three wires to the same color wires on the mercury vapor lamp.



ECONOMY. PLUS LIBERAL FRINGE BENEFITS.



Good gas mileage is still the thing you want most in a little car, of course. But we know you'd like more.

Like sporty looks and colors and models to choose from.

Bucket seats that fit you

comfortably.

Nice soft carpeting.

A floor-mounted shift control and an instrument panel with dials and gauges instead of flashing lights.

Really good handling.

An engine with a little

bit of varroom going for it.

A rear seat that folds down and a rear door that opens up, so you can use your little car like a station wagon.

The Vega GT. An economy car-and-a-half.

CHEVROLET MAKES SENSE FOR AMERICA

VEGA
CHEVROLET

MERCURY VAPOR LAMP

(Continued from page 179)

ture. Let concrete set 24 to 48 hours, then remove bag and mount the fixture head by wiring as follows:

To wire fixture only. Attach the black cable wire to the black fixture wire, white cable wire to white fixture wire, and green wire to ground on cable.

To wire the outdoor, weatherproof convenience outlet to provide a plug-in receptacle at the post. Connect the black convenience-outlet (CO) wire to the black cable wire, white CO wire to white cable wire and green CO wire to ground wire on the cable.

To wire a photoelectric-cell collar to the fixture. (This device turns light on at dusk, off at dawn.) Connect the white wire from the photo cell and fixture to the white cable wire; connect the black wire from the photo cell to the black cable wire; then connect the red wire from the photo cell to the black fixture wire. Aim photo cell toward the north.

To wire a photoelectric cell, convenience outlet and fixture. Connect the white wires from the fixture, photo cell and convenience outlet (CO) to white

cable wire; connect the black fixture wire to the red wire on the photo cell; connect the black wires from the photo cell and CO to black cable wire; then connect the green CO wire to ground wire on the cable. Use solderless connectors and wrap with electrical tape.

If the power source is a surface outlet on the exterior of your house, turn off the circuit and attach an L-shaped conduit to the outlet box. Pull cable wire through the conduit and connect it to corresponding color-coded wires in the outlet—white to white, black to black. If an outside outlet is not available, run conduit through the basement wall and make connections at the nearest junction box (see diagram, page 179).

A metal fixture or post must be grounded. When no convenience outlet is used, run ground wire to fixture. With an outlet (which can also be wired at base of the post), ground the receptacle box to the ground post and fixture. A waterproof outlet box at the house entry should have an internal ground screw for ground-wire connection.

Converting a gas post light is easy, but the gas line should be capped by a professional gas-pipe installer. ★★★

Installation tools and materials

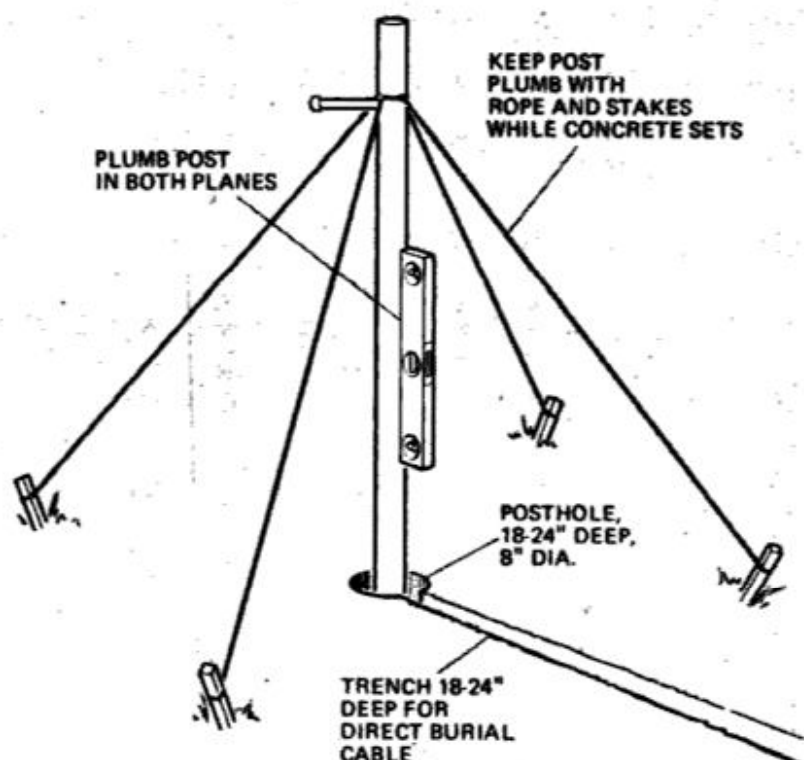
Materials

1. No. 12 direct-burial type UF cable wire (2 conductors with ground)
2. Solderless connectors (6)
3. Plastic electrical tape
4. 45-lb. bag of dry concrete mix
5. Heavy-plastic bag (minimum 4-in. dia.)
6. Rope
7. Stakes (4)
8. L-shaped conduit
9. Conduit sleeves (2)
10. Watertight bushings (2)

Tools

1. Spade
2. Long-nose pliers
3. Wire stripper
4. Screwdriver

Installation of lamp post



Nothing runs like a Deere

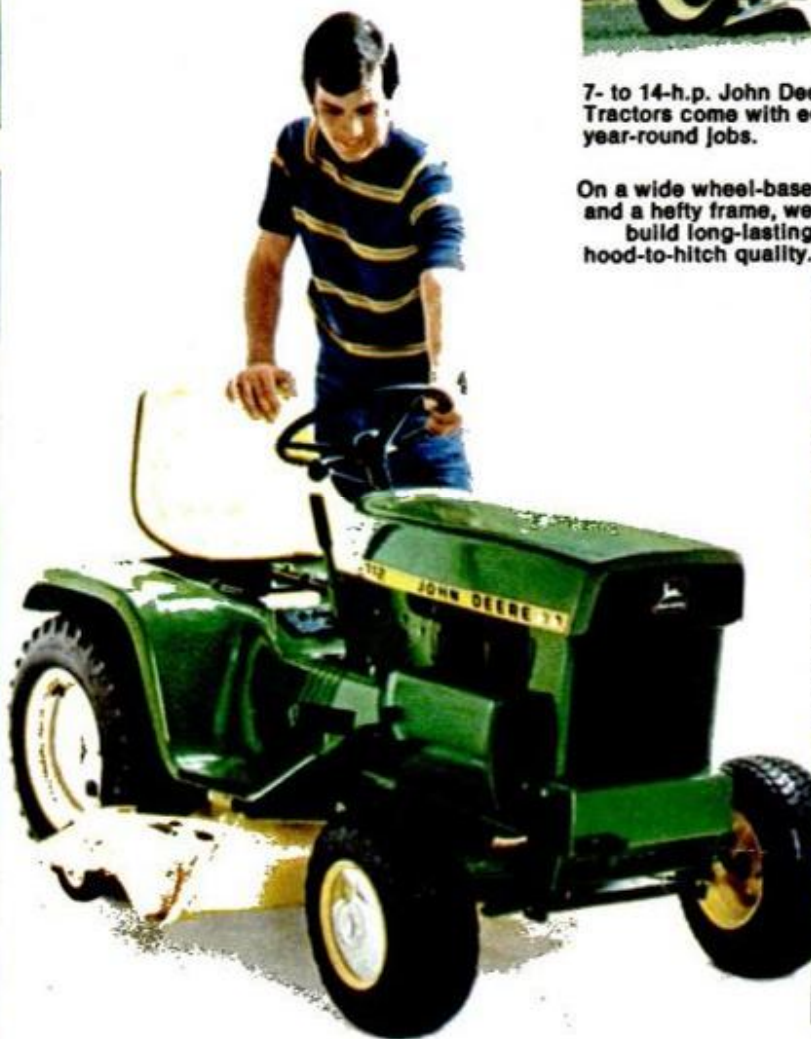


7- to 14-h.p. John Deere Lawn and Garden Tractors come with equipment for many year-round jobs.

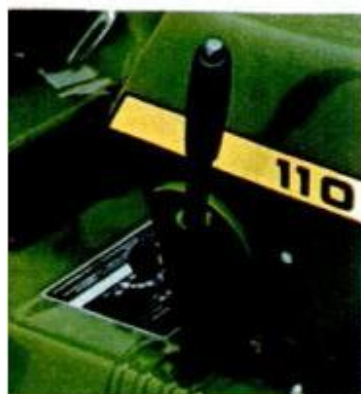
On a wide wheel-base and a hefty frame, we build long-lasting hood-to-hitch quality.



Automotive-type steering gives you tree-circling agility. One-piece deck and fender shields you from moving parts.



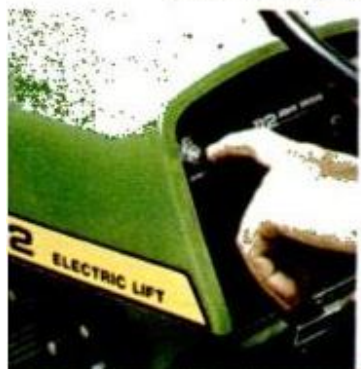
The reasons are all around you



Variable speed control on 8-, 10- and 12-h.p. models lets you change travel speed without shifting or changing equipment rpm.



Smooth three- or four-speed shifting or hydrostatic drive match power to the job.



Raise and lower equipment easily. On 10- and 12-h.p. models, you just flick an electric switch.

Ride in roomy comfort on a spring-mounted seat that adjusts to fit.

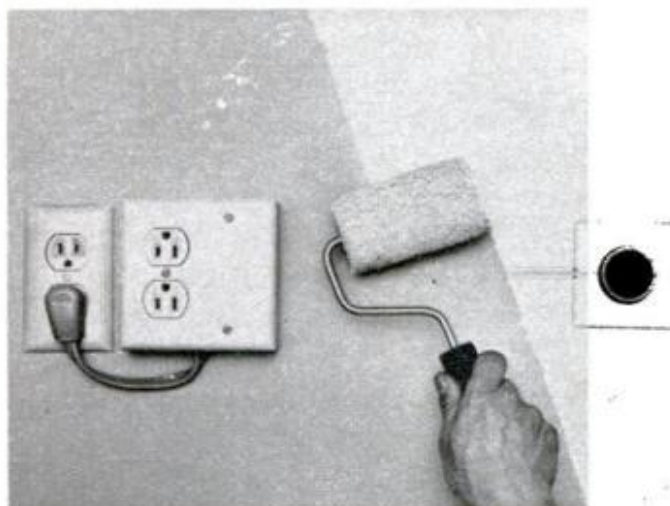


Step aboard a John Deere Lawn and Garden Tractor, and you're surrounded by value proved over a lot of lawns and a lot of years. And to make sure you get the dependability you expect, every John Deere dealer services what he sells. So don't toy around with your lawn, your money or your time. Find your John Deere dealer in the Yellow Pages. Ask about financing, too.



Now: A surface switch you can install in 30 minutes

**HOME
IDEAS
GUIDE**



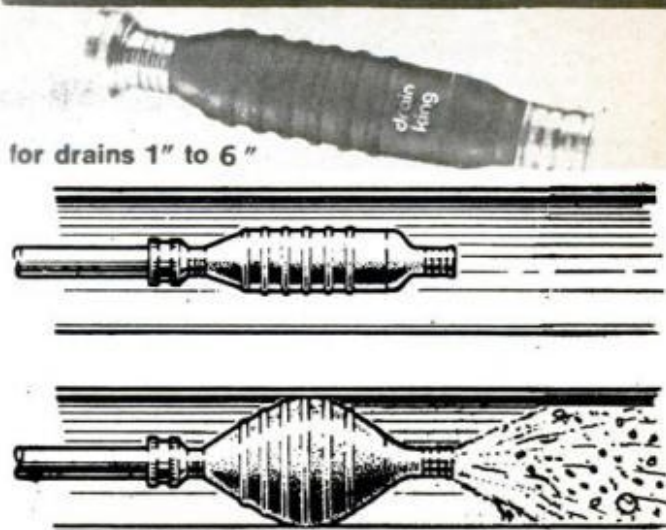
Mounted-on-the-wall switch system consists of adhesive-backed, plug-in transformer (power unit) placed next to existing duplex receptacle (above, left), sticky-back, two-wire conductor tape and clear plastic touchbutton switch. Wire is hidden with wallpaper or two coats of paint.

Installing a new wall switch used to mean cutting a hole in the wall for the switchbox and one or more holes for the tedious job of snaking the wires inside the wall from the fixture or outlet to the desired switch location. Then came the nuisance of patching before you could paint. Now, everything from lamps and TVs to stereos and airconditioners can be controlled by a wall switch so easy to install that a housewife or homeowner with little or no electrical knowledge can do it.

