

No way. Not when there are Gillette Twinjector® Blades around. Because, face it, a smoother, closer, safer injector shave is hard to find. Twinjector blades even have rinse slots. Specially-designed openings to help reduce clogging.

The Gillette Twinjector* Shave. Beautiful, baby.

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5 twin injector blade

Twin blades that fit your injector razor.

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ON THE COVER

Stained-glass creations that flood your home with color are easier to make than you think, S.E. Sayles created the window hanging with the same techniques you'd use for a window. Photo: George Ratkai

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Popular Mechanics

JUNE 1976 • Vol. 145 No. 6

INTERNATIONAL EDITIONS: Australia, Caribbean, Mexico, Southern Hemisphere

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Amazing search for life on Mars relates how a strange mechanical creature will land and unlock the secret that man has pondered for ages. Page 66.

If cost were no problem, what three cars would you pick to own? See what choices PM's auto editors made. Page 64.

Slip into something more comfortable gives you 9 exciting vacation homes that are ready when you are. Page 68.

How the tall ships sail details the strange maneuvers needed to steer a hard-to-handle square rigger. Page 78.

Look what's coming down the pike lets you peek at Detroit's timetable for model introduction and retirement. Page 100.

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AC Filters for the man who takes care of the things he loves.

If you're into machines, you know the importance of engine protection. You also know the importance of reliable filtration. So go with the names you know . . . AC Oil Filters and AC Air Filters.

An AC Oil Filter is made with strong polyester reinforced filter material. AC's unique "W" fold design can give you up to 12 feet of filtering protection.

An AC Air Filter is made with a scientifically designed porous paper with microscopic openings to efficiently trap harmful particles

and, at the same time, provide the proper air flow. This filter media is bonded right into the top and bottom of the filter.



so the air passes through the filter, not around it. This helps give your engine the clean air it requires.

Now, next to knowing the name to go with, the important thing about filters is knowing when to change them. Check your owner's manual, and you'll find that it recommends a change on the basis of time or mileage, whichever comes first. So learn to think months, not just miles, when you consider filter changes.

Then go with the name you know . . . AC.

Go with the names

AC-DELCO DIVISION OF GENERAL MOTORS CORPORATION



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EDMUND

Pocket CB

New integrated circuit technology and a major electronic breakthrough brings you the world's smallest citizens band transceiver.

SMALL ENOUGH FOR YOUR POCKET

Scientists have produced a personal communications system so small that it can easily fit in your pocket. It's called the PocketCom and it replaces larger units that cost considerably more.

MANY PERSONAL USES

An executive can now talk anywhere with anybody in his office, his factory or job site. The housewife can find her children at a busy shopping center. The motorist can signal for help in an emergency. The salesman, the construction foreman, the traveler, the sportsman, the hobbyist-everybody can use the PocketCom—as a pager, an intercom, a telephone or even a security device.

LONG RANGE COMMUNICATIONS

The PocketCom's range is limited only by its 100 milliwatt power and the number of metal objects between units or from a few blocks in the city to several miles on a lake. Its receiver is so sensitive, that signals several miles away can be picked up from stronger citizens band base or mobile stations.

VERY SIMPLE OPERATION

To use the PocketCom simply turn it on. extend the antenna, press a button to transmit, and release it to listen. And no FCC license is required to operate it. The Pocket-Com has two Channels-channel 14 and an optional second channel. To use the second channel, plug in one of the 22 other citizens band crystals and slide the channel selector to the second position. Crystals for the second channel cost \$7.95 and can only be ordered after receipt of your unit.



The PocketCom components are equivalent to 112 transistors whereas most comparable units contain only twelve.

A MAJOR BREAKTHROUGH

The PocketCom's small size results from a breakthrough in the solid state device that made the pocket calculator a reality. Mega scientists took 112 transistors, integrated them on a micro silicon wafer and produced the world's first transceiver linear integrated circuit. This major breakthrough not only reduced the size of radio components but improved their dependability and performance. A large and expensive walkie talkie costing several hundred dollars might have only 12 transistors compared to 112 in the Mega PocketCom.

BEEP-TONE PAGING SYSTEM

You can page another PocketCom user, within close range, by simply pressing the PocketCom's call button which produces a beep tone on the other unit if it has been left in the standby mode. In the standby mode the unit is silent and can be kept on for weeks without draining the batteries.

SUPERIOR FEATURES

Just check the advanced PocketCom features now possible through this new circuit breakthrough: 1) Incoming signals are amplified several million times compared to only 100,000 times on comparable conventional systems. 2) Even with a 60 decibel difference in signal strength, the unit's automatic gain control will bring up each incoming signal to a maximum uniform level. 3) A high squelch sensitivity (0.7 microvolts) permits noiseless operation without squelching weak signals. 4) Harmonic distortion is so low that it far exceeds EIA (Electronic Industries Association) standards whereas most comparable systems don't even meet EIA specification. 5) The receiver has better than one microvolt sensitivity.



EXTRA LONG BATTERY LIFE

The PocketCom has a light-emitting diode low-battery indicator that tells you when your 'N' cell batteries require replacement. The integrated circuit requires such low power that the two batteries, with average use, will last weeks without running down,



The PocketCom can be used as a pager, an intercom, a telephone or even a security device

MULTIPLEX INTERCOM

Many businesses can use the PocketCom as a multiplex intercom. Each employee carries a unit tuned to a different channel. A stronger citizens band base station with 23 channels is used to page each PocketCom. The results: an inexpensive and flexible multiplex intercom system for large construction sites, factories, offices, or farms.

NATIONAL SERVICE

The PocketCom is manufactured exclusively for JS&A by Mega Corporation. JS&A is America's largest supplier of space-age products and Mega Corporation is a leading manufacturer of innovative personal communication systems-further assurance that your modest investment is well protected. The



The PocketCom measures approximately %" x 1%" · 5%" and easily fits into your shirt pocket. The unit can be used as a personal communications link for business or pleasure.

PocketCom should give you years of troublefree service, however, should service ever be required, simply slip your 5 ounce Pocket-Com into its handy mailer and send it to Mega's prompt national service-by-mail center. It is just that easy.

GIVE IT A REAL WORKOUT

Remember the first time you saw a pocket calculator? It probably seemed unbelieveable. The PocketCom may also seem unbelieveable so we give you the opportunity to personally examine one without obligation. Order only two units on a trial basis. Then really test them. Test the range, the sensitivity, the convenience. Test them under your everyday conditions and compare the PocketCom with larger units that sell for several hundred dollars.

After you are absolutely convinced that the PocketCom is indeed that advanced product breakthrough, order your additional units, crystals or accessories on a priority basis as one of our established customers. If, however, the PocketCom does not suit your particular requirements perfectly, then return your units within ten days after receipt for a prompt and courteous refund. You cannot lose. Here is your opportunity to test an advanced space-age product at absolutely no risk.

A COMPLETE PACKAGE

Each PocketCom comes complete with mercury batteries, high performance Channel 14 crystals for one channel, complete instructions, and a 90 day parts and labor warranty. To order by mail, simply mail your check for \$39.95 per unit (or \$79.90 for two) plus \$2.50 per order for postage, insurance and handling to the address shown below. (Illinois residents add 5% sales tax). But don't delay.

Personal communications is the future of communications. Join the revolution. Order your PocketComs at no obligation today.

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Northbrook, Illinois 60062 CALL TOLL-FREE .. 800 325-6400 In Missouri call. . . . 800 323-6400 CJS&A Group, Inc., 1976 "I know you have a file of letters from people who have found varied uses for VISE-GRIP® tools. You might like to add this true adventure to that file."



Ed Carter Coloma, Michigan

"My buddy and I had gone up north for a couple of days of fishing. Unfortunately, it started raining so we hitched the boat and trailer to the car and started home about 7:00 p.m. the first day.

"After driving about four miles we stopped and saw that the nut had come loose from the trailer hitch ball.

"There we were in the middle of nowhere with no nut to fasten the ball to the bumper. I remembered I had a small pair of VISE-GRIP pliers in my tackle box, so I fastened themto the threaded part of the ball. They held just fine until we got a new nut."



A VISE-GRIP locking pliers is the most versatile hand tool you'll ever own.

Get several for the workshop, car, boat, garage, kitchen. Available at leading hardware, auto, discount and department stores.



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LETTERS

TO THE EDITOR

Toy box is tops

I've made many of your projects over the years, but none ever turned out as cute as the circus-wagon toy box (6 Fun-to-Make Toys for Christmas, page 118, Nov. '75) I made for my grandson. Everyone who sees it flips; they can't believe I made it myself.



The full-size patterns helped. And the tigers really give it a storebought look.

How about giving us more projects like it?

ANDY SPOKANE FORT LAUDERDALE, FLA.

Full-size patterns for the toy box—plus two paste-on paper tigers—are available for \$1.50 per set. Make checks payable to Popular Mechanics and send your order to Home and Shop Editor, 224 West 57th St., New York, N.Y. 10019.

Repairing rotted gas hose

In your March '76 issue, you published a letter from Rad E. Reavis on problems with rotting gas hose on a VW fuel injector (*Letters*, page 31). My experience tallies with his exactly—even to the VW parts man who said that replacement of the hose was impossible and that I would have to buy new fuel injectors at \$40 each.

He was wrong! It is easy to replace the rotted hose, and the repair is better than the original. It costs only pennies and is easily done with only a hacksaw!

Buy replacement gas hose; about five feet will allow you to replace gas hose connections around the filter and fuel pump in addition to those at the injectors. Buy aircraft-type hose clamps at an auto parts store. Two are needed for each injector; the smallest size (1/4 to 3/8 in.) is suitable.

Remove the leaking injector by pulling off its spade-lug wires, cutting its hose free and unbolting it. Make a diagonal saw cut with a hacksaw across the crimped brass ferrule and remove it by spreading with a screwdriver. The diagonal cut prevents injury to the injector. Cut off a new piece of hose equal in length to the old one and reinstall, using the new hose clamps.

Should the hose ever rot again, it can now be replaced with a pocket knife and a screwdriver, without removing the fuel injector from the engine.

JIM JEDLICKA LOS ANGELES, CALIF.

Mystery car is a Morgan

I am interested in the car pictured on page 91 of your March '76 issue. If it is a Morgan, I believe I have one and desire information about the car.

> PAUL CRADDOCK HORSE CAVE, KY.

Yep, it's a Morgan. And the best source for information is Morgan Car Club, 8600 16th St., Silver Spring, Md. 20910.

Candidates for the coroner

The letter from Nile C. Byers in the March '76 PM disgusted me.

Laws requiring helmets for cyclists hurt no one. The 90 percent "with an ounce of common sense" will wear a helmet anyway.

As a coroner's office pathologist, I have seen too many who didn't. I'm for any law that will get helmets on that 10 percent or allow the police to get them off the road before they become candidates for a pathologist.

JOHN H. MANWARING, M.D. SAN RAFAEL, CALIF.

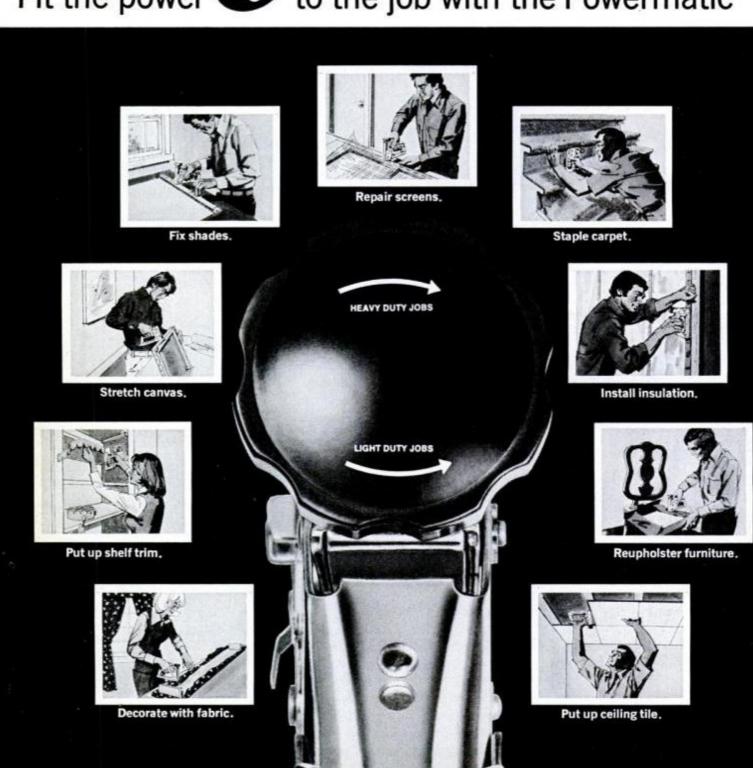
Lapidary nitty-gritty

In Speedy Gem Polisher You Can Build (page 102, Jan. '76), the author should have advised that two bowls are practically a must—one

(Please turn to page 177)



NOW! THERE'S A DIFFER A CUSTOM Tit the power by to the job with the Powermatic**



ENCE IN STAPLE GUNS: 1e Powers

Adjustable power means you can do right and it can even drive into hardmore jobs with your staple gun. Turn woods like oak. The Powermatic the knob to the left for lower power staple gun builds, fixes, covers. Fires five staple sizes. Window on side and the Powermatic will drive short leg staples into soft wood, fabric and signals when to reload and shows staple leg size. Loads fast and easy. shelf paper. Turn the knob to the right and increase power to drive too. Swing-open bot-9/16" leg lengths for jobs tom means there's no jam like insulating, ceiling tile, problem cause it's so easy to clear and load. There's even reupholstering. All the way a built-in staple remover! Handsome vinyl carrying and storage case, too. Perfect for pro or do-it-yourselfer!

STAPLE GUN
with police control knob!

Swingline

The Swingline Company, A Division of Swingline Inc., 32-00 Skillman Avenue, Long Island City, N.Y.

IMPORTS AND MOTORSPORTS



Just for fun



Here's another styling exercise from Ford that's gonna light up the switchboard. The urban car is not in production. It's nothing more than a project of Ford's Ghia design studios in Italy.

The teaser (as it should be called) is a rear-engine mini of amazingly small dimensions. It's a four-seater that's 8½ feet long and is powered by a conventional one-liter gasoline engine. The rear seats fold down and there's more storage available in the small front trunk.

Will Ford tool up for this potential Model-T-easer? Henry isn't talking —now.

Opel Aero

In the March I&M column we reported that the new Opel now appearing in Buick showrooms is made by Isuzu in Japan. But we didn't point out that Adam Opel AG, which is General Motors' subsidiary in Germany, is still very much in business—it's just that we cannot buy their cars here in the United States.



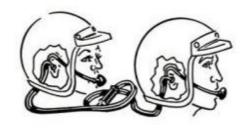
The latest German Opel, for Europe only, is a convertible that's based on the Kadett sedan. It's Opel's first convertible since 1955. The Aero is not a true convertible, of course, but it is an open car using the Targa approach: The roll bar remains in place, the top roof panel is removable and the soft rear panel folds down.

It's a slick new configuration for a good, economical sedan, and it seems a pity that it won't be available to the American enthusiast of practical yet sporty cars.

World Cars 1976

Here's the perfect book to use if you want to indulge your fantasies about owning any three cars in the world (Imagine owning any three cars in the world!, page 64) Over 900 current models from 33 countries are shown in the 1976 edition of World Cars. This favorite reference book of ours also includes a color feature about master coachbuilders, a summary of motor racing competitions and additional features on the major car-producing nations. It's priced at \$23.75. Herald Books, Box 17, Pelham, N.Y. 10803.

Motorcycle communications



Leave it to J.C. Whitney to come up with an item like this. They've got a \$12 gadget that puts an end to the shouting match between a cyclist and his passenger. The motorcycle intercom consists of adjustable headsets that fit under your helmets and are connected by lightweight acoustical tubing. It's nonelectric and has a quick-disconnect feature. Box 8410, Chicago, Ill. 60680.

A little more sophisticated, you might say, is the equipment from Beltek Corporation of America. It's in the electronics business and makes, among other products, CB units for motorcycles. Its Enduro 23 mounts on top of your gas tank and

includes all the necessary mobile accessories. You can write the company at 1093 Bedmar St., Carson, Calif. 90746.

Safety fast

Fast driving can also be safe driving —provided your driving skills are developed in the hands of professionals. There are a number of schools that are in the business of making advanced drivers out of average drivers who have the incentive. The incentive, in many cases,



is to go racing, but the skills you learn will make your street driving safer, too.

We sharpened our skills and had fun doing it at the Jim Russell School in Canada, while driving Formula Fords, as shown in the photo above. In response to a number of letters requesting names and locations of high-performance driving schools, here's the latest list:

- Skip Barber School of Performance Driving, Box 72, 14 Ashland, Somerville, Mass. 02144.
- Bondurant School of Performance Driving, Sears Point International Raceway, Highways 37 and 121, Sonoma, Calif. 95476.
- The Mosport Racing School, 1905 Avenue Rd., Toronto, Ont., Canada M5M 3Z9.
- The Fred Opert Motor Racing School, 17 Industrial Ave., Upper Saddle River, N.J. 07458.
- Bill Scott Racing School, 1420 Spring Hill Rd., McLean, Va. 22101.
- Jim Russell International Racing School (Canada), 723 Halpern Ave. Dorval 760, Que., Canada.
- Jim Russell International Race Drivers' School (U.S.A.), Box 911, Rosamond, Calif. 93560. ★★★

Vivitar TX Lens System

The ultimate in lens is a superior performer, lightinterchangeability.

One of the most useful features of 35mm SLR cameras is their ability to photograph through an incredible variety of "interchangeable" lenses from wide angle to supertelephoto.

This is also the feature that causes you the most grief when you want to change to another make of 35mm camera.

In most cases, one manufacturer's lenses aren't interchangeable with another manufacturer's camera. So changing cameras means making another big investment in accessory lenses and taking a beating on your old ones.

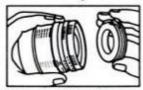
Vivitar's TX lenses eliminate that problem by being interchangeable with just about all the popular 35mm SLR cameras now on the market. Thanks to an ingenious adapter system. any TX lens will work on many different cameras. So if you change cameras, you keep the lenses and all you have to buy are the inexpensive adapters for your new camera. Each TX lens and adapter couples to the through-thelens exposure system of the camera (including automatic exposure control models) just like the manufacturer's own lenses.

All TX lenses are the result of computer-generated optical designs. Each one

weight, compact, multicoated, and among the fastest in its respective focal length. Wide angle lenses - 24mm f2.8, 28mm f2.5, 35mm f2.5. Telephoto lenses - 135mm f2.5, 200mm f3.5, 300mm f5.6, 400mm f5.6. Zoom lenses - 75 to 260mm f4.5, 90 to 230mm f4.5.

See the Vivitar TX lens system and try it on your camera wherever fine photographic equipment

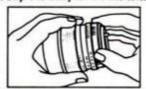
How to use the Vivitar TX Lens System.



1. Select a Vivitar TX adapter to match your camera.



2. Slip the adapter on the lens.



3. Rotate the lens mount locking ring to lock the adapter on the lens, then mount the lens to your camera in the usual way.



230mm 260mm

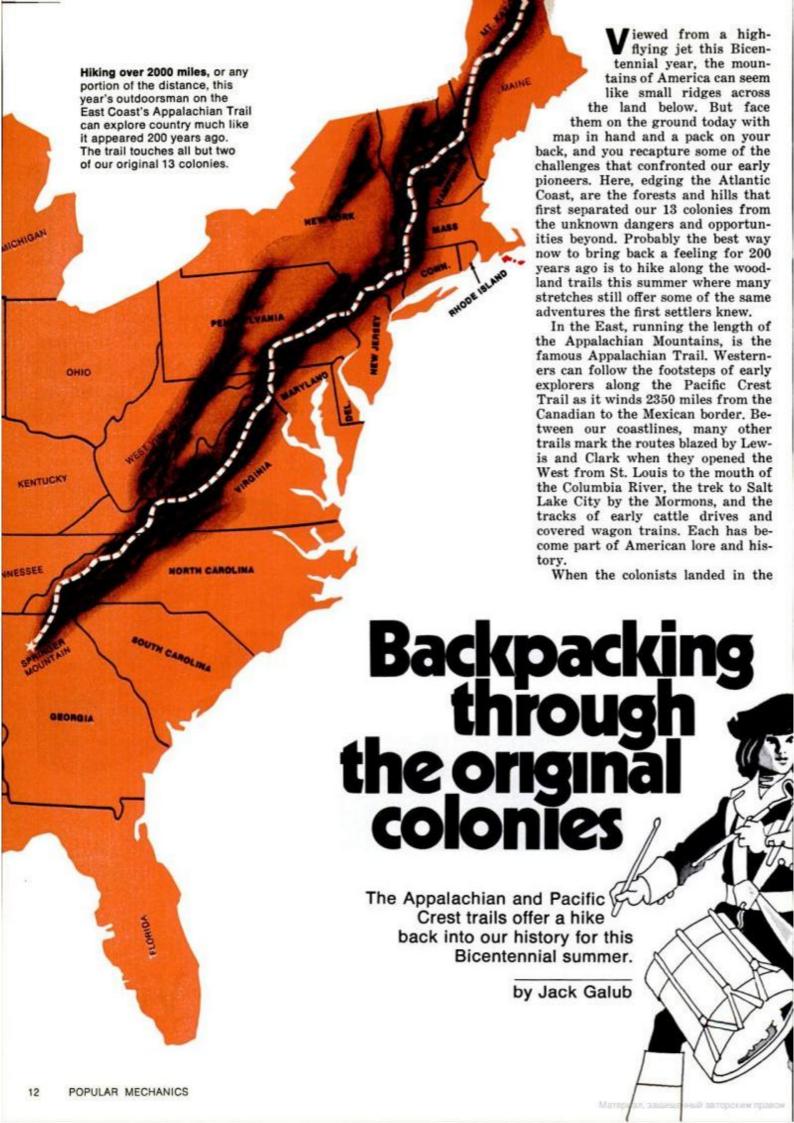
Vivitar TX Lens System adapts to: Pentax ES, SP, Spotmatic and K series: Minolta SR and XK series: Canon FL and FD series; Nikon F and EL series; Olympus OM-1 and OM-2; Konica Autoreflex series; Mamiya/Sekor DSX and DTL; Fujica ST series; Vivitar SL series; plus other 35mm SLR universal thread mount cameras.

> For independent test reports and TX lens brochure, write to Dept. PM-1, Ponder & Best, Inc.



A VIVITAR TX LENS...

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New World, they found the Indians had already carved out a complex network of footpaths. The heavily wooded area around Narragansett Bay that was to become Rhode Island was crisscrossed by three to six-footwide paths used by hunting and war bands ranging as far as what is now Boston. Explorers and adventurous settlers followed the Indians' trail along the Mohawk River from the Hudson to Lake Ontario as it rounded the northern Appalachians.

Today's Appalachian Trail of over 2000 miles, from Mount Katahdin in central Maine to Springer Mountain in northern Georgia, parallels many war and hunting trails through valleys and along river banks. Touching all 13 original colonies except Rhode Island and Delaware, it is maintained by Appalachian Trail clubs whose members are hikers, campers and outdoorsmen. While the complete trail has been covered in 66 days, most AT hikers take only short stretches and enjoy side trips to towns and sites that are part of America's heritage. Hiking the full trail usually takes 110 to 150 days. Maine-Starting from 5267 feet in Baxter State Park, the trail twists to the top of White Cap Mountain, across the Chairback Range, past Flagstaff Lake and along the Longfellow mountain range near Grafton Notch.

New Hampshire, Vermont, Connect-

icut—Here the trail climbs 6266foot Mount Washington goes on 46 miles through ski country to Hanover, west to link up with the Green Mountain Long Trail, and south along the Housatonic Valley, Taconic Range and Macedonia State Park.

New York, New Jersey—From Schaghticoke, the AT enters the Harlem Valley at Pawling, crosses Fahnestock State Park and Bear Mountain Bridge to Harriman State Park and over mountain ranges to the Delaware Water Gap.

Pennsylvania, Maryland—Beyond Lehigh, Schuylkill and Swatara Rivers, you hike through French and Indian War country to the Susquehanna River at Clarks Ferry. Turn south through Caledonia State Park about 15 miles from Gettysburg and into Maryland down to the confluence of the Potomac and Shenandoah where, in 1859, John Brown attacked Harpers Ferry.

Virginia—Following the Skyline Drive for 105 miles, the trail then joins the equally scenic Blue Ridge Parkway and climbs through the Jefferson National Forest to top Virginia's highest peaks.

Tennessee, North Carolina, Georgia
—The 200 miles through the Great
Smoky Mountains National Park and
Pisgah and Nantaha!a National Forests make up one of the most rugged
segments of the Appalachian Chain.
In Georgia, after crossing the Chat-



Crossing the ridges of the great western ranges, the Pacific Crest Trail covers 2350 rugged miles for hiking and camping.

tahoochee National Forest, the trail ends atop Springer Mountain.

While the Appalachian Trail is strictly a hiking path, pack horses and experienced guides are recommended for stretches of the Crest Trail. In California alone, the trail passes through 14 national forests, nine national and state parks, and ranges from 500 to 13,200 feet.

Starting at the Canadian border, you follow the backbone of the Cascade Range past glaciers and peaks that were once volcanoes, through mountain passes named by early trappers and explorers. Stretching down from the Siskiyou Range and Oregon, the California life zones range from Arctic Alpine to Lower Sonoran at International Border Monument No. 251 in Mexico.

For today's hikers and packers, these trails bring back the outdoor experience of early America. ***

For more information . . .

Trail maps and gear recommendations are available from the Appalachian Trail Conference, Box 236, Harpers Ferry, W. Va. 25425; Sierra Club Foundation, 1050 Mills Tower, San Francisco, Calif. 94104. Many road maps indicate locations of both trails, and descriptive materials can be obtained from national forests and parks through which these trails pass. Before any trip is planned, collect current information regarding trail conditions, location of shelters, route changes and permit requirements. Hiking the Appalachian Trail, a \$40 two-volume report by 46 who have made the hike, is published by Rodale Press, Emmaus, Pa.





Film loaders and accessories include (clockwise from upper left): Premier, Prinz 66, Western, Watson, unbranded model, Prinz standard. In front row are empty cartridges, bulk film and new Whitehead Cinek self-loading spools still in pilot production stage.

hat's the best photo equipment investment you can make? If you use a 35-mm camera, the answer is a bulk loader. Fill it up, use its contents once, and it has paid for itself. It will keep on cutting your film costs a third or more. And you'll be able to use some special-purpose films you just can't buy by the roll.

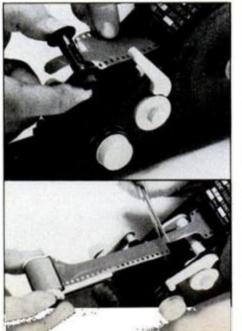
Here's how the economics work out: With a loader costing between \$6 and \$20, plus 18 empty cartridges (less than a quarter each-and they're reusable), you can turn a 100foot roll of film into 18, 36-exposure cartridges. An under-\$50 bulk roll of Ektachrome, for instance, gives you 18 rolls at less than \$3 each, including cartridges, a saving of well over a dollar a roll, or about \$20 total. Kodak Tri-X, will give you 18 rolls at 92 cents each from a \$12.05 bulk roll plus cartridges at 25 cents each -a saving of \$11 over factory-loaded cartridges at \$1.55.

Cartridges are reusable

Exact costs vary. Discounts are available on both factory loads and bulk rolls. The number of uses you can get from a cartridge depends on how carefully you (or the lab you send your film to) open them, and how free you keep them from dust. You can even reuse factory-loaded cartridges—except for Kodak's, which must be pried, not popped open, and can't be reused.

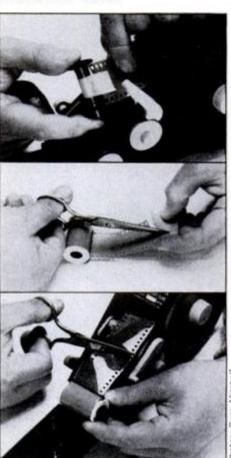
You can bulk-load quite a number of the films you now buy in cartridges—plus several that don't come in factory loads. There are black-and-white films from Kodak, Ilford, Luminos and Supreme, plus the supersharp, almost-grainless H&W Control films (page 52, Jan. '73). In color, you can get Kodak Ektachromes and Vericolor II (but not Kodachrome or Kodacolor). Other films you can buy

Short, 27½-foot rolls have precut tongue to fit slotted cartridge spools (below), film leader and new tongue every 36 exposures; but longer rolls save you more.





by Ivan Berger PHOTOGRAPHY EDITOR



Longer, 100-foot and 50-foot rolls must be taped to film spool (top) and cut at the end of each roll (center). Leader must also be cut in the end (bottom).

in bulk include Kodak's High-Speed Infrared and High-Contrast Copy.

And having a bulk loader also lets you try Kodak 5038 slide duplicating film (page 64, Aug. '75), a special Ektacolor that makes slides from col-

(Please turn to page 143)

Of all filter kings:

Look at the latest U.S. Government figures for other top brands that call themselves "low" in tar.

nicotine

	mg/cig.	mg/cig.
Brand D (Filter)	14	1.0
Brand D (Months	1) 13	1.0

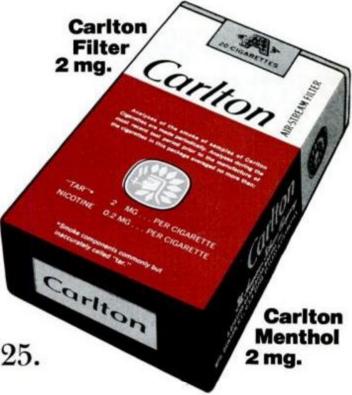
tar

brand D (Menthol) 13		1.0
Brand V (Filter)	11	0.7
Brand T (Menthol)	11	0.6
Brand V (Menthol)	11	0.7
Brand T (Filter)	11	0.6

Carlton Filter 0.2 Carlton Menthol *2 0.2

Carlton 70's (lowest of all brands)-

No wonder Carlton is fastest growing of the top 25.



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

Filter and Menthol: 2 mg. "tar", 0.2 mg. nicotine av. per cigarette, by FTC method.

15

^{*1} mg. tar, 0.1 mg. nicotine

^{*}Av. per cigarette by FTC method

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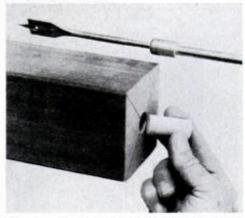
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HINTS

FROM READERS

Playing it smart



Many a fancy lathe-turned lamp base has been ruined when a hole was bored through the center after turning. I bore the hole before turning and glue a 1-in, piece of dowel in each end. When the turning is completed, I only have to bore out the plugs.

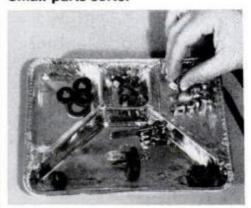
-Rosario Capotosto

There when you need it



A large cotter pin bent as shown and forced over your soldering iron will provide a handy two-legged stand that's always there when you need it. -Ken Patterson

Small-parts sorter



Save a TV-dinner tray; you'll find it extra handy for keeping parts grouped and separated in divided compartments when taking things apart for fixing.—Ken Patterson



Laser Beam Digital Watch

Never press another button, day or night, with America's first digital watch that glows in the dark.

Announcing Sensor's new Laser 220 the first really new innovation in digital watch technology.

It's ingenious, it's simple and it makes every other digital watch obsolete. Scientists have perfected a digital watch with a self-contained automatic light source—a major scientific breakthrough.

SELF-CONTAINED LIGHT SOURCE

The Laser 220 uses laser beams and advanced display technology in its manufacture. A glass ampoule charged with tritium and phosphor is hermetically sealed by a laser beam. The ampoule is then placed behind the new Sensor CDR (crystal diffusion reflection) display.

The high-contrast CDR display shows the time constantly—in sunlight or normal room light. But, when the room lights dim, the self-contained tritium light source automatically compensates for the absence of light, glows brightly, and illuminates the display.

No matter when you wear your watch—day or night—just a glance will give you the correct time. There's no button to press, no special viewing angle required, and most important, you don't need two hands to read the time.



Replace the battery yourself by just opening the battery compartment with a penny. Free batteries are provided whenever you need them during the five-year warranty.

A WORRY-FREE WATCH

Solid-state watches pose their own problems. They're fragile, they must be pampered, and they require frequent service. Not the Laser 220. Here are just five common solidstate watch problems you can forget about with this advanced space-age timepiece:

- 1. Forget about batteries The Laser 220 is powered by a single EverReady battery that will actually last years without replacement—even if you keep the 220 in complete darkness. In fact, JS&A will supply you with the few batteries you need, free of charge, during the next five years. To change the battery, you simply unscrew the battery compartment at the back with a penny and replace the battery yourself.
- Forget about water Take a shower or go swimming. The Laser 220 is so water-resistant that it withstands depths of up to 100 feet.
- 3. Forget about shocks A three-foot drop onto a solid hardwood floor or a sudden jar. Sensor's solid case construction, dual-strata crystal, and cushioned quartz timing circuit make it one of the most rugged solid-state quartz watches ever produced.
- Forget about service The Laser 220 has an unprecedented five-year parts and labor

warranty. Each watch goes through weeks of aging, testing and quality control before assembly and final inspection. Service should never be required. Even the laser-sealed light source should last more than 25 years with normal use. But if it should require service anytime during the five year warranty period, we will pick up your Sensor, at your door, and send you a loaner watch while yours is repaired—all at our expense.

 Forget about changing technology The Sensor Laser 220 is so far ahead of every other watch in durability and technology that the watch you buy today, will still be years ahead of all others.

THE ULTIMATE ACHIEVEMENT

Other manufacturers have devised unique ways to produce a watch you can read at a glance. The new \$300 LED Pulsar requires a snap of the wrist to turn on the display, but the Pulsar cannot be read in sunlight. The new \$400 Longine's Gemini combines both an LED and liquid crystal display. (Press a button at night for the LED display, and view it easily in sunlight with the liquid crystal display.) But you must still press a button to read the time. All these applications of existing technology still fail to produce the ultimate digital watch: one you can read under all light conditions without using two hands. Until the introduction of the Sensor.

PLENTY OF ADVANCED FUNCTIONS

Sensor's five time functions give you everything you really need in a solid-state watch. Your watch displays the hours and minutes constantly, with no button to press. But depress the function button and the month and the date appear. Depress the button again and the seconds appear. To quickly set the time, insert a ball-point pen into the recessed time-control switch on the side. It's just that easy.

Sensor's accuracy is unparalleled. All solid-state digitals use a quartz crystal. So does the Sensor. But crystals change frequency from aging and shock. And to reset them, the watch case must be opened and an airtight seal broken which may affect the performance. In the Sensor, the crystal is first aged before it is installed, and secondly, it is actually cushioned in the case to absorb tremendous shock. The quartz crystal can also be adjusted through the battery compart-



The new exclusive laser-sealed tritium and phosphor light source is a thin solid-state tube that automatically illuminates the display when the lights dim.

Would you do this with your solid-state watch? Of course not. Most solid-state watch-

es require care and pampering but not the Sensor. You can dunk it, drop it and abuse it without fear during its unprecedented fiveyear parts and labor warranty.

ment without opening the case. In short, your watch should be accurate to within 5 seconds per month and maintain that accuracy for years without adjustment and without ever opening the watch case.

STANDING BEHIND A PRODUCT

JS&A is America's largest single source of digital watches and other space-age products. We have selected the Sensor Laser 220 as the most advanced American-made, solid-state timepiece ever produced. And we put our company and its full resources behind that selection. JS&A will warranty the Sensor (even the batteries) for five full years. We'll even send you a loaner watch to use while your watch is being repaired should it ever require repair. And Sensor's advanced technology guarantees that your digital watch will be years ahead of any other watch at any price.

Wear the Laser 220 for one full month, If you are not convinced that it is the most rugged, precise, dependable and the finest quality solid-state digital watch in the world, return it for a prompt and courteous refund. We're just that proud of it.

To order your Sensor, credit card buyers may simply call our toll-free number below or mail us a check in the amount indicated below plus \$2.50 for postage, insurance and handling. (Illinois residents add 5% sales tax.) We urge you, however, to act promptly and reserve your Laser 220 today.

Stainless steel w/leather strap\$129.95 (Add \$10 for matching metal band)
Gold plated w/leather strap\$149.95 (Add \$10 for matching metal band)



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Материал, эацищенный автороким правог

Heat, the primary cause of transmission failure, is the result of friction between moving parts. As these parts move, the heat that is generated is transferred to the oil. While oil performs most efficiently in the temperature range of approximately 175° to 200°, a relatively small increase to the 235° range could reduce transmission fluid life from 100,000 miles to around 12,000 miles. Extra loads (such as in towing), air conditioners, emission control equipment, and high-temperature radiators, increase the need for additional oil cooling. For these reasons, oil coolers have taken their place among most essential accessories sold today.

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design, for best use of available space, is not the least of their attributes. Quality cooling systems by Thermo-Chem give you total coverage for overworked engines and transmissions.



THE BICYCLE SHOP

Nothing for free

I have seen articles about peoplepowered bicycle-type vehicles. I enjoy riding bikes but would like something with a canopy or enclosure for foul-weather riding. Any suggestions?-Carlo Andreol, Vineland, N.J.

I have ridden the current crop of people-powered vehicles and can report they wore out me and my energyladen teen-age son in two blocks. The models I rode were poorly made, not much better than a child's toy in quality. A truly lightweight, well made, easy (relatively) to pedal, totally enclosable three or fourwheeler has yet to be made. I suspect one could be, using lightweight, high-efficiency aluminum-alloy bicycle components and high-quality steel tubing, but so far no such vehicle has appeared, at least to my knowledge. If one ever is made, count on spending at least \$800 for it.

Quiet desperation

I desperately want to build a bicycle on my own. Where can I purchase Reynolds 531 tubing, lugs, dropouts, seat-post clusters and bottom-bracket tubes? What would they cost?-Fred Houssean, New Canaan, Conn.

You can buy all that's necessary to build a bicycle frame of Reynolds 531 tubing from Proteus Design, 9225 Baltimore Blvd., College Park, Md. 20740. This firm also sells Columbus tubing kits. You should buy its instructional frame-building book as well. Plan on spending about \$85.

I recommend you buy premitered tubing. If you don't know how to braze, you will have to learn how, perhaps at night school. Practice on old bike-frame tubing; busted frames from bike shops. You can build a frame that would cost two or three times as much as you pay for the frame parts. Remember, accurate tube alignment is vital; you will need some type of fixture to hold tubes when you're brazing.

Where to buy a Wren

I have just finished reading your very interesting article about painting a bicycle frame (page 14. Feb. '76) and would like to know where I can buy the Binks "Wren" air spray

gun you mention. It sounds a lot better than the spray can I've been using.—Merlin A. Luebke, Appleton,

Any hobby shop or Binks distributor should have one of these guns in stock. In your local classified directory, look under paint spray equipment to locate a Binks outlet.

Slower with a speedometer

Would adding a speedometer or cyclometer add a great deal of resistance to the efficiency of a 10-speed bike? What is the best way to install one of these devices to get best results? -John Cantilli, West Hempstead, N.Y.

A speedometer, with its attendant bulk, weight and cable drag, would slow you up a bit. I would never use one of those things; they're toys. I do use a cyclometer because I like to know my daily mileage on trips. The cyclometer adds just an ounce or two to the bike, has almost no drag and is well worth having. I do find the slight tick, tick, tick a bit annoying, but you can get used to it. You can also eliminate the tick noise by using one of the new silent pickup models sold by, among others, Schwinn dealers. Their model 02-815 has a reset feature so you can go back to zero at the start of each day.

Installing a cyclometer is a bit tricky, since the little arm that's mounted on one of the spokes must be accurately located so it strikes the cyolometer gear teeth near the top of the teeth. If you hear a "clunk" every time the arm hits the gear teeth, the arm is not in the right place.

Triple pick

Are there any Japanese triple chainwheels you can recommend?—Nick Arnold, Chicago.

Sugino makes a triple-chainwheel set, but only from 42 to 64 teethhardly wide-ratio. Your best bet would be the French-made T. A. chain-ring (from your bike shop), which gives you a wide combination of gear teeth from 26 to 50. Forget Campagnolo—its triple-plateau goes down only to 36. Shimano has not yet made a triple set, although one is reported to be in the offing.