Called "Surface Switch," this UL-approved system has three adhesive-backed components that are simply pressed against the wall: a plug-in, solid-state relay transformer (power unit) placed next to an existing single-gang receptacle, 15 feet of .005-in.-thick two-wire conductor tape and a clear plastic, wa-

(Please turn to page 184)

WATER POWER UNCLOGS DRAINS



for drains 1" to 6"

Super-duper drain declogger

By simply connecting this amazing new tool to your garden hose, the chore of unclogging sinks, tubs, showers and the like is made easy. When water is turned on, Drain King expands and locks itself in a pipe. Pressure forces strong jets of water through surge valve to dislodge blockage.

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Northridge, Calif. 91324

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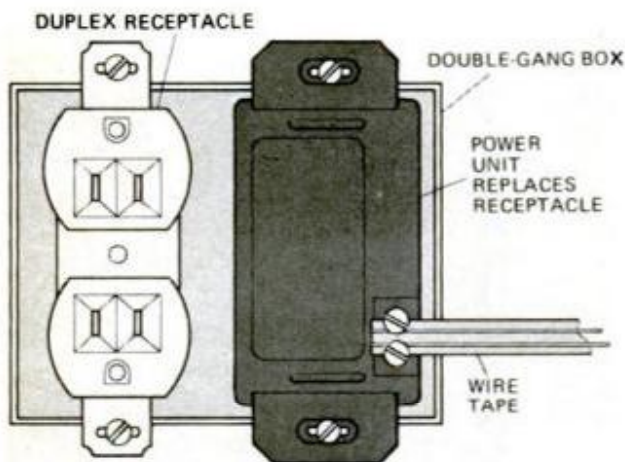
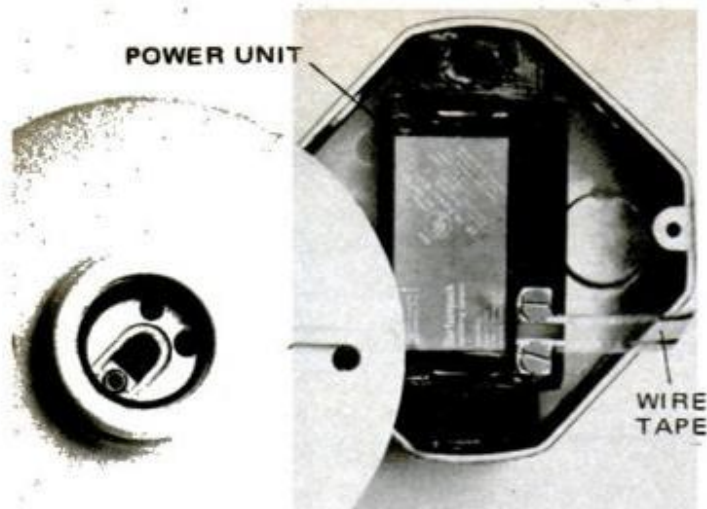
WALL-SURFACE SWITCH

(Continued from page 183)

fer-thin touchbutton switch. The power unit steps down 110-120-v. power to a 2-v. level, claimed to be so safe that if a child cut into the wire, the extremely low voltage would not be felt.

An alternate design, using the conductor tape and switch as before, has a separate power unit installed inside a double-gang wall receptacle or ceiling fixture outlet as shown at left. It's made by Switchpack Systems, Inc., 11578 Sorrento Valley Rd., San Diego, Calif. 92121. Plug-in unit kit, \$14.95; separate power-unit kit, \$12.95; available in hardware and department stores. Extra touchbuttons can be bought for multiple switching. ★★

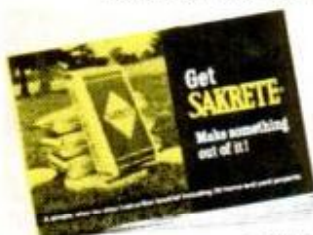
Second type of power unit, also used with conductor tape and a touchbutton switch, is mounted inside a standard octagonal ceiling outlet, or a double-gang receptacle box as at left. When installed, the power unit steps down 110-120-volt house circuit to a child-safe 2 volts.



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

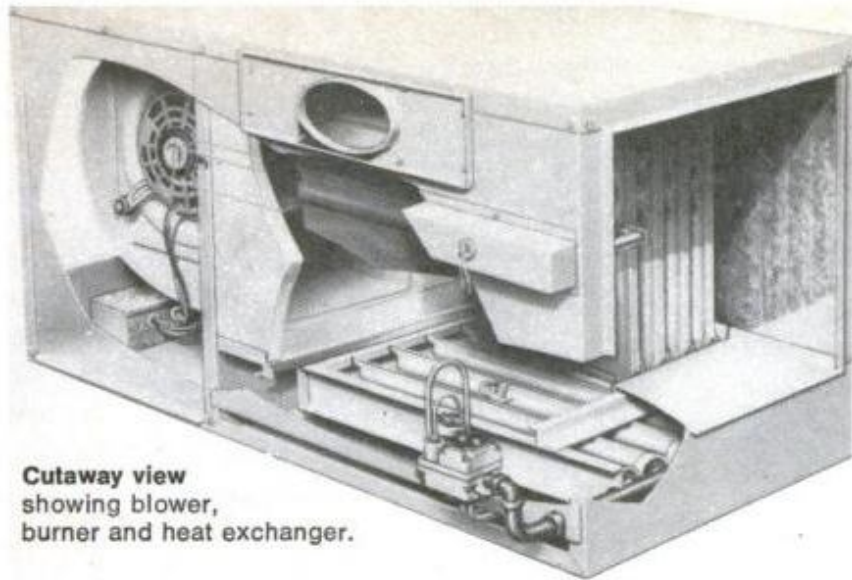


FREE . . . at your neighborhood SAKRETE dealer, our step-by-step instruction booklet featuring (20) select projects. Or, send 25¢ to cover handling to SAKRETE, P.O. Box 1071, Cincinnati, Ohio 45201.

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



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Cutaway view showing blower, burner and heat exchanger.

**HOME
IDEAS
GUIDE**

Stowaway gas furnace

There was a time when a furnace could be put only in the basement and nowhere else. Later it was tucked in a closet in slab-floor homes. Now, Lennox Industries of Marshalltown, Iowa, is marketing a horizontal gas furnace so compact it can be installed almost anywhere—in the attic, in a crawl space,

even hung from the ceiling of a utility room to save floor space.

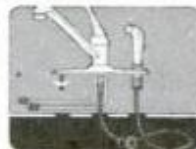
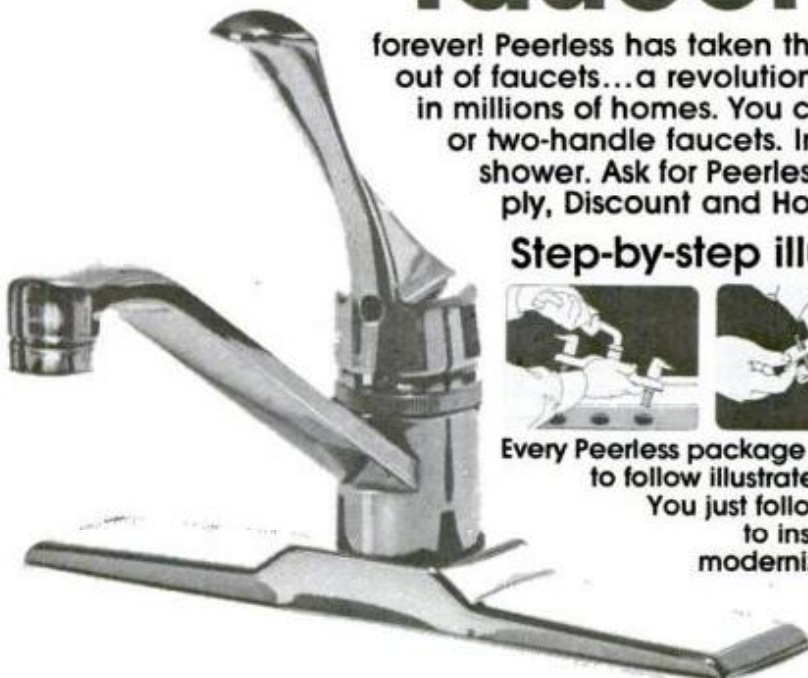
Called "Stowaway," this versatile, completely reversible heating unit features a clamshell heat exchanger, a burner assembly which slides out on a tray and a powerful multispeed, direct-drive (beltless) blower which has suf-

(Please turn to page 186)

You can do it, too! Peerless WASHERLESS faucets

Do-it-yourself! Save a bundle! And do away with old-fashion washer headaches forever! Peerless has taken the troublesome compression washer out of faucets...a revolutionary design that has proven superior in millions of homes. You can do it with Peerless single-handle, or two-handle faucets. In the kitchen, bathroom sink, tub or shower. Ask for Peerless Faucets in Hardware, Building Supply, Discount and Home Center stores near you.

Step-by-step illustrated instructions



Every Peerless package contains easy to follow illustrated instructions. You just follow the pictures to install, save, and modernize your home.

**PEERLESS
FAUCET**



P.O. Box 31, Greensburg, Indiana
A Division of Masco Corporation

APRIL 1974 185

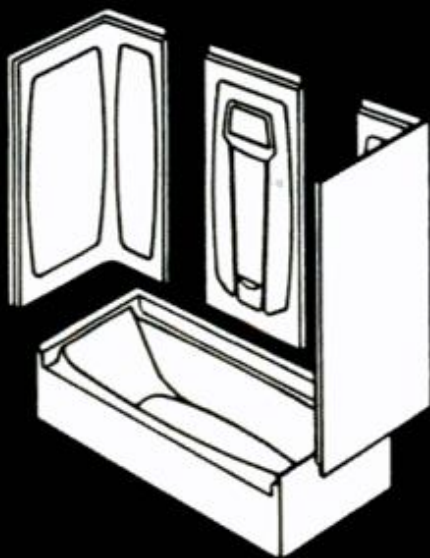
"Until now installing a bathtub was a real problem."

But now there's Versa-Bath. Borg-Warner's new 4-piece bath/shower cove, a remodeler's delight.

Versa-Bath is packaged in one easy-to-carry carton, will fit through any standard doorway, and assembles quicker than a blinkin' of an eye. Its rigid walls fasten right to the studs. No sub-walls. No tiling. No grouting.

Versa-Bath is easy to clean with just the wiping of a damp cloth, and will maintain its brilliant lustre over the years.

You'll find Versa-Bath at leading building supply stores nationally. To find your Borg-Warner dealer, dial 1-800-243-6000, free, any time, any day. (In Connecticut, 1-800-882-6500.) Or write: Borg-Warner, Plumbing Products Division, Mansfield, Ohio 44902.



Borg-Warner Corporation
Plumbing Products Division

BORG WARNER

STOWAWAY GAS FURNACE

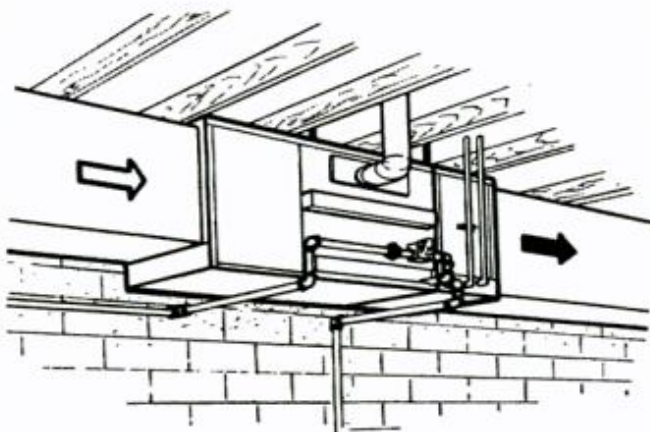
(Continued from page 185)

ficient capacity to handle airconditioning if you want to add it.

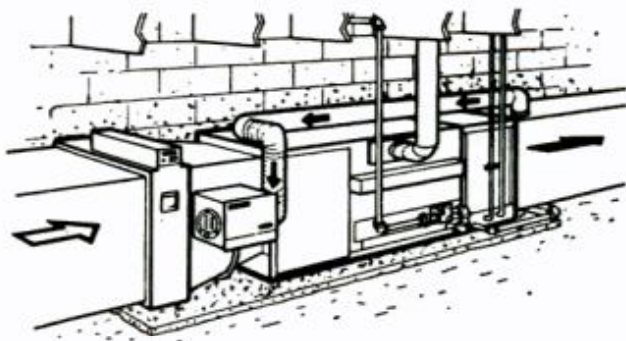
Seven models ranging from 75,000 to 140,000 B.T.U. heating capacity are available with 1½ through five nominal tons of cooling. You have a choice of flue connection, and burner and blower can be serviced from front or rear of the unit. The burner has one double row of continuous stainless-steel ports which make for clean and quiet combustion, and the fully dimpled surface of the heat exchanger gives minimum air resistance and better heat transfer.