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Look who's hooked on the Charger Daytona.

Richard Petty, who has won more NASCAR championships than anybody else, got hooked on Dodge Charger a long time ago.

And though he doesn't drive his street Charger 190 mph like he does his other one, he still likes a racy-looking hardtop with a two-tone paint job, antisway bars, power front disc brakes, and steel-belted radials. All standard on the Charger Daytona.

Of course, Richard likes his comforts. And Daytona has power steering, automatic transmis-

sion, and real cushy vinyl bucket seats standard, too.

Why not take a look at Charger? There are four models—even one priced only \$3,736.*

We have to warn you though, the caution flag is out. Because once you've looked, you're hooked.

*Based on manufacturer's suggested retail price for a 1976 Charger (not shown), excluding state and local taxes, destination CHR charge, and optional equipment





SCIENCE WORLDWIDE





Where care is called for

Repeaters—signal boosters—for a submarine phone cable linking Rhode Island with France are now in production in the Clark, N.J., shops of Western Electric. To avoid contamination of the complex devices, workers entering production areas must wash their hands, clean their shoes and don nylon uniforms. Even the common pencil is banned from work areas because graphite particles could short out components.

Repeaters are to be installed at points 5.1 nautical miles apart along the length of the 3692-nautical-mile cable. Each repeater will boost the signal it receives by more than 10,000 times to compensate for transmission losses.

According to Western Electric, there are 2500 WE repeaters lying on ocean bottoms in 19 cable systems. Yet, repeater failures are rare because of the extreme care that goes into their manufacture. Though it's expensive to make them this way, it's even more expensive to retrieve a faulty repeater from the ocean bottom and replace it.

Hawaii threatened by volcano

A major eruption of a Hawaiian volcano before July 1978 is predicted by scientists of the U.S. Geological Survey. If Mauna Loa produces sufficiently high volumes of lava over a long period of time, warn USGS volcanologists, the flow could destroy parts of the city of Hilo, the economic and transportation center of the island of Hawaii.

The dramatic prediction is based on a review of the history of Mauna Loa, one of the largest and most active volcanoes on Earth. Mauna Loa is one of five volcanoes that form the island of Hawaii. It rises over 31,000 feet above its sea-floor base and nearly 13,700 above sea level. It last boiled over in July 1975—a "small" eruption that produced less than 40 million cubic yards of lava. But Mauna Loa has a history of producing a big eruption soon after two small ones have occurred.

USGS experts are providing guidance to government agencies that are involved in planning ways of diverting lava away from potentially harmful paths.

Mining asteroids

To make up for dwindling nickel and iron deposits on Earth, we should develop plans to "mine" space. That's the view of Thomas B. McCord and Michael J. Gaffey, astrophysicists at the Massachusetts Institute of Technology.

They theorize that rockets or nuclear-impulse devices could be used to shove small asteroids into orbits closer to Earth. By harnessing heat from the sun, say the scientists, hunks of an asteroid could be melted into big ingots for shipment to Earth. Iron and nickel make up as much as 80 or 90 percent of some asteroids—tiny "planets" or fragments of planets, most of which circle the sun in a belt between Mars and Jupiter.

Bamboo to reinforce concrete

A new technique for treating bamboo so that it can be used effectively to reinforce concrete is under development at Lehigh University, Bethlehem, Pa. High tensile strength, which permits it to bend far without breaking, makes bamboo an ideal substitute for steel, a material that's scarce in many parts of the world, say researchers.

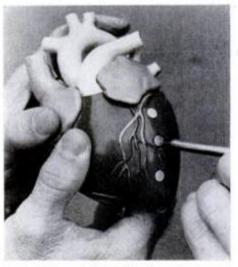
Lehigh studies show that the inherent weaknesses of bamboo—expansion and shrinkage due to water content, low bonding strength and a tendency to decay—can be overcome. At Lehigh, the bamboo is sandblasted to roughen the surface, thus improving the bonding strength. Then it's soaked in liquid sulfur to make it waterproof.

The Lehigh scientists point out that treated bamboo would also make a good reinforcement for low-cost building materials, such as adobe, a heavy clay used in many areas of the world where earthquakes are common.

New way to monitor heart

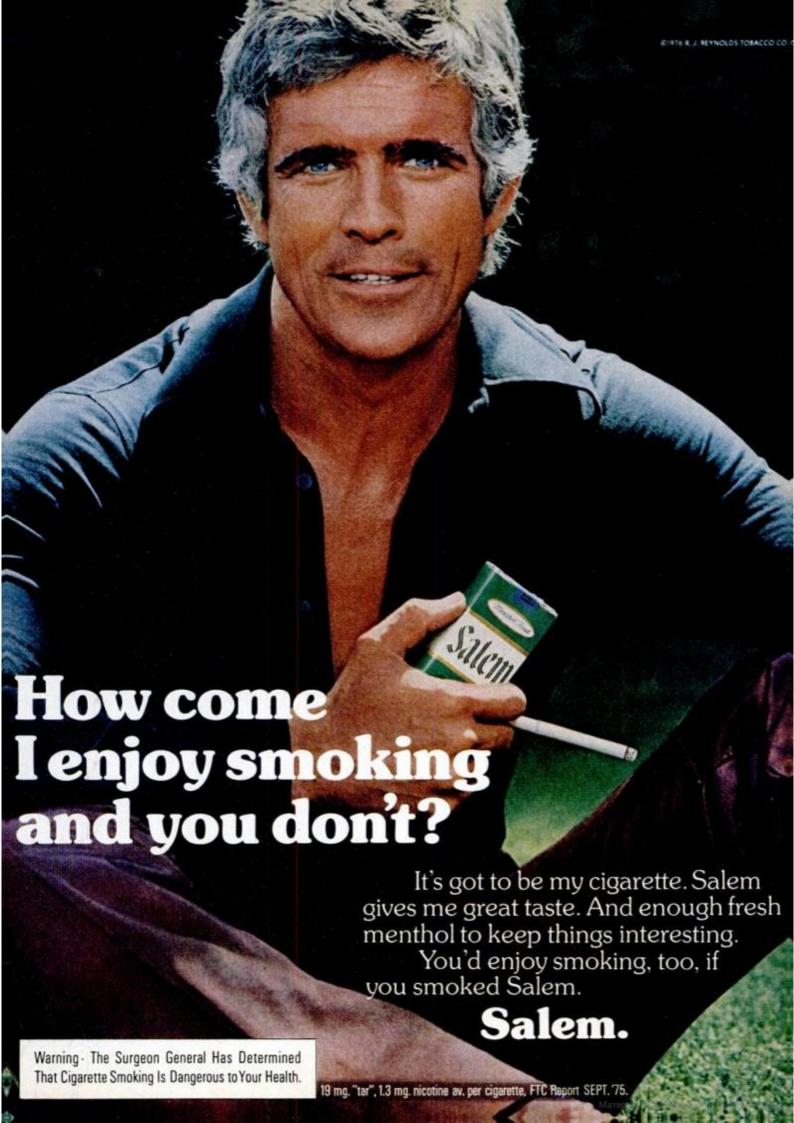
A new and better way of monitoring patients after open-heart surgery reportedly has been developed by bioengineers and surgeons at the Palo Alto Medical Research Foundation in California.

During an operation, they insert



seven tiny metal coils (as shown on the heart model in the photo) in key areas of the heart. In X-rays, the coils show up as discrete points, permitting medical men to determine how much blood the heart contains, how much blood it is pumping, the contraction time of muscles and if any part of the heart is not getting sufficient blood.

The coils are made of an inert metal—tantalum—and, say researchers, can be left in the heart without effect for a lifetime.



APPLIANCE CLINIC

BY PAUL MANN



How to get information

Many readers who write Appliance Clinic ask me to send them an address of a manufacturer or source of parts. I'm sorry to say that, because of the large volume of mail the Clinic receives, it's not possible to answer such questions individually.

The next best thing I can do is spell out for you here how to go about getting the information you need. If you seek the address of a manufacturer, consult the *Thomas Register of American Manufacturers*. I know of no library that doesn't have this or a similar reference.

One important tip on using the Register: Many products are sold under trade names that may not indicate the full, formal name of the maker. If you can't find the name you want in the main listing of manufacturers, try the section titled "Trade Names." After each name is listed the manufacturer. With this you can then look up the address in the main section.

If the address you want is for a manufacturer of major appliances, you can get the information from the Major Appliance Consumer's Action Panel, 20 North Wacker Dr., Chicago, Ill. 60606.

I know of three well-stocked appliance parts houses that will sell parts to PM readers through the mail. For small appliance parts, try Boulevard Brunswick Appliance Service, Milltown Rd. and State Highway 18, East Brunswick, N.J. 08816; or Factory Service, Inc., 457 Babylon Tpke., Freeport, N.Y. 11520.

For major appliance parts, write Jacoby Appliance Parts, Inc., 57 Albany St., New Brunswick, N.J. 08901.

Stiff in the joints

22

Our Maytag washing machine gets lazy when it gets cold. By nursing the machine along and filling it with hot water, it gradually warms up enough to operate at normal agitating speed. Then it works okay. What's wrong and what can I do about it?—Ronald Batson, Bradenton, Fla.

There's nothing you can do about it. You've just discovered what many of your northern friends with Maytags have known for years. Between 50° and 60° the grease that Maytag uses in the gear case stiffens up. If you permit agitation to continue without doing anything, it will be slow for a while, but will then work its way to normal speed. You use the "hot water method," which is just what Maytag recommends for overcoming this stiffness at once.

Why doesn't Maytag use a less "sensitive" lubricant? A spokesman says, "We've been having great success with this lube for many, many years, and we aren't about to try our luck with something else."

Popping off

When I replaced the rubber gasket around the door of my Norge gas dryer, it kept popping off. I returned to the parts dealer who sold me a wire that fits inside the gasket, but the thing still pops off. Is it okay to glue it back on?—Mrs. Don Ratkowski (no address)

I'm against it. If a glued-on gasket ever has to be replaced, getting it and the residue off is a big job. Perhaps the gasket isn't staying put because you were sold the wrong type. My money is on this. It could also be improperly installed. The gasket, with its inner spring, is supposed to snap into place under the narrow ridge around the door.

Can opener can't open

I have Sunbeam and Waring electric can openers. After a year's use, neither will cut lids off cans. Is the cutting wheel bad, is it the geared wheel that holds the can, or what?— Judy Conley, Belleville, Ill.

If I must choose, I'll bet on dirt which may be coating the cutter and sprocket assemblies and hampering the cutting operation. Clean the sprocket and cutter. In many models, the cutter assembly can be removed and cleaned in the sink. There is no easy way to clean the dirt from between sprocket teeth. You'll have to pick it out. Use toothpicks to prevent damage that a metal tool might cause.

A little maintenance would have gone a long way in preventing trouble. The cutter and sprocket assemblies should be wiped clean frequently to prevent foreign matter buildup.

If cleaning doesn't get the units

to cut cans, then examine sprocket teeth. If some or all are worn, the sprocket can be replaced. If you can't do it yourself, you may find it cheaper to buy a new appliance.

If the sprocket's okay, examine the cutting wheel. If that's damaged or worn, advice that applies to the sprocket applies to the cutter.

Tappin' a switch

The freezer fan switch of my Tappan Model 95-1641-17 frost-free refrigerator goes bad about every six months. The contacts burn, probably because of arcing. Is there a more durable switch available?—Otto Grummt, Burke, Va.

No, there isn't, but you don't need one—neither a more durable switch nor the one you have. You can remove the switch from the circuit by bypassing it. Newer models don't have door switches to control the fan, because the company found that this part was causing many problems and that the unit operated just as well without it.

There will be a slight change in functioning. The fan turns on when the compressor goes on; all the switch does is turn the operating fan off when you open the door. With the switch out of the circuit, the fan will keep operating when you open the door if it has been turned on by the compressor.

To make the changeover, pry the switch from place with a screwdriver or putty knife. You'll have to manipulate the liner to do this. The switch is a friction-type which is held by tabs. Pull the switch out to a point where you are able to cut the wires at the terminals and splice them together with a wire nut. (To be on the safe side, unplug the refrigerator beforehand.)

Now, push the spliced wires into the hole and reinsert the dead switch. Don't just throw it away. Without the switch in place, you'll have a big hole in the liner.

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

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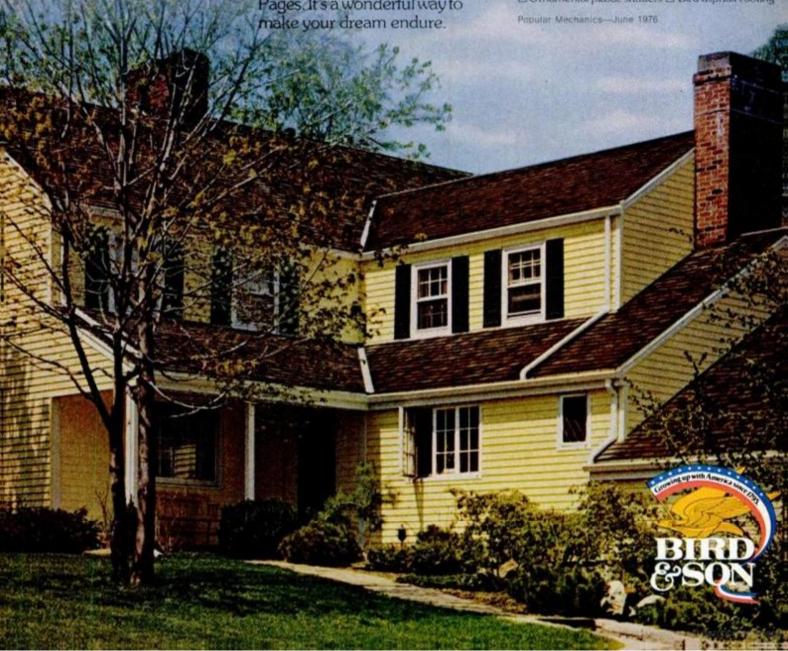
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"There must be a better

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Remember, it's your life. You might as well make the most of it. © 1976 Intext, Inc.

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ALL OUTDOORS

WITH BILL McKEOWN



Big shot BBs

Ever since Napoleon complained that Alpine snipers with silent air rifles were picking off his troops, pellet guns have commanded respect. For years, however, they were considered primarily as an excellent, inexpensive way for youngsters to learn gun handling and enjoy plinking. Names like Benjamin, Crosman, Daisy and Sheridan were lucky words for millions of kids.

Lately the BB gun has been growing up. Available in adult stock sizes and in prices to nearly \$500 for some imported models, the nonpowder guns are now offered by firearm companies as well. To mark its 90th anniversary, the Daisy Div., Victor Comptometer, Rogers, Ark., has issued a \$1.75 Daisy Shooting Annual 1976 that covers all phases of the history and development of the BB-gun sport.

Clean-cut cutters

Joining the flood of commemoratives and reissue of fine old standards by gun manufacturers, a number of knife companies are now producing modern sheath and pocket models with the look and feel of an earlier time. Stainless steel makes maintenance of the new "old-timers" easier. The high-quality knife for just \$1 is only a memory, but for the sportsman who can afford superior workmanship, and about \$10 (and up) for a fine blade of long life, there is a wide variety of choices.

Like those below, folding knives are now produced in small pocket sizes up to large hunting models, and kits are also supplied for the home craftsman. For some handmade and collector's-item knives, delivery may be as long as a year. Names like Buck, Camillus, Gerber, Ka-Bar, Morseth and Schrade are becoming well known to collectors. A catalog of knives from several makers is \$1 from A.G. Russell, Springdale, Ark.

Good gear

Continuing field tests by this department recently have brought in good reports on several products, thumbs straight down on others. The bad news is that two bargains in day packs saved money but multiplied aggravations. One neat little nylon knapsack, which folded into its own pocket as a belt packet, mounted one of those jamming zippers that feed on fabric and had to be thrown away halfway through a hike. Another low-cost canvas rucksack began unraveling strap ends and unstitching seams to make our tester swear back onto quality equipment.

Sew-it-yourself kits can be made into first-class custom equipment that may be better than anything you could buy. Rewards include a lower purchase price for great gear, plus the fun of accomplishment. The fun is very important, because if you figure the cost of your time, the total expense might zap out of sight. After many hours of effort, a thimble-thumbed friend recently gave away a half-completed tent he was making. The moral may be to take a trial stitch-up first on something simple.

Good news is in on several new items, however. What may be the ultimate in belt bags is called, reasonably enough, the Aspak Belt-pak. Large enough to carry food and gear for a day's hike, it has an inner pouch that's fully padded and insulated so even a rough climb is not likely to smash camera equipment zipped up inside. A wide inner belt makes the pack particularly comfortable to wear, and it slides around in front easily, we found, for quick access to its inner and outer pockets. It's \$28, and one of the most versatile aids we've seen.

Along with an untanned bald head, nose and chin, we sent a new sunscreening lotion called "Sundown" to Antigua in the Caribbean for a preseason burn test. Our tennis-playing, water-skiing sampler reported that swimming and athletics did not seem to rub off the protection, and his outfrom-under-a-rock complexion did not turn to lobster this time. The Johnson & Johnson product for sunsensitive skin is scheduled for drug outlets this summer.

Red Ball boots, old farm and outing favorites, are now available in a number of insulated, leather-top and wader models plus Royal sport clothing wet-weather suits and fishing shirts. And Uncle Homer Circle has recorded good advice in *Professional* Tips on Keeping Warm and Dry, a booklet at Royal Red Ball dealers.

One final bargain: Stow-A-Way Industries, Cohasset, Mass., now packages freeze-dried and dehydrated camping foods in big economy No. 10 cans. An outing group can buy in bulk and repackage for individual packs at substantial savings.









Good knives are becoming collectors' items: expensive, durable and often handmade. Shown, left to right, are Gerber's new little contoured FS 1 and Classic; Imperial's Wildcat Skinner: one-piece-steel Trail Creek from Ithaca, and a 10A Buck Deer of the Camillus American Wildlife Sid Bell series.

Материал, зацищенный авторским прав

Coleman Coolers and Jugs: 16 rugged ways to keep your cool... anywhere you go.

A cooler should be more than a big box for ice. So Coleman builds 'em to travel tough.

And Coleman builds 'em in all the varieties, colors, and sizes you could ever ask for.

Go with our "steel-belted" Snow-Lite® coolers and jugs. Or our rugged Poly-Lite® plastic lineup...including the Coleman Roundabout, "the cooler that's a jug that's a cooler."

Every Coleman cooler (and jug) has a tough hide. And a plastic bottom to fight corrosion, rugged enough to drag over a rough dock when you've just iced down your limit of fish.

And every Coleman cooler (and jug) is insulated with polyurethane, the kind you find in an expensive refrigerator.

Wherever you go, they're the best friends ice ever had.

The fun is out there. Let yourself go...with Coleman.













DETROIT LISTENING POST

'77s score low at first look

There's an old saying that you should not judge on first impression. I hope that's true about the 1977 cars because my first impression of the few I've seen isn't favorable. At the time this was written, I had seen four cars on the sly—the full-size Chevrolet and Buick, T-bird and Continental. Continental, which will go up a number, becoming Mark V instead of Mark IV, won't be much changed from this year. Personal opinion: still a good-looking car.

But the others have a chopped-up look, as though they were designed by guys working independently of each other. One department did the roof, another the lower body. One guy did the front, another the rear. Then the pieces were joined together.

There's a lack of cohesiveness, of overall esthetics. But first impressions can be wrong. By the time you read this, I will have driven most of the cars. Maybe a second, behind-thewheel look will lead to a different impression.

Who needs it?

New option for some '77 cars will be seat belts the same color as the upholstery. Who says there's no room left in the auto biz for frivolousness and frippery?

Locking out car crooks

The government has developed a package of ideas it wants automakers to put on future cars to protect them against thieves. The National Highway Traffic Safety Agency wants a device that will automatically eject the key from the ignition when the engine is turned off, so you can't leave the key in the car; three different keys for ignition, doors and

trunk; and inside-the-car release levers for hood and trunk. Assuming the expense isn't too great, most of these will be on the '78 and '79 cars.

Aluminum hood for Olds

A diesel engine for passenger cars isn't the only down-the-road idea being developed by Oldsmobile. Olds discloses it will use an all-aluminum hood on some '77 cars. Watch Olds if you want to know what GM is thinking of in new materials; it has apparently been designated as GM's "lead" division to experiment with substitute materials for body panels.

New nameplate for Chrysler

One of the two derivative cars Chrysler will pull off its new Volare/ Aspen body will carry the Chrysler nameplate, instead of Plymouth. The second car will be a Dodge.

Do-it-yourself sheet metal

I have a cheap radio I carry around the house for company. It went on the fritz and I took it in to be repaired. I'm not a big conservationist, but I don't believe in pitching things out and buying new if the old still has life left in it. The repairman said it would cost \$5 to check the radio to find out that was wrong, plus parts and labor charge. "Or I can sell you a new one just as good for \$9.36." I bought the new one.

I told this story to some auto people and asked if they could foresee a time when the same situation might apply to automobiles. Not to a point where you would throw out the whole car, but parts of it. The throw-away idea is already being used for operating parts. It's cheaper to replace than repair. But how about non-operating parts? Sheet metal?

The auto companies say it's possible that as cars become lighter and smaller, repair will give way to replacement on some nonworking parts. They point out such things as bumper facings, grilles, lamp housings and rocker panels could be made of inexpensive plastics that could be replaced-by the owner, if he wants to do the work-for less than the price of having the original piece mended or bumped out. There's an incentive for the industry to do this where there was none a few years back. Plastic reduces weight and that improves mileage. That's the name of the game these days-dieting down to increase mileage. A government standard coming in 1980 will require the companies to average 20 miles to the gallon on total production.

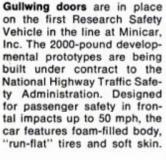
The Motown sound

Speaking of radios, if you visit Detroit or are driving within range of the major AM stations, catch the commercials on the drive-in and drive-home programs. You'll hear some sales pitches you won't hear on any other radio stations in the United States. The ads are for production equipment, production processes and raw materials used to make automobiles. Right now, for example, there's a country and western jingle for a certain type of steel.

The ads are aimed at a very small, select audience of auto company engineers and purchasing agents. The advertisers don't look for any direct sales, but they hope the commercials will pave the way for a salesman to do a face-to-face with buyers at the car companies. Let's see now, how do you rhyme heat treat, metallurgy and high-strength alloy?

Ford freebie

Ford has published a new edition of its annual freebie, Car Buying Made Easier. Despite the obvious bias in favor of Ford products, this is an excellent book. The first 36 pages contain a lot of practical information on cars in general, not just Ford makes. You can get a copy, no charge, by writing Ford Motor Co. Listens, Box 1976 TW, American Rd., Detroit, Mich. 48121.





"Why Viceroy? Because I'd never smoke a boring cigarette."



Viceroy. Where excitement is now a taste.

Biggest-ever sailboat for a one-man crew

The biggest boat ever built to be sailed single-handed is scheduled to race across the Atlantic this month. Her name is Club Mediterranee—after the famous resort organization sponsoring the 236-foot four-masted schooner. She'll sail June 5 from Plymouth, England, for Newport, R.I., 3000 miles away.

This spring nearly 200 boats signed up for the Royal Western/Observer Singlehanded Transatlantic Race, started 16 years ago and held once every four years. To qualify, the solo sailor aboard each craft must first have completed a preliminary single-handed 500-mile cruise to show he's competent. The 1972 winner, Alain Colas, outraced 51 other starters to set a record of 20 days, 13½ hours aboard the 70-foot trimaran Pen Duick IV.

During the '72 crossing, Colas studied his closest rival, three-masted, 128-foot Vendredi Treize (French for Friday the 13th and now a Club Med cruiser in the Caribbean), and decided a single hull of about 230 feet could win this year. Handling the 1445-square-yard sail area on 100-foot masts driving a hull as big as a Boeing 747, the French expert should have his hands full. An automatic pilot powered by solar cells and small wind generators is planned, but the race remains lone men against much sea.—Bill McKeown



Alain Colas, recovering from an ankle injury, will have to handle the lines alone on the Club Mediterranee's 236-foot deck.

CLUB MEDITERRANEE SPECS

Length overall: 236 ft. Waterline length: 213 ft.

Beam: 36 ft. Draft: 18 ft.

Displacement: 280 tons Sail area: 12,905 sq. ft. Bow and stern masts: 98 ft. Amidship masts: 105 ft, Deck area: 6192 sq. ft.

Sailing (in artist's conception) is the Club Mediterranee, Her skipper will hope for calm seas to break his 20-day record.



Steel hull at dockside after launching in Toulon, France, dwarfs Colas on her deck. First tank tests of design used models.





Masts of 98 feet fore and aft, 105 feet for two amidships, lie ready for stepping. They are balanced by depleted-uranium keel.



Built upside down, schooner was launched inverted with deck sealed. Skin divers then opened hatches in deck while cable-pull on keel righted hull, shown below.



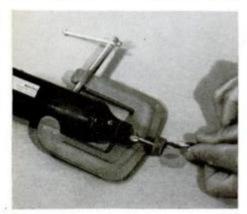
"With Rod Mace and State Farm, we have the best of both worlds."



STATE FARM INSURANCE COMPANIES Home Offices: Bloomington, Illinois

HINTS

FROM READERS



Clamp frees hands

A C-clamp can serve as a third hand for holding a hand grinder when both hands are needed to hold the work. Use a clamp with a throat that's slightly greater than the diameter of the grinder and tighten it snugly against the body of the tool.-Ken Patterson



Funnel with a handle

Pouring screws, nuts, nails and bolts back into narrow-mouth jars after searching for a certain size goes a lot faster without spilling with a funnel made from a 1/2-gal, plastic jug. Remove the bottom portion and stuff the hollow handle with paper to keep items from lodging in it.



Tin-can wall holsters

When cans are used as bins to store things in your shop, slanting slings cut from larger cans let you hang them at an angle for extra convenience. Use two roundhead screws to mount each sling and a third to engage a notched tab soldered to the bottom of each can to tilt it forward.

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'76 Ford Mayerick.

EPA average mileage estimates up 13% Scheduled maintenance requirements down 57%

Maverick. Still sticker priced less than any 4-door, 5-passenger compact.

Mileage ratings up 13%

'76 Maverick has EPA estimates of 30 miles per gallon highway, 22 city. That's an increase of 13% over 1975.

This is based on Ford's calculation using EPA city/highway test procedure for 200 CID 6-cylinder (Na. in Calif.) manual transmission engine, standard axle ratio.

Of course, your mileage may vary with the kind of driving you do, how you drive, optional equipment and your car's condition.

Ford Maverick. Gas mileage ratings up

'76 Ford Maverick. Still the simple machine.

The first Maverick was introduced as a tough, reliable compact. Simple to operate. Simple to service. And 6 years later, Maverick's still the same—only better than before! After all, when you build a car over 1,667,000 times you know how to build it right! The "old reliable" new '76 Ford Maverick...still The Simple Machine. Backed by millions of owner-driven miles. Available in 2-door or 4-door family sedan.



Independent reclining seats; optional Alpine plaidseat covering.

13%. That adds up to a lot of extra miles to see the country, or for just plain old family driving.

Scheduled maintenance requirements down 57%

Over the last 3 years, 57% of Maverick's scheduled maintenance requirements have either been reduced or eliminated. This is based on a comparison of 1973 and 1976 models.

Lowest-priced compact

The base Maverick is sticker priced at only \$3,189* America's lowest-priced compact. For added value, the Luxury Decor Option (shown) offers practically every luxury touch you want in a compact. Vinyl roof, exterior moldings, wheel

covers, WSW tires, Luxury Interior Trim, and much more.

High resale value

Maverick has built a solid reputation for high resale and trade-in. For instance, one through four-year-old Mavericks returned more of their original sticker price than Nova, Valiant or Dart.

'76 Ford Maverick. America's tough, reliable family compact. It offers you room for 5...13% average increase in mileage ratings over 1975...57% reduction in scheduled maintenance requirements from 1973, and sticker priced only \$3.189.

Maverick's standard features include: solid-state ignition, manual front disc brakes, foot operated parking brake, color-keyed 12-oz. cut-pile carpeting.

Ford Maverick. The dependable family compact. Backed by 6 years of refining and improving.

*Base sticker price for 4-door excluding destination charges, title and taxes. Car shown with Luxury Decor Option (\$508) and Tu-Tone paint (\$55).

The closer you look, the better we look. See your local Ford Dealer.

FORD MAVERICK

FORD DIVISION FORD



CAR CLINIC

BY MORT SCHULTZ



Sign of the times

According to several letters received at Car Clinic from readers throughout the country, fuel-system contamination has become a major problem, thanks to vandals. These half-wits are stuffing assorted forms of crud into gas tanks, including sand, water, sugar and soap powder. Once this garbage plugs up the fuel filter and carburetor passages, the engine starves for fuel and begins surging, misfiring or stalling.

You can determine if your car has been vandalized by taking the fuel filter apart if it is an in-line type, or inspecting it for contamination if it is seated internally in the carburetor inlet. Of course, vandals aren't the only reason for fuel-system contamination—just the main one. You may get a tankful of bad gasoline, or the fuel tank may be rusting.

In any case, here's what to do:

- The fuel tank has to be drained. removed from the car and thoroughly flushed. If the tank is rusting, better
- Fuel lines must be blown clear.
- Both fuel-line and in-tank filters have to be replaced.
- The carburetor has to be disassembled, cleaned with carburetor cleaner or mineral spirits, and inspected to assure that all passages are clear. This is assuming that the contamination has reached the carburetor. If carburetor cleaner or mineral spirits fails to clean a carburetor, the part should be washed in soap and water. All traces of cleaner should be removed before the carburetor is reassembled, and parts should be dry.

With the way things are going, it's little wonder that auto parts dealers can't seem to keep enough lock-type fuel-tank caps in stock.

Old rockin' chair's got him

My relatively new (2250 miles) 1975 Dodge Dart with slant Six engine can't keep its valves adjusted. In its short life, it has already been back to the dealer twice for adjustment, the last time only two weeks ago. Now I'm again beginning to hear that telltale pecking sound. I'm sure the mechanics at the agency know how to adjust the valves of the cars

they've been trained to work on. So what's causing my problem?-T. R. Jones, Charleston, S.C.

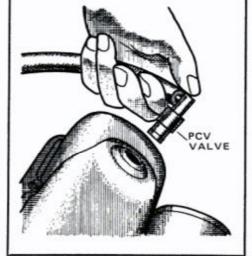
I'd bet on a bad set of rockers whose bolts keep loosening up. If the adjustment refuses to hold, that's probably what you have, so the solution is to replace the rocker arm assembly. Shouldn't cost you a dime with the warranty still in effect.

Running interference

I've been experiencing a problem with the front tires of my 1975 Chevrolet Monza rubbing against the

Remember PCV?

Because it's no longer new and out of sight, some drivers may be forgetting that the PCV system is still very much a part of every car. Results may prove to be a disaster since a clogged PCV system can cause condensation of blow-by gases in the crankcase, resulting in the formation of sludge and corrosive acids in the engine. You can make a quick check of system operation every few thousand miles just by pulling the PCV valve from its seat in the rocker-arm-cover. With the engine idling, cap the end of the valve with your thumb. You should feel a strong pull. No pull? The valve is probably clogged. Get a new one. Also check hoses and the small filter inside the carburetor air cleaner through which emissions from the crankcase pass on the way into the engine for burning.



inner fenders on tight turns. The dealer has replaced front springs and shock absorbers, but the situation remains. Any suggestions would be appreciated.—Murray M. Monosoff, Akron, Ohio

The best solution is to readjust fenders until there is no interference. If fender wells in your car are plastic, loosen bolts and adjust fenders. Then, tighten bolts. If fender wells are metal, your mechanic can use a mallet to make the "adjustment"-hopefully without damaging or distorting the metal. However, if you question his ability to do this work, then he can readjust steering stops to provide a shorter turning radius, preventing interference.

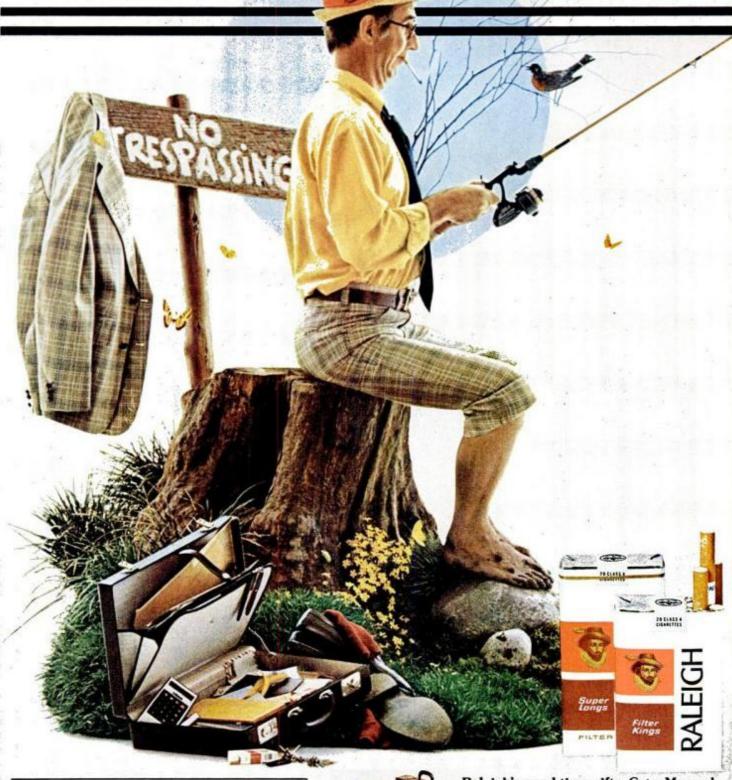
F-L-M owners . . . attention

For those who have been having performance problems with a 1975 or 1976 Ford, Lincoln or Mercury, one of the following facts may help you and also reduce the size of my mail:

- Spark knock (detonation—ping) can usually be eliminated by having your dealer adjust the distributor vacuum-advance diaphragm as outlined in technical service bulletin (TSB) 102, article 1329. According to an official at Ford, the key to achieving a successful repair is for the mechanic "not to overlook the next to last paragraph (step 6).
- 2. If spark knock continues anyway, remind your dealer that a properly functioning exhaust gas recirculating (EGR) system is necessary if detonation is to be avoided. Cooler gases injected by the EGR into the manifold should slow the burning rate of combustible gases in the combustion chamber and reduce the possibility of a second flame front forming.
- 3. If spark knock continues after all this, refer your dealer to TSB 99, article 1280, which explains how to retard the initial timing setting from the original specification.
- 4. If your F, L or M is equipped with a 460-cu.-in, engine that's been idling rough or stumbling (hesitating) on acceleration, get your dealer to apply the provisions of TSB 101A. The entire bulletin is devoted to this problem, which is widespread, TSB

(Please turn to page 38)

TASTE THE GOOD TIMES. RALEIGH



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



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CAR CLINIC

(Continued from page 36)

86, article 1055, should be consulted if the difficulty is being caused by a malfunction in the accelerator pump circuit.

5. Hesitation, stumble or stalling on an initial cold start when the temperature is between 50° and 90° F. is the subject of TSB 104, article 1363. Solutions, which apply to the 351M and 400-cu.-in. engines, include eliminating the electric choke assist, changing the position of the accelerator pump rod, and repositioning the choke cap index mark.

Mercy, mercy

I have a 1968 Mercedes-Benz 250 SE with fuel injection. When the engine heats up, the gas mixture stays rich. At high speed, the engine runs perfectly, but when I slow down it will miss until I step on the gas again. The action is similar to what happens in a conventional setup when the carburetor's automatic choke becomes stuck and doesn't allow the gas mixture to lean out.

I used to get 22 miles per gallon, but that's been cut to 15. Brand-new sparkplugs become carbonized quickly. My mechanic hasn't found the cause. Can you help?—Henry Voges, Oceanside, N. Y.

I don't know what your mechanic has or hasn't done, but a likely place to look for the malfunction is the cooling water thermostat. This is frequently overlooked in a search for a fuel-injection-system breakdown. The thermostat acts as a warmup device, signaling the injector pump to supply more fuel following a cold-engine start. If the thermostat is sticking, the mixture will remain rich even after the engine reaches normal operating temperature. The solution is to replace the thermostat.

Also check the carbon monoxide (CO) level in the exhaust at idle speed and normal operating temperature. The level should fall between 3.0 and 4.5 percent. If it does not, an adjustment should be made using the spring-loaded idle-control knob to bring the CO level and, consequently, fuel enrichment within bounds.

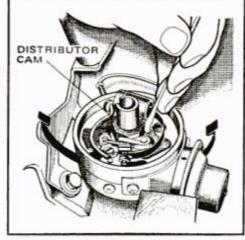
Impish Scamp

My problem concerns the airconditioning unit in a 1971 Valiant Scamp with 308-cu.-in. V8 engine. The car now has 48,000 miles on the speedometer, and would you believe that from mile one neither the dealer nor any airconditioner "expert" around here has been able to help me. The trouble is simply this: When the airconditioner is used, it keeps cycling

A little dab

good way to develop a bad problem is to forget that the distributor cam should get a drop of lubricant when you do an engine tune-up. Lack of this little dab will lead to rapid wear of the rubbing block, which will reduce the space between distributor points. Degrees of point dwell will increase, retarding ignition timing and causing performance problems. However, don't proceed to coat the cam with lubricant. Excess grease can splash on distributor points, causing rapid point erosion. A drop the size of a match head is all you need. Use only a distributor cam lube-it is specially formulated and won't melt.

PM CAR CARE



on and off every 10 or 12 seconds. Besides making the car slow down and speed up continually, this engaging and disengaging causes bolts to loosen that hold the unit in place. Answers from those I've consulted include: "Can't find anything wrong." "It's a new type experimental unit." "The unit was put together and wired wrong." "It needs adjustment." "It needs recharging." Can you help me?—Joseph Margolin, Brooklyn, N. Y.

Has anyone ever considered the possibility of either a defective temperature control rheostat or a bad compressor? I have to assume that someone had the good sense to check on the condition of the drive belt and drive pulleys.

To pinpoint the trouble area to either compressor or rheostat, with the engine turned off, pull the wire terminal block apart at the compressor. Hook up a jumper wire from the "hot" side of the battery to the wire pigtail feeding the compressor.

Start the engine and watch the compressor. If the compressor now cycles on and off, it should be removed for overhaul. There's probably something wrong with its clutch. If the compressor runs as smooth as

silk, then I'd say the rheostat is bad. Heat causes it to open too quickly, shutting off the cycle. Then, because the car never really gets cool, it just as quickly makes the circuit again.

Bearing down

I have a 1973 Ambassador two-door hardtop with 19,800 miles on it. I had the front wheel bearings greased and adjusted recently and was told by the mechanic that I should also have the rear wheel bearings greased. I called three American Motors dealers, because I always thought it wasn't necessary to grease rear wheel bearings. Two said they didn't know and one said it wasn't necessary. Who in heck am I supposed to believe?—Emmanuel Monaco, Stratford, N. J.

Me. I quote from the American Motors maintenance instructions (maybe you ought to do some of those fellows a favor and bring this to their attention):

"Inspection and lubrication of front wheel bearings—every 25,000 miles.

"Note: Universal joints and rear wheel bearings do not require periodic or scheduled lubrication."

Rear wheel bearings get lubricated by being splashed with grease from the rear end.

SERVICE TIPS

- Champion Spark Plug Co. warns owners of 1975 and 1976 automobiles with catalytic converters that severe and costly damage might be done by misusing fuel additives. For example, in the past a carburetor cleaner was applied by pouring it directly into the carburetor as the engine was run at fast idle. After allowing for a short soak-in period, the engine was restarted and the process repeated until the additive was consumed. This extensive idling can cause the converter to overheat. While most additive manufacturers have made necessary changes in procedure to prevent overheating, according to Champion, "there may still be stocks on the shelves that carry old instructions." Be certain, therefore, that you read instructions carefully to make sure the product is safe to use on your catalytic-converter-equipped car.
- If you've had trouble with your 1975 Chevrolet Vega with two-barrel carburetor failing to start in cold weather because of carbon-fouled sparkplugs, Chevy says to change the plug gap from the specified .060 inch to .035 inch. The company also recommends that next time you buy plugs you get R-43-TS or equivalent. ★★★

GOT A PROBLEM WITH YOUR CAR?

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



Any car that expects to be around tomorrow better be as intelligently engineered as Monarch is today.

With energy, ecology and economy growing more important every day, the most significant luxury any car can offer is efficient design. That's why in engineering Monarch we trimmed away excess bulk and overhang. Monarch is over a foot shorter than most mid-size cars, but with just about as much headroom and legroom.

■ Fully independent front suspension with linktype stabilizer bar to help prevent excessive lean when cornering. Hotchkiss rear suspension and staggered shock absorbers for excellent traction.

Steel-belted radials are standard as are front disc brakes. A sophisticated 4-wheel disc brake hydraulic power assist system is also available.

Energy absorbing steering mechanism with flex coupling to dampen road vibrations, and parallel linkage for precise control. An all-weather steering gear lubricant that never needs changing under normal conditions.

■ Fully synchronized standard transmission; engineered to minimize gear noise. Also available, automatic transmission that allows 1st and 2nd gear manual shift for greater control on steep hills, snow and ice.

solid-state ignition for quick starts. To add power without adding excessive weight a thin wall castiron V-8 is available.

■ Doors are actually double-paneled sturdy box units with steel guard rails hidden inside. Specially designed canted hinges give rear doors an extra wide opening for easy entry.

Over 100 pounds of insulation help give Monarch the quiet riding comfort you expect from Lincoln-Mercury. 25.9 sq. ft. of glass in the four door Monarch provides excellent visibility.

☐ 19.2 gallon gas tank. EPA mileage estimates 24, mpg highway, 18 mpg city with 250 CID engine, manual transmission. Your actual mileage may vary depending on the type of driving you do, your driving habits, your car's condition and optional

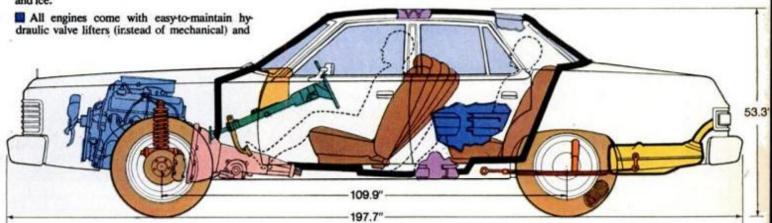
Yet, for its moderate price, Monarch offers the comforts and luxuries of a much larger car. And the smooth ride you've come to expect from Lincoln-Mercury's specialists.

Someday all car makers might wake up and start engineering cars as intelligently. But why wait for them when you can drive a Monarch now.

equipment. California ratings lower.

- Seats offer deep-cushioned comfort (up to 6" thick) engineered with firm support from a flexible grid of steel springs. For added luxury you can also order fully adjustable reclining bucket seats.
- Body construction is fully unitized steel. For strength and safety, roof and pillars are reinforced to withstand over 5,000 pounds pressure. Rubber insulators are generously employed to absorb noise and vibration.
- Instrumentation is clustered for easy reading. A few of the available options: tilt-steering wheel, AM/FM4-speaker stereo, air conditioning, quartzcrystal digital clock, speed control, sun roof.

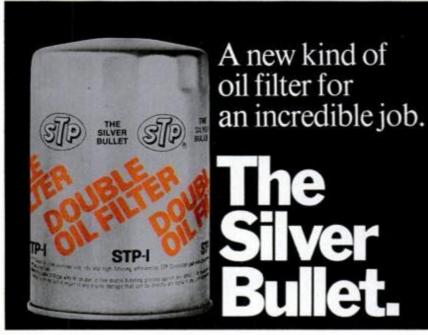
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In 7500 miles of driving (average speed 40 mph) your oil filter cycles approximately 28,000 gallons of oil!

An incredible job. So STP builds two filter elements inside this new Double Oil Filter. All your oil goes through both, every pass through the canister. Result: The Silver Bullet

gives you a better combination of long life and high efficiency than any of the 5 other best-selling filter brands. Of these best-sellers, only



The outer hiter: a 6 foot phenoiimpregnated cellulose element. The inner filter: a fiber strand more than 60 feet long, wound on a steel core. Your oil goes

Test results, certified by The American Standards Testing Bureau Inc. For a more complete test report write: The Silver Bullet, C/o STP Corp., 1400 W. Commercial Blvd., Ft. Lauderdale, Florida 33310.

Test terminated at 24 hours. Lack of pressure build up was abnormal indicating internal leakage

The Silver Bullet filters all your oil twice. Isn't that the kind of protection your engine deserves?

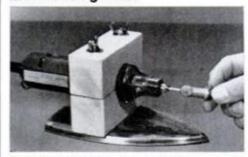
© 1976 STP Corp

Filter all your oil twice with The Silver Bullet.

HINTS

FROM READERS

Mini bench grinder



A hand grinder clamped in a cradle attached to the sole plate of an old iron becomes a little bench grinder, leaving both your hands free to hold the work. Grinder can be removed quickly for hand use.

From nuts to acorns



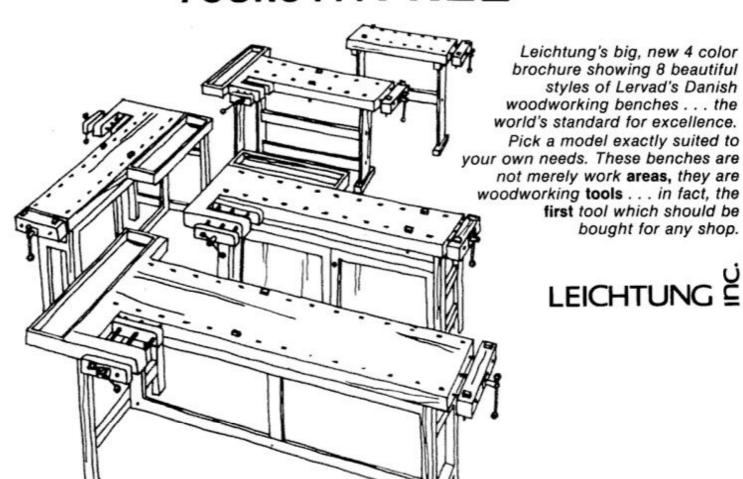
If you are in a bind for some acorn nuts, you can make your own by cementing the tops of nickel-plated upholstery nails to regular nuts. Simply cut off the nail shanks and fill the heads with epoxy.

Caulk and spoon



After you run a bead of caulking along the casing of a door or window, dip a plastic spoon in turpentine and run it along the bead. You'll wind up with a crack that's fully packed and a neatly tooled fillet.

YOURS ... FREE

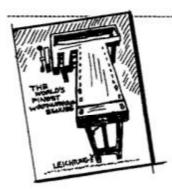


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- Furniture grade solid Danish beech construction.
- Perfect (and we mean perfect) kiln drying
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WOODWORKING BENCHES

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DAP Inc., General Offices: Dayton, Ohio 45401 Subsidiary of Plough, Inc.

For safety, build this electric outlet checker



Tester measures line voltage and checks outlet wiring (see table below). Designed for three-wire grounded outlets, it can also check three-wire adapters used in two-wire outlets; here, yellow light shows that "ground" screw isn't really grounded.

Photo: Benn Mitchell

by Rudolf F. Graf and George J. Whalen

A re your grounded outlets really grounded? Will the center screw of your ungrounded outlet be a safe connection for the pigtail ground wire of a three-wire adapter plug? Is the outlet's polarity correct? And what's your line voltage? Plug in this easy-to-build checker and you'll have all the answers.

Like commercial testers, it has three lights to indicate polarity. But because it also has an extension plug, you can read it easily even when your outlet is difficult to see or reach. And it checks voltage, too.

Parts are all readily available, and construction is simple. Take care when making the holes in the case. For the meter hole, drill a ring of small holes first, then carefully chip out the material between them. Holes for indicator lamps are first drilled small, then carefully reamed to size to avoid cracking the panel. ***

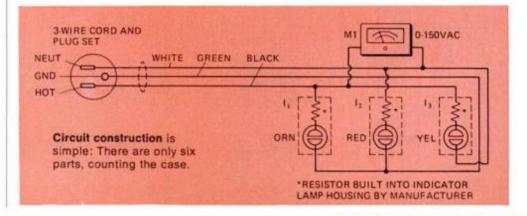
TABLE OF FAULTS AND INDICATIONS

CONDITION	METER READING	LAMPS	
PROPERLY WIRED OUTLET	NORMAL LINE VOLTAGE (U.S. AVG. 117 VAC)	1,001,	
OPEN GROUND	NORMAL LINE VOLTAGE	1,001,	
OPEN HOT WIRE	ZERO	l ₁	
OPEN NEUTRAL WIRE	ZERO	1,00	
HOT-NEUTRAL REVERSED	NORMAL LINE VOLTAGE	1,001,	
HOT-GROUND REVERSED	ZERO	1000	

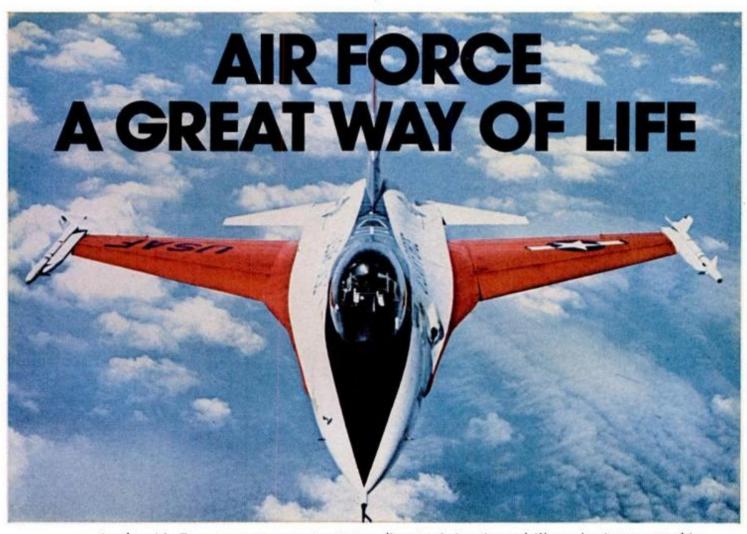
LEGEND: OLAMP ON OLAMP OFF

PARTS LIST

- I1, I2, I3,—Set of three neon indicator lamps with built-in dropping resistors (Set: Radio Shack No. 272-338).
- M1—0-150-v.a.c. voltmeter (Calectro D1-926 or equivalent).
- Misc.—Phenolic case with 5% x 2% x 2-in. panel (Calectro J4-717); three-wire line cord with U-ground plug; solder.



bris or



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HOMEOWNERS' CLINIC

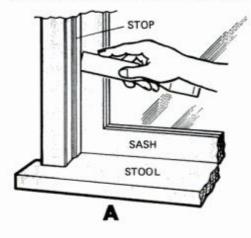
Paint aluminum siding?

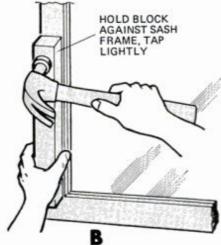
My home was aluminum-sided many years ago, and now it looks dingy. The finish appears to be chalking. Can I paint it, as one would conventional wood siding?—Walter Skwarski, Wyandotte, Mich.

As a rule, aluminum siding can be painted. If, after a thorough cleaning, you find the original coating is in reasonably good condition, painting might be delayed. If you feel that painting is necessary, apply a good exterior paint with a brush or spray to get a uniform coating without drips or sags.

Loosening 'painted-in' sashes

While redecorating, I found that hardened paint had locked the sashes in place in one room. So far I've not been able to loosen them without paint remover. If I use the remover,





I'll have to refinish the sashes. Any suggestions to save me time?—William Hartley, Los Angeles.

You may have to use paint remov-

er in the end, but try either or both of these methods first. Force a putty knife (or the long blade of a pocket knife) between the stop and the sash as shown in detail A. This usually does it. If that doesn't work, place a small block of wood against the sash frame and tap lightly with a hammer as in detail B. Move the block along the length of the frame, tapping as you go. Another alternative is to pry off the stop, which should be avoided if possible as it may damage the parts.

After repainting, slide each sash up and down several times to break the paint film.

Butcher block finish

I'm making the butcher block shown in your October '75 issue and need the "wood bowl seal" mentioned as a finishing material. It is unavailable locally, and no one seems to know where it can be obtained. It has been suggested that I use cooking oil, a mixture of linseed oil and turpentine, and even tung oil. I don't think any of these is suitable. Where can I get the finish specified?—Jim Caldwell, Midland. Tex.

None of these materials is suitable or safe for a surface on which food is prepared. Contact Craftsman Wood Service, 2727 South Mary St., Chicago, Ill. 60608, for a specially prepared salad-bowl finish. Follow instructions for application.

Changeable wood joints

I cured a problem with "sweating" windows by covering the crawlspace with roofing paper. Now I notice that joints in trim, wall cabinets and floorboards contract in winter and expand in summer, leaving unsightly gaps. Will this cause any problems, damage? Also, should crawlspace vents be open during winter, summer?—Robert J. Pfaff, Richmond, Va.

You might have done better to have covered the crawlspace with a plastic membrane, sealed at overlapped joints and carried up foundation walls a foot or more. However, since the roofing accomplishes the desired result, a change is hardly worthwhile now. Opening and closing of trim joints seasonally is usually



due to a rather high moisture content of the wood when installed. In time this generally corrects itself without serious damage.

As a rule, crawlspace vents should be left open winter and summer.

Lubricated plug prongs

I have trouble inserting lamp-cord plugs in two receptacles. I'm told the prongs should not be filed, as reducing the thickness may prevent



proper contact.
I'm no electrician
and don't know
what other step I
might safely take.
Will you advise?
—T. Garrison,
Memphis. Tenn.

It's usually possible to ease in-

sertion of plugs by applying a very small dab of lubricant, such as white grease or petroleum jelly, to the tips of the prongs as detailed. Wipe off any excess, leaving just a thin coating on the tops of the prongs. Be sure the prongs are straight; if they are bent, or otherwise out of line, straighten with pliers.

Paint for steel cabinets

I have steel kitchen cabinets, which are finished in white. I'd like to paint or enamel them in color. What is the procedure, and what finish do I use? —Tom Price, Cincinnati, Ohio

If the finish is the original one, go over all surfaces with No. 1 medium steel wool to provide a "tooth" for the new finish. You can use enamel brushed on, a brushing lacquer or an aerosol epoxy enamel.

Epoxy will give a more professional-looking job and be more durable. If you spray indoors, wear a painter's respirator. Don't forget to open windows and turn off pilot lights in the gas stove.

Do you have a home maintenance or repair problem? Send it to Homeowners Clinic, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. Letters cannot be answered individually, but problems of wide interest will be discussed in this column. For more home repair and maintenance help, get PM's Home Care Guide, \$4.49 postpaid. Send orders to PM, Dept. HCG, Box 1014, New York, N.Y. 10019.



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New smooth ride with Courier's new optional soft-ride package.

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THE PM GARAGE

EDITORS

Racy tire gauge

The most neglected bit of car maintenance is a check of tire pressure—a job that should be done every week. It's more than just a matter of keeping proper inflation to maximize fuel mileage and insure even wear of your tires; it's also to insure your own safety. Handling—especially in emergencies—is adversely affected by tire pressure that's too high or too low, or unequal on left and right sides.

One way to remind yourself to check pressure more often is to keep



your gauge in sight and prevent it from getting buried in the glove box. The gauge shown here is a pleasure to keep in view: It's a good-looking unit and it's a joy to use. It's also a lot more accurate than the pencilshaped, piston-plunger types. This AccuGage uses a friction-free bourdon tube with a full-geared brass precision movement. The dial face is covered with an unbreakable crystal, and the steel case is covered with a shock-absorbing rubber cover.

My gauge—Model MG60R, \$7.15—has a straight chuck and is graduated in one-pound intervals up to 60 p.s.i. It's one of several models sold by G. H. Meiser & Co., which has specialized in gauges and power tire pumps since 1906. Other models have swivel chucks and can measure pressures up to 160 p.s.i. G. H. Meiser & Co., 123rd St. and California Ave., Blue Island, Ill. 60406.—B.H.

Car insurance

I've examined various automobile antitheft devices over the years, but never got around to actually installing one in my own car. Recently, though, I figured I'd been pressing my luck and so I installed this \$15 "Stop-Thief" device from Stan-Gard Systems.



The principle of operation is simple: The Stop-Thief leads replace the 12-volt hot wire from the coil to the distributor. There's a thermal circuit breaker which will blow in a couple of seconds if someone should start the car and the unit is set in the on position.

My unit, which is mounted up under the dash, hasn't thwarted any car thieves—yet—but if and when it does, it can be reset simply by pressing the reset button next to the onoff switch. Stan-Gard Systems, Inc., 1204 North Woodward Ave., Royal Oak, Mich. 48067.—B.H.



License plate cover

License plates are a pain. And, as if the rear plate weren't enough, many states require another in the front. They get banged up, their paint comes off when you clean them and they're always a job to get off. This plastic cover won't solve all of your license plate problems, but it'll help. It mounts over the plate using the same bolts as the license, and it looks great.

If it's your style to run a real clean car, then this Protect-O-Plate is just the ticket. They're \$3 each, which is a good price since they're made of GE's heavy-duty engineering thermoplastic, Lexan. Per Products Co., May-Lee Building, Cleveland, Ohio 44118.—B.H.

Stainless steel in a can

This is a fascinating product: a rustproof stainless steel coating in a spray can. It's 100-percent stainless steel pigment and can be sprayed on practically anything—metal, wood, even plaster, brick and leather. I tried it on a nicked bumper, a bicycle rim and some outdoor furni-



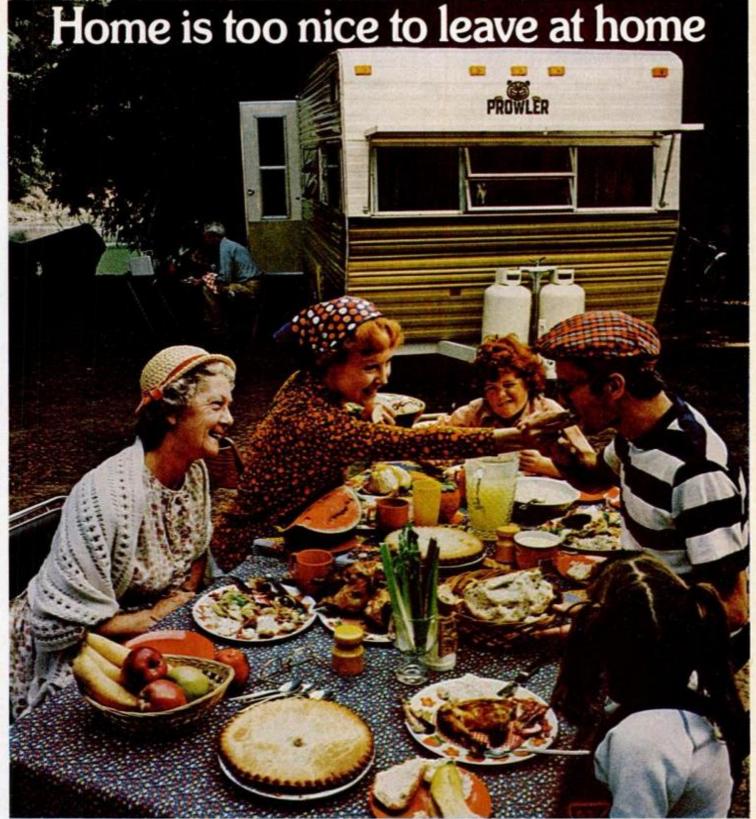
ture. Called Steel-It, it comes in quart cans, too, for brush application. A high-temperature formula is available for manifolds and other hot parts. A spray can is about \$3.25. Stainless Steel Coatings, Inc., Box H-265, Littleton, Mass. 01460.—B.H.

A real magic wand

Cyalume Lightsticks are self-contained light sources that depend on a chemi-luminescent reaction for their glow. To activate, you just bend the stick, which breaks an ampule in-



side the tube, and shake to mix the chemicals. They glow brightly about four hours, then more faintly about 10 more before becoming inactive. An American Cyanamid product, they're \$3.95 for a box of three from the distributor, Bohannon Enterprises, 16 Sorrell Ave., Plattsburgh, N.Y. 12901.—B.H.



Being able to pack the family off at a moment's notice for a week-end at the mountains or a week at the beach. It's a delicious kind of freedom that you have to experience to appreciate.

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The Konica C35-EF gets the shots that used to get away. Because it's the only 35mm camera with a built-in electronic flash!

That means you just press a button, the flash pops up, and it's ready for instant use. No matter where you are, how fast the action, or how dark it is! Just focus and shoot.

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automatically sets the correct exposure for you. Or, you can get perfect flash pictures because your Konica C35-EF automatically sets the correct exposure as you focus.

You always have a flash in a flash. The C35-EF is just one example of Konica's line of automatic 35mm cameras, including the world's most advanced automatic and manual SLR, the Konica Autoreflex.

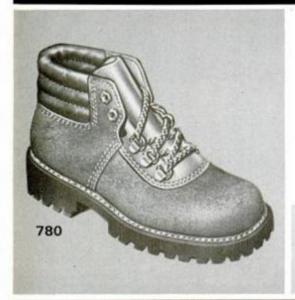
See your Konica dealer for a demonstration of the C35-EF or any other of our fine Konica cameras. Or write for "The Grab Shot Camera" brochure, to Konica Camera, Woodside, N.Y. 11377.

THE GRAB SHOT CAMERA.



KONICA C35-EF.

WOOD N'STREAM



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780—Brown Hobnail leather, 6" plain toe speed lace hiker with padded collar, Pacifate vamp lining, leather welt, and genuine Vibram sole and heel.

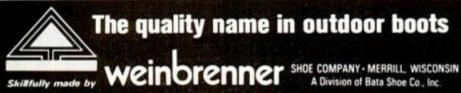


PHOTO HINTS

FROM READERS

Better close-up lighting



For shadowless close-up lighting of small objects, use a plastic lamp shade around the subject as a lighting tent. It will diffuse illumination evenly, withstand the heat of your photo lamps and leave a hole for the camera to shoot through.

-Ken Patterson.

Emergency 'tripod'



To support your camera when a tripod isn't available, slip the camera's neck strap around your gadget bag and tighten it. For vertical shots, strap camera to the end of the bag.

—Gary Cosand.

Bobbin makes cable-release grip



A round sewing-machine bobbin used as a finger grip adds leverage to cheap cable releases that lack wing-type finger holds. Just slip the camera end of the cable through the bobbin so the bobbin forms a flange for the plunger.—Grace B. Weinstein.

New Horizons In CB Performance

The Johnson solid-state meter.



Clearly an improvement! Bright ruby red LED readouts let you read signal strength, transmitter power and modulation precisely ... at a glance! All solid-state, it's completely reliable regardless of temperature, dust or humidity. Solid-state metering—exclusive in the Messenger 123SJ.

Engineer's triumph... Operator's dream.

Improving what is already the best is the ultimate challenge for the engineer.

And the ultimate reward for the CB operator. Now you can experience the incredible interference rejection of the only dual cascaded crystal filtering system in CB—plus a new fully automatic noise limiter and RF-type noise blanker. It's a dream rig you can own! Messenger 323 A.





Nearly 10 years ago we introduced the first CB sideband radio...now

Johnson offers the most advanced SSB performance on-the-air! With color-keyed lights for USB/LSB/AM modes, individual controls for every function, and famous Johnson quality, performance, warranty and service. Viking 352.

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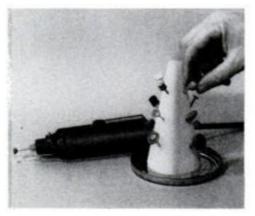
HINTS

FROM READERS



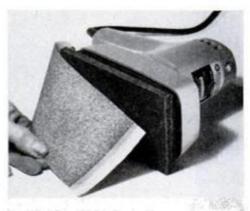
A dab or two does it

When it is important that two workpieces do not shift out of alignment when they're being tacked together, I use this stunt before positioning them and driving the nails. I apply two or three dabs of white glue here and there, then wait a few minutes for it to set. The glue becomes extra sticky as it sets and won't let the work shift as I nail.—Ned Jones



Hand-grinder 'pincushion'

Keeping track of tiny burrs, bits and grinding wheels for your hand grinder is easy when you store them in a Styrofoam cone. You can buy them in various sizes at a variety or hobby store. Pick one that's about 3 in. at the base and 6 in. tall and cement it to a 5-in. can lid. Poke holes in the cone at an angle and insert the tools.—Ken Patterson



Lengthening sandpaper

To save money, I bought $4\frac{1}{2}$ x 10-in. sandpaper strips instead of 9 x 11-in. sheets only to discover they were too short for the grippers to grab on my pad sander, I made them do by lengthening with two strips of $\frac{3}{4}$ -in. masking tape stuck to each end. I lapped the paper $\frac{1}{4}$ in. and applied the tape face to face. It works great.—Mark W. Lindsay



Your family photos needn't be just snapshots

by David Sagarin

Photos by the author





Neighborhood activities make good picture possibilities you'll enjoy in later years —especially if your own family is participating, as here. But click off enough frames to let people get used to your shooting.

Doing their own thing
in their own homes, your
subjects feel more at ease
—and the home environment
supports the picture. We
remember Grandma Sarah
just this way—and we
still have the afghan
she's shown making.

on't sneer at the snapshot. It's a quick response—aim and shoot. But when everything works right, there's a wonderful freshness and reality to it. If you're not quite ready, though, or something isn't working, you're out of luck, and the moment passes.

A formal photograph, with properly adjusted lighting, carefully determined exposure and traditional posing, generally comes out all right but without much individuality. Sometimes you feel more comfortable giving traditional photos, but there's a quality to a really good candid shot you can't get any other

What's a candid? It's a planned snapshot, made by predicting the course of spontaneous action and preparing yourself to take the best advantage of it.

Your planning needn't be complex—it can't be. Just try to picture in your mind what the finished print or

(Please turn to page 56)

YOUR FAMILY PHOTOS

(Continued from page 55)

slide will look like: Relate the situation to other times you've shot in similar light, or with similar backgrounds. If there's something you weren't happy about then, change it now. Maybe direct sunlight caused a squint, or a background of tangled foliage was confusing. Or maybe every time you're at the beach you overexpose (or, with metered cameras, underexpose).

You can control these things by moving around, by getting higher or lower, or by fudging the exposure settings in the direction you think they should go. You also gain control from prediction: Move to get a good background—not for the action as it's happening now, but for the action where you judge it will be happening by the time you've finished moving.

And instead of trying to keep action in focus as it moves, prefocus where you know the action's going, and shoot just as it gets there.

When the kids are doing something

(Please turn to page 58)



Get in close and fill your frame with your subject. You don't even need a "portrait" focal-length lens: This shot was taken with a normal 55-mm lens at about 21/2 feet from the subject.

Stand back when shooting people in activities—but just far enough to make the activity and the people's relationship to their environment clear.

Get high above your subject and you often gain simpler backgrounds, especially when, as here, subject and ground are of contrasting tones. But think how good this shot could also look if made from the little girl's eye level.





Husky Ford F-150.

Works hard, plays hard.
Runs on any kind of gas.

Now there's a whole Series of F-150 pickups to pick from: 2-wheel drive. Or new 4x4's that can make their own roads.

 F-150's are called Heavy Duty half-tons. They're built tough to handle hard work, can take over a ton of payload.
 Yet they ride smooth, the way a half-ton pickup should.

Choose from Ford's 300 Six and three V-8's that all run on any kind of gas you want. Regular cab or family-size SuperCab, America's roomiest 2-door pickup. Check 'em out—huskiest half-tons Ford has ever built!





Now step-up the boring range of your small electric drill or drill press to 11/2" with Irwin Speedbor® "88" wood bits. 1/4" shank chucks perfectly. No wobble. No run-out. Sharp cutting edges on exclusive hollow ground point start holes faster, let spade type cutters bore faster. You get clean, accurate holes in any wood at any cutting angle.

Each Irwin Speedbor "88" is forged from single bar of finest tool steel. Each is machine-sharpened and heattempered full length for long life. 17 sizes, 1/4" to 11/2". Buy singly, or in sets, at your Irwin hardware or building supply

Speedbor "88" sets.

6 and 13-bit sets in metal storage rack. 4, 6 and 13-bit sets in red plastic roll.



Marks hole, starts hole, threads hole for screw to easily enter wood and non-metal materials. Handlest tool in years for home and lob. Get one soon.



every bit as good as the name at Wilmington, Ohio 45177, since 1885



Shooting kids in low-light situations or indoors? Get them into quiet activities where slow shutter speeds and your slow focusing won't be problems. And don't feel every shot must show a face.



Unusual pose and activity kept my subject's interest alive. for a livelier expression. Again, the high angle simplified the background.

YOUR FAMILY PHOTOS

(Continued from page 56)

great, don't worry that if you take the time to change position you'll lose your shot. Shoot quickly where you are, then shift and shoot againfilm is cheap, but memories are priceless. And once you start thinking of positions as you shoot, you'll find yourself already in a good position when the best action starts, or able to work quickly into a good shooting position if it takes you by surprise. Not only that, but as you get into what you're doing, you'll be less of

a distraction to the people you're trying to shoot.

You might think it's easier to shoot good informal portraits of people you know well, but it's harder: The relationship gets in the way. A very fine professional photographer I know always took awful pictures of his wife-awkward, ugly, harassed. But that was his view of her; they're divorced now, and he takes lovely pictures of his new girl friend, I hope he can keep it up.

As long as you're aware of this problem, you can fight it. Just deal with those close to you as objectively



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POPULAR MECHANICS

as you can in the shooting situation. Concentrate on trying for good pictures, and they'll be good pictures.

Art and technique are blood brothers, not enemies. The more confident you are in the technical aspects of photography, the more forethought you've lavished on them, the more attention you'll be able to give to the situation, people, composition . . . pictures. When you see a photo you really like, think about how it was made: Where was the photographer in relation to the subject? What lens was used-telephoto, normal, wideangle? What would the effect have been if another lens or viewpoint had been used? What's the relationship between photographer and subject?

Improve your lighting

Look hard at lighting, too. Compare your memories of good pictures with the lighting you're about to shoot by: Your lighting can usually and easily—be improved. In bright sunlight, the first consideration is to lighten the shadows and soften the modeling of features with reflected "fill" light. A light wall (not a bright color, unless you're shooting blackand-white) will serve; so will a white card or cloth. Better yet, work in open shade to minimize skin texture. With black-and-white film, increase the ASA rating about 50 percent and double the development time. This will increase contrast enough to offset the flat light and lighten skin tones (which also helps make blemishes disappear).

Indoors, you get more natural results with bounce flash or available light, but the same basic principles hold: Keep lighting contrasts reasonably low, and fill in shadows that contain important subject detail.

Plan as you shoot

But indoors or outdoors, plan your snapshots as you shoot, and they won't be just snapshots—they'll be photos you'll be proud to show as photos, as well as captured memories.

Getting good candids often means shooting a lot of film—but it does not mean showing lots of pictures. Even within the family, too many shots don't preserve memories; they dissipate them. So once your shots have been developed, edit ruthlessly until you've come up with the one or two shots that best show the people and the situation (but don't be afraid, to do a mini picture story of several related, but unduplicated shots).

You can edit parts of pictures, too, either cropping as you enlarge or trimming off unwanted details from store-bought prints. But better yet, think as you shoot—and edit in your viewfinder.





CITY BOY. Paul spotted him first, just a bouncin' along, an' a grinnin' away like he know'd somethin' everybody else didn't. When he finally got to where we were a settin', Paul winked at me an' ask him real straight-faced, "You lost, city boy?"

"Not necessarily," he smiled.

Bobby ask him what it was that he was ridin, an' city boy said it was a Kawasaki. "A whut?" Bobby said. "A Kawasaki, KE175," city boy told him, real proud. Said it had some kinda new-fangled engine, an' a five-speed transmission, an' all kinds'a other fancy stuff. Said he could ride it just about anywhere he pleased, too...on the road or off—didn't make no difference. Bobby said, "I'll take my palomino any day, he don't get lost." "That's right," Paul said, "horses got brains. Know where they're goin, even if you don't." City boy just grinned an' said, "Which way's town?"

Well, right away Paul starts ta' pointin' up the road, toward the bunkhouse. An' no

sooner'n he had his finger stuck out, an' Bobby was a pointin' up t'other way.

City boy just eyed 'em both for a minute, an' then, with that same grin on his face, he started up his motor-sickle. First kick. Then he pulled out a map an' handed it over ta' Bobby an' said straight-out, "Stick it where your brains are, cowboy...and maybe you'll end up smart as your horse," An' off he rode.

Thought Paul and Bobby's faces were gonna turn redder'n their necks. Good thing that machine didn't stall.

Kawasaki lets the good times roll.





steering has to be by means of one or more submerged rudders. Competition is held on a two-and-a-half or three-mile oval course. This effectively eliminates the jet-powered rockets that can approach 400 mph in a straight line but could never complete the first turn. Airfoil adjustments that could be changed by the driver during a race are not allowed. Part of the skill of designing and driving an unlimited, in fact, is to keep it from turning into an airplane—and the disaster that follows.

The APBA rule book says nothing about building a 50-footer with five engines, but added size and machinery can increase weight and lose in the trade-off for more speed, although tandem multiengine installations have been tried. Competitors may make as many engine changes between racing heats as time will allow, however, and the rule means

that backers can pour unlimited cash into the sport.

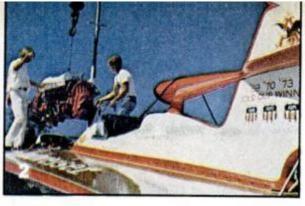
Earlier this spring, the Unlimited Racing Commission announced that the sport's most successful driver. Bill Muncey, had acquired Dave Heerensperger's fabled Pay 'N Pak. the most successful boat in unlimited racing history. Included in the package deal were some 30 World War II vintage Rolls-Royce aircraft engines, which pop for \$10,000 and up each, if you can find them. Muncey will campaign at least one of the three Pay 'N Pak hulls this season under the Atlas Van Line colors. He is a vice-president for the worldwide moving company, but reportedly made a six-figure deal with Heerensperger personally.

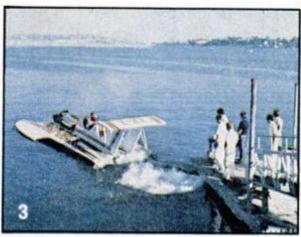
The start of something big

The first recorded unlimited powerboat race took place at Queenstown, Ireland, in 1903-and was won by a woman! Dorothy Levitt drove a 35foot Napier displacement hull with a 75-hp Napier engine at a sizzling 19.53 mph to beat out a French entry and win the first British International Trophy race. Fifty-nine years later, American Roy Duby would drive George Simon's Rollspowered Miss U.S. through the traps at Guntersville, Ala., at 200.419 mph -a mark that still stands today. The British International Trophy later took on the name of Harmsworth, a source of fierce rivalry between the United States, England, Canada and France until its hibernation in 1962.

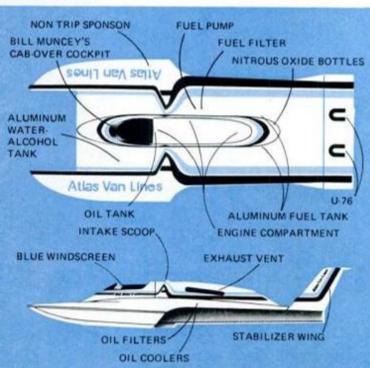
The "Grey Fox of Greyhaven," the late Gar Wood, dominated the 25 years the Harmsworth Trophy was awarded, winning eight times as driver and eight more as owner with his noted Miss America hulls. En-

(Please turn to page 118)









For the most speed over uneven water and around flat turns, hydros have developed special design. Pay 'N Pak (1), and Miss Budweiser (2) rely on rapid engine changes between heats for top performance. Test runs (3 and 4) give crew chief Jim Lucero (top right) tips for better trim, added thrust. Lucero's new cab-over design (previewed at left) is expected to develop into winning unlimited performer this year with veteran Bill Muncey as driver.

Photos by the author



Joy-riding at 150 mph

There is no safety belt to hold you in the crowded one-man cockpit of an unlimited. As speeds approach 200 and make each ripple ahead turn to rock while 3000 horses sit snarling in your lap and the wind buffets with gusts that can kite and cartwheel your craft into toothpicks, you do not want to be strapped in if something goes wrong.

Jim Lucero, called the best of crew chiefs, unbolted winning driver George Henley's special padded bucket seat and clamped in a board support so we could both fit inside Pay 'N Pak, winningest of all unlimiteds. "Hit me on the back," Henley said, "if it gets too rough for you." With wind and engine roar, there'd be no other way to communicate.

Firing up as we eased away from the dock and out onto San Diego's Mission Bay, the unmuffled Rolls-Royce Merlin sounded like those I'd flown in combat in a Mustang P-51. But we had used 55 inches of manifold pressure for takeoff power; this one was souped to more than double that and had a full life expectancy, I knew, of less than one full hour of racing.

George gunned the monster and over his shoulder I watched the speedometer flicker past 100 and then 130. We slammed into the flat, skidding, jolting turn as centrifugal force tried to lift-flip and fling us off the course. Turns are taken on the ragged edge of controlled speed. Then we aimed out down the straightaway chute again, eased added rpm to build boost without blowing the engine, and accelerated past the towering roostertail of another hydro on the course. Pay 'N Pak topped 150 when our seat-plank started vibrating loose and we slowed back down to reality.—Bill McKeown



Imagine owning any three cars in the world!

When PM's auto editors were asked to pick any three cars they'd like to own—with no concern about cost—this is what they came up with.

BOB LUND, Detroit Auto Editor: Unlike some guys who write about cars, I don't regard the automobile as a work of art. To me a car is like a doorbell, towel rack or a belt to hold up your pants. Practical, utilitarian. Its purpose is to get you from here to there. You can add a lot of qualifiers beyond that: A car should be safe, reliable, efficient, comfortable. But basically a car is a tool.

So if the keepers of the purse at PM said, "Go buy yourself three cars and we'll pick up the

tab," my first and second choices would be working cars. Tools, not toys or objets d'art.

Tool No. 1 would be a two-door Nova with a sixcylinder engine. I can hear the groans. Why pick an unexciting car like the Nova? I do a lot of city driving, in and out, on-street parking and not much room to move around. But if I'm concerned about maneuverability, why not pick a smaller car than Nova? Because I have to share the car with two other drivers. My wife and daughter. There are smaller cars I like better than Nova, but they aren't comfortable for three people. Nova will accommodate three adults without crowding. For its size and the money, Nova is the best car GM makes.