Such extras as a direct-expansion evaporator unit, electronic air cleaner and automatic humidifier can be easily added to the basic furnace. List prices start at about \$375. ★★★

TYPICAL APPLICATIONS



Suspended installation from floor joists with cooling coil added.



Crawl-space installation with cooling coil, electronic air cleaner and automatic humidifier added.

How you can install a NuTone Automatic Garage Door Operator System in just half a day.



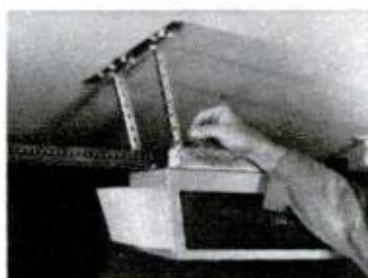
With a NuTone Automatic Garage Door Operator you stay safe, warm and dry, no matter what the weather. Press the transmitter in your car and your door opens, a light lights. Drive in, press again, the door closes and locks—all automatically.

If you're a *serious* do-it-yourselfer, you'll find installation easy . . . just challenging enough to make you proud of your accomplishment . . . and the money you'll save.



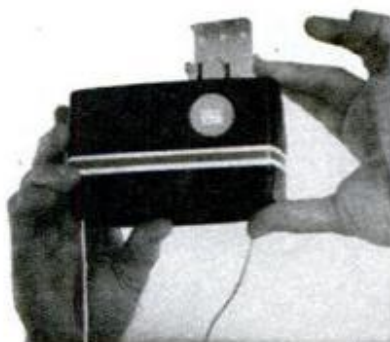
NuTone Operators are electronically controlled. This may scare off the novice and that's just as well. However, the wiring hookups are simple, and the power cord merely plugs into a 3-wire grounded outlet.

1. Make sure your garage door works well manually. Then install the wall mounting bracket over the door, centered 1" minimum above the highest point of door travel. Attach the operator assembly.



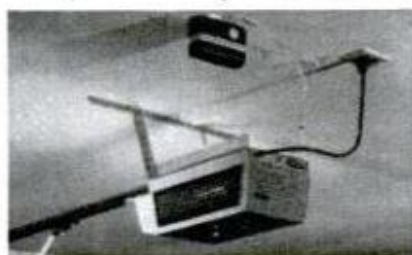
Hang the power drive from the ceiling. (Mounting accessories are available for every ceiling type.)

3. Assemble the door arms. Attach to trolley and the door mounting bracket. Measuring and centering is very important in all installation steps.



4. Install the radio receiver near the operator. Attach receiver wires to the operator.

5. For added convenience, push button control should be mounted near the door to the garage.

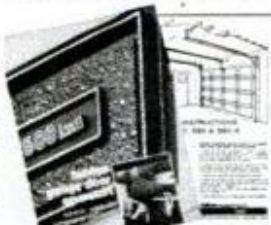


6. Here's the completed installation. Comfort, convenience and safety at the press of a button.

Can that be all? Well, we've simplified the steps because of space limitations here. But it's just about that easy.

To get complete details on NuTone's Automatic Garage Door Operators mail the coupon below. We'll send you complete step-by-step instructions plus a color catalog showing our full line of models.

Or, see your nearby NuTone distributor or installing dealer now. For his name, DIAL FREE: 800-543-8687 in the continental U.S.; except in Ohio, call 800-582-2030.



NuTone Division
Scovill

DEPT. PM-4
Madison and Red Bank Roads
Cincinnati, Ohio 45227

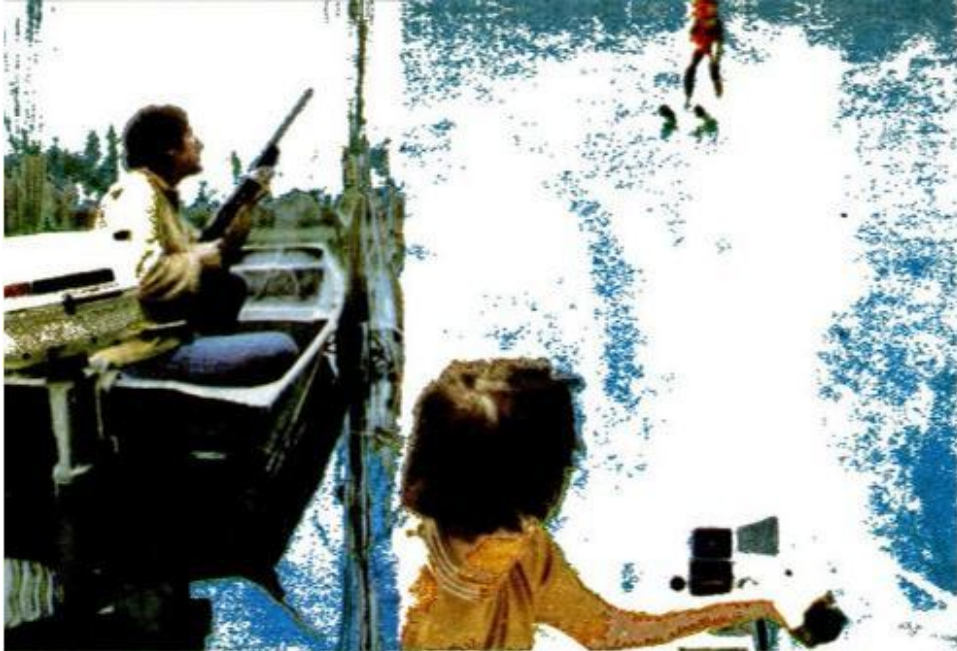
Please send Automatic Garage Door Operator catalog and detailed instructions. Enclosed is 25¢ to cover cost of handling and mailing.

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Form 2188, Printed in U.S.A.



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 lines 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 nearly the displacement of a 6. Our Lo-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 stuffed 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 компанией Chrysler



Informality and English Tudor styling are the keynotes of this playroom. Styling is created by using textured surfaces on walls and ceiling (see photos below).



'Stucco' your walls by the sheet

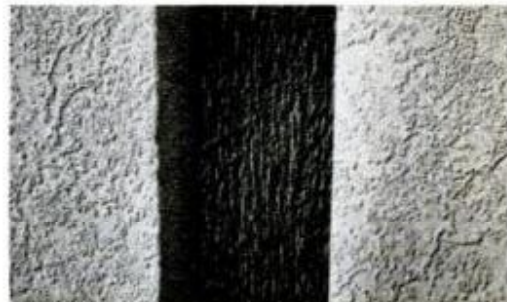
Textured panels make it easy to create an English Tudor look

An L-shape basement with an area of 900 sq. ft. is the spacious setting for a dual-purpose family room built by a couple for their family of six. In the area most used by adults, a wet bar and bumper-pool table were installed. The basic entertainment feature in the area for the youngsters is a table-tennis outfit.

Informality was the watchword in planning. To achieve it, the walls were covered with Stuccato indoor-outdoor siding which resembles stucco. The ceiling was covered with a prefinished, textured hardboard called Surfstone. Both textured panels are by Masonite Corp. and priced at about \$15 per 4x8-ft. panel. False beams and half-timbers are strips of an umber-stained, rough-sawn hardboard siding. ★ ★ ★



Close-up photo reveals Stuccato's texture. This paneling was used on walls.



Ceilings are covered with Surfstone; "beams" are stained strips of hardboard.

Wall arrangement from leftovers and scraps



With imagination, a thing of beauty can be made from the simplest, most basic materials. And that's just what happened with the wall in this room. The idea for this textured, three-dimensional wall arrangement of wood scraps came from architect and designer Paul Albitz, who, aided by his children, finished the wall.

First, the wall was framed with stained 2x10s and 2x6s. All interior wood pieces are scraps of standard fir and spruce lumber, mostly 2x4 and 2x6 cutoffs left over from remodeling projects. Each piece was squared, sanded, stained, and then attached to the wall with mastic cement. Result: A practically no-cost project that is an attractive focal point in the room.

Take a look at your collection of leftover wood and adapt this basic idea to decorate a drab wall or the foyer in your home. ★★★

A man likes to come home to Black Velvet.

Every man wants to feel the smooth, imported whisky from Canada.
And so does every woman.



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Old caulk must be removed completely or it will deteriorate and affect life span of the new caulk. Using a stiff-bladed putty knife, gouge out caulk along seam between tile and tub. This must be done very carefully to avoid damage to both surfaces.



Thoroughly clean seam and adjacent areas to remove all dust, grime and soap film: A trace of residue hinders caulk adhesion. Cleaning should be done with alcohol or other cleaning solvent. Caulk line is then rinsed with water and dried thoroughly.



How to recaulk a bathtub

Eventually, an annoying crack may develop where the top of your bathtub meets the wall tile. It's usually the result of slight sagging due to weight changes after repeated filling and emptying of the tub. This unsightly crack permits water to seep in, de-

SUPER CAULK™ Guaranteed for 20 Years

- Macco Acrylic Super Caulk will not lose adhesion, crack, bleed, stain or discolor
- Adheres to all common building materials
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Guarantee: Macco Adhesives guarantees that if Macco Acrylic Super Caulk is used as directed and fails within 20 years after application, Macco will replace an equal amount of material at no cost after inspection, and upon submission of proof of purchase to Macco. This guarantee applies to residential use only.

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IT'S CALLED SUPER FOR A REASON.**

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MIGHTY MAC SHREDDER- CHIPPER MODEL 12-P



Process garden refuse material through a mighty Mac shredder-chipper for compost heaps or till directly into your soil. The model 12-P shown above will chip tree limbs up to 3" diameter for valuable mulch. Don't burn your refuse; recycle it back to the soil. Process corn stalks, manure, leaves, sod and flower stems. Write for free literature describing the Mighty Mac quality line. Amerind MacKissic Inc., Box 111, Parker Ford, Pa. 19457



Apply new caulking in a long, unbroken bead which is slightly wider than the open joint. The plastic applicator tip on tubes of some caulking compounds such as the one shown have gradations to provide cutoff guide to obtain correct bead thickness.



Bead of caulk can now be worked or forced into the opening. Moisten finger with water or wrap a cloth tightly around a finger and push the caulk firmly into the joint. With type of caulking shown, the excess caulk can be wiped off tile and tub with a wet cloth.

teriorating the wall and loosening the tiles.

The solution is to fill the crack with a flexible, waterproof caulking compound. Be sure to use the type made for sealing the joint around tubs—not the kind sold for exterior house caulking.

Such tub caulking comes in squeeze tubes or disposable cartridges for use in a caulking gun. It's white in color, dries quickly and can be painted shortly after application. The caulk shown, Tub & Tile by Red Devil, is available at most paint and hardware stores. ★★★



John couldn't stand the pressure.

John whistled and you slammed the door on him. He squeaked and you jiggled his handle. Now, in desperation, he's doing his Niagara Falls routine.

But had you looked into John's tank earlier, you could have saved yourself a lot of mopping. His problem is obvious. An out-dated, corroded ball cock.

There's no need to lose your head, though. You can stop John's leaks, squeaks, and whistles once and for all with Fluidmaster. A simple-to-install device that eliminates the old-fashioned rod, float ball and other corrosive parts.

Fluidmaster controls toilet tank water hydraulically. Working with water pressure, instead of against it. So shutoff is fast, positive and quiet.

Write today for full details. And learn how to keep your head above water.

Manufacturer of the Model 100, 200, and 400



FLUIDMASTER, INC.
P. O. Box 4264 | 18100 Via Burton | Anaheim, Ca. 92803

"You'll never believe what my husband used Dow Corning Bathtub Caulk for."

This is an unsolicited testimonial from Mrs. Jim Hines of Cadiz, Ohio.

Whose husband's hobby is entering the farm workhorses in pulling contests.

"After an especially tough competition, Jim's best horse had sore and tender feet.

"Jim figured a cushiony, protective foot pad would help.

"So he packed the horse's hooves with Dow Corning Silicone Rubber Bathtub Caulk.

"The horse's feet are much better now, and Jim is entering him in pulling contests again."