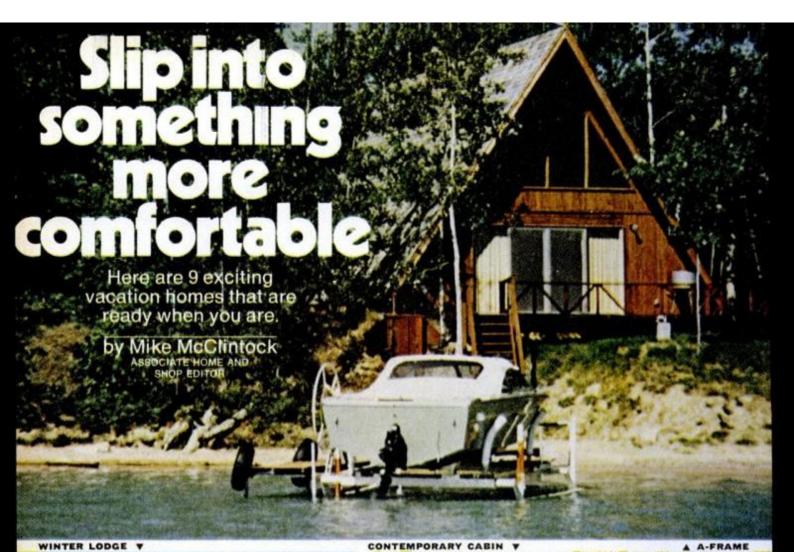
I'd have it equipped with an automatic transmission, AM/FM radio, power steering and brakes, air, radial tires (plain black), speed control and tinted glass. I'd prefer tinted glass just for the windshield, but Chevrolet won't sell it that way. You have to take tinted glass all around. I'd have a six-cylinder engine instead of an eight because if I'm buying the gas, I want good mileage. Nova gets 18 to the gallon in the city, 24 on the highway. The retail sticker for a car with this equipment delivered in Detroit would be \$4589.35, plus 4 percent

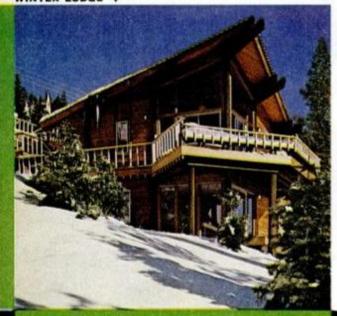
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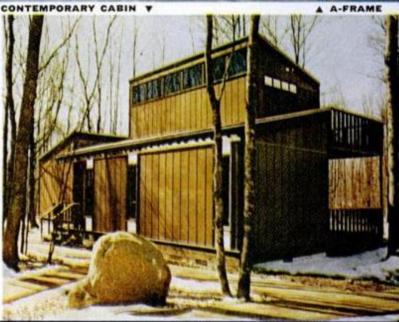


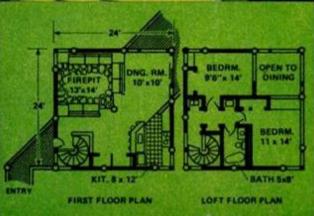






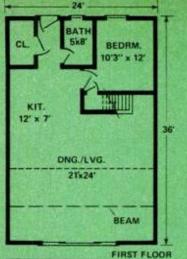






et's get away somewhere for the weekend." How many times have you heard that or said it yourself? It usually means stuffing people and possessions into the car and cashing a sizeable check to cover expenses. More often than not your dream weekend runs afoul of "no vacancy" signs, filled-up campgrounds, or traffic jams en route to that beautiful little spot nobody knows about.
"Let's go up to the cabin for the weekend." Does that

sound better? Over five percent of all PM-reading



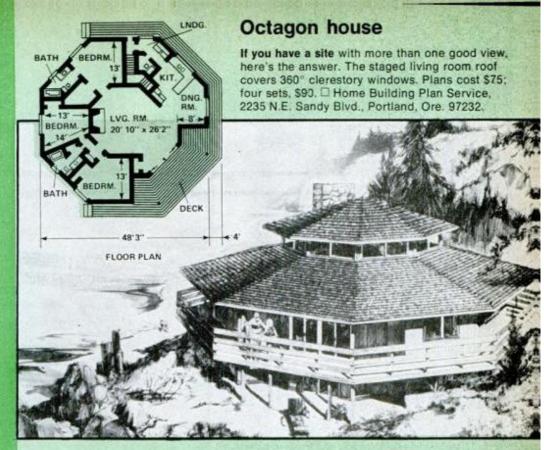
BALCONY

BEDRM.
15' x 12'

LOFT BEDRM.
15' x 9'

OPEN TO
LVG. BEAM

This A-frame is well planned with a good-sized bedroom and loft upstairs, plus a two-story living room, You'll see just about everything out the living-room wall. It's all glass. Price is \$6195 for shell construction (single wall), or \$13,998 for double wall. Vacationland Homes, Box 292. Bellaire, Mich. 49615.



SECOND FLOOR Contemporary design has three bedrooms. two baths, three DECK sun decks. Framing is on 16-inch centers with 2x8 REDRM joists doubled under exterior walls. \$12,595 for shell; \$15,699 for winterized double wall. D Vacationland Homes, Box 292. Bellaire, Mich. FIRST FLOOR PLAN 49615.

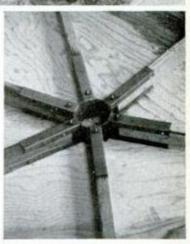
families have already taken the plunge into owning a home away from home. They're not millionaires. Most are enterprising families that have become two-home owners by building the second one themselves from blueprints, or buying a complete house kit that includes plans, materials and labor (if you don't want to do it yourself).

This year we're showing you nine vacation homes with a lot of variety. The A-frame on the lake is, by now, a classic design for simple, efficient construction.

Geodesic domes



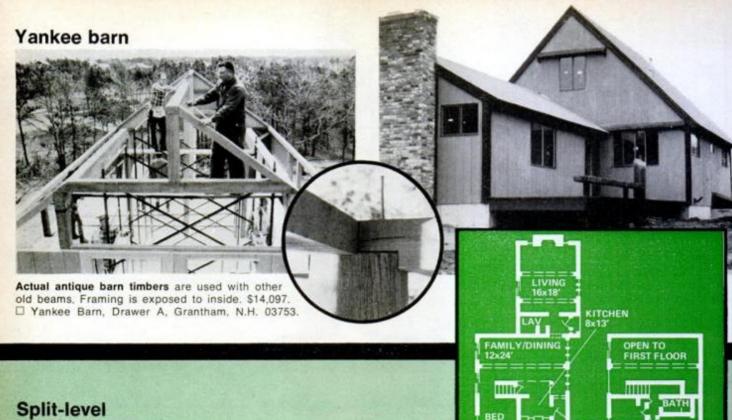
Geodesic domes (above) are simple, efficient, easy to build, economical. Stock 2x4s fit into ring connectors that automatically align 2x4s at the proper angle. Sizes vary from a small 18-ft. model up to giant 49-ft. dome. For a free catalog, write Dyna Dome. 22226 North 23 Ave., Phoenix, Ariz. 85027.

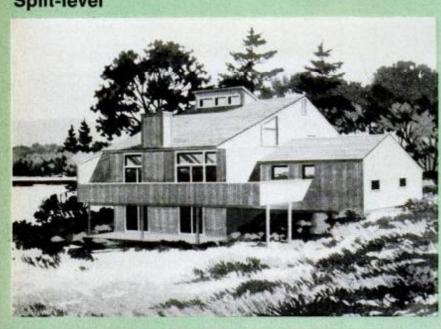


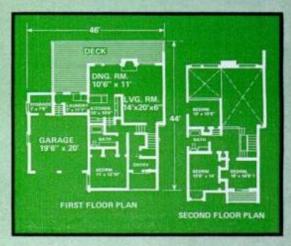
A winter setting (far left, facing page) is great for this modern, steep-roofed house. Complete plans and specifications are available for \$125; each additional set, \$5.

Charles Matcham Jr., A.I.A., Box 874, Tahoe City, Calif. 95730.

(For more vacation home plans, please turn page)







LOFT FLOOR PLAN

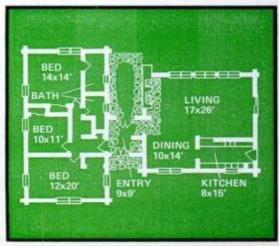
FIRST FLOOR PLAN

Log cabins

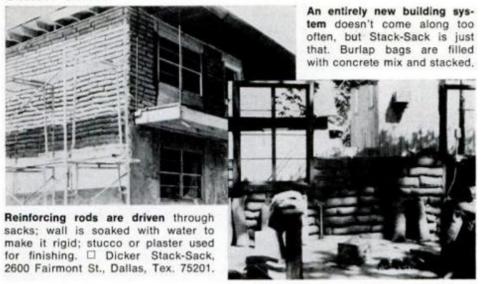
The most traditional vacation home is a log cabin. Its heritage extends back to the days of the first American pioneers, but log cabins have improved considerably since then. Twenty designs are available, precut and keyed to detailed instructions. Layout suggestions (but not material) are provided for interior walls. Price: \$11,800 (\$14,845 with garage.

Authentic Homes, Laramie, Wyo.





Stack-Sack



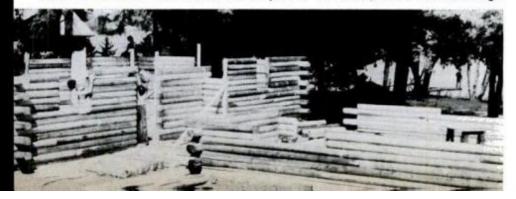
DECK DNG.
RM.

BASEMENT SECTION-THROUGH DINING-KITCHEN AREAS

BEDRM.

Complete plans and mechanical details are available for this spacious four-bedroom, two-bath house. Although it's certainly large enough to be your "first" house, we've included it as a "second" house because of the wide-open, lodgelike layout. You can see this best in the section drawings (left) where the livingroom roof rises above the balcony to a large entry and stairwell. There are decks on every level and a two-car garage you could add on to the house later. Set of plans is \$75; four sets, \$90 (if you're really serious about building, I recommend that you get the four sets because you'll need them for subcontractors and building departments); materials list, \$10; plumbing and wiring, \$10.
Home Building Plan Service, 2235 N.E. Sandy Blvd., Portland, Ore, 97232.

Modern log cabins still use old system of locking walls by lapping ends of logs at the corners. Another maker, Northeastern Log Homes, Groton, Vt. 05046, offers custom floor plans, price quotes for shipping (don't overlook this charge in figuring your total outlay) and delivery in about six weeks. Timbers can be sealed with neutral stain so the cabin becomes a natural part of the rustic, wooded surroundings.



We've also got an octagon house with a wrap-around deck that's great for a site with a view. Since the do-ityourself movement has grown so much, some of the houses shown here come as precut kits that you can assemble.

Not so primitive

Log cabin vacation homes are well suited to areas with a winter climate, but they blend in beautifully on any wooded site. This kind of house comes on a truck with all the logs precut and numbered, Although the exterior side is rough and ruggedlooking, the inside log surface is squared off, and fits (tongue-andgroove) for a tight, neat appearance. The Yankee Barn home (top of the opposite page) uses a frame that's made from oversize, aged timbers, many of which are reclaimed from old New England houses and barns. The timbers are exposed on the inside of the house to show beautiful details like mortised-in carrier beams that are pinned with 7-in, cut spikes, Siding is made at the factory into insulated, sandwiched panels with 5/8-in, rough-sawn fir on both sides and 2-in. polyurethane in between. All the windows and sliding doors are insulated, too, and each home is planned around a central fireplace.

You'll also find two offbeat ideas for vacation homes. The Dicker Stack-Sack system (top) uses sandbags filled with a concrete mixture for walls. They are piled on each other (staggered the way bricks are) and reinforcing rods are driven down through the bags to lock them together. A good soaking turns them into a strong, cool, fireproof wall. Geodesic domes are also ideal (and cheap) for getaway houses. We've shown them clustered around a courtyard, and have tracked down a company (see page 69) that makes all the assembly hardware, so that you can save on shipping by buying the dimensional lumber locally.

When you're done looking these over, here are some more sources so you can really shop around and find the second house that's right for you.

Stock blueprints

- Home Building Plan Service, 2235 N.E. Sandy Blvd., Portland, Ore. 97232.
- ☐ Hudson Home Publications, 175 South San Antonio Rd., Los Altos, Calif. 94022.
 ☐ Master Plan Service, 89 East Jericho Turnpike,
- Master Plan Service, 89 East Jericho Turnpike, Mineola, N.Y. 11501.
- National Plan Service, 1700 West Hubbard, Chicago, III. 60622.

Design booklets

- American Plywood Assn., 119A St., Tacoma,
- Wash. 98407.

 ☐ California Redwood Assn., 617 Montgomery St.,
- San Francisco, Calif. 94111.

 Western Wood Products Assn., Yeon Building, Portland, Ore. 97204.

Dodge vans get great mileage, but our survey was loaded with Sixes and the smaller-than-Fordand-Chevy V8!

PM OWNERS REPORT: 1976 FORD, CHEVY AND DODGE VANS

Open these look-alike boxes to find some surprises

by Michael Lamm
WEST COAST EDITOR

Vans might all look pretty much alike, but beneath those boxy exteriors lie some powerful differences. That's what our survey owners tell us in any case.

Dodge vans, for example, apparently give much better gas mileage, by and large, than Chevy and Ford vans. In part, this is because our Dodge owners opted for smaller engines—the Slant Six and the 318-c.i.d. V8.

Ford van owners feel happier about workmanship, quality and comfort. Comfort, particularly, rates extremely high: 90.8 percent marked comfort good to excellent.

Chevrolet people showed more enthusiasm than the rest for their vans' roominess and handling. Handling in this case refers more to maneuverability in parking and city traffic than to all-out cornering or roadholding in sports-car situations.

Here are typical, representative comments from owners concerning all the points raised in our survey questionnaires.

First, a 23-year-old professional motorcycle racer from Texas, owner of a Dodge B-200 Maxivan with the 360-c.i.d. V8 and automatic transmission:

"I bought this vehicle because I felt Dodge offered the best van for the money. The dealer treated me fairly and courteously, and I have received excellent treatment after the purchase. His service department is well equipped and staffed to please the customer. As a professional motorcycle racer, I use this van to transport my cycles to the races; also use van for general wheels and recreation. I've installed bunks and cabinets for spare parts, tiedowns for the bikes and a CB radio.



"What impressed me initially about this van was quality. Everything is well put to-trols are easy to reach, and layout seems well thought out. The things I like especially are lots of interior space, good handling and surprising gas mileage for such a big vehicle-11 mpg in town and up to 19 on the road. What I don't like is that the spare tire was an option. I had to order one after delivery. Also, I'd like to see Dodge offer CB equipment as a dash-mounted option."

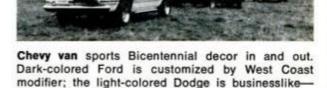
Here's a 30-year-old computer technical specialist from Richmond, Va., the owner of a Ford E-150 Econoline with the 351-c.i.d. V8 and manual three-speed: "I bought this Econoline because I wanted a truck but not a pickup. The van is much more versatile. The dealer had more orders than he could fill, so I had to wait three months for mine. I guess his truck ◀ both new and used. sales manager was more used to selling to fleets and volume buyers than individuals. Anyway, the only thing wrong with the vehicle when I got it was a leaky heater valve. I fixed that myself with a little epoxy, so I haven't taken the van in for service and don't know anything about the dealer's service department.

"I use the Econoline for camping and traveling. The van's increased height makes for great visibility forward (lousy to the rear), and I find long trips less tiring than in a car -also more enjoyable. Workmanship on the E-150 is far and away above the Dodge and Chevy vans; comfort, I feel, is excellent. My specific praises are for design and workmanship-when I close a door it's solid, not a tinny

Everybody's surprised at how comfortable rave reviews surprised even us.



Tremendous demand for vans these days, Resale value is high.

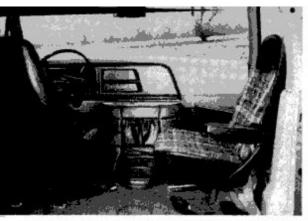


without frills or options.

Try backing one of these babies before you buy it. Rough stuff! Mirrors are a must.

A nationwide survey based on 1,064,654 owner-driven miles.





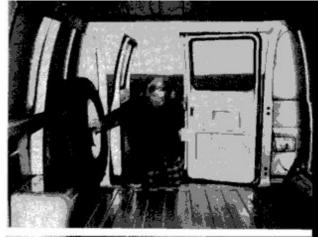
Captain's chairs pivot; arms fold for easier entry. Vans have fine vision ahead; big blind spots out back.

thunk. Also it's easy to service: oil, battery, More owners in this distributor. I haven't tried the plugs. My built-ins are only airconditioning and some storage boxes in the huge sleeping area. And the only thing I'd like to see Ford do differently is offer a four-speed transmission with column shift."

And here's a Miami garage owner and independent mechanic, age 32, who bought a Chevy van C-20 with the 350-c.i.d. V8 and manual three-speed: "I wanted a van so it would be easier for the family to travel together. After working on many customers' vans, I found the Chevy the easiest and quickest to work on -and with far fewer major problems.

"Except for a whine in the rear axle, which the dealer still hasn't cured (after three visits), this van has been a delight to own and drive. I found the dealer's sales policies good -the salesman didn't push and was very helpful in obtaining the right equipment. I had them install storage cabinets and cushioned benches for sleeping; also bought a captain's

(Please turn to page 144)





Dodge's cavernous interior is unadorned, and many owners buy their vans this way, intending to install built-ins later. Dodge vans with Slant Six and 318 V8s topped gas mileage competition. Access to mechanicals presents no problem, because engine cover inside cab lifts off to reveal top of block. Many of the owners do their own maintenance.

Summary of 1976 Chevrolet, Dodge and Ford Vans Owners R

survey serviced their cars than any others.

	Chevy	Dodge	Ford	F	Chevy	Dodge	Ford
Total miles driven	363,206	353,215	348,233	Specific likes: Handling	43.8%	34.8%	40.5%
Average miles per	gallon:			Roominess	30.0	26.1	17.6
292/225/300-cuin, Six respectively			Comfort Styling	21.3	18.8	31.1	
In town	11.0	16.7	13.6	Ride	13.8	18.8	32.4
Long trips 14.0 20.7 350/318/351-cu, in. Sixes respectively			17.2	Economy		26.1	
In town	11.4	11.6	10.4	Specific dislikes:			
Long trips	14.5	15.1	13.7	Low gas mileage	22.9%	-	24.6%
400/360/400-cu. in.	V8s respe			Rottles	10.8	7.5	11.6
In town		10.7		Poor workmanship Dealer service	=	7.5	13.0
Long trips		14.0	_	Poor service	_	7.5	13.0
Engines:		11.00/	22.00	paint and finish	-	11.9	_
Six-cylinder Medium V8	9.9%	67.1	27.8% 70.8	What changes would	you like	•7	
Large V8	4.9	21.9	1.4	Add swivel recliner	1 9.6%		13.8%
Transmissions:	4			Better gas mileage		10.3%	
Automatic	88.5%	89.3%	75.7%	Better quality More factory option	7.2	8.8	_
Manual	11.5	10.7	24.3	Easier sliding door		8.8	_
Why did you buy th	is van?			Glovebox			
Recreation	21.4%	14.2%		instead of slot	***	_	13.8
Camping	17.9	17.6	21.7	Dealer sales policy:			
For work Interior roominess	17.9	_	15.9	Good to excellent Average to poor	74.4%	63.5%	72.9%
Other reasons	14.3	27.1	20.5			30.0	47.1
				Good to excellent	55.6%	51.5%	52.4%
How do you use you Recreation	57.5%	58.7%	53.9%	Average to poor	44.5	48.5	47.6
Business	16.1	12.0	17.1	Had any mechanical		,	0.000
Both	26.4	29.3	28.9	Yes The machanical	54.5%	57.3%	52.0%
What built-ins do yo			3333	No	45.5	42.7	48.0
Beds	40.0%	43.1%	41.8%	What type of troubl	•7		
Refrigerator	20.0	10.5	28.4	Electrical	8.5%	11.6%	10.5%
No built-ins	32.5	33.8	22.4	Trans and shift	8.5		10.5
Carpeting Sink or stove	8.6	16.9	11.9	Rear axle Carburetor	10.6	20.9	
				ent data and rounding.	V. 5		100

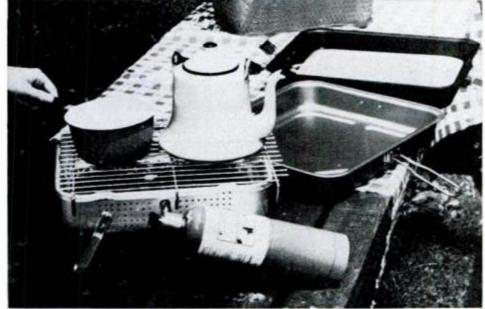
eports*			
	Chevy	Dodge	Ford
Miscellaneous	8.5	_	18.4
Did you repair it yo		100000000000000000000000000000000000000	1999
No	93.6%	88.4%	79.5%
Yes	6.4	11.6	20.5
Dealer repairs satis	factory?		
Yes	55.0%	55.3%	58.1%
No	45.0	44.7	41.9
Workmanship opinio	on:		
Good to excellent		54.0%	70.6%
Average to poor	45.4	46.0	29.4
Comfort opinion:			
Good to excellent	69.8%	69.4%	90.8%
Average to poor	30.2	30.6	9.2
Number of vehicles	owned:		
This van only	26.4%	44.0%	36.8%
Two cars	55.2	42.7	43.4
Three cars	13.8	9.3	13.2
Four or more cars	4.6	4.0	6.6
Makes of other vehi	cles own	ed:	
Chevrolet	31.2%	16.7%	12.5%
Ford	12.5		16.7
Dodge	10.9	11.9	-
Oldsmobile			12.5
Volkswagen		-	10.4
Age distribution of	owners:		
15-29 years	51.1%	70.7%	55.2%
30-49 years	30.7	22.7	34.9
50 and over	18.2	6.7	7.8
Would you buy and	ther?		
Yes	87.2%	71.9%	88.2%
No	12.8	28.1	11.8

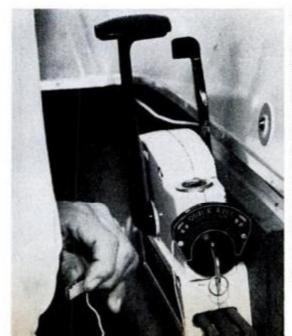
IT'S NEW NOW

Compact camp kitchen

Broil, bake, smoke, steam, toast or fry in a 12-pound portable kitchen measuring 5 x 14 x 16 inches for easy toting or storage. Everything needed for almost any culinary job is in the heavy-gauge foldup package, including pots and pans. Cast-aluminum griddle fries pancakes, bacon and eggs; chrome-plated grill set on griddle does toast; pressurized oven cooks a complete meal in 20 minutes. Add a smoke flavor by sprinkling smoke chips in oven before starting. After meal, oven bottom becomes dishpan over burner; oven top with grill is dish drain. Called Kangaroo Kitchen, it's fueled with propane, costs \$40. Modern Manufacturing, Box 383, Washington, D.C. 98055.







Safety switch for boats

A simple switch readily attached to any outboard ignition system, and connected to the outboarder's clothing by a nylon lanyard and clip, is all it takes to kill the motor if the driver flips overboard on a tight turn or in a heavy wake or chop. The sudden yank on the lanyard as the clip comes loose instantly cuts engine power. Called "Quick Kill," the unit is installed in minutes on dash-mounted key ignition switches or throttle/shift control boxes. It's available in five models that fit most key ignition outboard motors and sterndrives. The price is \$7.95. The manufacturer is Tempo Products, 6200 Cochran Rd., Cleveland (Solon), Ohio 44139.



Chemical sunpower for Australia

Giant parabolic mirrors collecting solar energy on Australia's Outback may be used with a thermo-chemical transfer grid for efficient energy production. Scale model of unit (above) uses sun's heat to decompose ammonia into nitrogen and hydrogen. At a central plant, ammonia is resynthesized from the gases, releasing usable heat for power, hydrogen for fuel.



Dasign for skimpy scootering

Traffic being what it is these days, riding a scooter in the streets is a risky business for kids. So a Polish inventor named Marian Hewalo decided the time had come to redesign the scooter ("autoped" is the word in Europe) with a tighter wheelbase for use in back yards and even indoors. His prototype boasts an adjustable balance arm and weighs 33 pounds. All he needs is a maker.

f, today, no car is quite complete without a CB set, then no CB set is quite complete the way it comes from the factory. The stores are full of add-on gadgets designed to make CB radios easier to use, easier to listen to, and harder to steal—and most of these gadgets work.

Most accessories for CB radios are designed for in-car use for good reason: Most CB sets are in cars—and anything that makes life and listening easier for the driver/operator leaves him more energy and attention for the road. Here's a brief rundown on some of the most popular and interesting add-ons:

■ Microphones that come with CB sets won't always do the job. If your car or truck is unusually noisy (or not airconditioned so you ride with windows open), you can get a noise-canceling mike that picks up your voice, but not the noise around you.

If your voice is weak and hard to hear on the air, or if for some reason you can't work close enough to your microphone, you can get an amplified or "power" mike. Despite its nickname, a power mike won't make your signal stronger or push it farther—but it will make a weak



14 new CB add-ons, bolt-downs

voice louder on the sets you reach already. With a normal voice, though, a power mike may make older sets overmodulate, distorting the voice till it's actually harder to understand, and sometimes "splashing" it into adjacent channels to interfere with other operators. And in newer sets, modulation limiters may keep unneeded power mikes from having any effect whatever—except to cost you money.

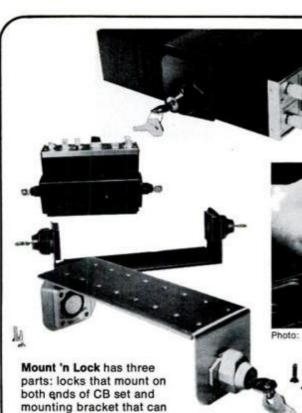
Compressor mikes, often confused with amplified mikes, boost softer tones, soften louder ones, or both, to keep the voice level of your transmissions consistently high. If you vary your volume expressively as you talk, you'll need one—but more important, it will make you easier to understand under marginal conditions of reception, when your softer syllables might otherwise be drowned out in noise or static.

■ Headphone/microphone combinations let you hear what's on the air despite noisy surroundings, thanks to a speaker snuggled at your ear. For mobile use, though, buy one-eared combinations that let your other ear hear the traffic around you.

There are other advantages of the







Slide-in mount from **Kustom Kreations** connects antenna, power and external speaker in a jiffy. There's an under-dash version, too.

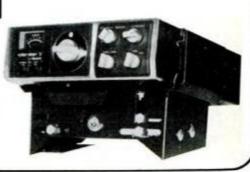


Mountie fastens to car floor or hump, locks unit in or allows easy removal,

with optional plug-in connector.



Breaker alarm blows your car's horn if would-be thieves disconnect your CB set from ground or the antenna, and keeps blowing till reset.



and signal-sweeteners by Ivan Berger



mount under dash or on

car's transmission hump.



The Killer switches your speakers from your tape deck or radio to your CB if you transmit or receive a call.



Test meters, like this Siltronix unit, measure your set's output and how well your antenna is matched to it.

Microphone hanger clips put your mike wherever it's most handy. They come in screw-on, glue-on or magnetic models. This glue-or-screw model is from Radio Shack.



LOCAL c b devices

Localizer cuts down both transmitted and received signals so you can talk to sets nearby (as in the next campsite) without overloading each others' receivers.

Photo: Benn Mitchell

by Tom Bottomley



Operation Sail '76 will see windjammers like full-rigged ship Danmark, above, and U.S. Coast Guard cutter training ship Eagle under sail at right.

Old square-riggers of the world are hoisting their clouds of sails and heading here for what may be the final time.

or perhaps the last time in this or any future—era a fleet of more than 200 sailing vessels, including the last of the "tall ships," will gather on the East Coast of the United States this summer in a salute by the maritime nations to America's Bicentennial.

Even in the great days of sail it would be rare to see so many squareriggers from so many countries in one mighty array of towering masts and clouds of canvas.

After assembly in Newport, R.I., in June, the fleet will be led by the host ship, the U.S. Coast Guard Cutter Eagle to New York for a grand parade up and down the Hudson River on July Fourth. Following this, the fleet will split up with some vessels returning home while others visit various American ports, ranging from the Great Lakes to the Gulf and West coasts.

Square-rig sailing

The square-rigged ship, as developed by the middle of the 19th century, was a fast, powerful vessel capable of carrying a tremendous load—as long as the wind was right. A square sail does not have the aerodynamic efficiency of the modern foreand-aft sail that develops "lift" when going to windward. A square sail has to be "pushed" by the wind.

With the wind abaft the beam, there is no problem, and most squareriggers could maintain a course at least 90° to the wind. Some, including most of the modern ones, can do a bit better than that. But even in the heyday of the great grain ships, it was safer, faster and more economical to make a voyage around the world than to try to beat back from Australia or China against the prevailing westerlies of the south latitudes of the Cape of Good Hope and Cape Horn.

Practically self-steering

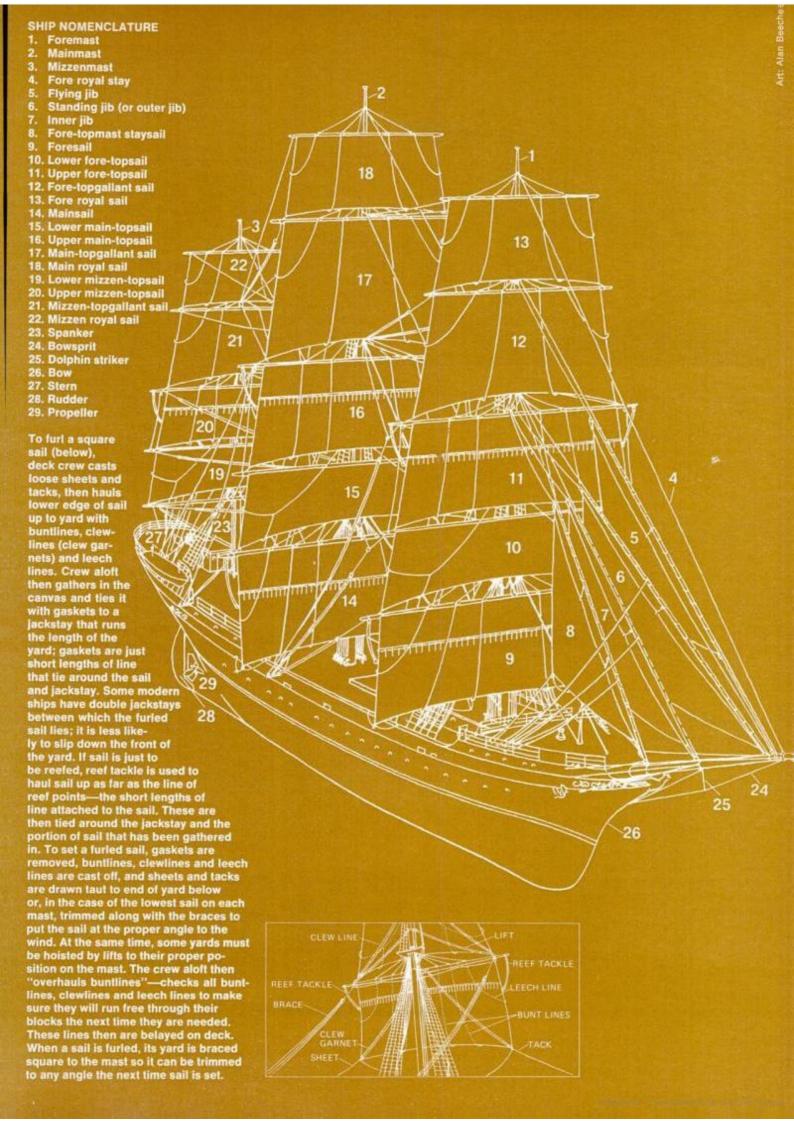
Once sails are trimmed to the wind, however, the big square-riggers are practically self-steering. Major course changes requires major sail adjustments; the rudder acts more like a trim tab for minor corrections. Of course, in a heavy blow, tremendous forces are built up on the rudder and an extra effort is required at the helm. The Coast Guard Cutter Eagle, for example, has three wheels that are linked together, and each of them is manned by two seaman whenever necessary. There are no power assists for steering.

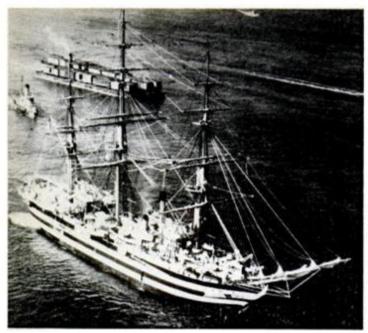
The easiest course for a squarerigger to maintain is the *run*, with the wind dead aft. This is not the case with the modern fore-and-aft pleasure-boat rig, where care must be taken to prevent an accidental jibe an uncontrolled swing of the boom across the vessel.

Broad reaching

When a ship is running at right angles to the wind, it is broad reaching. The yards are braced around at an angle to the wind so that the force developed by the sails has a forward component as well as one that tends







One of largest,
Amerigo Vespucci
from Italy (at
left) is 330 feet.
Ships now can use
auxiliary engines,
but once longboats
were lowered and
towed ship out
from harbor.

Norway's Christian Radich, training vessel for cadets, is 240-foot fullrigged ship seen in Windjammer movie of 1950s.



to push the boat to leeward (side-ways).

Since the keel and underbody of the ship have tremendous resistance to this sideways movement, it is only the forward component of the developed force that provides movement through the water. The hull moves ahead.

Typical pleasure boats, with their fore-and-aft rigs, can sail as close as 45° into the direction from which the wind is coming (high-performance racing yachts can sail even closer). A square-rigger, however, may do no better than 75° or so. No matter which type of vessel it may be, when a boat under sail is headed as close as it can into the wind, it is "beating to windward."

Tacking and wearing ship

If a square-rigger must reach a point that is directly to windward, it will have to run a series of courses that zig-zag across the direct line to that point. One way to do this is to tack back and forth—that is, bring the head of the ship across the eye of the wind; the other way is to wear ship—to bring the stern of the ship across the eye of the wind.

Tacking a modern sailboat across the wind is simple, quick and safe. Tacking a square-rigger is a job that requires a high degree of seamanship on the part of the crew and good judgment from its officers. If things go wrong, this can be a dangerous maneuver.

Speed builds up momentum

To begin with, the ship has to build up enough speed to provide the momentum that will carry it through the arc when it is headed to windward. The sai's have to be trimmed to spill the wind as the head of the ship approaches the eye of the wind, with headsails backed to catch the wind as it crosses the eye, then all sai's must be trimmed to catch the wind proper'y as the ship settles onto its new course.

If the vessel doesn't have enough way on—enough speed—it may not round up into the wind at all, or if it does get up into the eye of the wind but doesn't have enough momentum to pass on through it, the ship is "taken aback," "in stays," or "in irons."

Front pressure dangerous

The terms all mean the same thing. The wind is hitting the square sails on the wrong side, and this is where the danger lies. All the rigging of a square-rigger is designed for pressures that will come from behind or the side, but not from in front of the masts. Too much pressure from in front of the masts front can cause them to snap.

It is far easier, and far safer to wear ship, although this means executing a loop that takes the vessel away from its destination for a portion of the maneuver. If the vessel is not very close-winded—won't point more than a few degrees up into the wind—wearing ship may actually result in loss of ground toward the objective.

It can be seen why a lee shore in a gale was so dreaded by square-rigger crews. To try to tack away was to risk dismasting; to try to wear ship would bring the vessel even closer to shore.

Modern square-riggers

Almost all of the major squareriggers in operation today are used as training vessels for navies, merchant marines or, in the case of the United States, Coast Guard cadets. These are the big ones, of 200 to 350 feet or more in 'ength: including full-rigged ships, barks and some topsail schooners.

A ship, technically speaking, is a vessel with three or more masts that carries full square sails on all masts; a bark is a vessel with three or more masts and square sails on all but the aftermost masts; a barkentine has three or more masts and square sails only on the foremast; and a topsail schooner has two or more masts. all of which carry gaff fore-and-aft sails, plus square topsails on one or more of the masts (usually these are on just the foremast).

370-foot entry from Spain

Ships scheduled to take part in Operation Sail include Italy's Amerigo Vespucci; Christian Radich from Norway; Danmark, from Denmark; Libertad, Argentina; and the little Rose, the 170-foot replica of H.M.S. Rose, from Newport, R.I.

Barks include Dar Pomorza, Poland; Gloria, Columbia; Gorch Foch.

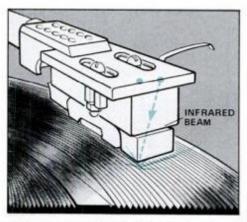
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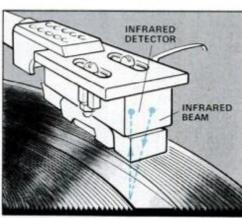


Two new direct-drive turntables

No belts, wheels or gears—but what's left is eyepopping.

by Ivan Berger





ADC Accutrac 4000 is the most automatic turntable around. Buttons on the front not only stop and start it, raise and lower the arm and set it down at the beginning of the record, but also select which bands on the record you will hear. The secret is an infrared beam projected from within the cartridge shell. Recorded grooves scatter the beam (above, left), but the mirror-like bands between selections (above, right) reflect it back to a sensor in the shell. Circuits in the cabinet count the bands.

Netronics kit is the least expensive direct-drive turntable made—\$164.50 with the Audio-Technica arm shown, \$104.50 if you have another tone arm you'd prefer to use. And it's better isolated from external vibrations than any other one we've tried.



wheels and belts and gears designed to transmit the motor's power to the platter that turns the record, while reducing the motor's 1800-rpm speed to the record's speed of 45, 78 or 33½ rpm. That tradition seems to be ending, for the two unique turntables shown here have none of those parts. Instead, their motors drive their platters directly.

Direct-drive turntables are turning up all over, with more than a dozen models now on the market. The Netronics kit, at \$104.50 without arm (\$164.50 with) is by far the least expensive of them—and its suspension is both unique and good. And the ADC Accutrac 4000, at \$500, is the first turntable ever to have its arm automatically seek out and play any individual band on a record.

Both turntables have motors that drive their platters directly at the required speed for the record. That's always been the theoretical ideal, for several reasons: First, the slower the motor turns, the less its vibrations can be heard through your speakers as rumble. Second, the fewer moving parts the better.

Electronic speed control

What's kept direct drive just a theory has been the dual difficulty of controlling precisely a slow-turning motor, and of playing more than one record speed without a "gearshift" between motor and record.

What solved both problems was electronic speed control. Let an electronic circuit constantly monitor the motor's speed, correcting its speed the instant it begins to deviate, and

(Please turn to page 148)

Six secrets of safe summertime cycling

Before you shift down and power through those exciting curves, make sure that you and your bike are ready.

by William Hampton

1. Watch road surfaces









Keep your eye on the road surface: At far left, the slipperiest part of the uphill stretch is in the middle where there's an oil slick from vehicles and trucks laboring to the top. Top left is an asphalt surface: it's slippery, but tires get some bite on the high spots. Center left is classic hazard of wet leaves on turn. Bottom left is a combination of slippery surfaces: leaves on shiny. smooth crosswalk markings, and loose pieces of broken pavement that further increase the danger.

hat do you do when that summer thunderstorm hits—stop, or keep going? With a little common sense, you can keep right on going and arrive safely at your destination. That is, if you know a few basics about slick-surface cycling.

One of the basics of successful motorcycle riding is to feel relaxed with it. You must imagine that twowheeler as a natural extension of your mind and body. Because the bike is so responsive to your slightest movements, you must be careful not to overcontrol it on a slippery surface.

Your movements must be smooth and sure. Your only links with the road are two *small* patches of rubber. So you musn't do anything to disturb that intimacy between "the rubber and the road."

Mind over matter

But before you can feel relaxed with that two-wheeler, you must first have the right frame of mind. You must believe that you're capable of riding safely on slick surfaces

If you have a strong fear of spilling, your negative

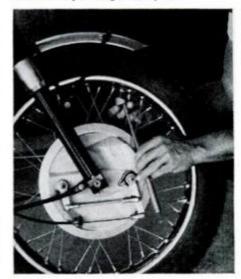
2. Watch road hazards



Road hazards are many, but three of the most dangerous are shown above. Railroad tracks should be crossed at right angles, and watch for washouts alongside tracks. Gratings come in all shapes and sizes and are slippery; so are expansion joints.

3. Check tire pressure

Tire air pressure is critical. Better to be underinflated than overinflated, but best is p.s.i. right on spec.



Select right tires

Right tires are a must for staying up on two wheels. Cross-blocked tread (below, left) provides good power delivery to road while allowing dispersal of water. Ribbed tire (below, right) is ideal front tire; channels water away, minimizes sideslip.



Waterproof gloves are necessary, if you want to keep your hands from slipping off the grips and controls.

Top off your wet-weather gear with a pair of nonslip-soled, lightweight boots.

Prepping your bike

Besides getting yourself prepped for slick-surface cycling, you've got to make sure your bike is ready, too.

■ Tire condition is extremely important, so let's start with tires.

If you do much road riding, you should have suitable tread designs. The two basic road-tread designs are the ribbed and the universal. The ribbed design is good for up front because its circumferential-rib construction resists sideslipping when the bike is banked. This tire design wears well and provides good steer-



4. Check chain tension

Proper chain tension is important for insuring that power delivery to rear tire's contact patch is smooth, positive. There should be ¾-inch play midway between the sprockets. See text.



6. Know about hydroplaning

When your tires lift off pavement and ride on a thin layer of water, you're hydroplaning. Speed at which this occurs depends on many variables (see text). Since control is lost when this happens, be prepared for the phenomenon.

ing. Its lack of cross-block tread, however, makes it unsuitable for the rear, as it'll spin rather easily under power.

The universal design, on the other hand, can be used on both front and rear. This tire features a closely spaced tread-block pattern, which makes it effective for delivering the engine's power to the ground.

A variation of the universal design is the trials-universal tread pattern. Its tread blocks are more widely spaced than those on the universal; therefore, it doesn't provide as good a "bite" on a slippery surface as does the universal. The trials-universal design is a compromise between a true road tire and the offroad sports knobby.

Dual-purpose bikes that are used (Please turn to page 150)

attitude will affect your riding. Remember: Don't fear wet roads; respect them.

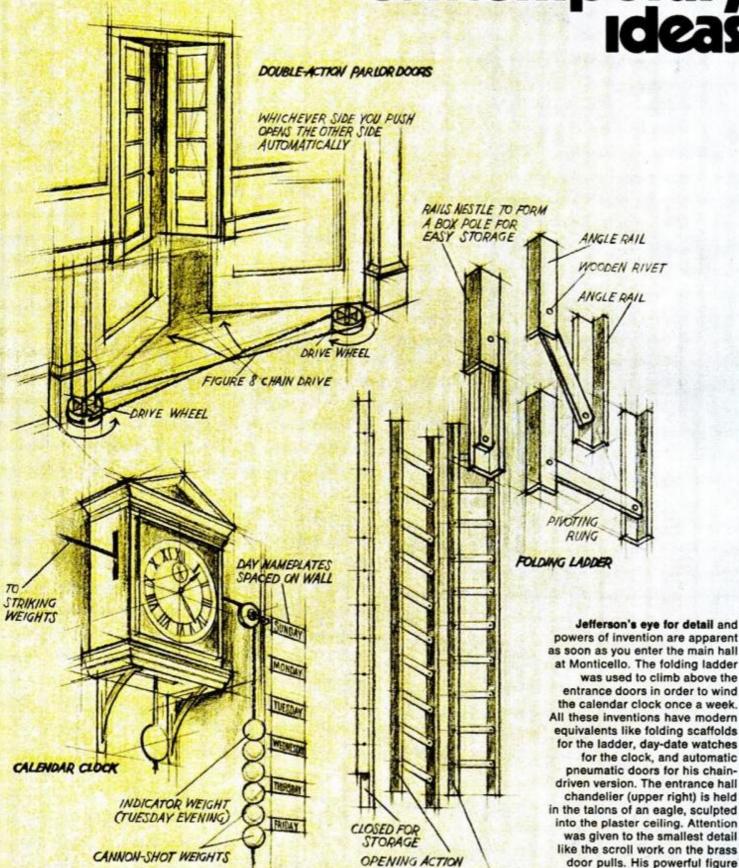
What to wear

Besides getting into the right frame of mind, you should also have the right kind of riding gear.

A good helmet and rainsuit are necessary, along with effective eye protection. For maximum eye and facial protection, a face shield is ideal. It not only protects the eyes, but it also saves your face from the stinging impact of raindrops.

Snug-fitting, large-lens goggles offer good eye protection, but they don't provide the facial coverage of a face shield. Whether you use goggles or a shield, get the Hydron-treated plastic as it absorbs moisture and minimizes "fogging-up."

A Revolutionary man with contemporary ideas DOUBLE-ACTION PARLORDOOKS WHICHEVER SIDE YOU PUSH ORDERS THE OTHER SIDE WHICH EVER SIDE YOU PUSH ORDERS THE OTHER SIDE



OPENED FOR CLIMBING ABOVE DOOR TO WIND THE DAY CLOCK

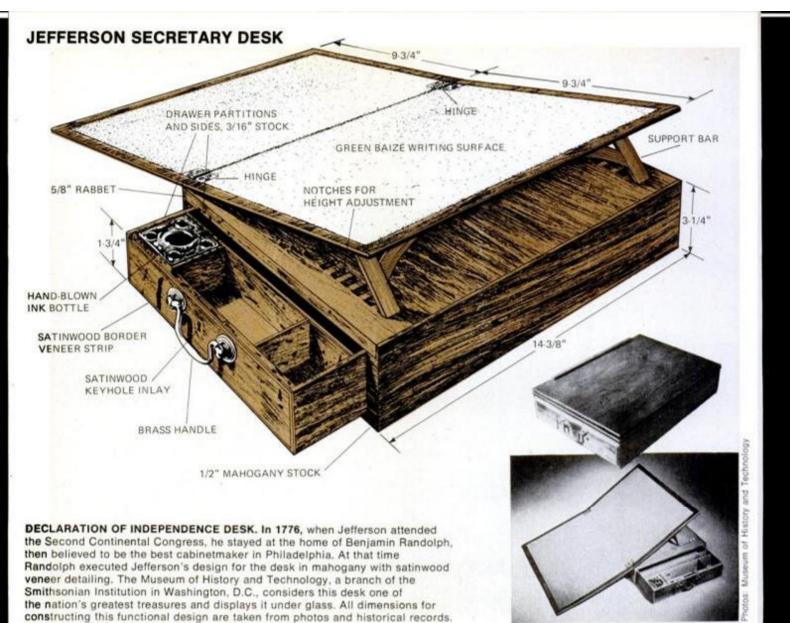
Art: Adolph Brotman Photos by the author

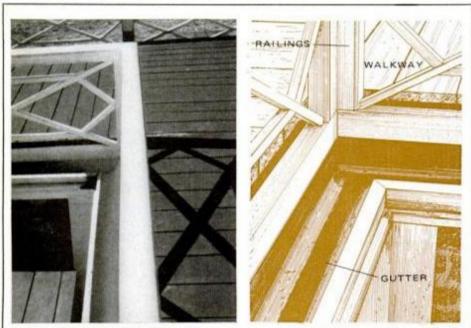
Washington, D.C.

of the Jefferson Memorial in

(lower right) stands under the dome







WATER COLLECTION SYSTEM. Time and energy-saving devices were the result of Jefferson's imagination. He built two cisterns and completed an extensive gutter and drain system to catch water from walkways and carry it to the cisterns for storage. He also built and stocked a small pond so that fish would be fresh for meals.

Thomas Jefferson was born in 1743 to parents who, though wealthy, were uneducated. He grew up at Shadwell, largest of the family tobacco plantations in Virginia. His father, Peter Jefferson was a successful surveyor and prosperous landowner. Before his father died, when Thomas was 14, he saw to his son's formal education in the classics.

Thomas Jefferson inherited from his father almost 4000 acres of land and a thirst for ideas that was quenched only by education through studies at William and Mary College and by reading books which he collected the rest of his life. After grad-

Thomas Jefferson, architect, also designed the main buildings at the University of Virginia.

uation, he studied law for five years; at age 25 he had already begun plans and drawings for Monticello. At that time, most construction was

DESIGNS AND DEVICES:

Water-collection and storage system Double-sash storm windows Space-saving sliding pocket doors Servoassisted double doors Weathervane with an inside indicator Finial-shaped sundial Concealed fireplace dumbwaiter One of the first parquet floors in the United States The calendar clock Commercial nail-production shop A more efficient type of agricultural plow Quartet music-holding stand Polygraph duplicate writing machine Experiments with "carbon" paper Time and motion studies





STORM WINDOWS. Jefferson's version of modern insulated glass was a two-window unit built into a single frame that was accommodated in the 2-foot-thick walls. His interest in energy-saving features led him to use tin roofing, downspouts, skylights and shutters on the inside and outside. supervised by a master workman, who would handle some work himself and subcontract the rest. The owner's part in the project consisted only of choosing designs from one of the many English architectural handbooks then popular. But Jefferson, although without formal training, had read enough about architecture to make extensive drawings, with details and dimensions, for the original house and gardens.

In 1770, the family house at Shadwell was lost in a fire and he moved into Monticello (which is Italian for "little mountain") while part of the house was still under construction.

Two years later, Jefferson married Martha Wayles Skelton. They braved a winter blizzard, making the final trek up the mountain to Monticello on foot and in the dark in an attempt to reach the house on their honeymoon night. But they found that only the dining room had been fully enclosed and covered and had to spend the night in a tiny cabin adjoining the main house.

It took the next 10 years to complete the house. Work progressed slowly because most raw materials were gathered locally and everything was built by hand. All lumber was cut from the grounds of the estate,

Jefferson, as statesman, served as governor of Virginia. Secretary of State, Vice-President and President.

and Jefferson built a kiln to fire the bricks used for the massive walls.

When his wife died three years later, Jefferson was too distraught to complete the details on the house and accepted an appointment as minister to France. He did not return to Monticello for five years.

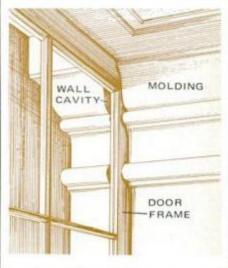
Jefferson was greatly affected by the buildings he saw in France. He visited Roman ruins and used one building, the Maison Carée at Nîmes, as a basis for his design of the Virginia state capital. One house in Paris impressed him particularly. He wrote, "I was violently smitten with the Hôtel de Salm, and used to go to the Tuileries almost daily to look at it." Its design was U-shaped; with colonnades flanking the wings of the one-story house that had a domed roof.

On his return to America, Jefferson started a massive renovation of Monticello, based, in part, on this design. He raised the ceilings in three downstairs rooms and doubled the house size by adding a new wing. Small windows for second-story bed-

(Please turn to page 158)

SLIDING POCKET DOORS have worn small ruts into the floor over 200 years, but still glide freely, disappearing into wall when opened fully. Many entry doors to rooms were doubled for noise reduction, privacy.





BIOGRAPHY:

April 13, 1743-Born at Shadwell, family tobacco farm in Virginia 1760-William and Mary College 1762-Studied law

after graduation

1767-Started plans for Monticello 1769-Construction started

1772-Married Martha Wayles Skelton

1775-Delegate to Second Continental Congress

1776-Drafted Declaration of Independence

1779-81-Governor of Virginia 1782-Death of Martha Jefferson 1784-89-Minister to France

1790-93-Secretary of State 1797-1801-Vice-President

1801-09-President

July 4, 1826-Died at age of 83 at Monticello, 50 years to the day from signing of the Declaration

Digital watches are changing the face of timekeeping.

by Ivan Berger

Look, Ma, no hands!

igital watch wearers no longer make a big production out of looking at their wrists. But you can still tell the guy with the digital timekeeper: He's the one who glances down and snaps out "Ten forty-two" when you ask for the time, while an ordinary watch-wearer will look, pause and tell you "It's . . . about . . . quarter of eleven."

Digitals are not only easier to read precisely, they're likely to be more accurate as well. Even the new, \$20 digitals offer timekeeping accuracy you'd have had to pay over \$100 for a few years back.



Battery savers: Longines G-II (top) has liquid crystal daytime display, pushbutton LED for night. Pulsar AutoCommand (above) lights when you flick your wrist.

That may prove the most important, if least-mentioned, aspect of the digital revolution: Soon there will be little or no difference in accuracy between the cheapest and the most expensive watches. Higher prices will be justified only by differences in case styling and construction, and in extra features. Watches built like jewelry will still cost like jewelry—and you'll find them, as usual, in jewelry stores. (One digital, from Concord, costs \$12,000—mostly due to diamonds encrusted in its case.)

But in the \$20-to-\$400 range, which accounts for the vast majority of watch purchases, special features will be of paramount importance. Digitals can do more tricks than clockworks ever thought of. Already there are such exotic developments as solar-powered watches that require no batteries and multifunction models that are also calculators.

Basic feature: the display

The first digital watches had LED (light-emitting-diode) displays that were easy to read in the dark, but sometimes hard to read in bright sunlight (though some, including Texas Instruments' new \$20 watch, glow brighter in bright light. These oldies had to be switched on whenever you wanted to know the time, since they used too much battery power to be left on continuously. Pulsar has an ingenious solution to that problem—a watch that lights up when you flick your wrist.

The solution to battery drain was the LCD—liquid crystal display that can run all the time on little power and is easy to read in bright sun, though it doesn't light up in the dark. To solve that, some watches, such as the Seikos on the facing page, have lights that glow behind the LCD when you touch a button. The Longines G-II (below, left) lights up an LED display when needed, plus an LCD that runs all the time. Heuer (opposite page) tells time using an LCD system with an illuminating button; but its stopwatch functions use LEDs, both because the stopwatch functions aren't normally lit all the time and because LEDs respond faster than LCDs—important when you're timing events to as little as ½000 second.

Stopwatches and 'second hands'

More and more digitals have stopwatch functions built in: The Mercury MasterChron (\$150) at the top of the next page, though styled to avoid the technical look of most Chronographs, not only shows time and date, but times in 1/100-second increments up to an hour. Also, it has the ability to freeze time part way through while still counting total time elapsed, so you could, for instance, check the time at the end of each lap of a race as well as record the elapsed time for the entire race. Like conventional stopwatches, it lets you suspend timing for time-outs, then resume from where you left off. Seiko's \$295 chronograph does the same (but in tenths of seconds) and also counts laps and lets you clock the time of the winner and the runnerup, individually.

The Heuer (\$450), made by a firm known for its spring-wound chronographs and stopwatches, times to 10 hours in \(\frac{1}{10}\)-second increments.

Meanwhile, less expensive chronographs are coming. Microma has an

(Please turn to page 160)





Photo: Four by Five, Inc.

lags will be flying all over the country this year, and it's easy to be part of the celebration. There will be Fourth of July parties in many cities and towns, and another good spot for one is in your own back yard.

Each year my family (including grandparents, brothers, sisters, cats and dogs) gets together for a Fourth of July picnic. We unroll the flag, have a good time and end the day by listening to a reading of the Declaration of Independence. It makes more sense than listening to politicians and it reminds you of the tremendous struggle for this country's birth 200 years ago.

On June 14, 1777, Congress convened at Philadelphia to take up the business of the new nation. The agenda consisted of passing two payment orders, referring a letter to the marine committee, and appropriating sums of money for independent militia companies. The next entry in the journal reads: "Resolved: that the flag of the United States be made of thirteen stripes, alternate red and white; that the union be thirteen stars, white

in a blue field, representing a new constellation." Before adjourning, they also appointed a new commander for the ship Ranger—John Paul Jones.

After several months spent outfitting his ship, Jones sailed for France in November, 1777. On entering port, he exchanged flag salutes with the admiral of the French fleet. This was the first official recognition of our flag by a foreign power. Two months later, Jones baptized the flag under fire by defeating the British sloop *Drake* off the English coast.

In 1779, now commanding the flagship Bon Homme Richard, Capt. John Paul Jones engaged the British ship Serapis in her home waters. The close-quarter battle raged for more than three hours. The Richard received so many hits that only the pumps kept her afloat. Her flag had been destroyed by cannon shot. Captain Pearson of the Serapis demanded surrender, to which Jones replied, "I have not yet begun to fight." Although outgunned and outmanned, Jones's crew cap-

Flags flown by Americans during history-making events



1773 This Sons of Liberty flag takes its name from Boston Tea Party uprising in Boston Harbor.



1775 The Bunker Hill flag flown by militiamen when they faced the British soldiers in Boston.



1776 The Gadsden flag was carried by Corps of Marines in the first action of the American Navy.



1777 Bennington flag flown by militiamen who decisively defeated British raiders in Vermont.



1836A symbol of freedom, this early Mexican flag flew over the Alamo in battle with Santa Anna.



1945 The 48-star flag was raised by marines over Mount Suribachi on Japanese island, Iwo Jima.

Flag facts

- 24 hours—One popular misconception about the flag is that you may not fly it at night. The Congressional Flag Code states that it may be flown at night for patriotic effect. The code, over 50 years old, also says a flag flown from a car must be firmly attached to the radiator cap.
- 299 feet 7 inches—That's the height of the tallest flagpole ever erected. It was trimmed from a Douglas fir for the Panama-Pacific Exposition at San Francisco in 1915.
- 1500 pounds—A lot of weight is added to the side of the J.L. Hudson store in Detroit every Flag Day when the firm displays the world's heaviest flag. It's also the largest, measuring 104 x 235 feet, and each star is 5½ feet high.
- 15 stripes—When Kentucky and Vermont entered the Union, Congress added a stripe for each to the flag. It soon realized this would ruin the design as more states joined the Union and wisely reinstated the 13 stripes for the original 13 colonies.

1969 The 50-star flag was planted on the moon by Neil Armstrong, commander of Apollo II.



tured the Serapis. The Bon Homme Richard sank two days later.

Since that time our flag has been carried into nine wars and has wrapped the coffins of more than a million servicemen. It has been carried by explorers to both poles and was planted on the moon by astronauts Neil Armstrong and Buzz Aldrin. A facsimile of the flag has followed American technology into the depths of the ocean and on a flyby to Venus. It is now on a million-mile-a-day trip to a soft landing on Mars, planned for the Fourth of July.

A facsimile of the flag has
American technology into
as of the ocean and on a flymus. It is now on a millionmus trip to a soft landing on
anned for the Fourth of July.

Home-grown project

With such a tradition,
it's easy to take pride in

displaying the flag. And

Tall, straight tree should be selected for your flagpole. You can check this by sighting up from base of trunk (1). Slight bend along bottom 10 or 12 feet is all right as most of this length will be below ground. After you've cut down the tree (2), trim branches flush to trunk (3). Next (4), you lug it through the woods (I could have used some help with my 25-foot tree).











Cut two 6-foot lengths from thick end. If you bury the thickest end of one and thinnest end of the other, the two ends showing will have the same diameter for a neat appearance. See diagram on facing page for parts and dimensions. Support posts should be spaced about 1/4 inch farther apart than diameter of the rest of the pole. Bolt detail (5) lets you lower pole with ease; ends need for halyards and pulleys. A pipe can be used in place of lower bolt for extra-fast raising and lowering. Eyebolts and snap hooks (6) make easy mount for flag. I got some help (7) for first test.

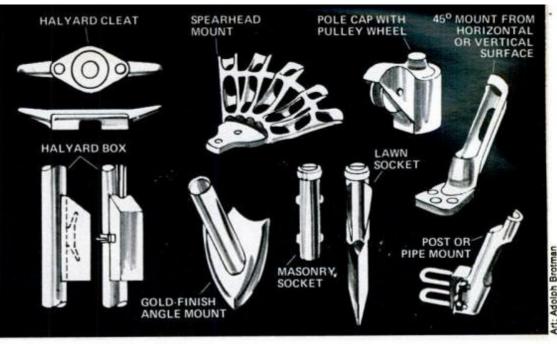


Photos by the author



Flagpole hardware

There's a mounting for every conceivable type of installation. Shown are some by Dettra Flag Co., Oaks, Pa. 19456. One of the most versatile is a lawn socket that will hold a pole securely anywhere in the ground. For aluminum poles, write American Flagpole, East Setauket, N.Y. 11733. Its 24-foot tapered pole is sold at Sears, complete with fittings.

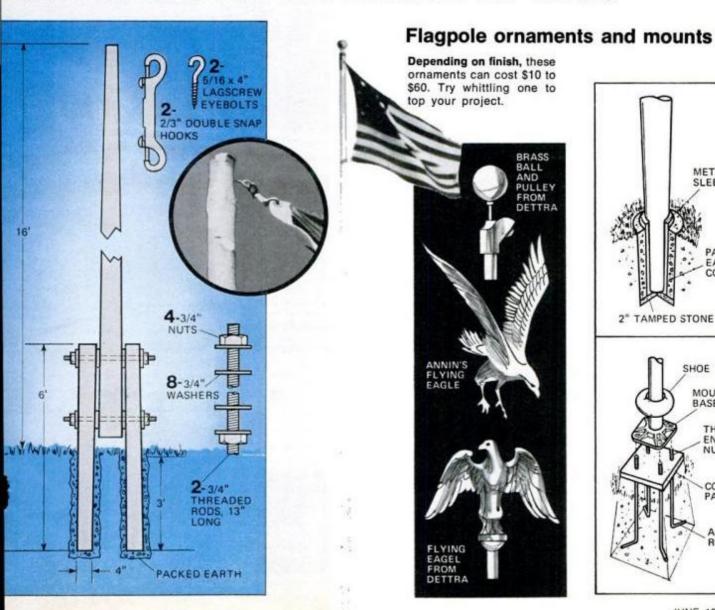


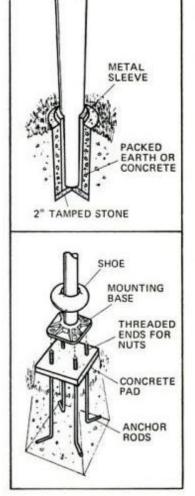
you can do it in a big way, easier than you think. You can buy flagpoles or make your own. The tilting pole I built, with fittings and hardware, took less than three hours to complete and ran about \$10 in materials. Before I began, I thought the trimmed tree I was using might look too rough. But the simple, natural rugged bark sets off the flag beautifully.

From start to finish

You can get the family involved, too, by making your own flag. A good source for information on materials and methods is the Flag Research Center, Winchester, Mass. 01890.

Another nice project is to carve your own top ornament. Almost any piece of folk art, especially the eagle, can serve as the pattern. However you mount it or make it, the stars and stripes have extra signicance this year, and you can celebrate the start of our third century with your own colors flying.

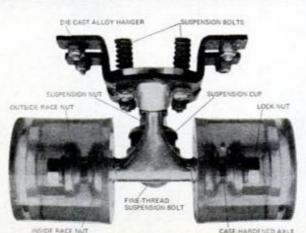






Giant storm drains in southern California (above) provide adventurous, and sometimes treacherous, rides for skateboarders. The top riders can develop enough speed to shoot 14 feet up the curved side wall—and they get a pretty good ride coming down, too. Local events now feature speed runs, paired slalom races, a singles freestyle and tandem rides like the flying carry at right.







Photo; O'Mahoney

Mix one part soapbox racer, one part roller skate and one part surfboard, and you can get into one of the hottest sports around—skateboarding.

by Mike McClintock

ASSOCIATE HOME AND SHOP EDITOR

What would you be doing if you were shooting a backward tail wheelie, a spinner, a daffy or a coffin? Unless you're Russ Howell, the acknowledged king of skateboarding, you'd probably be sitting on the pavement saying ouch!

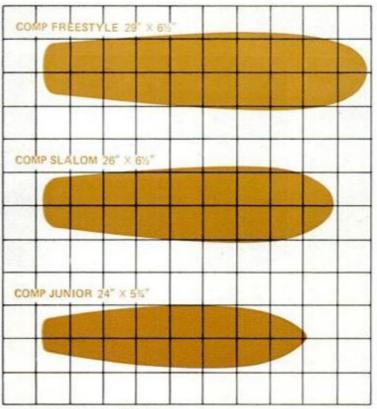
The ocean waves off California have spawned a new breed of surfer who gets his ride on concrete now instead of water. The sport is sweeping the country, and it's easy to get into. Homemade boards work well and don't cost much. The wheel assemblies (called trucks) are the only hardware you'll need. It's a fad that has grown into a sport (it's featured at all pro track meets) and it's a great way to get exercise.

It all started in the early '60s when skateboards made the transition from an old plank on roller skates to gracefully shaped boards made of ash or laminates. The fad caught on (any kid could ride one in the driveway), but was pretty much limited to California. By 1965, some companies were trying to fill orders for 10,000 boards a day. Gordon & Smith, a small innovative company, introduced a Plexiglas unit that laid the groundwork for today's flex boards. But by the end of the year, the bottom dropped out of the once-booming market. Skateboards took a nose dive, partly caused by the overexposure of inferior equipment.

Last year, skateboarding took off

(Please turn to page 170)

TYPICAL SKATEBOARD PATTERNS



Scale: 1-inch square = 3 inches

Exotic materials like unidirectional fiberglass, lightened aluminum alloys and Lexan plastic are being used for board construction. Hand-laminated boards may have as many as 30 layers of fiberglass cloth. You can use one of our patterns (above) to get the shape of your rig, or go with a wild design of your own. X-Caliber's "pultruded" fiberglass board (near right) is shown with Roller Sport's Racing Slicks. The hand-laid glass board (far right) has a flaired kick tail.



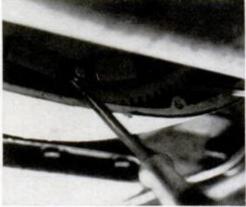


How to avoid the automatic

 Flywheel cover is removed for access to the drain plug for the torque converter. The table on page 98 will tell you if there's a converter drain on your car's transmission.



2. Rotate converter to get drain plug in the 6:00 o'clock position. Kick it around using the starter or, as shown here, inch it around with the ring-gear teeth using a screwdriver.



Remove the drain plug and drain fluid into a catch basin. After draining the fluid, replace the plug and tighten to spec.

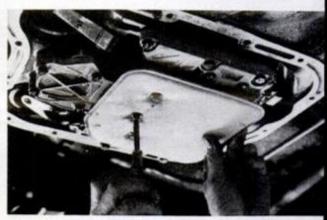




7. Old gasket must be scraped away from the transmission body. Use a conventional putty knife or a sharp scraper for this.



Old gasket should also be scraped away from the transmission pan.



Install a new transmission filter or put back the cleaned screen. This procedure depends on the design of your car's automatic transmission.

Photos by the author

by Michael Lamm WEST COAST EDITOR

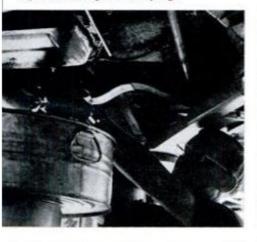
A transmission-shop owner told me recently that three quarters of the overhauls he performs could be prevented if car owners would change their automatic transmission fluid (ATF) more often. How often? Every 12,000 miles, he recommends, with new filters or screens cleaned every 24,000 miles, no matter what the books say.

Most car owners not only neglect changing fluid—most don't even know how. The photos and captions should clear up the major mysteries. Also helpful are the following tips on the care of automatic transmissions.

- Changing fluid yourself can save you between \$10 and \$20 per change. Filling stations usually charge about \$10 for labor plus 25 to 50-percent markups on fluid, filters and gaskets.
- Expect some metal filings in the bottom of your transmission pan. A few filings are normal, It takes a good transmission man to "read"

transmission repair shop

4. Loosen all the bolts that hold the transmission pan. If the pan has a drain plug, use it to drain fluid first, and then replace and tighten the plug.



5. Remove all bolts except two at the back of the pan. They should be loose but not removed so the pan will tip down at the front to drain fluid into a catch basin without making a mess. That's the theory, but it takes extraordinary care to make it work.



6. Remove the filter or screen after the pan has been taken off. A screen may be cleaned in solvent, but filters must be replaced. The Mopar filter shown in the photo below must be replaced.





10. Clean the transmission pan thoroughly in solvent before you put it back on the transmission body.



11. Replace the pan using a cork or a neoprene gasket, and don't use any adhesive on the gasket. Run up a couple of bolts to hold the pan while you align the gasket, and then tighten all bolts in a crisscross pattern to prevent any warping of the pan.



12, Half fill the transmission with recommended fluid. Start engine and run it in neutral; then continue filling until you read a pint below full mark. Shift through all gears and recheck. When engine is hot, fluid should expand to the full mark.

the filings for signs of wear, but don't let anyone sell you an overhaul simply because you see a pinch of

If your transmission hasn't been shifting properly-if it slips, clunks, makes noises, lags-don't change fluid. Let a transmission shop check things out first. If you do need a band adjustment or other work, you'll have to change ATF again, so you'll be paying for fluid twice.

■ Be sure you buy a name-brand fluid because the cheaper brands break down quickly. Be aware, too, that ATF comes in two main types: Type F and Type A/Dexron, Dexron is a type, not a brand, and different brands of Dexron will mix. It's the same with different brands

of Type F.

■ When refilling, use only the type of fluid called for in your owner's manual. Basically, Type A/Dexron fluid is used in cars made by General Motors, AMC, Chrysler, BMW, Datsun, Fiat, Mercedes, Opel, Saab, Volkswagen, Audi, Simca, Hillman and Sunbeam. Type F is recommended for all Ford products plus Austin,

Jaguar, Toyota and Volvo.

- Some transmission pans have drain plugs. Use these plugs, but to get out all the ATF and also to get at filters and screens, you'll have to remove the pan. Pans without plugs have to come off, of course.
- The trick to removing a no-drainplug pan without slopping fluid all over the floor is: Place a big catch basin under the pan; remove all pan bolts except two at the rear corners; loosen but do not remove these two bolts; tap or pry the front of the pan so it drops down. The two loose rear bolts will hold the pan and fluid will run out the front into the basin. Or that's the theory at any rate (see photos).
- On the GM Turbo Hydra-Matic 400 and other automatics with cantype filters, replace filters every other fluid change. And note that no GM automatic has provision for draining torque converter. Ford and Chrysler converters all drain and demand more fluid when refilling (see chart, below).
- In Ford products using the C-4 or

- C-6 automatics, don't touch the filter unless you can see that it's plugged. People have a habit of tightening these filters too tight, thus doing more harm than good. Also, if you remove the screen on a 1970 or later C-4, be sure not to lose the valve and spring under the screen. The valve is held by a spring up against the screen.
- Screen-type filters inside automatic transmissions can be cleaned in kerosene or solvent and don't need to be replaced. Paper or can-type filters do need to be replaced. To tell whether your transmission uses a screen, refer again to the chart.
- Install only cork or neoprene pan gaskets—never paper ones. And never use an adhesive or grease to help seal. Pan gaskets usually come complete with filters and gasket, but check the pack when you buy it. And always be sure you buy everything you need before you start the job: fluid, filters, gasket and so on.
- Check your transmission's vacuum modulator for leaks. If there's oil in the vacuum line or modulator, replace

the modulator. And be careful not to lose the modulator pin.

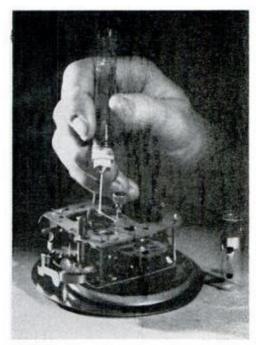
- In transmissions with converter drains (only), refill with four quarts initially, then keep filling until your trans dipstick shows one pint below full. At this point, run your engine and shift slowly through all ranges, including reverse. Check the fluid level again and refill to one pint below the full mark. This allows for fluid expansion when the transmission gets hot. Never overfill, because when the fluid gets hot, it'll expand and be thrown out.
- Check your pan for leaks, and keep an eye on your garage floor to check for leaks.

Yes, it's true—some motorists manage to rack up 100,000 miles and more on their original ATF. Eventually, though, neglect catches up. Being stranded out of town on a holiday weekend with a shiftless automatic is no way to have fun. So regular fluid changes every 12,000 miles make good sense and are good insurance against aggravating breakdowns and transmission repair bills. ***

AUTOMATIC TRANSMISSION DRAIN AND REFILL DATA

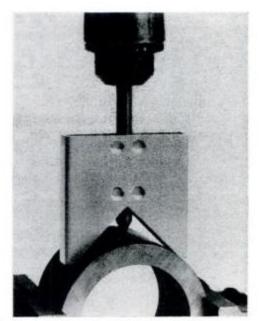
NAME OF TRANSMISSION	CAR MAKES AND YEARS	SCREEN OR FILTER	CONVERTER DRAIN	APPROXIMATE REFILL CAPACITY (qts.)	NOTES
General Motors					
Turbo Hydra-Matic 400	Various 1964-76 GM cars	F	No	31/2-4	Felt filter on later models
Turbo Hydra-Matic 350	Various 1969-76 GM cars	S	No	31/2-4	Modulator
Turbo Hydra-Matic 450	Fwd 1966-76 Olds and Cadillac	F	No	4-41/2	Modulator
Powerglide	1962-72 Chevrolet	S	No	21/2-3	Aluminum case
Corvair Powerglide	1960-69 Corvair, 1961-62 Tempest	S	No	21/2-3	Transaxle
Super Turbine 300	1964-69 Buick, Olds and Pontiac	F	No	3-31/2	Olds called it Jetaway
Roto Hydra-Matic Model 10	1961-64 Olds and Pontiac	F	No	7-8	No modulator
Roto Hydra-Matic Model 5	1961-63 Olds F-85	F	No	6-7	3-speed
Jetaway	Various 1960-64 GM cars	F	Yes	11-12	No modulator
Jetaway	Various 1956-59 cars	S	Yes	11-12	Also 1956-57 AMC
Dual Path Drive	1961-63 Buick Special	S	No	21/2	2-speed
Dynaflow	1948-63 Buick	S	Yes	11-12	2-speed
Turboglide	Chevrolet	S	No	21/2-3	Modulator
Ford Motor Co.					
Cruise-O-Matic C-6	1966-76 Ford products	s	Yes	11-12	Replace elastic locknut to prevent leaks
Cruise-O-Matic C-4	1966-76 Ford products	S	Yes	8-10	See above
Ford small-case 3-speed	1951-76 Ford compacts	F	Yes	9-10	Screen used through 1967
Ford medium-case 3-speed	1955-69 Ford Intermediates	F	Yes	9-10	As above
Ford 2-speed	1959-64 Ford products	S	Yes	7-8	Modulator
Turbo-Drive	1961-65 Lincolns	F	Yes	10-11	Modulator
Chrysler Corp.					
TorqueFlite Model 904	1960-76 MoPar Sixes	F	Yes	8-9	Also used by AMC and I
TorqueFlite Model 747	1962-76 MoPar V8s	F	Yes	9-10	As above
TorqueFlite pushbutton	1956-61 Chrysler products	S	Yes	11-12	3-speed
Powerflite	1953-61 Chrysler products	s	Yes	8-10	2-speed
American Motors Corp.		- 10	Yes	-1100	and the second
TorqueFlite Model 904	1972-76 AMC Sixes	F	Yes	8-9	By Chrysler
TorqueFlite Model 747	1972-76 AMC V8s	F	No	9-10	As above
Flash-O-Matic	1962-71 Rambler	S	No	31/2-4	Borg-Warner T-35
Flash-O-Matic	1957-71 Rambler	S & F		31/2-4	1968-71 felt filter; modulator on some
International-Harvester		1859 10	NOTES AND ADDRESS OF		TO-SECULO SECULO SE
TorqueFlite 904 and 747	I-H Sixes and V8s	F	Yes	8-10	By Chrysler
Borg-Warner	I-H to 1972	S	Yes	8-9	Modulator

IT'S NEW NOW



Needle-like precision oiler

If you ever tried to put a drop of oil into a watch or clock, you'll know why a stainless-steel spout .035 inch in diameter is a better deal. The barrel of this oiler is butyrate and handles up to S.A.E. 40 viscosity. Droplets are formed by squeezing the barrel. \$2.98. Draper, Box 61, Yonkers, N.Y. 10702.



Frustration-proof pipe driller

Drilling a hole through the exact diameter of a pipe is a breeze with a new self-centering device that positions cylindrical objects directly under the drill point for perfect alignment. The jig comes with a long-shank, double-ended center drill and combination scribe and center punch. Unicon, Box 239, San Clemente, Calif. 92672.

Fire snuffer

When the frying pan flares, just toss a fire-smothering cloth over it. The blanket snuffer measures 21/2 by 3 feet and can be used to douse grease, wood, paper and most other fires (except volatile fuel) common to kitchens, workshops and boats. The reusable cloth is made of glass fiber said to withstand temperatures up to 1500° F. Price is about \$10. Research & Trading Corp., 1206 King, Wilmington, Del., 19801.





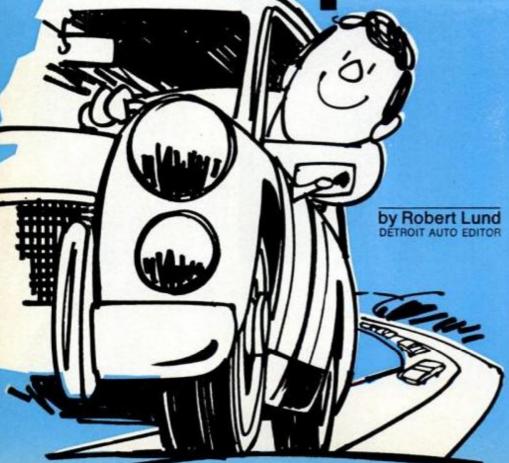
Sculpture by light beams

No more sitting for days while a sculptor measures nose, forehead and chin with calipers and punches a lump of clay into the general shape of your face. Now an inventor, F.J. Pechman, has come up with something he calls a Light Beam Profiler. The instrument scans head and shoulders of the subject with a light beam. It revolves around the subject and "reads" the facial contour for each of the 360° it travels (left). Signals are transmitted to a stylus that routs each contour in a block of stonelike material. The result is a cylinder of rough cuts (lower left). An artist then smooths the surface and finishes it as desired. Sitting takes five minutes. In glazed stone, a likeness costs \$750; used to make a mold for bronze, \$2000. Liberace, shown here, got bronze (below). Want one? You sit at Bullocks, Weyburn Ave., Westwood, Los Angeles, Calif,



f you are planning to buy a new car in the next three or four years, here's a chart that will help you decide on the most opportune time. This chart is your car-by-car preview of just what's coming and when. Timing is very important in the (Please turn to page 130)

Look what's coming down the pike!



DETROIT'S TIMETABLE-

MAKE AND MODEL	BODY
AMERICAN MOTORS	
Matador Pacer	CS ²
racoi	
Gremlin Hornet	C ₃
CHRYSLER CORP. Dodge Dart	A
Plymouth Valiant Dodge Charger	B
Chrysler Cordoba Dodge Coronet Plymouth Fury	B B B
Chrysler New Yorker Plymouth Gran Fury	CC
Dodge Monaco Dodge Aspen Plymouth Volare	F F
New car (name not yet announced)	L
FORD/LINCOLN-MERCURY Mercury Bobcat Ford Fiesta	S ⁴ S ⁴
Ford Mustang II Ford Pinto	S ⁴ S ⁴
Mercury Comet Ford Granada	C3
Ford Maverick Mercury Monarch	C ₃
Mercury Cougar	1 1
Ford Elite Mercury Montego Ford Torino	11
Lincoln Mark IV Ford Thunderbird	IS ⁵
Lincoln Continental	Le
Ford LTD Mercury Marquis	Le Le
GENERAL MOTORS	
Buick Century Chevrolet Chevelle	A
Oldsmobile Cutlass Pontiac LeMans	A
Chevrolet Monte Carlo	AS7
Pontiac Grand Prix	AS ⁷
Chevrolet Impala Pontiac Catalina	В
Pontiac Bonneville Oldsmobile Delta	B
Buick LeSabre	В
Oldsmobile 98	C
Buick Electra Cadillac Calais	C
Cadillac Fleetwood	C
Cadillac deVille Cadillac limousine	C D
Buick Riviera	E
Cadillac Eldorado Oldsmobile Toronado	E
Chevrolet Camaro Pontiac Firebird	F F
Chevrolet Vega Pontiac Astre	H
Pontiac Sunbird Buick Skyhawk	HS ⁸
Chevrolet Monza Oldsmobile Starfire	HS*
Cadillac Seville	K
Chevrolet Chevette	T

Buick Skylark	X	
Chevrolet Nova	X	
Oldsmobile Omega	X	
Pontiac Ventura	X	
Chevrolet Corvette	Y	

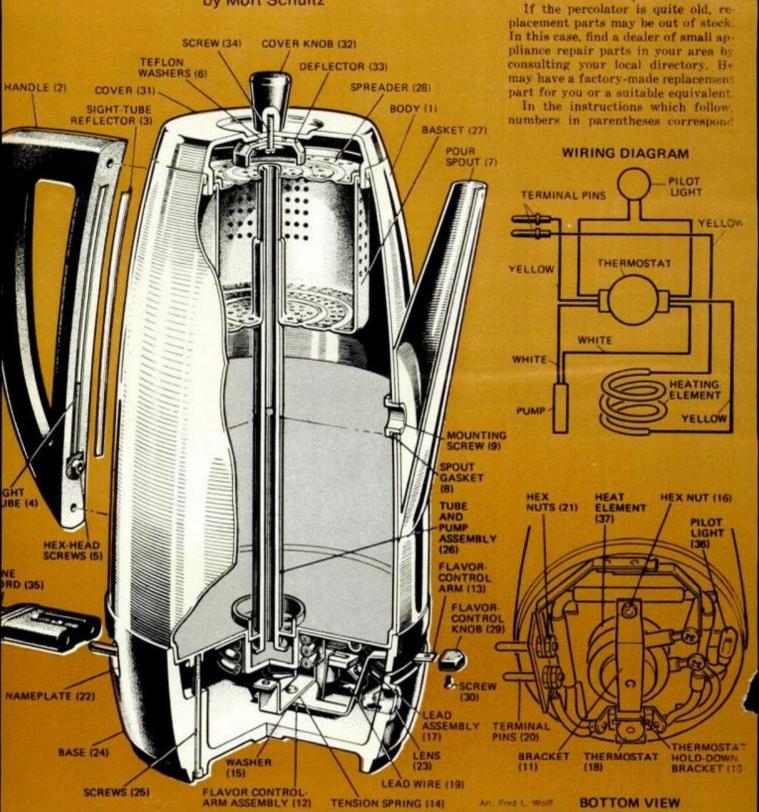
IT'LL HELP YOU CATCH THE BEST DEAL ON YOUR NEXT NEW CAR!