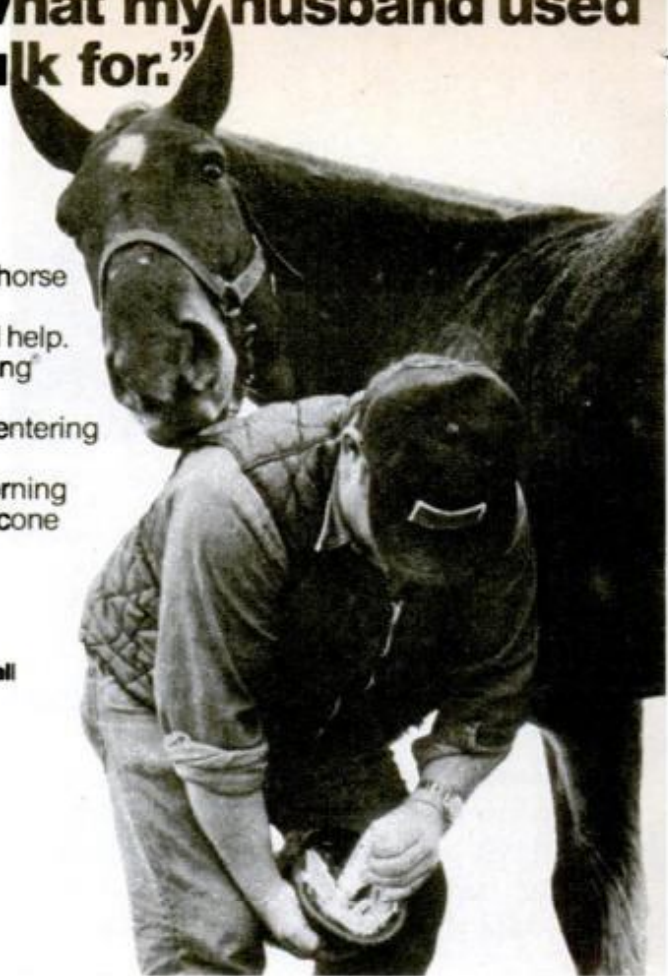
What can you do with cushiony, rubbery Dow Corning Bathtub Caulk in white or decorator colors? Or with our Silicone Sealers in clear, black and aluminum?

We'd like to know.

Dow Corning Corporation, Dept. C-4103, Midland, Michigan 48640.

For a limited time, look for the special 25¢ refund sticker on all packages of Dow Corning Bathtub Caulk and Silicone Sealers.

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Superior Interiors

25¢

If you thought red cedar shakes and shingles look good only outdoors, you're 25¢ away from a pleasant surprise. Send for our 8-page color brochure showing how to dress up living rooms, decorate halls, adorn ceilings... even fireplaces... with the infinite textural variety of red cedar. Brochure teaches you to select from the 19 styles of red cedar shakes and shingles, how to mount, cut, overlap and finish. If you can hammer a nail and measure, you can add red cedar's warmth and beauty to your home. *Superior Interiors*, a how-to-do-it bargain for only 25¢. Write: **Red Cedar Shingle & Handsplit Shake Bureau**, 5510 White Building, Seattle, WA 98101. Enclose 25¢ for handling.

Name _____
 Address _____
 City _____ State _____ Zip _____

Build this good looking storage building in your own back yard!



Here's a great way to take the strain off your garage. This handsome back-yard building has plenty of room for tractors, lawnmowers, bikes, tools or whatever. You can use it for a workshop, an escape room, a bunkhouse for the kids, or even a pool house.

It measures 8 feet by 12 feet; has a second floor; and can be built by most any handyman.

Plans give detailed building instructions. You probably will want to order two sets of plans as you likely will have to submit one set to your local building department.

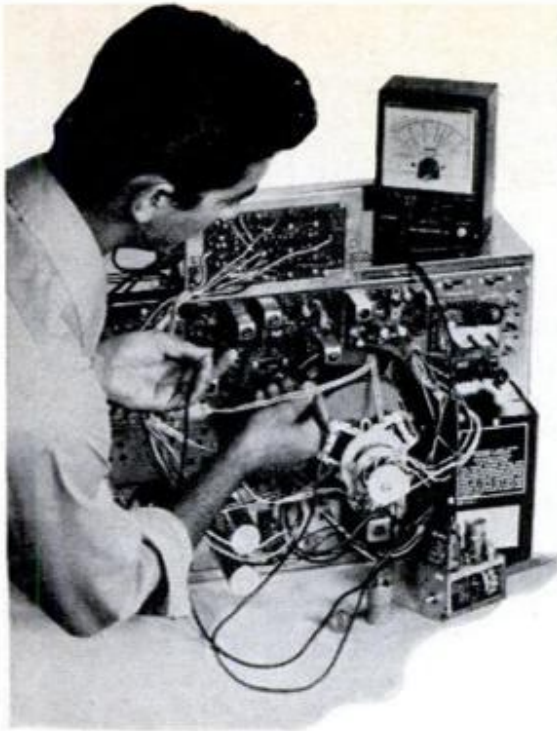
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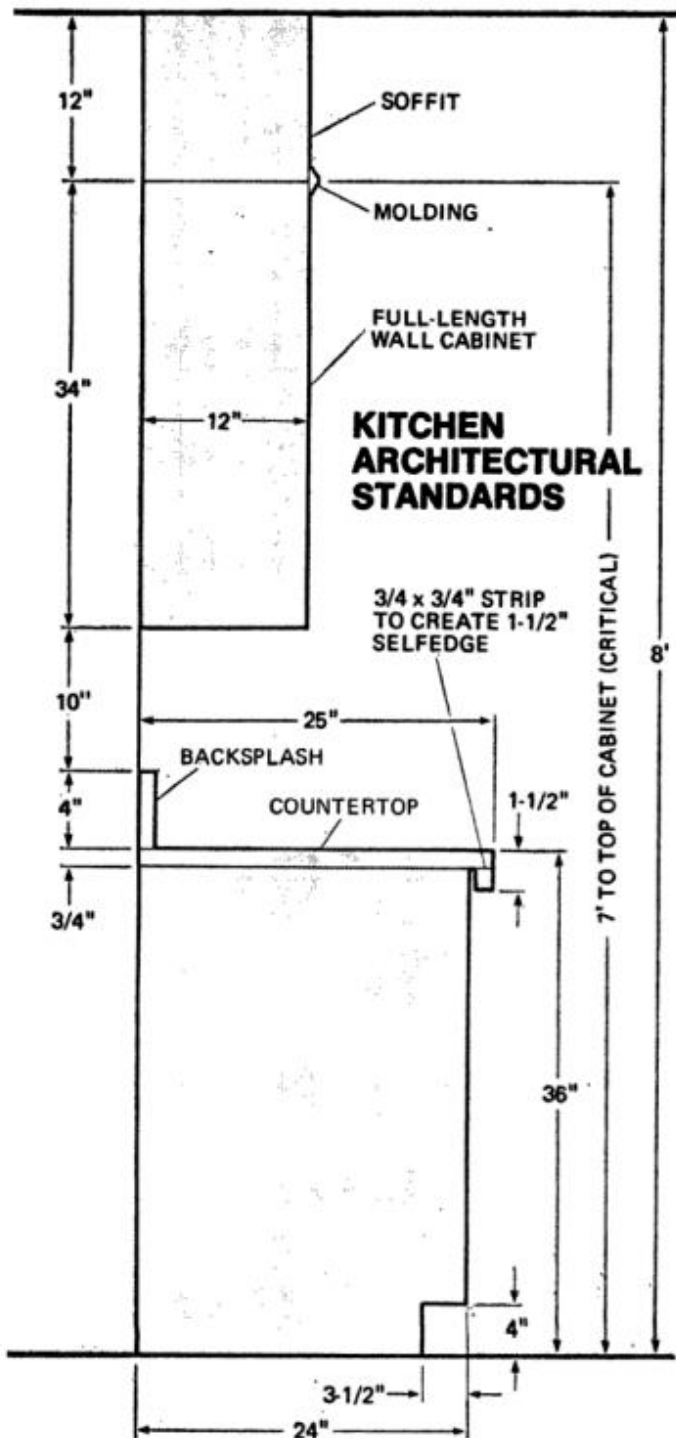
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GTE SYLVANIA

How to install kitchen cabinets

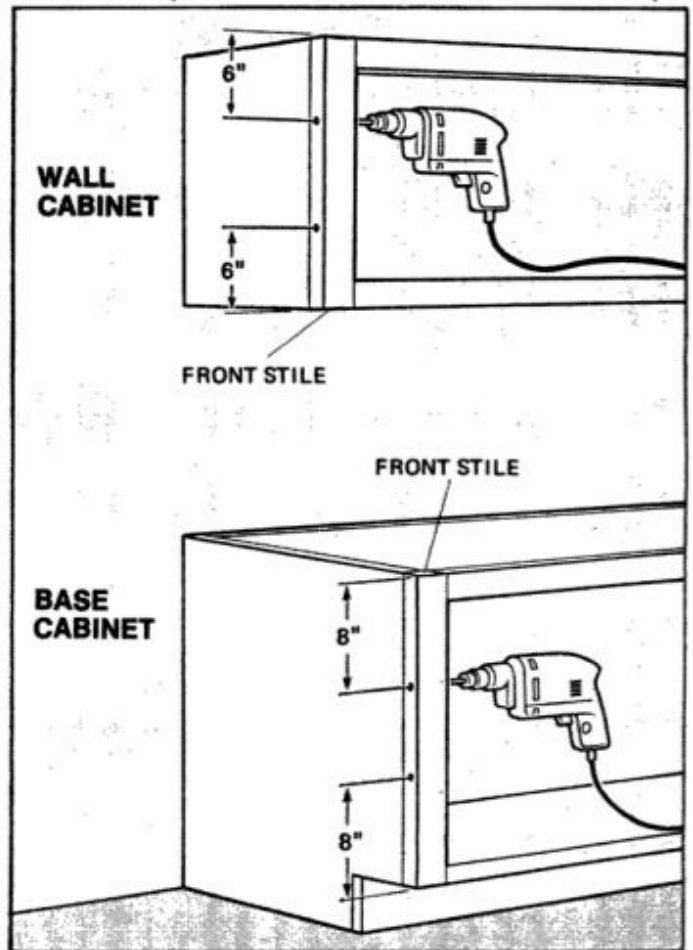
There are three basic points to keep in mind when you install kitchen cabinets: 1. Base cabinets must be set level, thus shims are usually required. 2. Cabinets must be securely fastened to wall studs. Although many contractors install cabinets using hefty (16d) common nails, proper-size wood screws are a better choice. 3. You must stick to the architectural kitchen standards

shown in the drawing at left, below. These dimensions are important; any variance from standard working and reaching heights and depths will result in an uncomfortable-to-work-in kitchen. Also, keep in mind that kitchen cabinets are, in fact, pieces of fine furniture; handle with care to avoid scratching or marring the finish. And keep tools off the countertop.



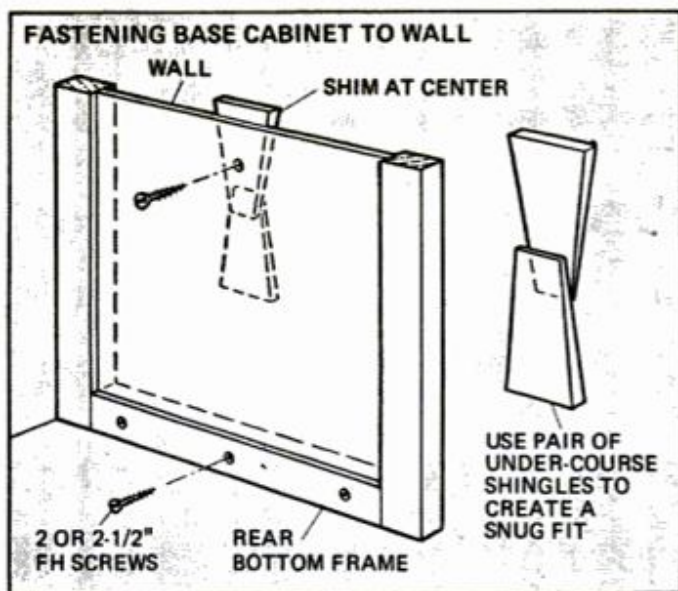
Data: John Gaynor

Art: Peter Trojan



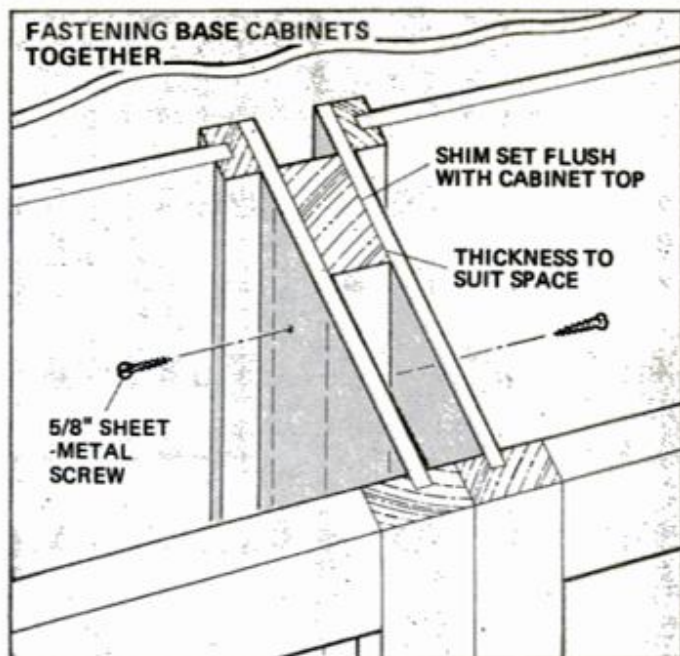
Joining two cabinets

Start by drilling installation holes in stiles of those cabinets that will butt another. Holes should be large enough for fastening screws to slide freely. Butt the two cabinets and, using each installation hole as a guide, drill a smaller, correct-size pilot hole in the adjacent cabinet's stile. Later, as screws are turned home, they will take their bite in the adjacent stile and pull the joint tightly closed. Hole locations are shown above; for less than full (34 in. high) hangers, usually only one hole is needed at stile center. Use additional screws wherever joint is not tight.