1977	1978	1979-1980
		Upgraded Pacer expected to replace Mata dor as AMC's top car.
2-door wagen early in calendar year.		Two new vehicles, a mini pickup and min
Will use VW's 2.04-liter Audi engine.	New 4-passenger, front-wheel-drive mini to re	van, to be considered for Pacer body place Gremlin.
	Probably last year for these cars.	
	Down-sized to intermediate size on a stretche base, 4-doors to 114.5 in.	ed F body; 2-doors will go to 112.5-in. wheel
Two new 2-door luxury hardtops being C-body cars. The 440 and 400-cu. in	worked up off the F body (Aspen/Volare) to replace engines will be down-sized.	Company says its cars will be trimmedown 100 pounds a year between 197 and 1930. New R body in 1979.
Chrysler's mini, an Americanized Sim wheelbase, 170-in. overall, VW 104-c	nca, will be out in Dec. 1977 or Jan. 1978—100-in. cuin., 4-cyl. engine.	VW engine replaced by new Chrysler 122 cuin., 4-cyl. engine.
New mini from Europe midway in '77 r wheel drive. Station-wagon model w	model year—93-in. wheelbase, 1.4-liter engine, front-	New line of subcompacts.
Wilder all Vo. Station-Wagon House W	Excluding Fiesta, these cars will be upgrad- ed to make room for new sucompacts in 1979.	
	Entirely new line of compacts, including a wagon.	
Major face-lift and lighter, but short new body.	of a	
Slimmed down and renamed Mark V. Will be built on intermediate body to weight.	save	
Junior edition 4-door on Granada/Mon shell due in March.	May get a version of Mustang II.	460 and 400-cuin. engines phased out to all cars except Lincoln.
G.*	GM will drop the A-body letter designation. The A cars will be replaced by a new J body. They will be smaller cars with a wheelbase of about 112 in. All Js will have a 6-cyl. engine as standard.	
All B and C-body cars will be scaled d Bs will be reduced to 116 in., Cs to in. Except for Cadillac, all GM m using V8 engines will go to a sm displacement; the 455 and 454-ci engines will be down-sized to not it than 400 cu. in. for a maximum fue provement of 3 mpg. Cadillac's 500 in. engine will be reduced to 425 cm	o 121 sakes saller uin. more I im-	
	Es will have a shorter wheelbase of 116 in. Riviera will get front-wheel drive.	-
		Planned through 1979 models. After that shorter wheelbase, front-wheel drive.
New 2.5-liter, 4-cylinder engine design by Pontiac.	gned Future of these cars is uncertain. They may be discontinued in 1978 or 1979.	shorter wheelbase, front-wheel drive.
	Oldsmobile in line for K-body version. Pontiac, Buick and possibly Oldsmobile may get versions of the T car in 1978 or 1979.	T car will shrink to 130 in. overall on 85. in. wheelbase in late '79 or early '80 will have transverse 4-cyl. engine, frontwheel drive, new automatic trans. In Chevrolet and Pontiac versions.
		New L body to replace X, may also be used in GM's F cars. It will have front-wheel drive, 104-in. wheelbase and carry a transverse-mounted 4-cyl. engine.

Footnotes: 1—Intermediate. 2—Compact special, separate body. 3—Compact. 4—Subcompact. 5—Intermediate special, stretched-out version of Ford's intermediate body. 6—Full-size cars. 7—Stretched-out version of GM's A body. 8—Stretched-out version of GM's H body.

ceed to find the pertinent section How to repair below, which may be used as a guide in making repairs. coffee percolators er. His address is normally stamped

by Mort Schultz



ot a problem with an electric coffee percolator? Consult the troubleshooting chart on the facing page to pinpoint possible causes. Then pro-

Replacement parts can usu-ally be obtained from a dealer

selling your make of appliance. If there is no dealer in your area, contact the manufactur-

on the bottom of the percolator's base.

to those on the main illustration for easy identification of parts.

Caution: Except for specific tests requiring power, be sure to disconnect the percolator before doing any work on it.

Replacing the pour spout (7)

1. Remove the mounting screw (9) and spout gasket (8) holding the pour spout (7) to the percolator's body (1).

Replace the pour spout with a new one, making certain you install the spout gasket to prevent leakage around the spout.

Possible difference: Spouts of some

coffee percolators are a molded part of the body and cannot be replaced.

Replacing the handle (2) and sight tube (4)

1. From inside the body (1), remove the hex-head screws (5) and Teflon washers (6) holding the handle and sight-tube assembly.

2. Lift off the handle and sighttube assembly and disassemble the handle (2), sight tube (4) and sighttube reflector (3).

3. Replace the damaged part or parts and prepare for reassembly by placing sight-tube parts in correct sequence into the groove in the handle.

home supply centers and supermarkets. Follow instruc-

4. Place the entire assembly against the percolator's body, lining up the assembly with the screw holes.

5. Insert screws and washers and tighten the handle and sight-tube assembly to the body.

Caution: Make sure Teston washers are used to prevent leakage around holes

Possible differences:

- Some units do not possess sight tubes.
- 2. Handles of some units are held by a screw at the top of the handle only. The bottom of the handle is released from its seat by inserting a screwdriver beneath the metal bracket-type clip and prying outward. To replace, press the bracket-type clip into place and insert the screw into the top part of the handle.
- Handles of some other units cannot be replaced. The hand'e is a molded part of the body.

Replacing the base (24)

- 1. Invert the percolator and remove the screw (30) ho'ding the flavorcontrol knob (29). Remove the knob.
- 2. Remove the two screws (25) holding the base to the bottom of the percolator.
- 3. Slowly lift the base up, tipping it to the side slightly so the flavor control arm (13) slides through the slot in the side of the base, which is covered by the nameplate (22).
 - 4. Take the pilot light from the lens
- Remove the hex nuts (21) securing leads to terminal pins (20). Damaged parts may now be replaced.

Possible differences:

- Some percolators do not have a flavor-control knob.
- 2. Some percolators that do have a flavor-control knob do not have knobs held by screws. They are pressed on the flavor-control lever and are removed by pulling them off.
- 3. Bases of some percolators are held by a single screw that may or may not be slotted to accept a screw-driver. If not slotted, screws may be removed with pliers.
- 4. Bases of some percolators have gaskets between the base and the body that should be examined. If damaged, the gasket should be discarded and replaced with a new wo. However, if the unit is an immersible percolator, treat the percolator as non-immersible once the base has been removed on the chance that the sealing qualities are destroyed. Onlimmersible means that the unit is should not be submerged in water when the percolator is be a serior water when the percolator is be an and the base has been removed on the chance that the sealing qualities are destroyed.

Replacing the thermostat (18)

1. Remove the base (24) as we judescribed.

(Please turn to page 182

Coffee tastes bitter

POSSIBLE CAUSE WHAT TO TRY 1. Residue and stains. Periodically clean all coffeemaking parts and the inside of the percolator with a cleaner made for electric coffee percolators which is sold in hardware stores.

Water boils, but does not percolate

POSSIBLE CAUSES		WHAT TO TRY	
1.	Percolator tube and pump assembly not seated.	Make sure that the pump portion (base) of the percolator tube and pump assembly is seated in the heater well in the body.	
2.	Percolator tube and pump assembly is be or pump portion is inoperative.	Replace the percolator tube and pump egsembly.	

tions on the package.

Coffee is too weak or too strong

POSSIBLE CAUSE	WHAT TO TRY
Reduced percolating time.	Make certain the percolator is being filled with cold water—never with hot water. Hot water will reduce percolating time.
2. Slow percolating action.	See that the inside of the heater well in the body and the bottom of the percolator tube and pump assembly are free of coffee grounds and deposits that will slow percolating action.
3. Defective thermostat.	Test the unit by removing the percolator tube and the pump assembly and then filling the unit with cold water. Insert a thermometer and connect the perculator to an electrical outlet. The thermostat should open at 180° to 195° F., which is signified by the pilot coming in. If the thermostat should open sooner (or later), replace the thermostat.

Unit does not heat

1.	No voltage at the receptacle.	Check the receptacle with a table lamp or voltage tester
2.	Line cord has gone bad.	Replace any line cord that has fraved insulation. Check the cord for continuity. A bad cord should be replaced with one of the same size as that originally used by the percolator's manufacturer.
3.	Badly corroded or burned terminals, pins.	Try cleaning the terminal pins with a small piece of sandpaper. If this doesn't work, replace the pins.
4.	Defective thermostat.	Replace the thermostat.
5.	Defective heating element.	Replace the heating clement.

odern technology has produced a wide variety of improved adhesives that will bond practically anything to anything. These sophisticated new bonding agents possess remarkable qualities. As a result, you have at your disposal today a wealth of wonder glues with which you can tackle any job in woodworking, home maintenance and general home-improvement projects. But bear in mind that no one glue will do everything—you have to know which is best for what.

Actually there are only about a dozen basic types of glue. The question of which one to select will depend on the specific characteristics of the glue and the nature of the job. Many glues are quick-setting, while others are not. Offhand, a quick-setting ad-hesive would seem to be ideal and so it is-for small assemblies. But what happens when a quick-setting glue is used on a large complex assembly? Trouble. The glue may dry on one part while it is still being applied to another section or before clamp pres-sure can be applied. Another factor contributing to glue failure due to premature setting is temperature. Most glues, including the slow-drying types, will set faster at high temperatures.

Some glues will fill gaps

The fit of a joint can also influence the choice of glue. Most glues work best with well-fitted joints, but for those joints which are not precisely accurate, a glue with good gap-filling properties should be used. There are situations where a joint must, of necessity, be made loose-fitting in order to permit final assembly. This is generally encountered on projects which have angled dowel or mortise-and-tenon joints which converge or diverge. Thus the need for a gap-filler.

Can you get by with a water-resistant glue for an outdoor project or must you go to the more expensive waterproof type? It depends on the degree of exposure to the elements your project will be subjected to. A chair put together with water-resistant glue will serve nicely on a covered porch, but the same chair would require waterproof glue if used out on the lawn or open patio.

Still another factor to consider in glue selection is its resistance to heat. Thermoplastic glues like the popular white polyvinyls become soft at temperatures above about 150° F. This

When joints go together quickly, a fastgrabbing, fast-setting glue formulated for use on both hard and soft woods will reduce clamping time and allow a few clamps to do the job.

Stick with the right Here's a complete guide on what glue to use for what job. by Rosario Capotosto





QUICK-REFERENCE GLUE GUIDE

KIND	USES	GAP FILLING	STRENGTH	WATER RESISTANCE
Hide (animal)	Structural bonding of wood: indoor furniture, cabinets, veneer.	Good	High	Poor
Casein	Structural bonding of wood for most applications; particularly good for oily woods such as teak, lemon, yew. Can be used at any temperature above freezing.	Good	High	Fair
White (polyvinyl resin)	All-around household and shop glue for furniture making and repair, model and hobby work, paper and leather.	Poor	Medium	Poor
Aliphatic resin	Structural bonding of wood for furniture assembly, casework: edge and face gluing.	Good	High	Poor
Plastic resin	Structural bonding of woodwork where considerable moisture resistance is desired.	Poor	High	Good
Waterproof resorcinol resin	Structural bonding of wood exposed to soaking: furniture, framework, boat building and repairs.	Good	High	Excellent
Contact cement	Nonstructural bonding of wood, paper, fabrics, glass, cork, felt, linoleum. Laminating veneers and plastic compositions (Formica, Micarta and so forth) to countertops and vertical surfaces.	Poor	Medium	Very good
Epoxy resin	Structural bonding of rigid materials: wood, metal concrete, brick, tile, glass, china, some plastics and any application requiring high strength or extreme outdoor exposure.	Good	High	Excellent
Hot melt (glue gun)	Bonding wood, metal, leather, fabrics, plastics. Household repairs, hobby and craftwork.	Good	High	Excellent
Mastic adhesive	Installing plywood and hardboard paneling, gypsum wallboard to wood, plaster, concrete. Bonds ceiling and wall tiles, floor tiles.	Very good	Medium	Excellent
Silicone seal	Bonding glass, metal, pottery, porcelain: aquarium construction, weatherstripping, caulking.	Good	Medium	Excellent
Super glues*	Bonding glass, metal, wood, rubber and numerous other nonporous materials.	Poor	High	Excellent
	*A wide variety is available. Check labels for specific applications.			

kind of glue would be poor choice for a project such as a radiator enclosure or the like.

This is a sampling of the considerations which decide glue choice. Your particular applications will suggest more. Above all, read the manufacturer's instructions and follow them to the letter.

Kinds of glue

- Polyvinyl (white) resin glue is a good all-around household and workshop glue for furniture repairs. It sets fast at room temperature, dries clear leaving an invisible glue line, and can be used for paper, leather and cork as well as wood. It's quite strong, but softens under heat and is not waterproof.
- Liquid hide (animal) glue is an old-time favorite in the furniture industry. It's made from bones, hooves and hides of animals, makes a tough, lasting bond, has excellent gap-filling properties and is very slow-setting, which makes it ideal for large assemblies. A disadvantage is that it is not waterproof. Hide glues lost some popularity for a while with the coming of the synthetics, but are now making a comeback.
- Casein glue is made from mild curd, hydrated lime and sodium hy-

droxide. It is available in powder form and is mixed with water for use. It can be used at any temperature above freezing, has good strength and is fairly water resistant. It is very abrasive on tools and will stain some woods such as redwood. It is especially effective on oily woods such as teak and lemon. It is good as a gap-filling glue.

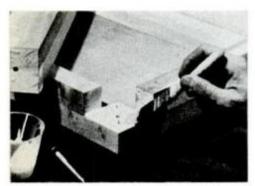
■ Plastic-resin glue is a dry powder made with urea resin. The catalyst or hardener is incorporated in the powder. It is mixed with water to a creamy consistency for use. Highly water-resistant and stain-free, it sets



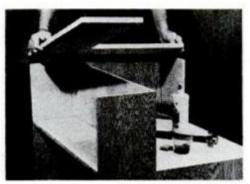
Glues which require mixing with water should be proportioned very carefully for best results, A postal scale will be useful for weighing the components.

- very hard to produce a bond stronger than most species of wood. It's a good choice for salad bowls, serving trays and other articles subjected to moisture. Joints must be well fitted, however, because this glue is a poor gap-filler.
- Aliphatic resin glue, a relative newcomer among the synthetic resin glues, is a creamy, light tan liquid and comes ready to use. It is somewhat similar to polyvinyl white glue but has decided advantages. It is strong, highly resistant to heat and takes sanding very well (white glues do not). It's a good gap-filler, is fast-setting (30 min.), but lacks water-resistance qualities.
- Resorcinol waterproof glue is a two-component adhesive comprised of wine-color resorcinol resin and a separate dry-powder catalyst. When the components are combined, the mix is activated and cures at room temperature. It is 100-percent waterproof, will withstand extreme cold as well as boiling water, acids, alkalies and solvents; and is excellent for building or repairing boats, outdoor furniture and toys. It is quite expensive, leaves a dark glue line, is slow-setting and fills gaps rather well, but it cannot be used below 70° F.

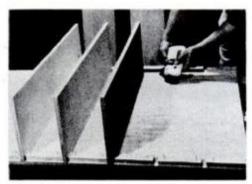
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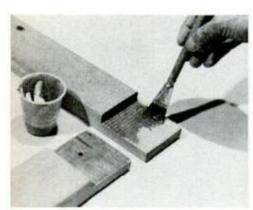
End grain soaks up glue like a blotter so it should receive two coats. Apply a thin coat to the end grain first, then recoat it after mating surface has been coated.



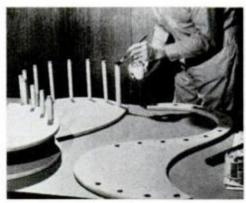
Freshly glued surfaces are very slippery. Always start a few nails on a butt joint before applying the glue. The projecting nail points will prevent skidding.



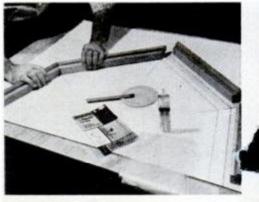
Temporary cleats can help you obtain an accurate spacing of the shelf members. Beads of glue should be spread with brush to distribute it evenly.



On any joint, the larger the gluing surface the stronger the construction. Lap joints, tongue-and-groove and dadoes are examples which provide extra surface.



A project such as this, which has many fitted parts, calls for a slow-setting glue to give you plenty of time to position and clamp the pieces properly.



Some irregular assemblies are practically impossible to clamp. Quick-setting 5-Minute epoxy solves the problem. A steady hand grip substitutes for clamps.

Build the Sequoia an 11-foot travel trailer for \$976

The Sequoia mini trailer is ideal for small families with compact cars. There are a surprising number of features in this lightweight, easy-to-tow, easy-to-build unit. For example, there's a fully enclosed toilet room, two full-height wardrobes, and a pass-through kitchen for outside cooking in fair weather or inside cooking in foul weather. The settee and dining table convert to a full-size double bed for sleeping. A pipe-supported canvas berth can be made up over the settee for additional sleeping capacity.

The Sequoia has space for a large icebox, two-burner stove, sink, ample water capacity, plus plenty of storage space. Best of all, you can tow this mini trailer with virtually any car that can be equipped with a trailer hitch. The original testing prototype was towed nearly 3000 miles by a family of three using a Toyota sedan with a 1.9-liter engine. All types of terrain were encountered, including unpaved roads, mountain grades, city driving and high temperatures. Average fuel consumption over all speed ranges was 20 mpg under loaded conditions. Towing ability was admirable and should be easily duplicated with any similar or larger towing vehicle.

SEQUOIA SPECIFICATIONS

Length overall: 10 ft. 8 in.
Width overall: 5 ft. 9 in.
Interior length overall: 7 ft. 10 in.
Interior width overall: 5 ft. 1 in.
Ground to roof: 6 ft. 6 in.
Ground to frame clearance: 11 in.
Dry weight: 1000 lbs.
Tongue weight: 100 lbs.
Freshwater capacity: 12 gal.
Sleeping capacity: 3 adults

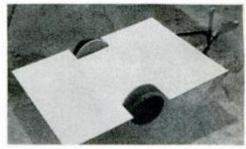
HOW TO ORDER PLANS

Complete plans, patterns and instructions, as well as component kits, equipment and fittings are available. Plans are \$10 post-paid from Glen-L, Dept. PMS, 9152 East Rosecrans, Bellflower, Calif. 90706.

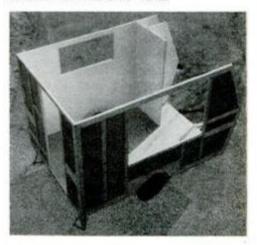




Welded frame is made from 2-in.-square steel tubing. Optional electric or surgetype brakes are not required by law in most states, but do provide extra safety.



Floor is cut from two %-in.-thick plywood sheets and bolted to the steel frame. Inner wheel wells are made out of waste cutouts from the side walls.



End walls lap the side walls and are in two sections. Most of inner walls are installed before front walls to form a rigid structure. Diagram below shows layout.

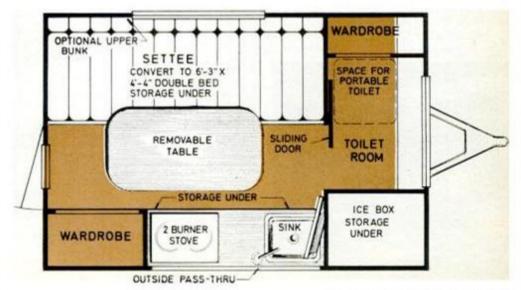




Photo: Benn Mitchell

A look underneath the table shows the dovetailed rails. All tightening knobs are big enough to provide a good grip. The heavily ribbed bed shrouds the power takeoff. I fitted it with a ½-in. chuck and mortising bit. The arbor (well overbuilt) has an incredible 25/32-in. diameter.

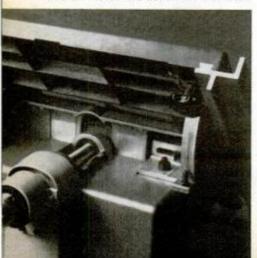


TABLE SAW (Two Sizes)

Specifications Table size Extension Blade diameter Saw speed Arbor size Weight Height Base price	10" Model 7" Model 20% x33%" 16½ x22½' 20% x47½" None 10" 7" 3800 rpm 3800 rpm 25/32" %" 66 lbs. 28½ lbs. 38½" 36½" \$375 \$225	*
Capacities: Height of cut Rip to center Table rise	3-3/32" 2-3/32" 23¼" 11¾" 2¾4" 1¾"	

Features

Splitter behind blade for safe ripping Unique, floating, adjustable blade guard Extruded box-design rip fence Vernier table scale through 45° Cast table insets for flush mountings The mortising table (below) has two articulated arms for a controlled feed of stock into the bit, both in and out and side to side. There are two hold-down clamps and precise stops for limiting the length of travel on the bit. Table adds about \$120 to the cost of the saw.

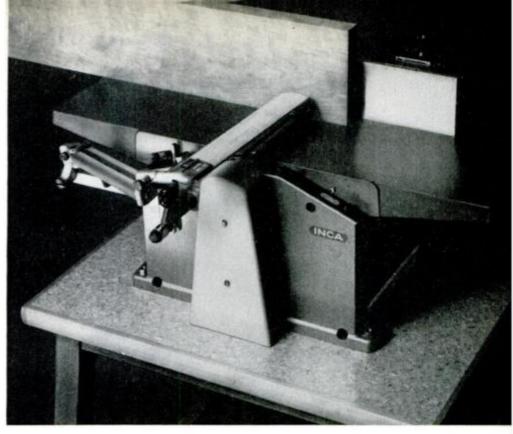


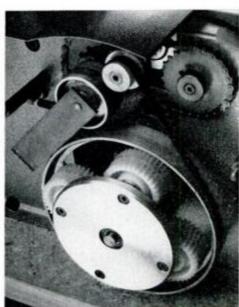
These power tools won't look familiar to you even though they've been manufactured for more than 35 years and are sold in 60 countries around the world. That's because they're Swiss-made and, until now, have never been imported here although they are the No. 1 seller in Europe.

Their manufacturer, Inca, has picked two small U.S. firms to introduce the tools in this country. They are Garrett Wade Co., 302 Fifth Ave., New York, N.Y., and Ansom Lumber, 414 West Cypress, Glendale, Calif. Garrett Wade personnel have spent considerable time at the Swiss factory and have "Americanized" the tools by providing scales in inches as well as centimeters, and by installing U. S.-made motors and wiring.

In a nutshell, here's what's happening with power tools in the United
States. There are two distinct markets—professional and amateur. Professional tools are of high quality but
expensive; amateur tools have been
going down in quality to sell at a low
price. This trend has opened a middle
market for high-quality, moderately
priced power tools, and Inca is aiming for it.

The tools—a table saw in two sizes, a jointer in two sizes and a bandsaw, are small enough to fit nicely in most home shops, yet powerful enough to withstand vigorous use. The quality of the machined parts is excellent and the attention to detail is downright surprising. I was especially impressed with the 10-inch table saw. It took me a good three hours just to try out the different accessories. This machine accurately cuts mortises, tenons, dadoes and all combinations of compound angles. The photos on these pages give you a closer look at the impressive details.





JOINTER (Two Sizes)

10" Model 8%" Model Specifications 311/2 x 11" Table size 30 x 834" Cutter width 101/4" 856" 1/411 Maximum cut 1,411 Cutter block dia. 21/16" 21/16" Cutter speed 6000 rpm 6000 rpm 14 lbs. Weight 77 lbs. Base price \$750 \$315

Features: 45° tilting fence; balanced, 12,000-cuts-per-minute knives

The 10 in. jointer (above) is also an autofeed planer. Its table is screw-driven at each corner post, a precision feature not on many industrial planers. Planetary geared chain drive (left) makes hardwoods seem like butter; 8%-in. model (below) features optional thicknessing rig (for \$75). Both machines have articulated, floating cutter-guard arms for safety.

Micro-adjusting guides and rollers give precision cuts. Saw track has tolerances so fine that saw teeth ride just off band wheel to preserve sharpness, reduce wear. An adjustable rip fence and miter guide (with depth stop) are standard.

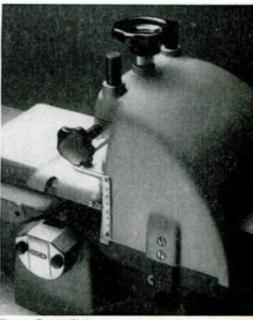
BANDSAW (10-inch)

Specifications and capacities

Table size 11"
Width of throat 10¼"
Blade length 72½"
Band-wheel diameter 11"
Weight 33 lbs.
Cutting depth 6¼"
Base price \$250







Photos: Garrett Wade

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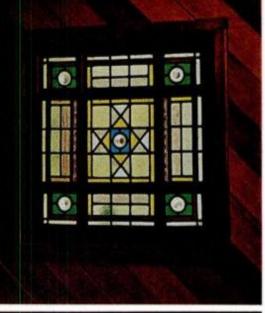


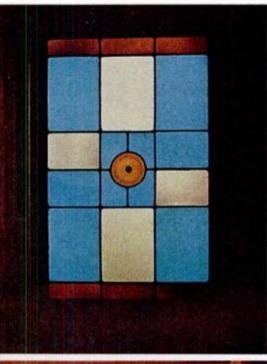
by Robert Wortham

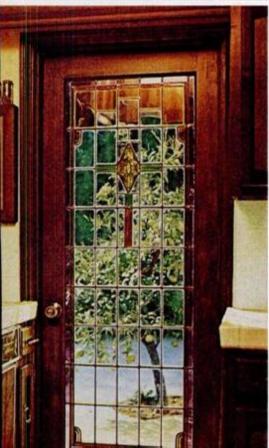
Capture the spectrum's dazzling light in your living room. Stained glass leading is easier than you think. Here's how.

OWS









The jewel-like brilliance of stained glass has made it one of man's oldest decorative building materials. Its use dates back through the Renaissance and Middle Ages to the ancient Egyptians who decorated their houses with mosaics of colored glass set in plaster.

Essentially, a stained-glass window is a transparent design of colored glass held together by lead strips and enclosed in a frame of wood or metal. Its design can be as complex as a jigsaw puzzle with hundreds of glass sections requiring intricate cuts and skills of an advanced craftsman, or as simple as a checkerboard for assembly by one who has never handled stained glass before.

The latter project can consist of three rows of glass panes, each measuring 2½ x 5½ in. with alternating colors of blue and amber, surrounded by a 1-in.-wide amber border. Tools required are a glass cutter, lead knife, hammer, shingle nails, square, 40 to 80-watt soldering iron, 60-40 solid-core solder and oleic acid (flux).

An inexpensive glass cutter with a steel cutting wheel is adequate for general cutting but one with a tungsten wheel will stay sharp longer. An inexpensive lead knife can be made by sharpening the opposite curve of a linoleum knife. Do not use a soldering iron of higher than recommended wattage or it may melt the lead during soldering.

Stained-glass sources are listed in your local directory under "glass, stained, & supplies." The glass can also be purchased by mail from Whittemore-Durgin, Box 2065, Hanover, Mass. 02339.

Kinds of stained glass

Cathedral glass is machine-rolled, smooth on one side and has medium to heavy texture on the other. Rolled patterns are available in hammer, seeded, rippled, streaked and antique textures and in a variety of colors. Of uniform ½-in. thickness, this glass is priced from \$1.95 to \$3 per square foot. You cut cathedral glass on the smooth side.

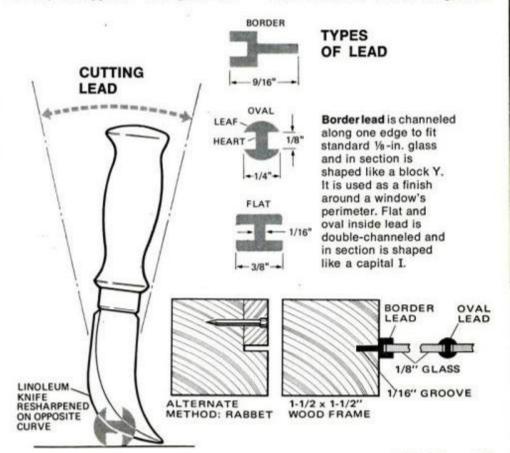
Antique glass is not an old glass, but a product of modern glass chemistry. Most of it is imported from Europe and closely duplicates the irregularities, striations, ripples, bubbles and streaks of handmade Renaissance glass. A very soft glass, it cuts easily on the smooth side and costs from \$3 to \$6 per square foot.

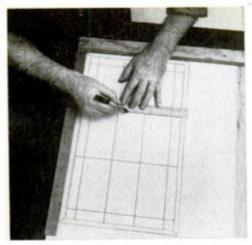
It's the irregularities of stained glass that enable it to refract and multiply light. In window and door installations, the smooth side of the glass faces inward.

Working with lead

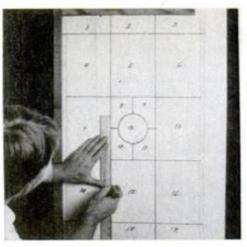
Especially contoured strips of lead, called lead came, make up the skeletal component into which stained glass is fitted to compose a stained-glass window. Although lead is soft and easily cut with a curved knife, it is quite strong when fitted precisely and soldered at intersections on both sides of the design.

Lead comes in 6-foot strips and

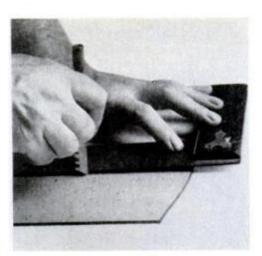




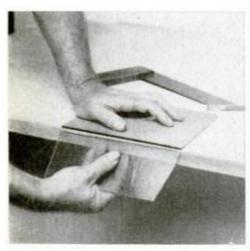
1. Pattern for this 12 x 20-in. window is penciled, then inked with 1/16-in.-wide felt-tip pen. Inked lines (called "heart" lines) approximate the 1/16-in. thickness of lead hearts. Shaded double lines are the 9/16-in, border lines,



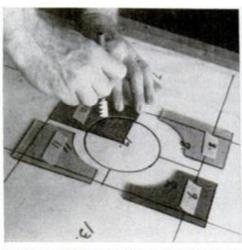
2. When the pattern is complex like this one, number each section and corresponding glass pane as they are cut. This is important in a design where several colors of glass are used. Otherwise, you'll wind up with a real jigsaw puzzle.



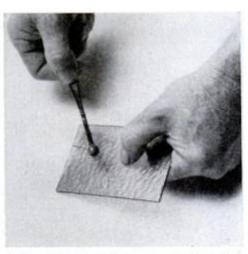
3. To score glass, dip the cutter in kerosene to clean the cutting wheel, hold the cutter perpendicular to the glass and begin scoring a fraction of an inch from the edge of the glass in a continuous even stroke without lifting the cutter.



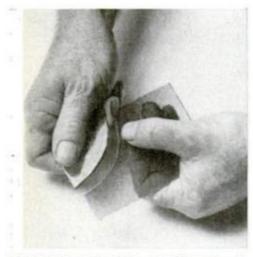
4. After scoring, place score line parallel to and slightly beyond table edge and press downward firmly on each side of the line. If score is uniform its full length, glass will separate evenly and cleanly and fit channels of leads perfectly.



5. When cutting out for a rondel, place the glass on top of the circle pattern as shown and score the glass freehand, carefully following the outside edge of the circular heart line with the cutter. Keep cutter perpendicular to the glass.



6. Turn the score line over, grip the glass as shown, press downward on the glass and tap along the score line with the ball end of the cutter. As you gently tap, you will see the glass gradually fracture along the score line for its full length.



7. Using your knuckles as a fulcrum, grip the glass with both hands and snap the pane by bending down and outward on both pieces. The glass will part neatly if you make the score line cleanly with the same even pressure on the cutter.



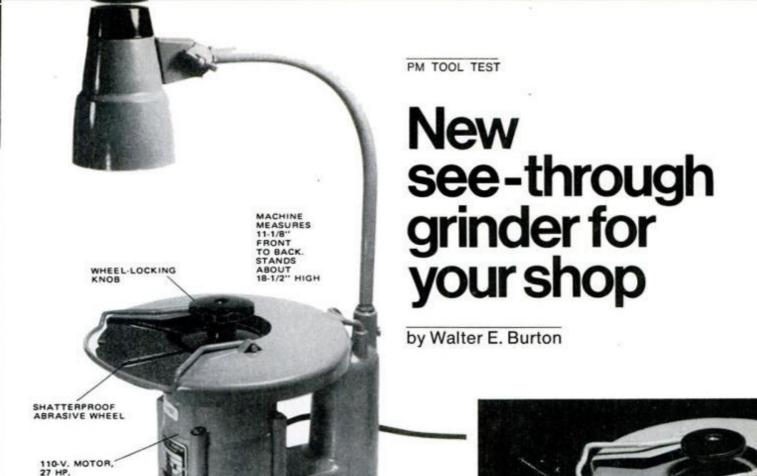
8. L-shaped cleats nailed to wood workboard hold the window along two sides and assure squareness. Tap each section of glass firmly into channels of leads with hammer and wood block. Nails hold the border and inside leads for soldering.

must be stretched before cutting to remove crimps and twists. To straighten lead, fasten one end in a vise and grip the other with pliers and pull. A strip will increase about two inches in length after straightening, but avoid excessive stretching as it will weaken the lead. In all window and door designs the longest leads should run continuously along the greatest dimension of the design (that is, uncut from border lead to border lead).

The shorter leads run across the narrow dimension of the design and are called "fill" leads.

Border lead is channeled on one edge to fit standard 1/2-in, glass and in section is shaped like a block Y. It is used as a finish edge around the perimeter of the window and has a

(Please turn to page 173)



new import on the American market is a bench grinder that's truly unique. It's called the Stephan invisible-wheel grinder and you can actually look through the spinning wheel to see exactly what is happening to the edge you are grinding; no need to constantly remove the tool to inspect the bevel as in using a conventional grinder.

Here's how this see-through grinder works: The horizontally mounted grinding wheel has six slots in it. Rotating at 3200 rpm, the wheel becomes "invisible" in the same way as a spinning airplane propeller. A lamp, mounted directly over the wheel, beams light through the slots onto the workpiece. You work against the underside of the wheel.

Watch while you work

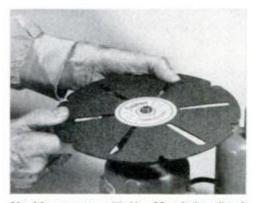
The same slots that allow light to pass through the spinning wheel also let you observe the surface being ground. Short notches in the rim of the wheel enable you to watch the grinding and polishing of grooves which require the use of the edge of the wheel. Sparks and wheel particles are thrown downward away from the operator.

The 81/2-in.-dia. grinding wheel

Horizontally rotating abrasive wheel carries sparks and grit safely away from the operator.

Wheels are changed in less than a minute. Knob locks wheel in place.

ON-OFF SWITCH



Machine comes with No. 60 grit (medium) EF wheel. Fine, very fine also available.

to minimize "burning" and drawing temper of the tool steels.

Wheel has left-hand thread

I found the grinder easy to use, re-

quiring very light pressure to grind a perfect bevel.

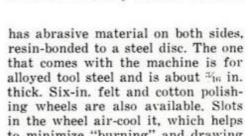
Installing a wheel is somewhat like placing a record on a phonograph. After fiddling with the plastic hand knob that locks the wheel on its shaft, I discovered that it has a left-hand thread. When I first turned on the motor, I expected the lamp to lightbut it didn't. I eventually found that it is controlled by a pushbutton switch hiding under a rubber diaphragm at the top of the lampshade.

Takes only little practice

The grinder I tested ran smoothly. I had little difficulty manipulating a tool or other object precisely against the grinding surface. It was fascinating to watch the metal vanish from a surface, corner or edge as a piece of steel was shaped. The clarity with which a workpiece can be observed is affected by the light-reflecting ability of the piece and the position in which it is held.

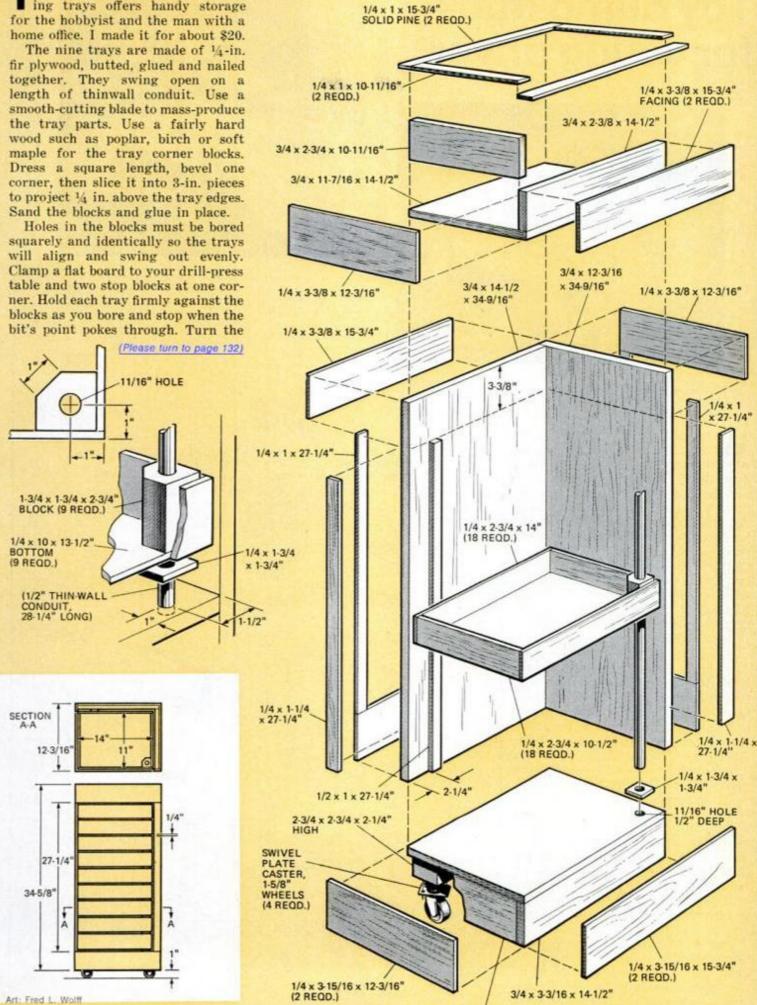
The instructions suggest that an (Please turn to page 168)

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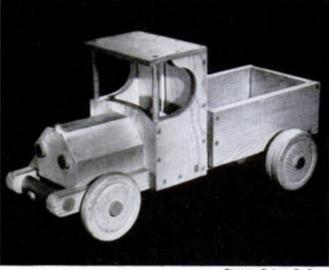
his roll-about stack of swinging trays offers handy storage for the hobbyist and the man with a home office. I made it for about \$20.