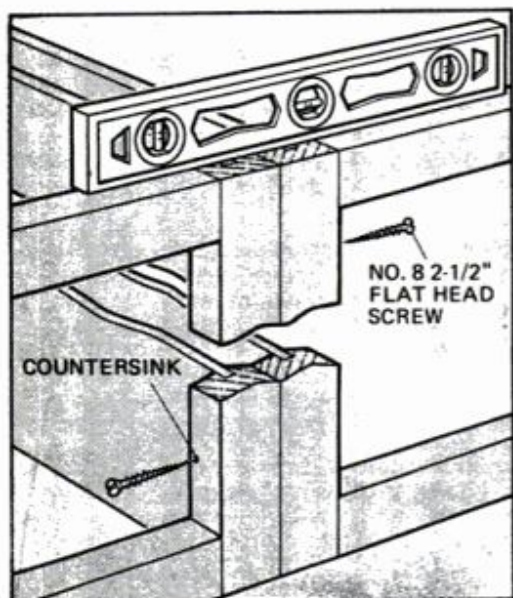
Fastening cabinets to the wall

If it is necessary to drive screws through the back plywood panel to penetrate a wall stud when attaching a base cabinet (above), use shims—under-course shingle—to assure a rigid installation and to prevent bowing the cabinet's back. Use this method on base cabinets only. For wall cabinets, install 2-in. No. 10 wood screws through the wood fastening rail at inside top back of the cabinet.



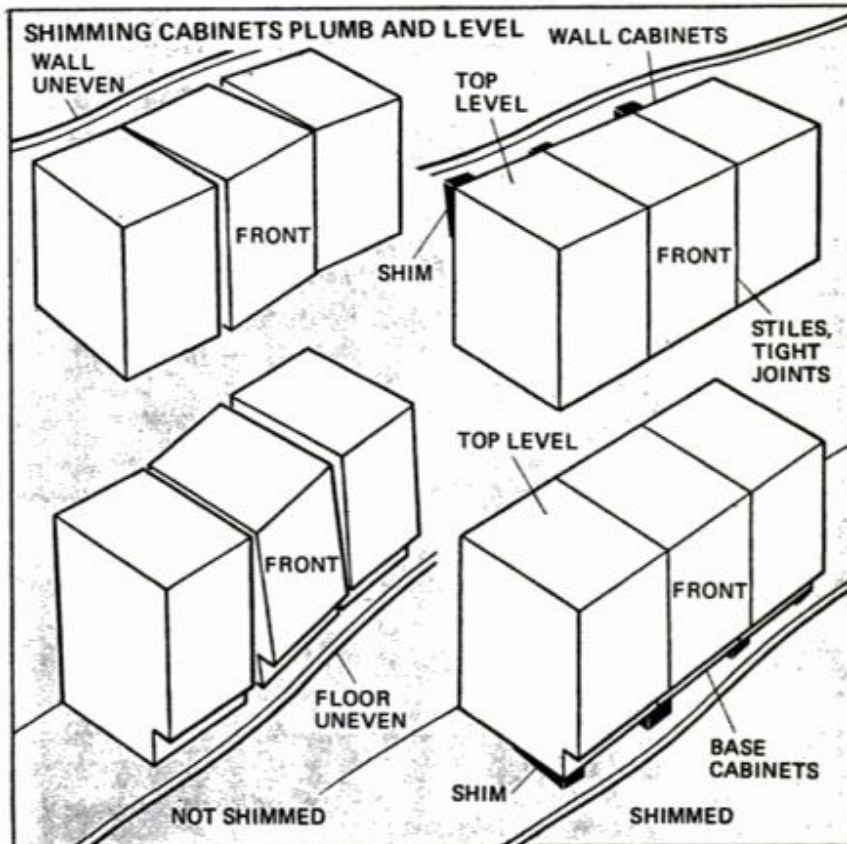
Shimming between cabinets

If stiles project beyond sides, use a shim between cabinets as shown. The shim can be of solid wood if the dimension matches stock lumber. For example, if the space between is $\frac{3}{4}$ in., simply use $\frac{3}{4}$ -in. pine or plywood. For odd dimensions, use a pair of shingles (above left) to obtain a snug fit.



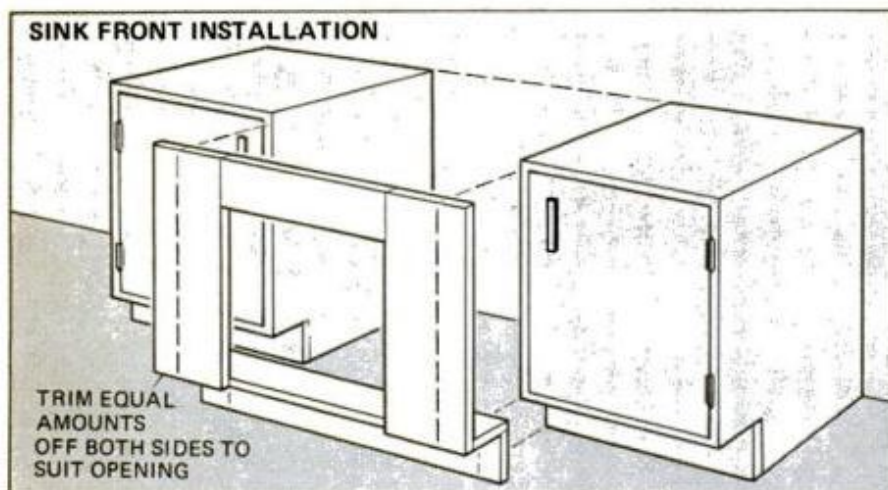
Joining front frames

Use your spirit level (a 4-footer is best) to level cabinets. Where necessary, slip a shim under low cabinet to bring it up into the same plane as the fastened first cabinet. When satisfied with alignment and plumb, join the cabinets by installing $2\frac{1}{2}$ -in. screws through the installation holes you drilled earlier (see page 198). Use flat-head screws and countersink them so that the screwheads will not interfere with the operation of either doors or drawers.



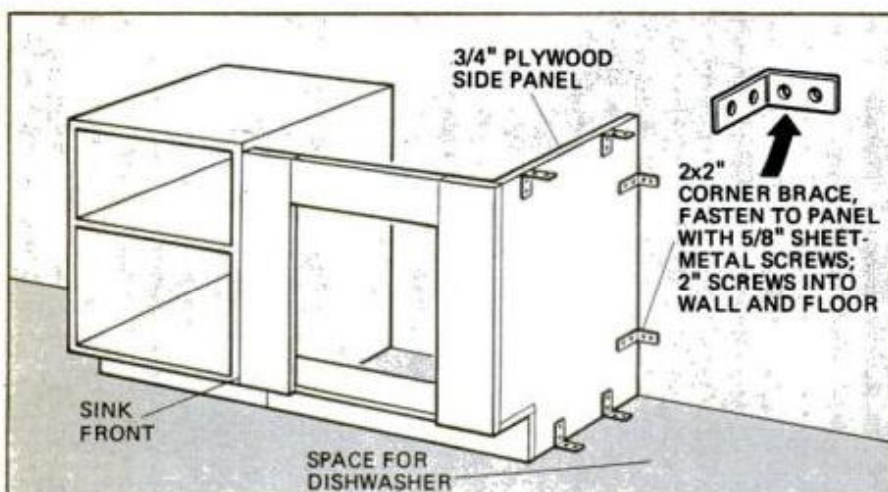
Floor and wall shimming

If your floors and walls are not level and plumb, it is a must to shim behind base and wall cabinets to the highest point as above. Shimming assures proper alignment of horizontal cabinet rails for appearance, and is necessary to assure that doors and drawers will function properly after installation.



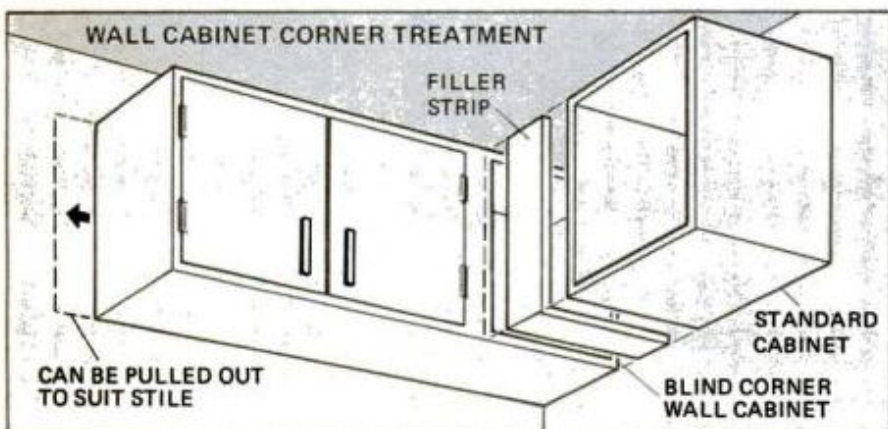
Sink-front installation

Generally, a sink front (designated SF), not a cabinet, is used below a kitchen sink. Since the most widely used single sink is 24 in. wide x 21 in. deep, most sink fronts come in 24-in. widths. Larger widths for oversize and double sinks are also manufactured. Some makers put extra-wide stiles on the SF so that they can be trimmed to the required size (width) on the job. Sink fronts are secured by fastening through stiles to the cabinets butting both sides of SF.



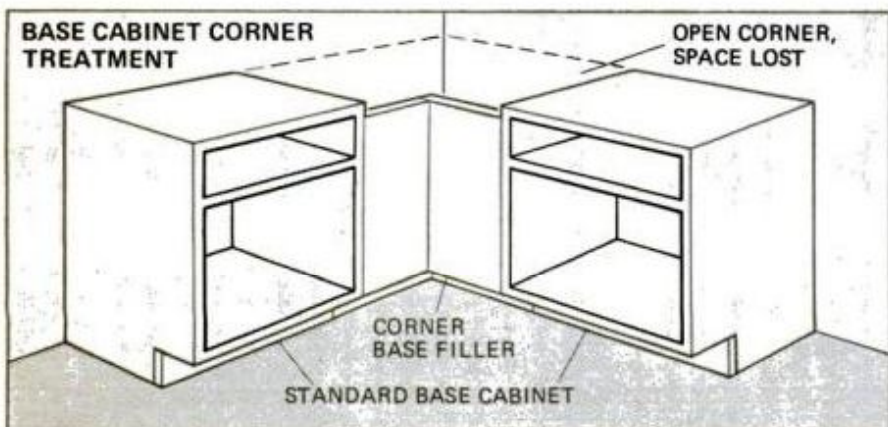
Dishwasher next to sink front

If your layout calls for a dishwasher (DW) to be located next to the sink, an extra step will be necessary. Since there is no cabinet for fastening SF on DW side, it is necessary to cut a 3/4-in. plywood panel to serve as a sidewall. For rigidity, fasten the plywood "side" to the floor and wall using 2x2-in. corner braces. After countertop is installed, add corner braces from plywood panel to underside of countertop; use 5/8-in. sheet-metal screws to top. DW conceals corner braces.



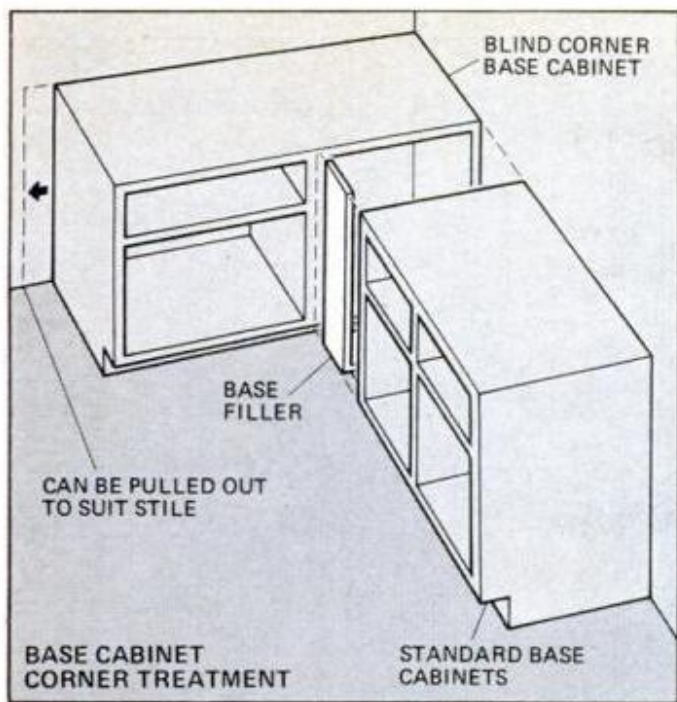
Blind corner wall cabinet

Installation is the same as for other wall-hung cabinets except that a 3-in. filler is used between the blind cabinet and the cabinet butting it at 90° (to assure clearance for door swing). The filler is attached by screws through the hanger cabinet, and from inside the blind corner hanger into the filler. Butting cabinets are hung conventionally using screws through the inside back top rail into wall studs.