3/4 x 3-3/16 x 10-11/16"

Toy dump truck for young driver





Photos: Robert D. Borst

by Dave Acton

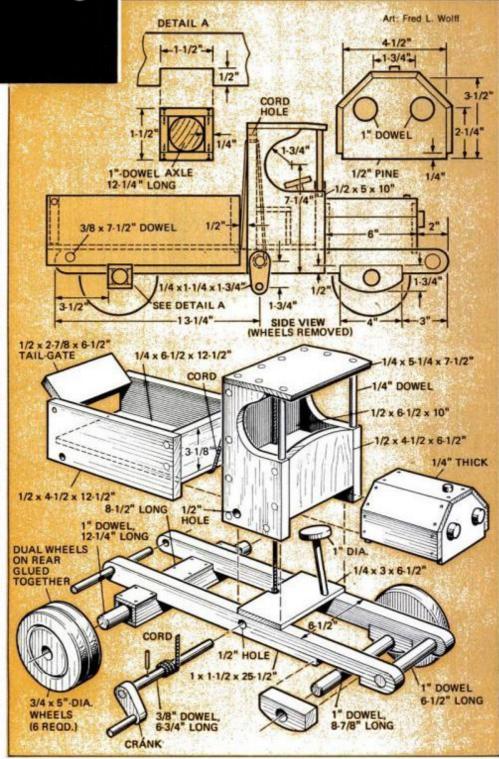
hat little guy wouldn't think his dad the greatest ever when surprised with this all-wood dump truck. It actually dumps with a turn of a crank, and it's built to take the beating a young truck driver can give it. Most of the pine wood you need to make it can be found in your scrap box.

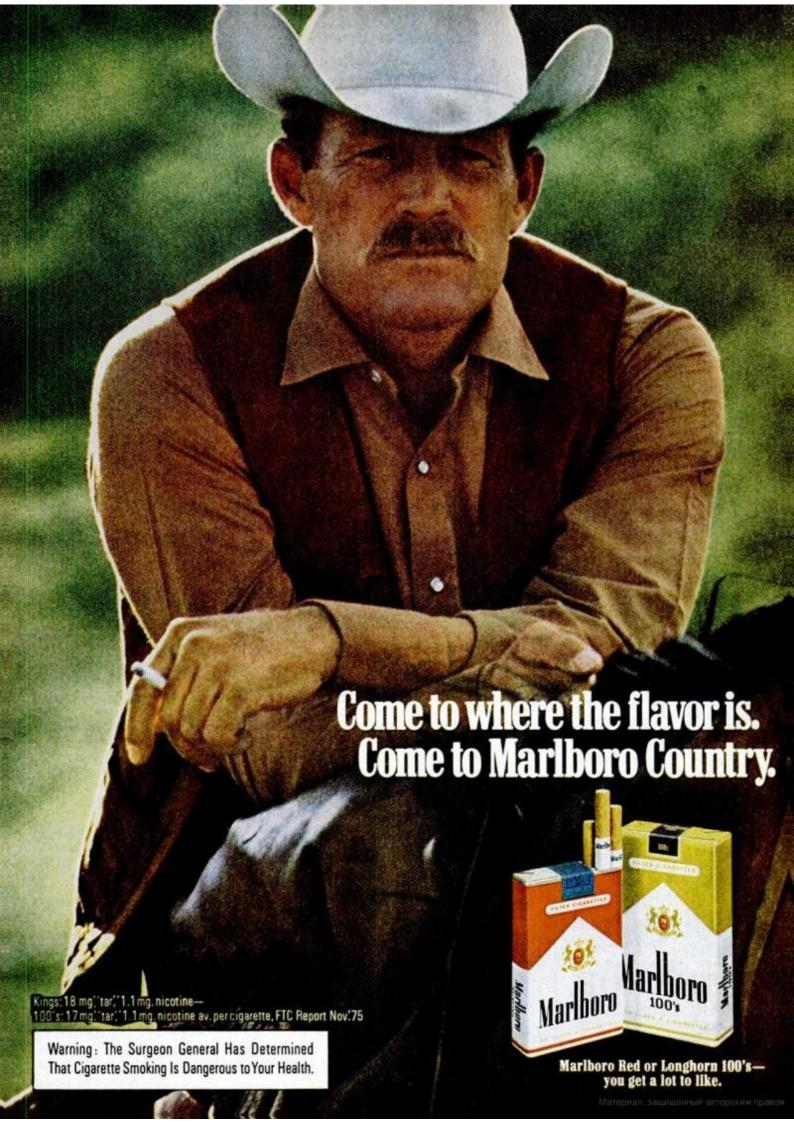
Start work with the chassis and cut, notch and bore the two rails at one time. Bore both front axle blocks together so the holes align, and assemble the 8½-in. long square "tube" in which the rear axle turns.

Space the two rails 6½ in. with a 1-in. dowel at the front and the axle tube at the rear. Glue the axle blocks in the notches at the front and add the cab's floor and steering wheel. Single wheels are glued to the front axle; dual wheels to the rear. Both dowel axles should turn freely.

Assemble the cab so it straddles the rails and floor. Make it complete with seat and bore a hole in the floor, seat and back for the winch cord. I used screws in counterbored holes, then capped the heads with short pieces of dowel glued in the holes and sanded flush. Make the ends of the hood fit between the rails and cover them with ¼-in. pine. Drill for 1-in.-dowel headlights and for a ¼-in. radiator cap.

Inside width of the dump body should be 65% in. so it fits over the rails and pivots freely on a dowel at the rear. The tailgate should also swing open freely. Finish with nontoxic paint or varnish, or let it remain as bare wood.





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THUNDERBOATS . . . UNLIMITED (Continued from page 62)

gland took it five times, Canada three and France once. Wood, the wiry little inventor of the dump truck who may have held more patents than anyone at the time of his death, shook up the water-speed world in 1932. In that year, he drove Miss America X, a 38-foot mahogany beauty powered by four 12-cylinder Packard aircraft engines with a combined horsepower of 7600, over a measured course at a flashing 124.915 mph, while her four engines sucked in five gallons of gasoline per mile.

Today's class of unlimiteds began after World War II when surplus aircraft engines become available. Big machines and big-moneyed owners entered competition, and some race results were taken to court as hard-fighting tycoons tried to bend the rules. The present Unlimited Racing Commission was launched in 1958 when a brash young driver from Detroit, 26-year-old J. Lee Schoenith, told the venerable APBA that the sport seemed to be getting out of hand and needed its own special organization. Schoenith became the first racing commissioner for the big boats and, with his own Gale unlimiteds, won three national championships along the way. Under his guidance, the Unlimited Commission has pioneered such safety requirements as mandatory medical checkups for each driver the morning before each race, fireproof clothing, kill switches and other regulations that help keep drivers alive in a sport filled with inherent dangers.

Accidents happen

Even so, the big boats have had their bad days. At the 1966 President's Cup race on the Potomac at Washington, D.C., expert drivers Ron Musson, Rex Manchester and Don Wilson were killed in two accidents, followed by Chuck Thompson in a Detroit race one week later.

Recent races have been gratifyingly accident-free, while speed, maneuvering control and reliability of the big roostertailers keep inching up. As of last year, the most successful arrangement for winning in this fastest-boat league has been to have someone like Ron Jones design you a pickle-fork hull with a supercharged 3000-hp World War II Rolls-Royce Merlin engine in it, the kind that sent British Spitfires and American P-51s chasing after German Messerschmitts. But now you will need two more major parts: a nitrous oxide tank and injector to squirt an additional 300 horses into the engine when you want to get out of a turn ahead of another boat. And

you need a near-genius crew chief, who rivals the top driver as a most important ingredient of the sport.

Pay 'N Pak's crew chief Jim Lucero, who reportedly went along with the boat and engines to Atlas Van Lines in the Bill Muncey deal, practices all sorts of magic to keep the big mills humming and the hulls intact. To win, the thunderboats are often pushed beyond their red-line points by means of exotic fuel blends (such as 10 percent nitromethane and 90 percent methanol), plus spurts of nitrous oxide (laughing gas). They must also contend with the hazards of high-speed collisions with other boats, coconuts, sea cows and floating beer cans that are as hard as rock reefs when hit at high velocity. Latest Jim Lucero creation is a new cab-over hydro, previewed here, which the circuit expects may be the boat to beat this coming season. If she tests out according to designer Lucero's expectations, Bill Muncey will be driving her.

World record holder

Other designers and power sources are represented on the unlimited courses. Two years ago, a turbinepowered hull, Pamela Clapp's U-95, made the scene but sank after setting a new U.S. course record. Some racers feel that the U.S.-made turbocharged Allison aircraft engine, which flew in P-40 Warhawks, may have a stronger block and better lowend and medium-range torque. So far, however, no one has been able to make it hang together long enough to beat the likes of Pay 'N Pak, Miss Budweiser or Weisfield's (now Olympia Beer). Pak's world record of 16 wins tops the 14 formerly posted by Muncey in Miss Thriftway. Now the fans are waiting to see what Bill Muncey can do with the current Pak and the new Lucero cab-over, both campaigning under the blue-andwhite Atlas colors.

The postwar boom in thunderboats started when 30 new hulls were built and the circuit went nationwide in 1947. Designer Ted Jones introduced his surface-riding prop in 1950 on his famous design, Slo-mo-shun IV. first to have the propeller lift the hull enough so that it ran on three points-the two sponsons and the lower half of the propeller. Owner Stan Sayres took the boat through the traps on Seattle's Lake Washington at the then incredible speed of 160.323 mph, 21 mph faster than the Indy '500" was run on land that year. Sayres's record topped the 141.740 mark set 11 years earlier on

(Please turn to page 120)

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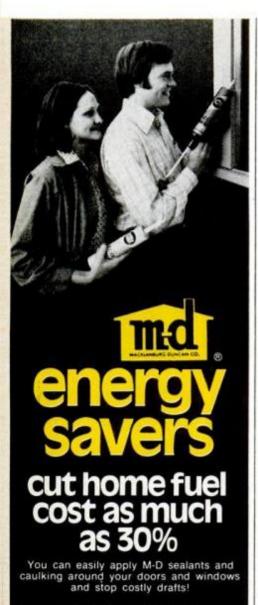
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Better than Ford. Better than Chevy.

In 49 states, a '76 Dodge D-100 with manual transmission and 225/6 cyl. engine beat Ford and Chevy with 25 mpg on the highway, 18 in the city. (Estimated figures from the latest EPA tests.) In California, our D-100 with automatic transmission and the same engine got 23 on the highway, 16 in the city. That beat Ford and Chevy, too. Your mileage may vary, depending on your type of driving and driving habits, your truck's condition and optional equipment.

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Scotland's Lake Coniston by the illfated Sir Malcolm Campbell in his Bluebird II. Earlier, Campbell had lifted Gar Wood's 124.9 record with a 1937 run in Switzerland aboard the first Bluebird at 129.5 mph.

Incredible speeds

Ten years after Stan Sayres's first record, Bill Muncey flashed over the same Seattle course at 192.001 mph in his Gold Cup winner, Miss Thriftway, in 1960. Previously he had won two Gold Cup championships in earlier models of Thrifty and even survived a lost rudder. Heading into the first turn of a Seattle Seafair, Thriftway continued on a straight course for the spectator fleet and rocketed into an anchored Coast Guard boat. Both sank, but there were fortunately no fatalities. It was the first time a Coast Guard craft had ever been sunk by ramming.

Better boat balance and both aero and hydrodynamic improvements, plus advances in construction materials and safety gear, have cut down the number of accidents. Smaller courses also help. "We used to run on three-and-three-quarter mile courses," Bill Muncey recalls, "and more bad things happen when you wind up for such a long time. I honestly think that today's Pay 'N Pak, constructed from honeycomb aluminum, could have turned in 130-mph laps on the bigger courses."

Most races today are staged on two-and-a-half-mile ovals with a few run on threes. One race last year at Phoenix, Ariz., was fought over a tiny mile-and-a-half course. And last vear was one of the most accidentfree, with no major mishaps other than Bernie Little's Miss Budweiser holing out and sinking in the Gold Cup race at Tri-Cities, Wash. Little, whose boats tied a record winning three straight national championships in 1960-71, once again made good his boast of never missing a race in 13 years of competition when he showed up at the Seattle Seafair event just a week after the sinking.

Dangers are different

Because of the small number of thunderboat races each year and correspondingly fewer accidents, many spectators are unaware of special dangers which auto competitors don't have to face. The biggest enemy of the hydro driver is the sudden unexpected flip. A hydro can kite and go over just when it seems to be riding the smoothest—which probably means it has left the water and is sailing through the air! The best drivers can usually sense the change

and immediately ease off to bring the bow down.

And there are other hazards. A broken prop blade can suddenly slash through the hull, a stack fire can spread or an engine explode. Collision from a boat out of control, hosing down from the 50-foot-high roostertail of prop spray of a boat ahead, or holing out from hitting floating debris are major problems.

Yet there is something about riding one of these huge machines down the straightaway and into turns at 170 mph, or watching other battling boats do it, that seems to infect people for a lifetime. Every year competitors pour thousands of dollars into this unlimited hydro racing with no hope of ever getting it back in prizes, although firms who know how to use publicity often get back more than their money's worth in millions of words of printed copy and numerous television shows. And the "little guy" competitor, so-called without tractor-trailers filled with engines and spare parts or motorhome loads of mechanics and pretty girls, keeps coming back every year as well, waiting for a chance that one of the well-heeled favorites may break down and give him a win.

Thousands watch

The fans are equally devoted. One of the biggest crowds ever to watch a sports event was the audience of 500,000 lining the banks of Seattle's Lake Washington several years ago to witness a Gold Cup race. Last year the thunderboats played before a combined total of 1,200,000 fans, with an estimated 420,000 of them attending the Detroit contest.

The unlimited frenzy reaches its peak at Seattle each year where the entire town goes wild with banners on street lights, speeches at civic clubs, parades, banquets and almost nonstop TV coverage of it all. Here enthusiasm runs so high that collectors of the various arm patches and boat badges even have their own fenced-in area where they barter from custom-made displays, with a favored boat badge going for up to \$100 each. Little old ladies can discuss quill shafts and turbochargers, kiting hulls and blipping engines, and kids know which year band leader Guy Lombardo won the Gold Cup and how Lou Fageol, using half the lake for a full-throttle flying start, cartwheeled his boat in mid-air.

Fastest, noisiest, most expensive and exciting—the unlimiteds are getting up power for another year of competition in a class by themselves.

Dutch Boy invents the house paint that doesn't crack and peel. It stretches.

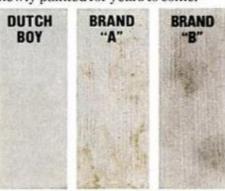
You may not notice it, but your house expands and contracts daily with the weather. Ordinary paints can't stand up to this continual stretching, so they soon crack and peel . . . and you face another paint job.

Now Dutch Boy introduces Super Latex, the house paint that can stretch with any house. To demonstrate the in-



credible flexibility and crack and peel resistance of this new paint, we covered one half of a balloon with Dutch Boy Super Latex; the other half with a leading premium exterior house paint. When the balloon was fully inflated, the Dutch Boy side remained fully coated, while the other side cracked.

Dutch Boy Super Latex delivers the maximum in hiding, color retention, chalk adhesion, and mildew / prevention ... even after years of exposure, Naturally, Super Latex does cost more than conventional house paint, but you'll find that it saves you more and more with every year that it's on your home. Buy Dutch Boy Super Latex now, and make a longterm investment in a home that looks newly painted for years to come.



Mildew Resistant

We use the best mildew-fighting agents known. Tests show no paint beats mildew better than Dutch Boy Super Latex.



Chalk Adhesion

Painting over worn, chalking surfaces? Dutch Boy Super Latex adheres like no other paint on the market.

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Dutch Boy Super Latex has a higher percentage of prime pigments ... for a thicker, smoother coating and superior covering qualities.









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FAVORITE CARS

(Continued from page 57)

sales tax. Transportation charges and higher sales tax would up the cost in most other areas.

Tool No. 2 would be a van. That may seem like an incongruous pairing-to jump from a compact to a van, I'd like a van because I do a lot of hauling during my free time. One of my off-time projects is the restoration of a century-old building. This involves hauling a lot of oversize, awk-



For Lund, happiness is a new Chevy Nova.

ward stuff that can't be transported

I've put a lot of miles on a lot of vans and, as Will Rogers said about people, "I never met a van I didn't like." I guess I'd go for the Dodge Sportsman MaxiWagon B200—same equipment as on the Nova, but with a V8 engine and a 59-amp. (heavyduty) battery. If it was PM's money, I'd include airconditioning. But if it was my own money, I wouldn't pay \$572.40 extra for air. Including air and Michigan sales tax, this job would price out at just over \$7000. (I'd also throw in a couple Sears air mattresses-\$8 each when they are on sale-so I could sleep in the back of the van if I wanted to camp out.)

Choice No. 3 would be a show-off car. I'm not up on museum-piece cars, but I know one that would be a blast to own. It's the Golden Bugatti Type 41 Royale.

The Golden Bug is the biggest piece of iron ever made. It weighs more than 7000 pounds and measures 22 feet overall.

Bugatti made only six or seven



And a Dodge van would help, too.

Type 41s. The fans argue over the number. Some say six, some say seven. Back in the late '20s, early '30s, when the car came out, it sold for \$42,000. All six/seven are still in existence and it's anybody's guess what the car would sell for today. If you found an owner who was really hard up, he might let it go for a mere \$250,000. But that would be a steal and the price could go as high as \$500,000 or more.

I wouldn't know what to do with a Golden Bug if I had one. Pet it, I guess. But if people have pet rocks, why not caressable cars?

MIKE LAMM, West Coast Editor: When PM asked me to list the three cars I'd most like to own, these popped to mind immediately:

My first choice would be a 1930 Cadillac V16 phaeton; second, a 1934 Ford roadster; and for everyday driving I'll take a 1955 Chevrolet Bel Air convertible.

Combined value: \$125,000 in the condition I'd like them.

I've had a passion for cars all my life, especially for classics and special-interest types. In 1952, when I was 16, I bought a 1932 Cadillac V16



Lamm's dream realized: '34 Ford roadster.

in Harlingen, Tex. Paid \$90. This was a five-passenger sedan on the 143inch wheelbase. The car hadn't run for four years, but I restored it for about \$300 and I drove it daily for two years.

It was a marvelous car-smooth, quiet, easy to handle, and amazingly potent. I vividly remember showing off the car to friends by placing the gearbox in high and then moving off from a standstill. The clutch needed very little slipping, and this 5625pound car would walk away in total silence. I mean total. And with the smoothness of an automatic. By the time it hit 30, the carbs began to moan and the torque started to make itself really felt.

The V16 engine was a pleasure just to look at. It had an aluminum block with porcelainized navy-blue exhaust manifolds, and black-and-silverribbed aluminum locker covers. All

(Please turn to page 124)



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FAVORITE CARS

(Continued from page 122)

wires were hidden, and all nuts and bolts were chromed. Twin updraft carburetors made it clear that the 452-cu.-in. V16 was, in actuality, two straight Eights on a common crankcase.

The Cad had a vacuum clutch, I recall, and a vacuum-brake booster that never quite worked. The first time I crawled underneath to check this booster, I was amazed to find dozens of chromed acorn nuts hidden here and there on the chassis and running gear, all where no one but a mechanic would ever see them.



And a '55 Chevrolet convertible.

That's the kind of car it was: extravagant, overbuilt, overengineered, superbly detailed, and more fun to drive than the hot rod I also owned then.

I finally sold the Cadillac to Pinky Dierks for \$450. About five years ago, a Houston doctor offered this same car in Hemmings (I recognized the auxiliary headlights I'd installed) for \$10,000.

The 1934 Ford roadster-well, I like its lines very much. I realize it's traditional to prefer the 1932 Ford V8 roadster, but I fancy the '34. Just a personal thing. Too, the '34 V8 is more powerful and trouble-free than the '32. What I admire about the 1934 Ford roadster, then, are its looks foremost-the clean design, the way the cowl wraps around the cockpit: then secondarily its simplicity and sensible engineering.

As for the 1955 Chevrolet convertible-again, I can't deny the styling influence. But I feel, too, that it's an important car historically, being the first to carry Ed Cole's modern, light-

With only the addition of front disc brakes, the 1955 Chevy would be as practical, economical, and comfortable as any 1976 American compact. Engineering practices haven't changed appreciably these past 20 years except in the areas of complexity, safety and emissions.

I like to do my own repairs and maintenance. On today's car, many "simple" repairs take equipment and knowledge beyond the home mechanic.

The '55 Chevy V8 is a car I could live with if I knew I'd never buy another. And all three of my choicesthe 1930 Cadillac V16 phaeton, the 1934 Ford roadster, and the 1955 Chevy convertible—will appreciate in the future, so they're what I consider sensible investments. Sensible and fun.

BILL HARTFORD, Auto Editor: When I started thinking about owning any three cars in the world, my sweaty right palm dropped to my side, fingers grasping the Lamborghini gearsh.ft knob of my dreams; my right forearm started flailing uncontrollably in an H-pattern and my right foot started a heel-and-toe twitching under my desk. My eyes-they had already half bugged out of my head. The other PM editors had to endure several hours of low, guttural "vroomvrooms" echoing through the office.

It took a whole day just to get control of my Dr. Jekyll and his Jaguars, Ferraris and Maseratis. This was a tough one; I'd better sleep on it.

By the next day I was quite rational again: I'd need a garage three times the size of my present one or, at least, some off-street parking places. I'd need three times my usual glovebox gear-tire-pressure gauges and so on.

I got very practical. After all, I'd be the one to maintain and fuel these three machines; PM would only be picking up the purchase price. Respectable fuel mileage would certainly have to be among the features.

I kept working on the project-daydreaming rather. All of my choices



Hartford's workhorse is a Volvo 265.

would have to be brand-new cars. I like the gleam of just-machined surfaces; I'll do the breaking in, thank you. I'd rather expend my energy keeping a brand-new car in tip-top shape rather than restoring an old one, and would rather zip along behind the wheel of a modern automobile than chug along in an antique. So, it came down to three cars currently in production.

The three would have to meet as

(Please turn to page 128)

No other TV/Audio home study school puts prices in its ads. Why?

Maybe it's because they can't match these values

NRI will give you complete TV/Audio service training with a solid state 25" diagonal color TV and a 4-speaker Quadraphonic System for hundreds of dollars less than the combined tuition cost of courses at another school. Only NRI gives you a choice of five ways to learn, starting as low as \$445 with convenient, inexpensive time payment plans.

NRI pays no salesmen. We buy no out-side "hobby kits" for our experiments and training kits. We pass the savings on to you, giving you the top educa-tional value available anywhere.

Take vour choice in TV/Audio training

Only NRI gives you a choice of five courses in TV/Audio servicing. Each comprehensive course features bitesize lessons, special reference texts,

special engineered "power-on" training kits, and service instructions for black and white TV, color TV, FM multi-plex receivers, PA systems, antennas, radios, tube, digital circuitry, transistor, and solid state circuits.













7 kits including Quadraphonic Stereo...\$445

A basic TV/Audio Servicing Course including 7 training kits for your experiments. You build your own 4-speaker Quadraphonic System, solid-state volt-ohmmeter, CMOS digital frequency counter, and electronics Discovery Lab. Includes 48 bite-size lessons (18 on color TV), 10 special reference texts with hundreds of servicing shortcuts, tips on setting up your own business, etc. This completely up-to-date course covers black & white and color TV, FM multiplex receivers, public address systems, antennas, radios, tube, transistor and solid-state circuits.

11 kits with Quadraphonic Stereo and B/W TV...\$550 or low monthly terms

A complete course in B&W and Color TV Servicing, including 48 lessons (18 on color TV), 10 special reference texts and 11 training kits. Kits you build include 4-speaker Quadraphonic System, solidstate volt-ohmmeter, CMOS digital frequency counter, electronics Discovery Lab, plus a 12" diagonal solid-state black & white portable TV to build and use. At each assembly stage, you learn theory and "Power-On" application of that theory in typical solidstate TV sets.

11 kits with 19" diagonal color TV...\$880

The course includes 42 lessons and 4 reference texts plus kits and experiments to build a superb solid-state 19" diagonal color TV receiver . . . complete with cabinet, and engineered specifically for training by NRI's own engineers and instructors. This handsome set was designed from the chassis up to give you a thorough understanding of circuitry and professional trouble-shooting techniques. You build your own solid state volt ohmmeter, CMOS digital frequency counter, and experimental electronics Discovery Lab.

14 kits with 25" diagonal color TV and Quadraphonic Stereo...\$1195 or low monthly terms

The ultimate home training in Color TV/Audio servicing with 48 bite-size sessons, 10 reference texts, and 14 training kits . including kits to build a 25" diagonal color TV, complete with console cabinet; a 4-speaker Quadraphonic Center; a wide band, solid-state, triggered sweep, service type 5" oscilloscope; digital integrated circuit color TV pattern generator; a CMOS digital frequency counter, and an electronics Discovery Lab. This gives you both TV and Audio training for hundreds of dollars less than the tuition cost of TV and Audio combined from the next leading school.

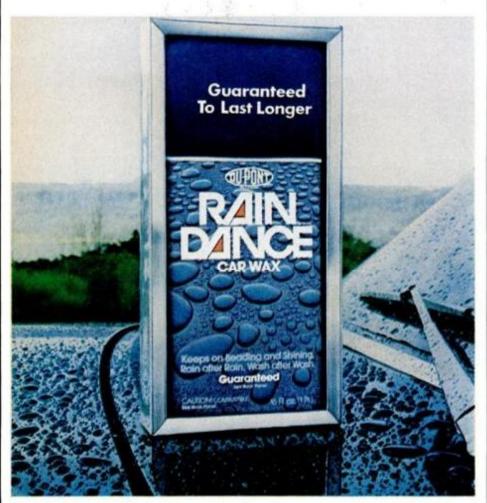
This Master Course combines theory with practice, using the "Power-On" stages for experimentation and learning. Building NRI's equipment will give you the confidence and ability to service any color TV or Audio unit on the market. And you'll have a magnificent TV and quadraphonic system for years of trouble-free performance.

Advanced Pro Color with 19" diagonal color TV...\$665 or law monthly terms

An advanced Color TV Servicing Course for experienced technicians, 18 lessons, 5 new "Shop Manuals", and NRI 19" diagonal Color TV receiver with cabinet.

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Water beading proves it. Du Pont guarantees it.



Tests prove "Rain Dance" actually lasts twice as long as the leading "\$5" paste wax.

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Premium-performance "Rain Dance" is easy to use. It gives your car a fantastically brilliant shine because it cleans deep down as it waxes. And that shine lasts longer.

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GUARANTEE: "RAIN DANCE" is guaranteed to keep on beading and shining longer than any leading liquid or paste car wax. If not completely satisfied, return unused portion to 8-4233, Du Pont Company, Wilmington, DE 19898, for full refund of actual purchase price and postage.



Now available in liquid and new paste.



FAVORITE CARS

(Continued from page 124)

many of my motoring needs as possible. I figured that I'd need a supercar for fast, fun driving; a workhorse with a tailgate or hatchback and a set of wheels with bunks for the boondocks—a compact camper of some sort.

Once I had a grip on my automotive fantasies, the specific cars fell into place quite easily. First choice would be Porsche's new Turbo Carrera—a \$26,000 package of pure performance, a turbocharged, fuel-injected screamer wrapped in a slick skin and loaded with all the creature comforts anyone could want. It's the only turbocharged production machine you can buy; it'll blow the doors off anything on the road, and it'll run in traffic at low rpm without overheating and without wheezing



And great escapes via VW Campmobile.

and wobbling. And, to show you how practical I am, it'll get over 20 mpg.

So much for fun. Next, a workhorse—with a tailgate. You can't get any more car in that category than the \$11,000 Volvo 265 station wagon. It combines a cavelike cargo area with incredible comfort for driver and passenger. I can see it now, a metallic blue 265 crossing the bridge to PM's Manhattan offices: chauffeur behind the wheel, Mack bulldog mounted on the hood and yours truly in mechanic's overalls, reclining in the co-pilot's seat, contentedly leafing through the Wall Street Journal.

Finally, a vehicle unique in its own way. The VW Campmobile has been around for quite a few years. It's the forerunner of all the campers on the road today, but what makes the \$8000 VW so appealing is the compactness of the rig, the care with which it's put together and its good mpg.

There. I'd be happy with a modest \$45,000 worth of machines . . . but, now let's see, do I have a token for the subway tonight?

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New Solid State Transistor Radio Fits On Your Wrist Like A Watch

...Leaves Both Hands Free For Action!

Now at last you can enjoy all the benefits of a powerful, portable transistor radio without ever having to carry it in your hand. No matter where you go or what you do, you can depend on your new Wrist Radio for the latest news bulletins, up-to-date weather reports and continuous music.

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Powerful—Pulls In All AM Radio. Stations From 535 To 1605 On the Dial Although this amazing Wrist Radio operates on only one penlight battery, it produces a full 80 milliwatt power output. The 2" permanent magnet speaker gives you sharp, clear tones without distortion or vibration.

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CROWN-CASTLE, LTD., Dept. WRN 133 51 Bank St., Stamford, Conn. 06901

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WHAT'S COMING DOWN THE PIKE!

(Continued from page 100)

purchase of a new automobile. If you plan your strategy well, you can save hundreds of dollars. Here are some examples:

Bargain prices for new cars

The big price increases come during the years when there's a new body. The auto companies like to use up the old pieces before making a major body change, so they usually crank out a number of extra cars in the final months of production of an old body.

Dealers then list bargain prices for these cars to clean them out before the new-body car arrives. This is a good deal if you expect to keep the car for a minimum of three years. But you don't want to be caught with an old-body '77 on your hands if you're planning to trade it on a new-body '78.

Depreciation and trading

Detroit's timing on major body changes has a direct influence on what you get for your used car when you trade it. Depreciation is higher during the years when there has been a big change between one year and the next than it is during years when there has been minimum change—face-lift years.

The chart presented on pages 100 and 101 shows that the companies are planning by body designations. Bodies, not car models. There is no difference in the body between a Superior, Super Superior and a Super Superior Superb. They are all Superiors.

Letter designations

GM and Chrysler use letter designations to distinguish between the bodies of their different cars; such as A body cars, B body cars, and so forth.

Ford and American Motors do not use letter designations. (Ford is working on a numerical identification system. If Ford adopts this system, the bodies will be numbered four, five or six. These numbers are in reference to passenger capacity. A four-place car would mean that the car is designed to accommodate four people.

For the purpose of compiling the chart, PM has arbitrarily assigned letter designations to Ford and American Motors cars. I, for example, stands for an intermediate, while a C car indicates a compact. The letters that have been assigned to Ford and AMC cars are explained in the footnotes appearing at the end of the chart.



FOR 200 YEARS, NOBODY HAS.

In 1775, eight ships flying this flag prepared to defend our colonies. In the 200 years since, the Navy has never stopped working to keep foreign nations from treading on democracy.

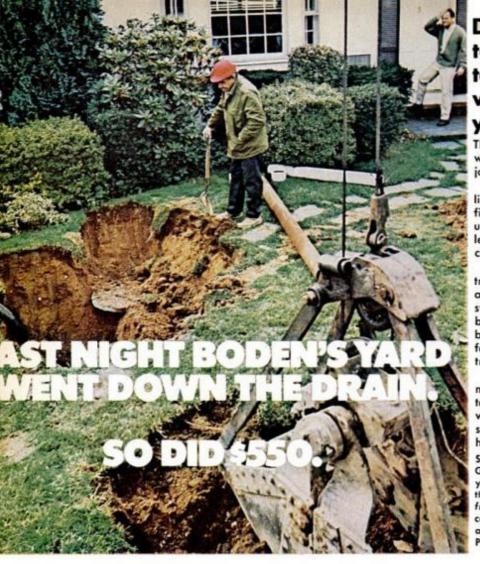
Of course, there have been a few changes. Today, our ships range from aircraft carriers to nuclear submarines to hydrofoils. Today, we continue to safeguard democracy all over the world. And today, a sailor can learn to be an expert in skills like radar, aviation mechanics, nuclear propulsion or advanced electronics.

Today's Navy can train you in more than 60 career fields. And give you the opportunity to meet new people, continue your education, and possibly even see the world. Your Navy recruiter can tell you what training you're qualified for. Speak to him or call toll free 800-841-8000. (In Georgia, 800-342-5855.)

The Navy. Like America, it's come a long way in 200 years.

NAVY

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First	(Please Print)	Last
ADDRESS		
CITY	STATE	ZIP
A	ALL RIVERS A	"一下语声"
BIRTH DATE	AVAIL TO THE AVAILABLE	Last Grade Complete
PHONE	one comme	
(Area Code)		
ACTION CONTRACTOR	-	
THE RESERVE AND ADDRESS OF THE PERSON NAMED IN COLUMN TWO	AND REAL PROPERTY.	



Don't you wait for septic tank or cesspool trouble to start. Use Rid-X® now. 50¢ worth once a month can save you hundreds of dollars.

The Bodens are real people. Their cesspool really needed work. This picture was taken as it was being done. The job really cost \$550.

It could happen to you! For years the Bodens were like most home owners. Their sewage system worked fine, so they ignored it. Meanwhile, trouble built up underneath their feet until one day, it surfaced. They learned the hard way—when you see septic tank or cesspool trouble, it may be too late.

That's why you should start using Rid-X now, before trouble starts. Today's modern detergents, bleaches and lyes can destroy the active bacteria your sewage system needs to work efficiently. Rid-X is a beneficial bacteria additive made to help reactivate that essential bacteria action; to help liquefy waste matter, oils and fats. Rid-X works to keep septic tanks and cesspools trouble-free.

Don't confuse Rid-X with liquid and caustic products made to simply unclog drains. Rid-X is specially made to work inside septic tanks and cesspools. Just 50¢ worth, flushed down the toilet bowl once a month, can save you hundreds of dollars! Buy Rid-X today, at your hardware or food store.

SPECIAL COUPON OFFER.

Get a discount coupon worth 50¢ towards your purchase of Rid-X (it's like getting the first month's supply free) - plus a free 16-page booklet on septic tankcesspool maintenance. Send name and address to Rid-X, P.O. Box 225, White Plains, N.Y. 10606.

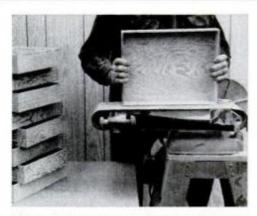


BUILD THIS STACK OF SWINGERS

(Continued from page 115)



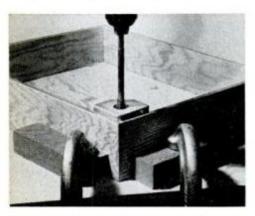
Assemble trays with glue and %-in. (20ga.) brads, being careful to drive them straight. Cut parts from flat plywood.



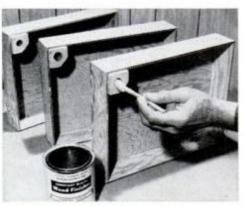
Ease all sharp corners of assembled trays with a block plane, then sand outside surfaces. Sand inside ones before assembly.



Protect outside corner with a notched 90° block when gluing and clamping pivot blocks in right front corners of trays.



Clamp two stop blocks to wood drill-press table to assure identically bored holes in the corner blocks of all nine trays.



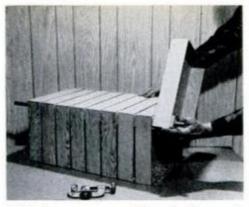
Coat holes with sanding sealer, then sand lightly when dry. Cotton on stick makes swab, Follow with coat of candle wax.

tray over to complete the hole. Halfinch conduit is 11/16 in. o.d. (outside diameter) so use this size bit.

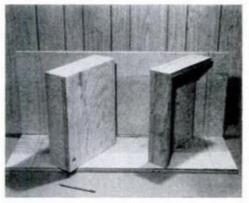
When the holes are bored, paint trays and insides of holes with sanding sealer, then sand lightly when dry with 220-grit paper, holes and all. Rub a wax candle in the holes and across the tops of the blocks. Now slide the trays over the conduit post.

Make the outer cabinet shell from 34-in. fir plywood. Drill a 14-in.-deep hole in the top of the base section and in underside of the upper section, and nail and glue the base section in position. Insert the conduit

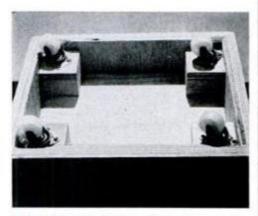
Материал, защищенный авторским пра-



Slide trays over conduit post. Wax coating inside holes and on tops of corner blocks assures smooth-swinging trays.



Bore holes for conduit in top and bottom sections of cabinet before final assembly. Glue the bottom section in place first.



Attach free-swinging, swivel plate casters to the four corner blocks. Wheels should extend about 1 in. below the sides,

in the hole in the base and place the upper section over the top of the conduit. Then glue and nail the top section in place to secure the conduit.

Now turn the unit upside down and install blocks in the corners for plate-type swivel casters. The wheels should project about 1 in.

A facing of 1/4-in. plywood is attached to all surfaces except the top edges of the upper compartment. These edges are faced with 1/4 x 1-in. solid pine. Ease (round slightly) all corners with a block plane and sand You'll find the wild grain pattern of fir plywood can add an interesting effect when finished natural with a clear satin varnish.

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"Think the world of my Sharr-All. Am now grossing about \$4,000 a year part time, and hope to expand shortly. Now doing work for the State of New York, Carrier Corp., and General Motors."

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\$5.36 an hour

8"On Saturdays, my big day, I take in \$45 to \$55.
Other days I average less, but I figure I make between \$5 to \$6 per hour... and sometimes more. I am presently enlarging my shop, and thank BELSAW and their fine equipment for making it measures.

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"Bought my SHART-ALL four years ago, and it has done everything (and more) than you said it would. I never sharpened a saw in my life, but when I had to quit my regular job, I knew I had to have something to do. Now I have more work than I am able to do — I have as many as 100 saws shead of me at a time."

Frank Sartin Grandview, Washington \$8930

100% Disabled

*I was disabled by an accident while employed as an iron worker. They declared me 100% dis-abled and said I'd never work again. I don't think work again, a started my ne else but I started my could work for anyone else but I started m arpening business part-time and now it's turne to a full-time job with more work than I can do.

Res Stage Tampa, Florida 33614



You risk nothing by accepting this offer to see how easily you can turn your spare time into Big CASH Profits with your own Complete Sharpening Shop. Send coupon or mail postcard for full details on our exclusive 30-Day Free Trial Offer!



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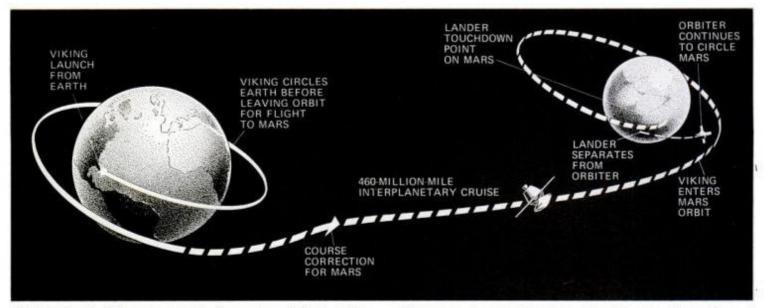
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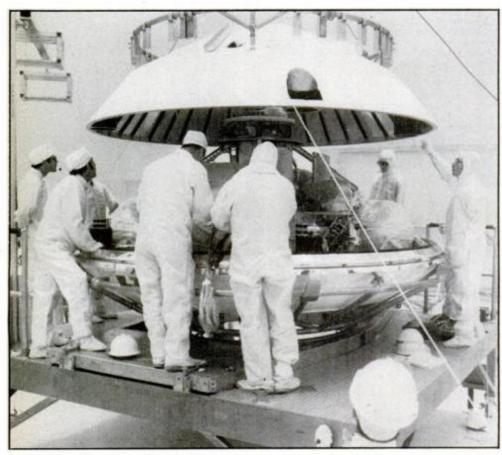
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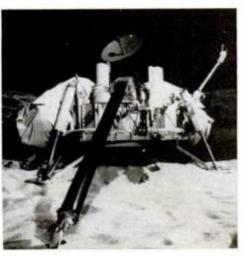


Flight path of Viking spacecraft shows how it first orbits Earth after launch, then steers course for Mars, 460 million

miles away. Approaching Mars, it again goes into orbit, and Lander module separates for landing on the planet's surface.



Clothed in antiseptic garb, technicians hover like surgeons over Lander module as it's prepared for trip to Mars in sterile lab to avoid any possible contamination that might affect its findings on the strange planet. The Lander is then sealed in between two protective saucer-like shells shown open above. The lower shell, a heat shield called the aeroshell, jettisons after the probe enters the Martian atmosphere. The upper shell, to which the parachute is attached, later jettisons at about 4000 feet and Lander's retrorockets fire to slow its descent for a soft landing on the planet's surface. Photo at right shows a full-scale working model of the probe with legs and a soil-collector boom deployed to check out various functions.