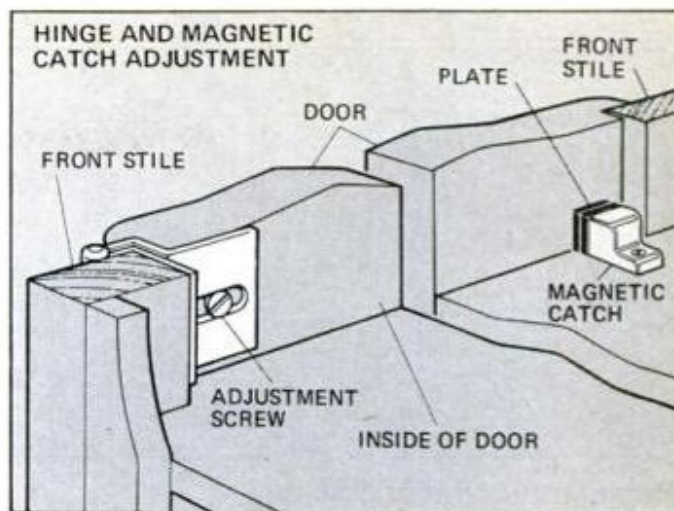
Corner base filler

Base cabinets can be installed as shown at left by using a corner base filler. Though there is a cash saving initially when this type corner is used, it is recommended only for kitchens where space is ample. Once closed in, that corner area is space lost for good. To utilize corner space, consider instead installing a blind corner cabinet (BCC). See drawing of BCC at top of next page.



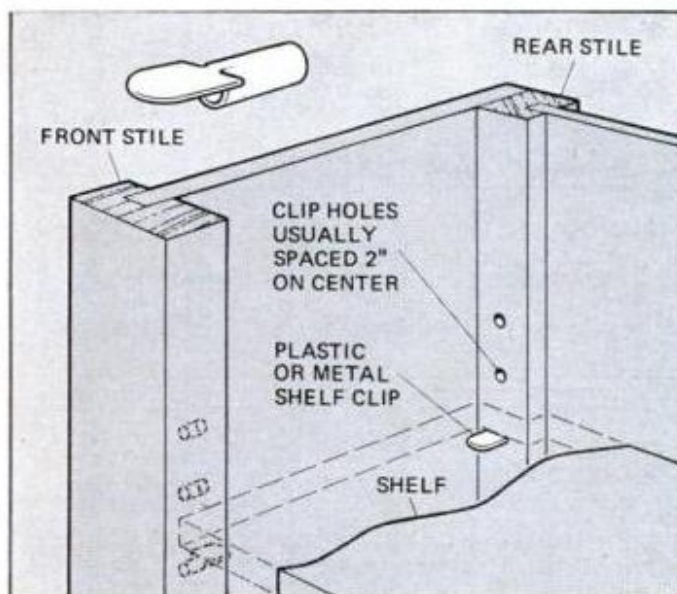
Blind corner base cabinet

A standard cabinet is installed with filler between it and the blind corner base cabinet (BCC). Fasten the filler with screws through standard cabinet's stile and, if possible, with screws through BCC center stile into opposite edge of the filler. Access to corner space is through the standard-cabinet door.



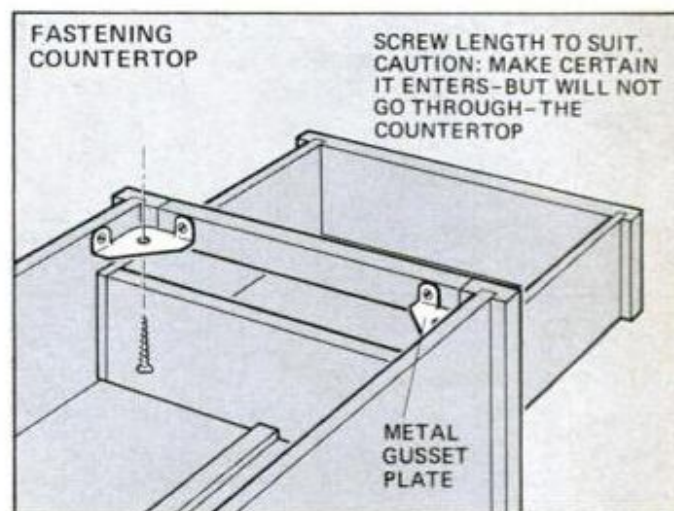
Adjusting doors

Since misalignment of doors and drawers can be caused by rough handling during shipment, most manufacturers pack door and drawer adjustment instructions with the cabinets. Realignment of these parts generally consists of loosening the hinge screws slightly, squaring the doors and retightening the screws. It is also frequently necessary to adjust magnetic or friction catches. The correct hold is achieved when the contact is merely a "kissing" touch. To adjust a magnetic catch, you simply loosen the screws and slide the magnet forward or backward in its slots until the desired contact action has been accomplished. Then, retighten the screws.



Shelf installation

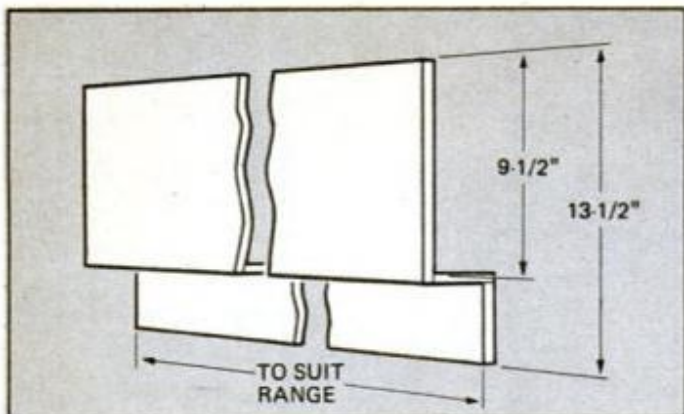
Most base cabinets come with a fixed shelf; full-height wall cabinets usually contain two adjustable shelves. Though there are several kinds of adjustable shelving systems, a commonly used type consists of plastic or metal supports pushed into pre-drilled holes in wall-cabinet stiles. Simply insert four supports for each shelf and lay it in place. If shelf rocks, firmly "slap" it in the middle to true up supports and seat shelf squarely.



Installing the countertop

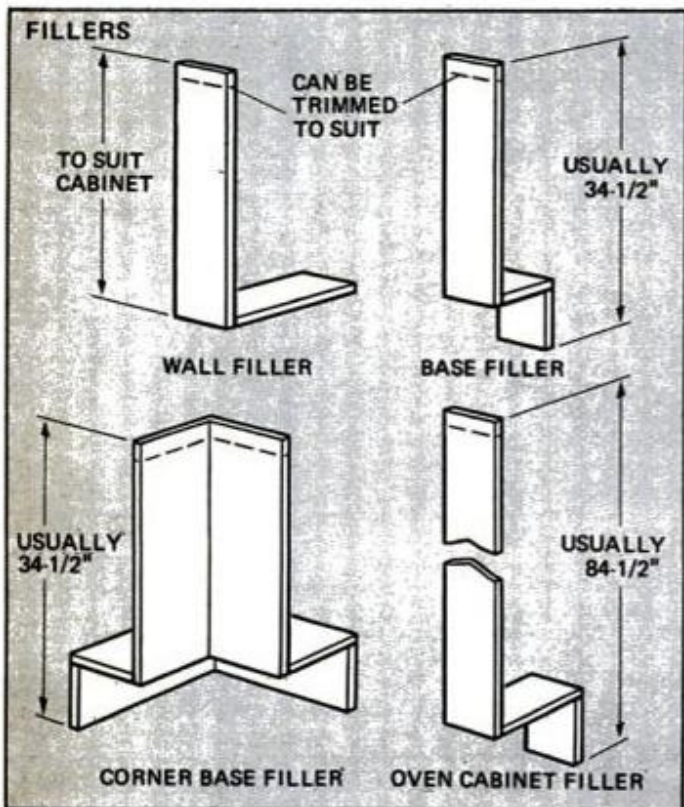
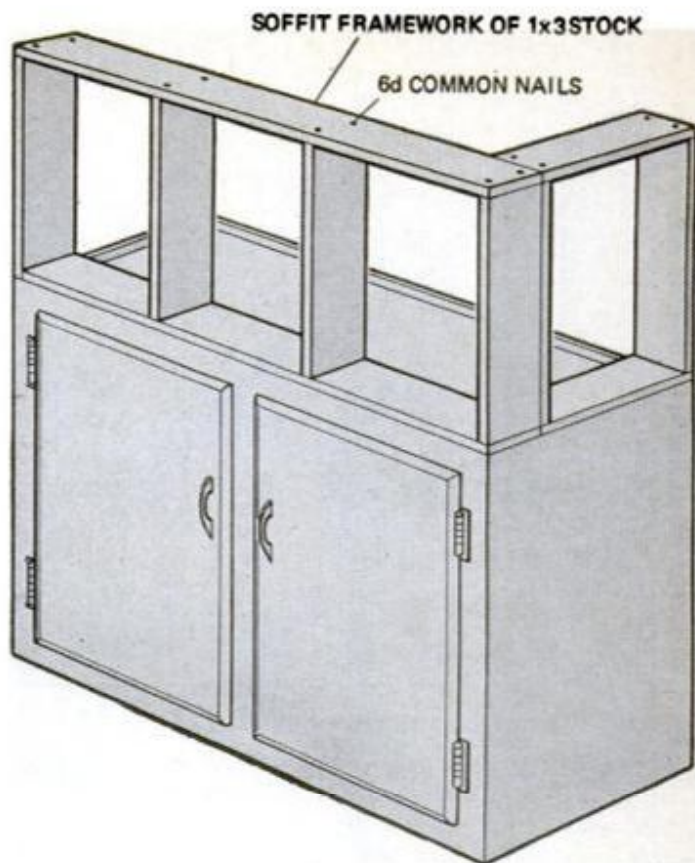
Usually, base cabinets have metal gusset plates in each corner at top. These serve a dual purpose: Adding strength to the cabinet and anchoring the countertop. With the countertop in position, carefully measure the length of screw required to obtain a purchase in top's underside without coming through the laminate finish. Not many screws are required here as their primary function is to keep the top from shifting laterally.

Kitchen cabinets



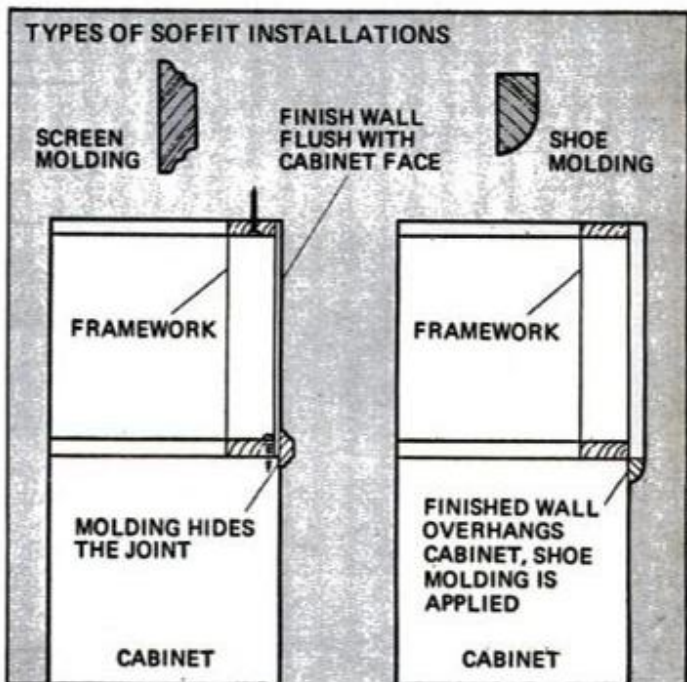
Range front filler and panel

The range front filler and panel are used when a drop-in range/oven is to be installed. Some ranges call for more elaborate filler pieces than others; thus, the range should be picked before cabinets are ordered and the maker's specifications checked to see if—and what type of—a wood front is needed. A specified size of 1/4-in. paneling, finished to match cabinets, may be all that's required. Bring these specs along when you order cabinets.



Typical fillers

The most commonly used fillers are shown above. Besides serving for blind corner-cabinet installation, these are required when a cabinet run will butt a wall at 90°, and when a wall is so out of plumb or irregular that it will be necessary to scribe (custom-fit) the last cabinet to the wall.



Installing the soffit

The easiest-to-make soffit enclosure is a ladderlike structure made of 1x3 furring. Take accurate measurements between cabinet and ceiling at ends and middle of run and assemble sections on the floor. Then hoist sections in place and fasten using shims as needed. Framework can be set back a distance equal to thickness of material covering it, or installed flush with cabinet fronts. ★★★

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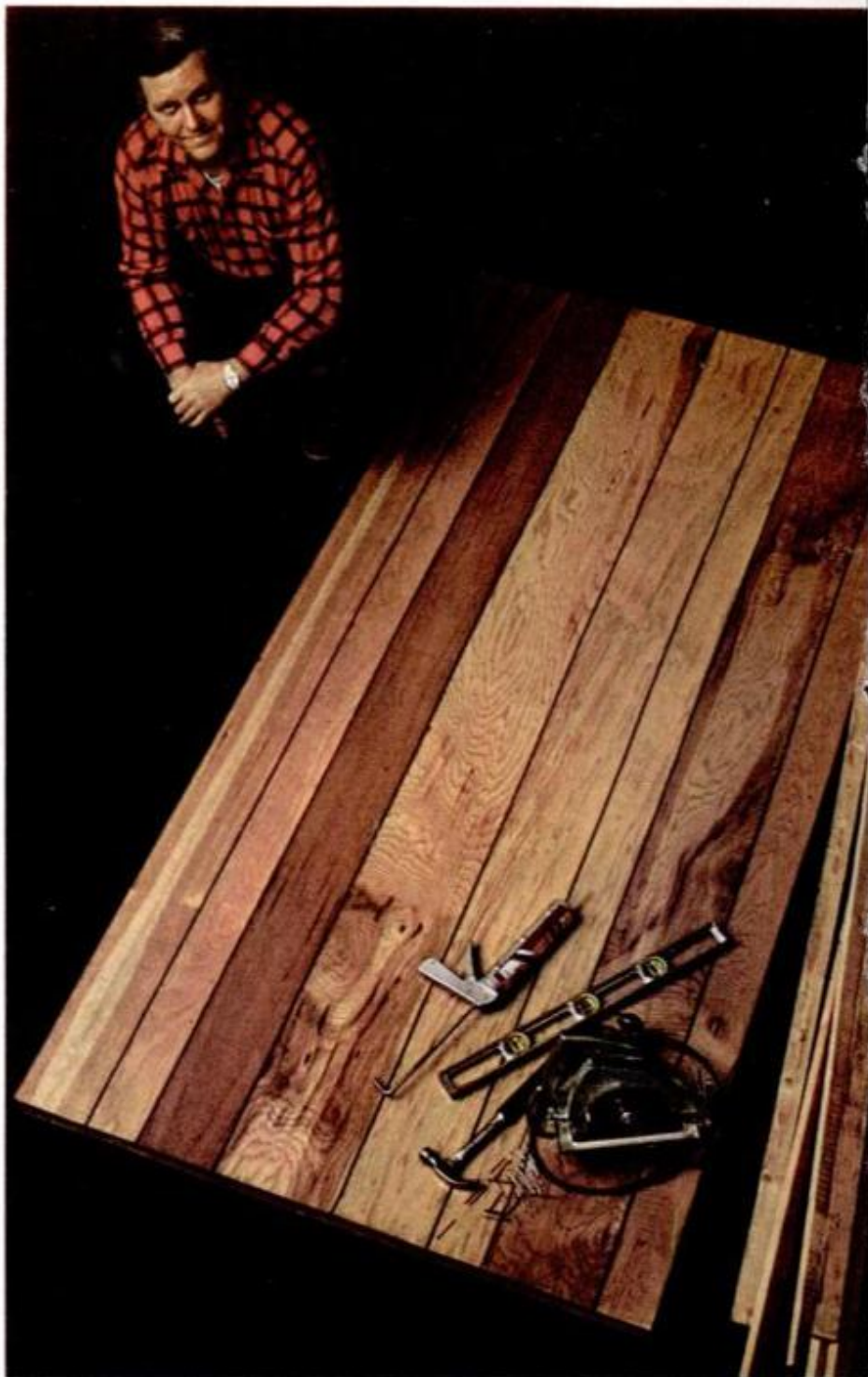
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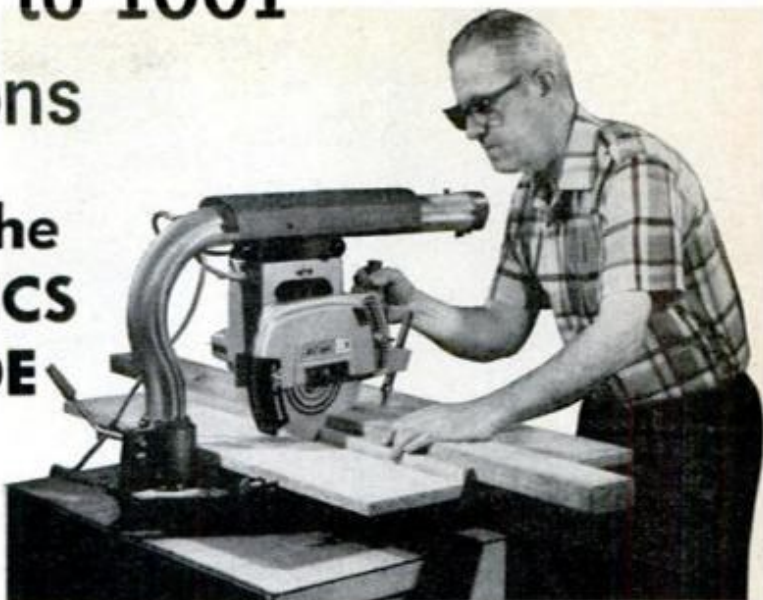


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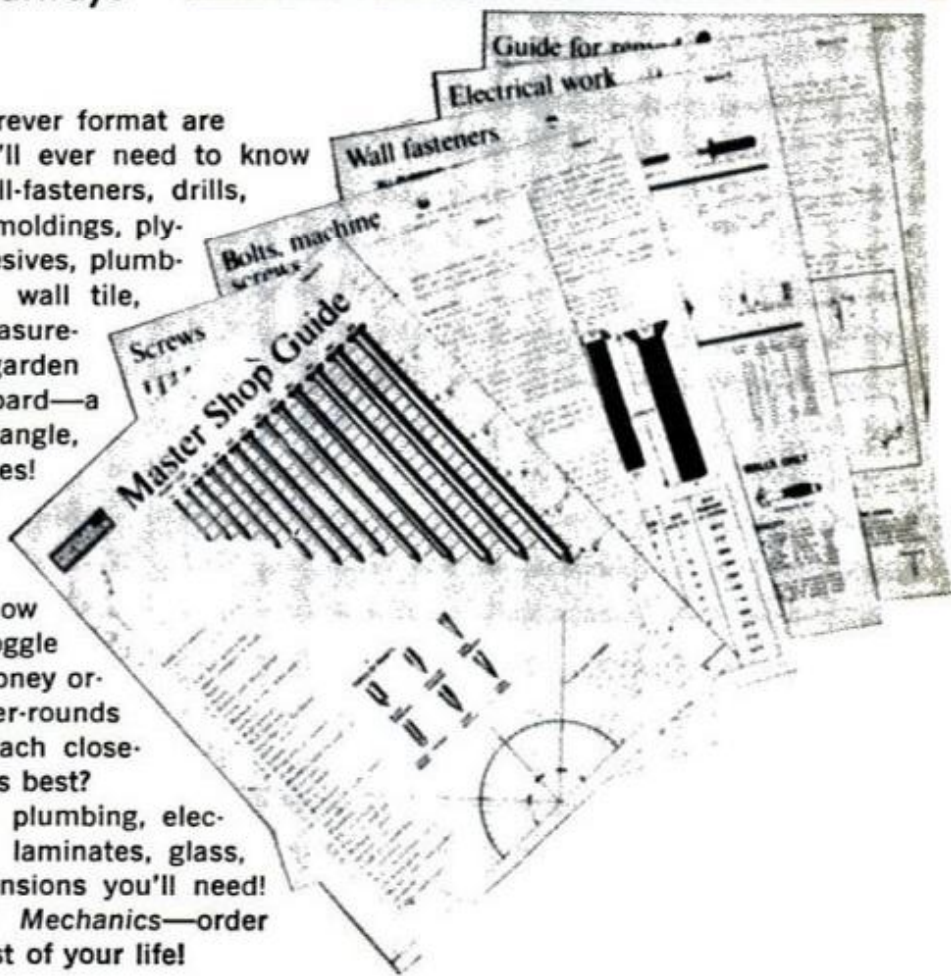


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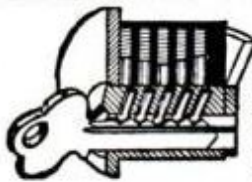
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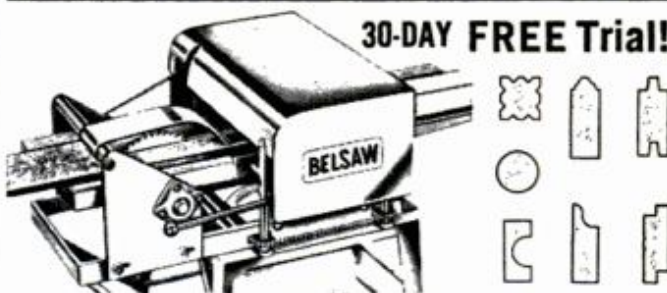
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Electric three-wheeler: 45 miles without a drop of gas

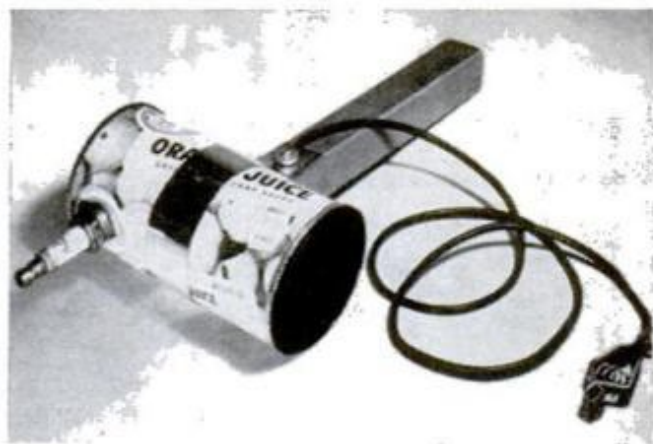


With this sportily styled two-seater runabout there's no waiting at the gas pump—it burns no gas. It runs on two rechargeable batteries that give 45 miles of driving on a single charge. The batteries can be recharged from any a.c. household outlet. This means you can drive more than 40 miles a day, recharge the batteries overnight and be ready to go again the next day.

The EPV (for Electric-Powered Vehicle) has a 1-hp, 5-speed drive capable of speeds up to 25 mph—not fast enough for highway use, but suitable for around-town shopping chores and short-run commuting trips on local roads. The novel three-wheeler, slated for production this fall, is licensable and has everything needed to make it street-legal—hydraulic disc brakes, seat belts, head, tail and brake lights, horn, rear-view mirror and turn signals. Radio, heater and all-weather top are optional. The batteries store in a rear well along with a built-in charger (top photo), and there's cargo space for shopping purchases. Base price will be about \$1200 from EVI, Inc., Sterling Heights, Mich. The car is an outgrowth of the same company's pedal-powered version called the PPV (see next month's *PM* for an article on pedal cars). ★★ ★

HINTS

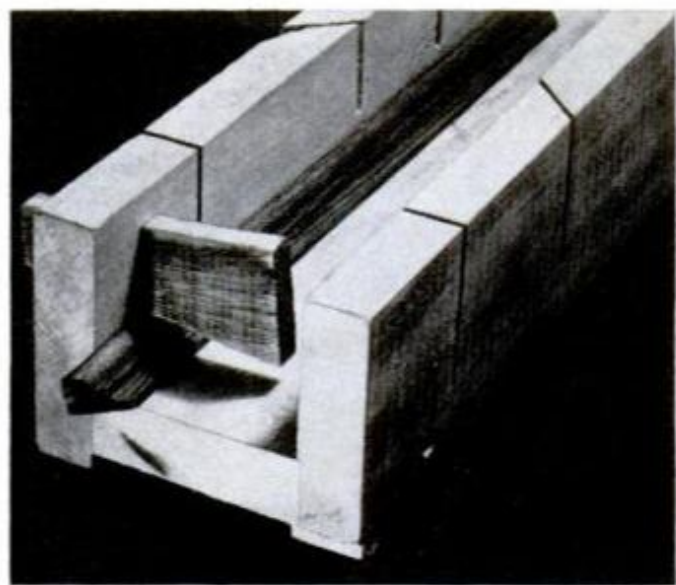
FROM READERS



Testing gas engine for spark

A simple device tests for spark on any gas engine. To make it, fasten wood handle as shown to tin can holding an old sparkplug. Can is painted black inside to show spark. Ground with battery clip, attach sparkplug cable to plug in can and crank engine.

—Harold Neibert, Davenport, Iowa



Wedge in slot holds workpiece

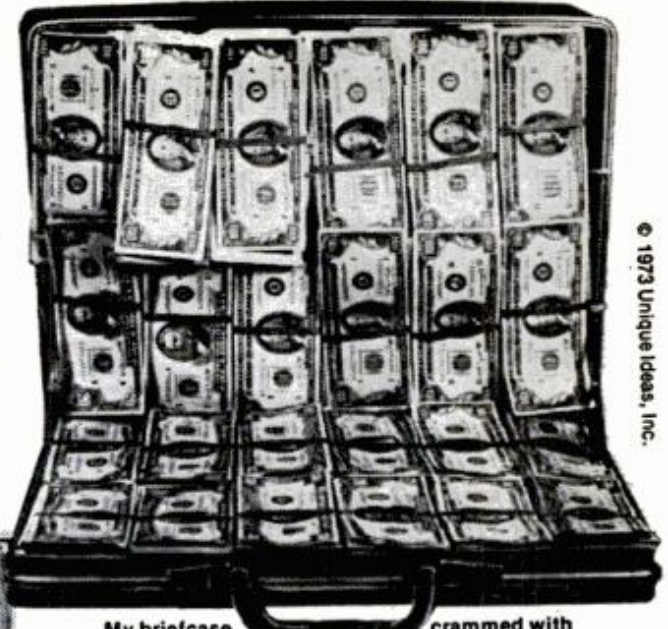
It's sometimes awkward holding both a wooden miterbox and workpiece with one hand while sawing with the other. Cut slots in back "wall" of miterbox at both ends from "bed" up. Insert tapered wedges in the slots to clamp narrow stock.

—Andrew Vena, Philadelphia

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**YOU GET RICH MAKING
"THE RIGHT MOVES"**

I've proven this to be true despite the fact that I was born poor and barely squeaked through high school. I still made a fortune in just a short period by making the right moves and I'll show you exactly how I did it.

But why am I so anxious to reveal to you my secret money making method? Surely there's more to it than because I enjoy helping others share in the rich good life as I have but frankly I expect to profit at least two hundred thousand dollars, maybe more, from the publishing of these ads in nationally famous magazines and newspapers.

STOP WASTING PRECIOUS YEARS

I should know, I wasted more good years than I care to remember, before I finally discovered the secret of making money. I stayed up to my neck in debt, bounced around from one eight hour dead end job to another. Just working, waiting and wishing for a great fortune to fall in my lap. I got married, became a proud father at a young age. I worked in a toy factory for a short time and peddled cosmetics from door to door, but everything I tried my hands at failed because I didn't know the right moves to make. This only happened to me twelve years ago. No doubt there are millions who are suffering this agonizing torment now.

**REVEALING: THE RICH MAN'S
SECRET MONEY MAKING METHOD**

It's true that most rich persons keep

their money making secrets to themselves, seldom sharing it with others, but fortunately I met several unusually fair minded rich men who were so impressed with my ambition to get rich that they agreed to teach me the secret money making techniques that their many years of making millions had taught them, providing I would virtually work for them at least one year. I eagerly jumped at the opportunity to gain this valuable knowledge and said yes to their generous proposition. So for one year I listened and watched very closely, until I learned from A to Z how these financial wizards made thousands of dollars every single day. I'll always be most grateful to these men for teaching me their fast and easy money-making secrets. It didn't even matter that I was practically penniless when I first put these methods into action.

**SUDDENLY IT STARTED
MAKING MONEY FOR ME**

At first it was unbelievable ... I paid off all my bills and my wealth continued to multiply. Huge sums of cash poured in so fast that I was forced to employ a full time bookkeeper and retain a corporation attorney, accountant and tax expert to help manage my prosperous financial affairs.

We had investments, property, stocks, money in the bank and can afford most anything we want. My family and I enjoyed our wealth and success. We were very proud of our accomplishments and it was our secret of making the right easy moves that made it all happen.

**THIS IS YOUR CHANCE
DON'T BLOW IT**

It's a better chance than I had. If you're really serious I'm willing to share my secret. Surely I can afford to give it to you free of charge, but I won't, why should I give you something for nothing? Instead I'm going to ask you to send me ten dollars for sharing my secret. What's more, I want you to know that I intend to make a fair profit

from the information I mail you, why not? If I can show you how to make more money than you ever made in your life why should you care if I make a profit? Remember what I'm giving you for only ten dollars cost me 12 years to master. Even more important you get certified and documented proof beyond the slightest doubt that my method can make a fortune, this is why I can offer you the strongest legally binding guarantee possible!! A guarantee so incredible that you'll probably think it sounds too good to be true.

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GET READY TO GET RICH

Every single day my method can bring you more cash. You'll never again need to borrow, budget or ask anyone for credit. You'll be proudly independent. You can enjoy those luxuries you've always dreamed about, but never could afford. Sound impossible? But it's not, you only need a serious belief in my proven method, very small capital and enough ambition to give it a try. Remember "nothing ventured nothing gained" and there's absolutely no way you can lose.

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Ed K. says: "I never earned over one hundred dollars a week in my life until I

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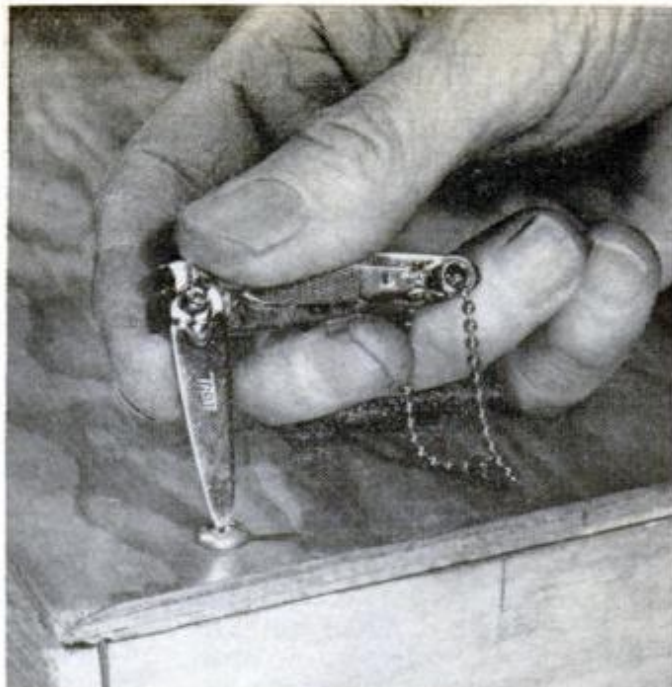
FROM READERS



Polishing small objects

Cotton swabs such as Q-Tips, soaked with polishing compounds, make ideal polishing pads for small metal parts. Cut in half, they can be chucked in a hand grinder; for best results, use at low speed.

—Ken Patterson, Regina, Sask.



Emergency Phillips driver

The blades of a pocket nail clipper can be used, in an emergency, to turn Phillips-head screws. Typical clipper has two rounded-tip blades that fit small and medium screws. Angling the blade slightly may give a firmer "bite."—E. B. Walters, Chicago



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*(Continued from page 89)***SUZUKI**

Street models: GT 750 LeMans, GT 550 Indy, GT 380 Sebring, T 500 Titan, GT 250 Hustler, GT 185 Adventurer.

Dirt/street models: TS 400 Apache, TS 250 Savage, TC 185 Ranger, TS 185 Sierra, TS 125 Duster, TC 125 Prospector, TS 100 Honcho, TS 50 Gaucho, TS 100 Blazer, RV 125 Tracker, RV 90 Rover.

Dirt/competition models: TM 400 Cyclone, TM 250 Champion, TM 125 Challenger, TM 100 Contender, TM 75 Mini-Cross, RL 250 Exacta.

Suzuki GT 750



The water-cooled GT 750-cc LeMans (see *Big Banger from Suzuki*, page 130, Feb. '72 *PM*) still leads the lineup for Suzuki. New additions are the TM 75 Mini-Cross, the TM 100 Contender, the TC 185 Ranger and the beautiful RL 250 Exacta trials—the most excitingly styled bike to come along in recent years.

TRIUMPH

Street models: Trident 750 (three-cylinder), Bonneville 750 (twin), Tiger 750 (single carburetor), Daytona 500 (twin).

Street/dirt model: Trophy Trail 500 (single cylinder).

Dirt/competition models: Avenger 500 (single), Rickman 250 MX (motocross).

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YAMAHA

Street models: TX 650, TX 500, RD 350, RD 250, RD 60.

Dirt/street models: DT 360, DT 250, DT 175, DT 125, DT 100.

Dirt/competition models: SC 500, MX 360, MX 250, MX 175, MX 125, MX 100, YZ 250, YZ 125, TY 250, TY 80.



Yamaha TX-500

New '74 Yamaha models include YZ 125-cc and YZ 250-cc professional motocross machines, and the lithe TY 80-cc and TY 250-cc trials mounts. Now emphasizing high-performance dirt cycles, Yamaha has fine entries in all categories. Witness the twin-cylinder RD 350 and double-overhead-cam TX 500 road bikes—and versatile enduro models such as the familiar DT 250.

YANKEE

Street model: 500 SS Street Scrambler.

Street/dirt model: 500 Z.

Yankee is the "other" American motorcycle (joining Harley-Davidson). The 500-cc SS is a potent twin-cylinder street performer and the 500-cc Z an I.S.D.T.-type gazelle that goes from pavement to meadow to mountain with untold ease. The Z, "first all-new American-made motorcycle in 30 years," boasts six speeds, superior low-end torque and super durability with 88-mph top speed. Yankee's emphasis in engineering and styling for 1974 will attract the cyclist with a weakness for the homespun.

ZUNDAPP

Street/dirt model: Enduro 125.

Dirt/competition model: MC 125.

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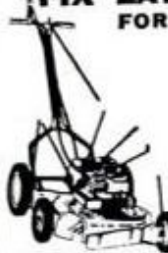
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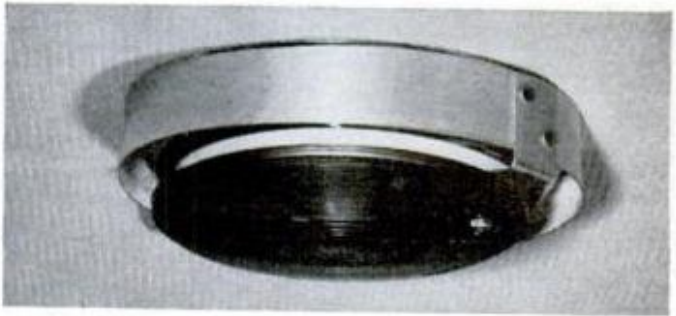
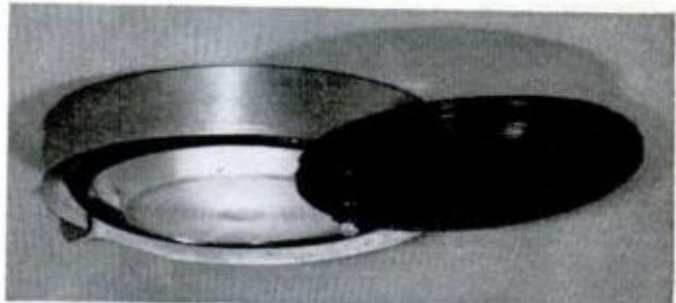
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(Continued on page 228)

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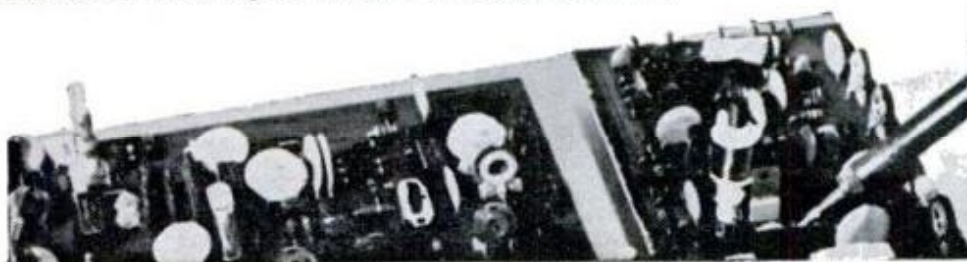
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(Continued on next page)

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(Continued from preceding page)

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