SEARCH FOR LIFE ON MARS

(Continued from page 66)

do the work of human hands. The Viking craft, first of two scheduled to probe Mars, consists of two sections, the Orbiter and the Lander modules. After entering an orbit around Mars, the sections will separate, the Lander descending to the surface as the Orbiter continues to circle the planet to serve as a relay station.

For nearly a year, the Viking has been streaking through space at a 54,000-mph clip—a phenomenal 1.3 million miles a day—to cover the 460-million-mile distance from Earth to Mars (as measured along a curving flight path, not in a straight line from point to point). The main purpose of its billion-dollar mission is to settle once and for all the long-pondered question: Is there life on Mars?

Landing site a gorge

As the Lander module breaks loose from the Orbiter, it will plunge into the Martian atmosphere, deploy a parachute to slow its descent, carefully skirt a 15-mile-high volcanonearly three times as high as Mount Everest and the highest point on Mars-then fire its braking retrorockets and head for a gentle touchdown in a gorge known as the Valles Marineris. The huge, 3000-mile-long trench has been chosen as a landing site on the assumption that a sheltered valley is more likely to contain whatever little moisture there may be on the predominantly dry planet, thereby making it a possible spawning ground for Martian life-if life exists at all. Later, a second Viking Lander, already on its way, will

(Please turn to page 138)

Says Cliff Hicks, Editor of the Popular Mechanics Do-It-Yourself Encyclopedia:

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SEARCH FOR LIFE ON MARS

(Continued from page 134)

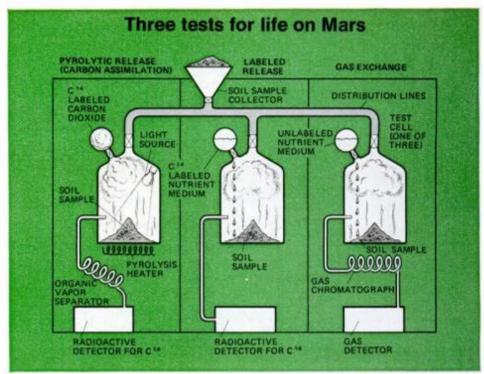
probe a different landing site, to confirm the findings of the first or perhaps uncover new secrets.

We already know from earlier Mariner explorations that Mars is a harsh, forbidding place for life to develop and prevail. The fiercely chilling Martian night, with temperatures down to minus 165° F., makes it likely that much of the water needed to support life is permanently frozen.

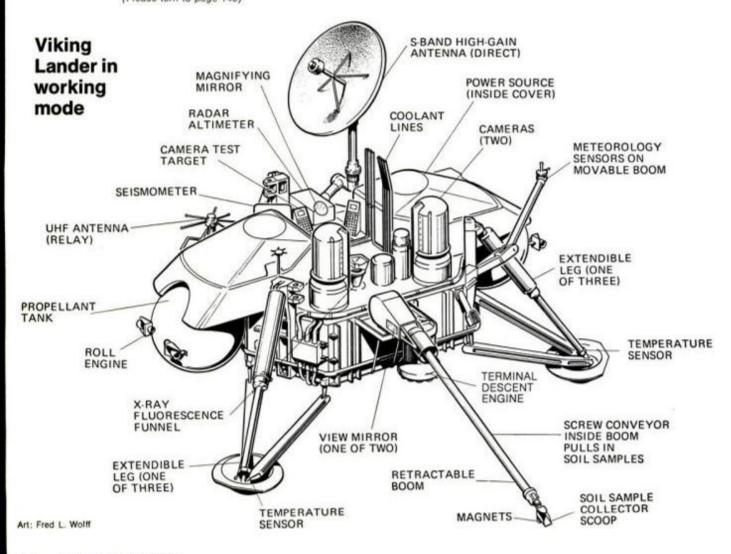
Hostile environment

In addition, deadly ultraviolet rays from the sun beat down mercilously through the thin Martian atmosphere—about ½00th as dense as Earth's—and much surface is desolate desert raked by monstrous dust storms. Winds of 100 to 300 mph rage savagely across the barren, battered wastes. Precipitous chasms up to 20,000 feet deep—nearly four times the depth of our Grand Canyon—gash the craggy, cratered crust like giant, ugly knife wounds. A forbidding place to live indeed.

For its attempt to unlock the mys-(Please turn to page 140)



Intricate mini lab, crammed into one cubic foot of space inside Mars Lander, is shown diagrammatically above. Three separate chambers will test for living matter in soil samples scooped in by Lander's collector boom. First two will use radioactive tracer—carbon-14—one to detect plant life, second to detect animal life. The third chamber will analyze gases produced by processes of metabolism in possible living creatures. If gases are found, they would indicate almost certain existence of life.



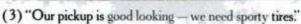
HOW YOU CAN SOLVE THE FOUR BIG TIRE PROBLEMS OF THE FAMILY PICKUP TRUCK.

By Steve Petrasek, Firestone Tire Engineer











Those are common comments often made by different family members about the same truck. Four tire needs, all for the same truck.

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On the front go Firestone's Transport 500 Wide Oval" — strong nylon cord body, long mileage truck tires. They're the steering part of the system, and those big, wide Town & Country Transport 500 Wide Oval* treads help stabilize your truck, help float it over soft stuff, and give you a

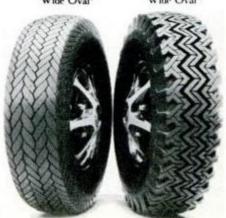
nice ride down the road.

On the rear we put Firestone's Town & Country Wide Oval.™ It is a really strong traction tire with nylon cord body and long mileage tread rubber that can stand up under heavy loads and claw its way through fields and ruts, yet still behave gently on street and highway.

Nice ride, big loads, good looks, bad roads? Now you know Firestone has a truck tire system for handling them all.



Ask a friend about The Wide Oval System from Firestone.



SEARCH FOR LIFE ON MARS

(Continued from page 138)

tery of Mars, the Viking Lander contains unique and ingenious equipment: Crammed into a space of about one cubic foot is a complete, three-stage, automated laboratory of almost unbelievable complexity. This ultraminiaturized lab will, among other things, sample Martian soil, examine it for traces of living matter, then send the test results millions of miles back to Earth.

To get a better idea of the Lander's operation, I visited RCA's Astro-Electronics Div. near Princeton, N.J., where the space probe's radio equipment was built. There I studied a full-scale mock-up of the Lander, about the size of a Vo!kswagen. Though the actual Lander had long since been launched, I asked out of curiosity if I would have been allowed to see some of its hardware.

"No," my guide told me. "You're too dirty."

Lander must be sterile

Everyone coming near any part of the Lander had been required to be "biologically clean" to prevent contamination of the Lander by germs or other microorganisms. "If there is any life on Mars," the project engineer explained, "it has had no chance to build up immunity to infection by Earth organisms. Even microbes harmless on Earth might cause epidemics on Mars, wiping out whatever life exists there." That's why only "surgically scrubbed" persons had been permitted in the assembly areas.

I peered into glass-walled labs that resembled hospital operating rooms. There, men in special decontaminated clothing, wearing surgical masks and breathing only filtered air, had labored like surgeons on the Lander's intricate, miniaturized communications equipment. Much of the work was so delicate it had to be done under microscopes.

The first thing the Lander has to do after settling its spindly legs on the Martian landing site is make contact with Earth. By sensing the center of gravity on Mars, an on-board computer figures out where the Earth is at that particular moment and aims a 30-inch dish antenna toward us to report findings and receive commands. In addition to this direct link, a second antenna beams signals at the Orbiter module circling overhead. The Orbiter then relays messages to Earth.

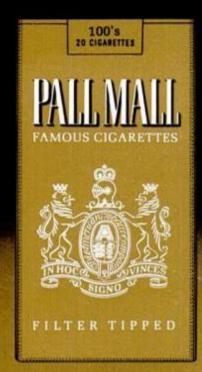
"Having two separate radio channels gives us backup capabilities," explains Irv Brown, who designed the communications system for the Viking Lander. "Besides, more transmitter power is available on the larger 5000-pound, solar-powered Orbiter."

Only 50 watts of power

Brown constantly stresses the need for power conservation because the total energy generated on the Lander is a mere 50 watts, produced by a miniature atomic powerplant. To run the whole automated life-detector lab. plus other experiments and data transmission, on less than the power consumed by an ordinary light bulb takes careful sequencing of every separate step to avoid overloads. Fortunately, the Lander can accumulate energy in batteries for short bursts of extra power, such as for deploying and activating special devices.

As the Lander starts to work, a mechanical arm unfolds like a spider's leg from the creature's weird buglike body. At its tip, a claw resembling a miniature backhoe digs into the most alien soil ever touched by a shovel. If life exists on Mars at all, it most likely is in the form of

Decisions...decisions





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microbes-and microbes would be present in the soil.

Inside the sampling arm, an auger screw begins to turn, pulling measured amounts of soil into three separate chambers for three different life-detecting tests:

1. The first chamber checks for possible plant life, incubating the soil sample under a sunlamp in a natural Martian atmosphere for five days, adding radioactive water vapor for nuclear "tagging" with carbon-14. By their photosynthesis, plant organisms would absorb the radioactive carbon. The atmosphere is then withdrawn from the chamber and the sample heated to 1160° F., a temperature high enough to vaporize the solids. The vapors then pass through a C-14 detector. A positive reading would indicate the presence of plant organisms.

2. The second chamber tests for animal life and also works by nuclear tagging. Here a nutrient broth is spiked with C-14. Martian "bugs" eating this nutrient during an 11-day incubation period would give off radioactive gases in their waste and thus signal their existence.

3. The third life-detection chamber contains no radioactive material. Little Martian soil creatures—if any -will drink a special broth called "chicken soup" by the experimenters. As in any other animals, their metabolism would produce gases like oxygen, hydrogen, methane and carbon dioxide, and an automatic gas analyzer keeps track of their digestion and the products given off-telltale signs of possible life.

Photographing little green men

This triple test, scientists believe, is likely to pick up any available chemical clues to the presence of living organisms-at least as we can conceive them. The lab itself and the instruments for automated gas analysis were built by TRW, Inc. and Litton Industries in California, and every step of their complex operation is sequenced and monitored by the on-board computer.

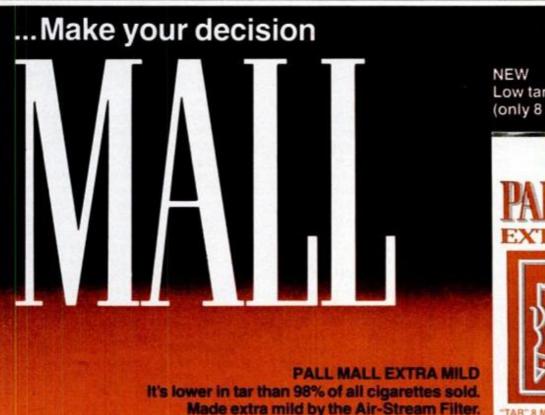
Larger life forms-for example, little green men with pointed heads -would not cook down easily in the mini test chambers. But they might show up in pictures furnished by the Lander's TV cameras. Special imaging techniques used in these cameras provide high-resolution pictures, far sharper and more detailed than commercial TV. What's more, since two cameras are used in tandem for every shot, three-dimensional (stereoscopic) pictures can be ob-

To get the clearest possible pictures, the video signal is taped on arrival at the Earth stations. The tape is then played into a computer, which reconstructs the original image while discounting "noise" and static inherent in the transmission path. The computer directs an array of red, green and blue lasers to trace an extra-sharp, full-color image with their fine rays. To build up a single frame, point by point, takes as long as 128 minutes by this method. A faster scan rate-two minutes per frame -is also available, but this rate vields less detail.

Still more test equipment

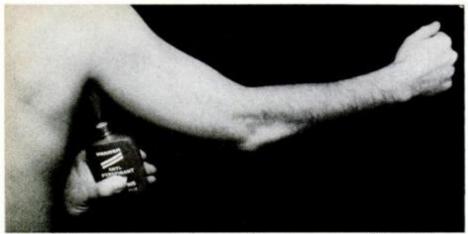
These slow-scan cameras obviously can't catch anything that moves, but if the little green men won't hold still long enough to get their picture taken, they'll at least reveal their presence by telltale blurs. What is far more likely and important, however, is that the high-resolution pictures may reveal signs of past or existing life in close-up views of the soil samples or the nature of the surrounding terrain. Moreover, the cameras can survey the landing site and pin-

(Please turn to page 142)



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AMAZING SEARCH FOR LIFE ON MARS (Continued from page 141)

point the most promising areas for test digging.

Life detection is the Lander's main task, but not the only one. The space probe also carries instruments to analyze inorganic soil substances that will tell something of the geological history of the planet. A compact weather station will furnish temperature and wind data, and a seismograph will report possible earthquakes-or rather Marsquakes. Radar will explore the reflection of radio waves from the Martian surface, and special instruments will sense magnetic forces, thermal properties, and the distribution and movement of ions in the Martian atmosphere. Also included will be a critical test for the presence of moisture—essential to the support of life.

Many different companies and universities have cooperated in designing all these special, highly sophisticated instruments, and the total engineering effort has been coordinated by the Denver division of Martin-Marietta, main contractor for the Viking Lander project.

 Transmitting these findings back to Earth involves tremendously complicated methods of telemetry. All instrument readings appear as electric voltages, which are converted into digital pulse patterns and stored in a special multichannel tape recorder. At certain predetermined times, when Earth swings into view on the Martian sky and the Orbiter appears overhead, the tape recorder "dumps" the accumulated data into the radio transmitter, which then relays the entire "data stream" via the Orbiter to the huge dish antennas of receiving stations in California, Australia and Spain.

Data transmitted digitally

At these locations, computers sort out and interpret the information. The Lander's computer issues an individual "identification tag" to each of the taped instrument readings. This digital signature enables Earthside computers to tell apart all the different data and even verify calibration of the Lander's instruments.

Presenting information digitally—
in the form of distinct pulses—also
makes it easier to transmit the data
over enormous distances with very
limited power. The on/off pulses—
like coded flashes from a searchlight
—show up more clearly at the receiv-

ing end than a continuous signal. As a result, information is less likely to get "buried" in background noise and static interference.

I asked Irv Brown at RCA if he encountered particular problems in designing the electronics for the Lander. Plenty, he assured me. "When we put the transmitter antenna in a simulated Mars environment, the whole thing lit up like a Christmas tree." The Martian atmosphere, consisting mostly of carbon dioxide, is electrically far more conductive than air and causes arcs to flash between the antenna elements. To keep the transmitter energy from being burned up in these flashes, special insulating pods had to be devised for the antenna arms.

Baking a space probe

But the main problem was sterilization. Before liftoff, the entire Lander had to be sterilized by baking for three days at 230° F. Standard electrical components couldn't withstand such heat, so new materials had to be developed. And, all materials had to be nonvolatile under Martian conditions. As Brown puts it, "It would make no sense to send a sensitive chemical probe up there if all it could do was sniff its own body odor."

Martian dust, whipped by frequent hurricanes, presented another problem. Dust seals had to be fitted to moving parts. The TV cameras clean their own transparent dust shields with blasts of pressurized carbon dioxide. Every possible condition on Mars had to be carefully considered before the Viking probe was sent on its historic voyage through space.

What are the chances of finding life on Mars? Scientists are wary of speculating. Once thought to be a "dead" body like our moon, the 4½-billion-year-old planet is now believed to be at least geologically active, with deep fires still burning in the bowels of towering volcanoes and periodic heaving and settling of a not yet stable crust. But the existence of life in such a hostile place is another matter. The most optimistic researchers put the odds at only one in 10; the more pessimistic, as little as one in a million.

Still, life has a way of adapting to an astoundingly wide range of conditions, so it's conceivable that some forms of living organisms may have managed to evolve even in the brutal Martian environment. If so, their discovery will greatly strengthen the theory that we are not alone in the universe—the awesome possibility that other conscious, intelligent beings may exist elsewhere in the vast reaches of outer space. We'll soon know.

35-MM FILM CARTRIDGES

(Continued from page 14)

or negatives, films to make black-andwhite slides from negatives or directly in the camera, and other special-purpose or scientific films as well.

Most well-stocked photo stores carry at least some bulk films (usually Kodak's), as do such mail-order shops as Spiratone (135-06 Northern Blvd., Flushing, N.Y. 11354), Porter's (Box 628, Cedar Falls, Iowa 50613) and 47th-Street Photo (36 East 19th St., New York, N.Y. 10003).

Bulk rolls come in lengths of 100, 50 or 27½ feet. The large, economy-size 100-footers are really the most economical, but you may prefer shorter rolls of films you use less often. Both 50-foot and 100-foot rolls can be spooled off in any quantity you wish, in case you just need a 10-exposure roll. But 27½-foot rolls have leaders notched out at 5½-foot intervals—just enough for 36-exposure loads.

How loaders work

Loaders go back to the dawn of 35mm photography, when the only way to get film was to spool your own from movie stock. But those loaders were simple, open-air devices like barbecue spits on which you turned the cartridge spool that you were loading; they had to be used in darkrooms.

Today's loaders are light-tight and require darkness only for the few moments it takes for you to put the bulk roll in. If you lack a darkroom, you can use a light-tight changing bag; in a pinch, you can even do it at night under the covers of your bed or in a closet.

Actually, there are two light-tight compartments in these loaders: The large one holds the bulk roll, and the smaller, with its own door, holds the cartridge. Connecting them is a light-tight slit, the light trap, designed to let the film be drawn out of the big compartment without letting light leak in.

To load a cartridge, you first open it and remove its spool, then attach the spool to the film end protruding through the light trap, as shown above. With the film coming from your right, the spool's long end should point toward you.

Reassemble the cartridge around the spool, insert it under the crank in the loader, close the light-tight door, and wind till you have enough film in the cartridge. Then open the door, remove the cartridge, and cut and trim the film end. Some cameras will require that you trim your leader





Before.

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Don't get burned.





New Whitehead Cinek preloads require no loader: You just slip one in a cartridge shell, then pull the lightproof leader through the cartridge slot.

like those on factory loads or $27\frac{1}{2}$ foot rolls, and you can get trimming
templates for this. Most cameras will
do nicely with a short, diagonal cut
as shown on page 14. And in many
cameras the film will work fine if you
just cut the end square.

What to look for in a loader

There are two basic types of loaders: Inexpensive, under-\$10 ones, like the small Prinz and the unbranded model shown, use felt-lined slots as light traps. The felt works, but the longer you own the loader, and the more you use it, the greater the chance that a sharp bit of dust will

embed itself in the felt and scratch your film.

More expensive models (still under \$20), like the Watson, Western, Premier and Prinz 66, have light traps that can't scratch the film because they never touch it. Instead, a door clamps tight against the film when you open the cartridge compartment, but opens wide to pass the film through freely when the cartridge-compartment door is closed. Interlocks prevent your opening the cartridge compartment till you've closed the light trap; but you must remember to open the trap when you wind the film to prevent scratches.

These models also have counters that click off the number of exposures you've wound; felt-trap models usually just have charts telling how many crank winds correspond to what number of exposures.

Most models of the same type work about equally well, though the tiny, light unbranded model would chew film if you set its lid at the wrong angle, and the Premier had the best interlock, but the worst crank.

The Cinek Redi-Loads are something else entirely: preloaded spools with opaque leaders, ready for insertion into cartridge shells. So far, they're just in pilot production. * * *

FORD, CHEVY AND DODGE VANS

(Continued from page 74)

chair for the right passenger, and airconditioning. The dealer's service department rates about the same as other dealers in this area—not bad, not great. I especially like the van's legroom, the airconditioner and the sliding side door. What I don't much care for is gas mileage—12 and 14 mpg in town and on the road."

From a 23-year-old Arkansas student and owner of a Dodge Tradesman B-200 with the 318 V8 and automatic: "I raise Dobermans and needed a van for hauling and basic transportation. The Dodge dealer was excellent—I never felt pressured. They had a large selection. I told them what I wanted, and they didn't try to talk me into a lot of expensive accessories.

"I've had ignition trouble, and the carb was dumping gasoline into the oil. The dealer's service department is always courteous; it fixed everything and tried to get me back on the road as soon as possible.

"I didn't buy this van specifically for comfort, but the standard seats give good support and the driving position is adequate. I plan modifications later. Handling is excellent, even with the cheap Chrysler shocks. I also like the 318's overall performance and the good heater. What I dislike are the lack of visibility on the right-hand side and an unusually long flat spot with the stock carburetor. There are also a few rattles, but otherwise the van feels solid. I get 13 to 15½ mpg."

Now a Michigan journeyman electrician, age 42, with a Ford Econoline 150, the 351 V8 and automatic: "I work 800 miles from home and wanted to have a place to sleep at work or on the road. I plan to install a stove, table and a real bed later. When I bought this van, the salesman was a dink, but the sales manager straightened him out. Even so, I've had troubles. All valves in the right bank had to be replaced, and the engine cover didn't fit right. The dealer did a valve job, but I wasn't happy, so I went to another dealer, who pointed out that the first dealer never changed the oil filter, and left a lot of residue in the engine. The second dealer also fixed the engine cover, which the first dealer never did. Anyway, I think the factory should institute more quality control.

"I especially like the quietness of the body. It's extremely quiet because of the good insulation and padding. It a'so handles well. About the only change I'd like would be a real glovebox instead of the hole, but it's really a good, comfortable machine, and I'm very pleased with it."

And finally, from the 37-year-old Georgia owner of a 292-c.i.d. six-cylinder Chevyvan G-20 with manual gearbox: "I wanted a van for the family so we could take small children on long trips—utility, comfort, convenience. We've built in seats that fold into a bed; also have put in storage for clothes and food. Except for minor adjustment, we've had absolutely no problems, and I would rate the dealer as very good. I feel he gave me the best price I could reasonably expect.

"Options include captain's chairs, CB radio, total carpeting and the aforementioned built-ins. My only complaint is gas mileage. I bought the Six with three-speed stick for the specific purpose of holding down gas bills. I believe this engine should do better than 13.5 mpg on the highway. Even so, I much prefer to drive and ride in this van than in any so-called luxury car, especially over long distances with children. As for workmanship and quality, it's good. In response to your question, yes, I would buy another one."



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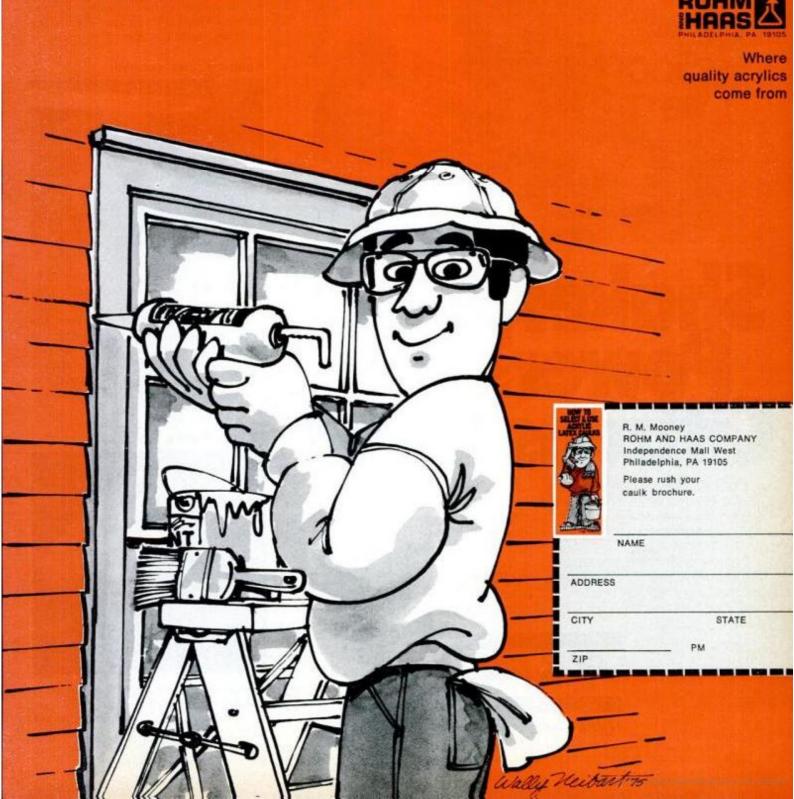
Housepaint failure. The tell-tale signs are peeling and blistering around door and window frames. If you're faced with a costly repaint job before you expected it, chances are it's the caulk—not the paint—that's at fault.

You can prevent this deterioration next time by sealing all exposed joints and seams beforehand with a quality acrylic caulk. Today's acrylic latex caulks are products of the same technology that led to the development of durable, easy-on acrylic latex paints. With a number of useful properties in common.

Unlike other caulks on the market, acrylic latex won't dis-

color, crack or lose adhesion on exposure to the elements. You can paint within an hour after applying an acrylic caulk, and it's compatible with either alkyd or water-based paint. You'll get good adhesion, easy clean-up, and add years to painted surfaces.

When you go to buy your paint, ask your dealer which caulk lines include high-performance acrylic latex. They're worth the extra cost. Meanwhile, for more tips on caulking, return this coupon now.





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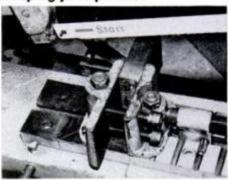
FROM READERS

Sanding board you can't beat



Clipboard holds sheet of sandpaper flat to make perfect sanding surface for small parts. Two paper clamps are used at bottom.—Ken Patterson

Keeping jaws parallel



Because I could not keep the fixed jaw of the vise on my metal cutoff saw from turning to one side when sawing short pieces, I remedied the problem by drilling and tapping 5%-in. holes in the movable jaw for two Allen-head bolts. Now I simply tighten the bolts to bear against the fixed jaw to hold it parallel to the work.—Norman E. Johnson

Tamper from a jug



Filled with concrete and fitted with an iron-pipe handle, a ½-gal. plastic jug makes a fine lawn and fill tamper that weighs almost 13½ lbs. Use second jug for funnel. Let soupy mix set and cure two weeks.

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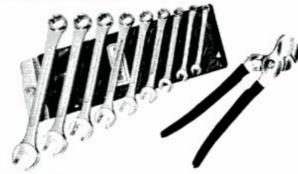
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DIRECT-DRIVE TURNTABLES

(Continued from page 81)

even a slow-speed motor can keep the record turning evenly and at the right pitch. Also, the same electronic circuit can be made to vary speed both to switch from one type of record to another and to vary the speed to adjust the record's pitch.

The ADC Accutrac's electronics don't just control its motor's speed. Built into its cartridge is an LED which projects an infrared beam onto the record just ahead of the stylus. There's a sensor, too, which can detect that beam's reflections. Recorded grooves just scatter the beam—but smooth, areas between bands reflect back to the sensor.

Pushbutton selection

As the tone-arm's motor moves it across the record, a circuit inside the turntable counts how many bands the arm has passed. A row of buttons on the turntable's control panel lets you select any single band, choose any combination of several bands, in any order, or play the entire record.

Other buttons raise and lower the arm, interrupt play to move the arm to the next selection, command the unit to repeat the current selection once it's done, or clear the memory for new commands. And all these controls are repeated on a palm-sized, wireless remote control.

The Netronics's long suit is isolation. Like the Accutrac, it has its arm, motor and platter mounted on a board spring-mounted within the cabinet. But unlike the ADC, its cabinet is spring-mounted, too, for double isolation from vibration.

Locked-in pitch control

Even setting the Netronics directly on a speaker driven by a 200watt amplifier won't cause acoustic feedback from the speaker's vibrations—a severe test.

The Netronics also has a unique speed-stabilizing circuit, called Auto Pitch Control, that locks speed in precisely even when you add the drag of record-cleaning brushes. You can also switch the APC off and vary speed enough to raise or lower the record's pitch about a semitone. The turntable has a built-in meter that shows at what percent above or below normal speed the motor is running.

The kit goes together in about three or four hours, and the instructions are quite clear. Prices include postage, and kits are sold only by Netronics, Route 6, Bethel Meadows Plaza, Bethel, Conn. 06581. ***

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NOTHING TO WEAR OUT.

There are no mechanical wearing surfaces connected with the sensor or trigger wheel. So timing can be kept constant and the dwell remains the same for the life of the system, delivering top performance under nearly all conditions. This helps your spark plugs burn clean

and far outlast their normal service life. DYNALIFE'S solid state circuitry is virtually maintenance-free.

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GENERAL MOTORS 8 Cyl. with single contact Distributor 6 Cyl. except with Buick V-6 Engine Includes GMC Trucks 1965-75	1957-75* 1963-75*	CN 7020 CN 7021	
CHRYSLER 8 Cyl. "A" Engine 273, 318, 340 and 360 C.I.D. with single contact Distributor in rear	1960-72	CN 7026	
6 Cyl. "B" Engine 361, 383, 400, 413, 426, and 440 C.I.D. with single contact Distributor in front 6 Cyl. All	1960-72 1960-72	CN 7025 CN 7024	
FORD 8 Cyl. with single contact Distributor 6 Cyl. except with V-6 Engine and/or Loadomatic Distributor	1967-74 1968-74	CN 7023	
AMERICAN MOTORS 8 Cyl. Delco-Remy Equipped 6 Cyl. Delco-Remy Equipped Except V-6 Engine	1963-74 1963-74	CN 7020 CN 7021	
INTERNATIONAL HARVESTER 8 Cyl. Delco-Remy Equipped 6 Cyl. Delco-Remy Equipped	1961-74 1971-74	CN 7020 CN 7021	

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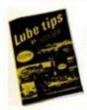
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14 NEW CB ACCESSORIES (Continued from page 76)

headset combo. For one, the microphone is held by a boom at just the right distance from your lips for good communications. For another, a push-to-talk switch that fits on the turn-signal stalk, or a voice-operated (VOX) circuit that turns on the transmitter when you talk, helps you keep your hands on the wheel.

Better speakers improve listening. They can be better speakers than the ones built into CB sets, and they can be placed where they're easiest to hear. Some mount atop or underneath the dash on adjustable brackets that let you aim them where needed most; others mount against an inside panel; and still others are weatherproofed to operate outside the car for picnic listening or publicaddress use.

For maximum speech clarity, these speakers should have limited frequency response, without bass resonances to muddy the sound or extended treble that just lets you hear more noise—the opposite of what's needed in tape-deck or radio speakers. Try to hear a speaker demonstrated before buying.

Security devices can keep your set from growing legs and walking away. They're of three types: mounts to which your set locks solidly (which work only if they're solidly bolted to the car as well); alarms that sound a warning if your set is tampered with; and slide-out mounts that let you take your set with you when you leave your car.

The slide-out mounts have an ad-

ditional advantage: If space is limited, you can use one to alternately mount a CB set, tape deck, monitor radio, FM receiver, ham transceiver or other equipment. But there are catches-you have to know how many electrical connec-tions you need. Most slide-mounts have six connections, enough for a stereo's two power and four speaker leads (or, in the case of the Kustom Kreations mount shown here, two each for power, an extra speaker, and the CB antenna). Most slide-mount makers offer extra bases so you can share your tape deck or CB between several cars (or car, boat and camper). The setmounted, slide-in part is not usually sold separately, however, so if you want to buy any extras of these, you'll have to take them with

Speaker switchers let you receive or make CB calls while listening to music without constantly readjusting your radio or tape deck volume controls. The Killer model automatically switches your speakers from radio or tape to the CB whenever a call overrides the CB's squelch, or whenever you transmit. Resistors within the unit protect the output stages of your music machine when the speakers are disconnected from it. (But not all switchers share this protective feature.)

There are at least as many more accessories in the Citizens Band grab bag. Watch for them at your local store—and on these pages. * * *

6 SECRETS OF SAFE SUMMERTIME CYCLING (Continued from page 83)

for both on and offroad riding feature trials-universal tires.

The sports knobby has even less rubber to contact the road than the trials-universal design. If you must ride on a wet surface with the knobby type, use extreme caution. This tire is meant for dirt riding only.

■ The rear chain must be lubricated and tensioned properly to insure smooth delivery of power to the rear tire's contact patch.

A dry chain will bind and jerk around the sprockets. If it's too loose, it'll surge or whip as it travels between the sprockets. A primary-drive chain (if your bike has one) is even less tolerant of lack of lubrication and improper adjustment when it comes to delivering the engine's power smoothly.

■ Check the sprockets, too. If their teeth are pointed, hook-shaped, or—worse yet—worn to nubs, replace them. Worn sprockets will make a

worn chain alternately tighten and loosen at certain points of its travel.

Don't run a worn chain with new sprockets; by the same token, don't put a new chain on worn sprockets. Although it might seem expensive to replace all the worn items together, you'll appreciate it later when you're on a slick surface.

■ Don't overlook the throttle, clutch, and brake cables either. They need adequate lubrication so that they won't bind anywhere. Make sure the throttle-cable housing doesn't bend sharply anywhere and restrict the movement of the cable inside.

Also check for throttle-cable binding as you move the handlebar from side to side.

■ Check the brakes to see that they don't grab or drag. They should take hold without requiring heavy applications of pressure. It's impor-

(Please turn to page 152)

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6 SECRETS OF SAFE SUMMERTIME CYCLING (Continued from page 150)

tant, too, that the clutch engage and disengage smoothly. Furthermore, you'll need to keep that engine tuned. When you twist that throttle, you want the engine to respond at that instant-not a moment later when the rear tire is on some slippery substance.

Surface conditions

Although there are only two basic kinds of paved road-asphalt and concrete-there are infinite variations of them regarding surface conditions. Within the radius of just a few feet, you'll find all kinds of surface irregularities.

For that reason, you must be on your toes constantly, scanning the road ahead for anything that can make the tires lose adhesion with the road. An otherwise tractional surface can be made slippery by the presence of oil deposits, sand, leaves or other debris. And, especially at night, you may not notice these substances lying on the road.

Now if you've had little or no experience on wet roads, you might want to conduct an "eyeball" inspection of different surfaces some time. That is, squat down and really look a wet surface over. Feel it with your hand. Look for any substance that could enhance the slipperiness of the road surface.

You'll notice characteristics of a surface that will help you interpret similar surfaces later, when you're behind the handlebars.

New asphalt generally has a coarser surface texture than concrete. So, even with residual water lying on the road, the tires can still get some adhesion. There are exceptions, however, as some asphalt sections may be worn smooth, Also, beware of worn asphalt roads that have smooth, tarred areas. They can be very slippery when wet,

Furthermore, in hot weather, those tarred spots will be soft and unstable. adding to their slipperiness. They may even have sand sprinkled on them.

The camber of a road must be considered, too. If it has little or no camber, deposits of water will be trapped on the surface.

Regardless of the type of road you ride on, never ride in the middle area of the lane, especially on uphill approaches.

Why?

The center area of a lane is the final resting place for oil drippings from other vehicles. You'll find heavier deposits of oil on those long uphill lanes frequented by truck traffic. Watch out for concentrations of oil drippings at traffic lights and stop signs, too.

Whenever possible, ride to either side of the lane's center. Riding to one side of the lane has another advantage when it's raining: By staying in the "tire wipe" areas of the vehicle in front of your bike, you can take advantage of the squeegee effect of that vehicle's tires. In other words, those tires will displace excess water on the road, giving your tires better traction.

If there's any time that you should be particularly cautious of a wet road, it's during the first few minutes of rainfall that follows a long dry spell.

Those first drops of rain mix with all sorts of oil, dirt, tire-wear particles and other debris to form a slimy mixture that coats the surface. You can't really see it, because it's not very thick. But it's extremely slippery. And until it's had a chance to be washed away, you should "tiptoe" over the road, or even pull off to the side for a few moments.

Road hazards

What makes slick-surface motorcycling so challenging is the variety of surfaces you encounter. You've read about the need to be on the lookout for oil deposits, leaves, sand and other debris that can enhance the slipperiness of an already slick surface. But what about bridge-floor gratings and expansion joints, manhole covers, crosswalk markings and railroad crossings?

Take railroad crossings: Ever since the first motorcycle sputtered down the road, they have been responsible for cyclists parting company with their bikes. Even when they're dry, rails can be slippery; but when they become wet, they can send a two-wheeler slithering in an

Just remember to approach them at a right angle. Go easy on the gas and stay off the clutch and brakes when traveling over them. Do your braking and down-shifting before you get to them.

And watch it around gas stations. Cars that have just had their tanks filled may slosh gas onto the road as they exit from a station. Gasoline is slipperier than water and it is also virtually unnoticeable on a wet surface.

Hydroplaning

Skidding is a constant threat on wet surfaces, if you don't know what you're doing. But there's another phenomenon that can create moments

(Please turn to page 157)

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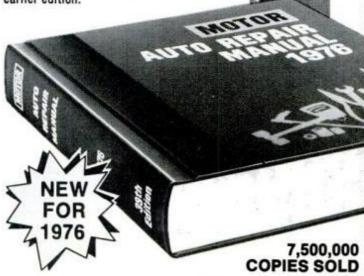
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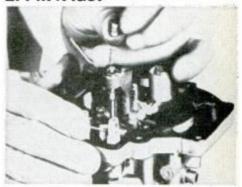
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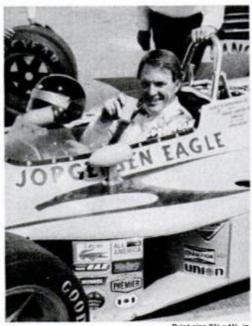
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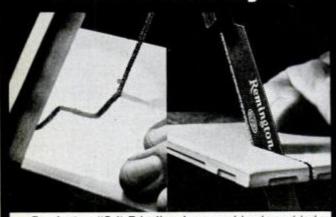
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Beryllium	X	X			X
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Cast Iron	X	X			X
Composites	X	X	X	-	X
Composition Board			X	X	X
Fiberglass	X	X	X	X	X
Foamed Glass	X	X			X
Friction Materials	X	X	X	X	X
Glass	X	X			X
Hardened Steel	X	X			X
Honeycomb Materials					X
Marble, Natural	X	X	X		X
Marble, Synthetic	X	X	Х	X	X
Plaster			X	X	
Plastic Laminates	X	X	X	X	X
Plywood	1000		X	X	X
Stainless Steel	X	X	X°		X
Stranded Cable	X	X			X
Superalloys, Iron-base	X	X			X
Superalloys, Nickel-base	X	X			X
Tempered Hardboard			X	X	X
Tires, Steel-reinforced					X
Titanium	X	X			X
Tile, Ceramic	X	X	X		X



When ordinary blades can't cut it.





SAFE SUMMERTIME CYCLING

(Continued from page 152)

of panic: hydroplaning. It occurs when a layer of water actually wedges itself between the road and one of the tires, most often the front

Whether hydroplaning occurs or not depends mostly on the speed of the motorcycle and on the amount of water on the road. With modern motorcycles, it's not hard to cruise at speeds higher than 50 mph on wet surfaces as a result of high-traction tires and improved suspension systems.

Because hydroplaning can occur at speeds as low as 35 mph, providing there's enough water on the surface, your bike can turn into a motorized surfboard. Here's a rule of thumb for figuring if there's enough water present to induce hydroplaning. If there's enough water lying on the road for raindrops to make a dimpling effect, there's enough water for hydroplaning. Watch it!

Riding technique

Other factors that enter into hydroplaning are the width and tread design of the tires. A worn, wide tire will plane at a lower speed than a narrow tire with a deep-tread design. In addition, the lighter the combined weight of bike and rider, the lower the speed at which hydroplaning will occur.

When it comes to stopping your bike on a wet surface, you must develop a touch of finesse with the brakes. Learn how to decelerate by using the brakes and engine compression together. You can apply the rear brake an instant before the front brake to help stabilize the ma-

If you apply only the rear brake, you run the risk of locking it up. It takes more pressure to slow the machine with just one brake. With both brakes, you're distributing braking pressures between them, in smaller amounts. And by downshifting, you employ the services of a third brake: engine compression.

Taking advantage of the retarding effect of engine compression lets you apply less pressure to the brakes than you normally would without downshifting. What's more, a fourstroker will provide more retarding effect than a two-stroker. Take that fact into consideration when you switch from one type of engine to the other.

Concentrate on all your control movement, like braking, accelerating, gearshifting and cornering until you can perform them smoothly and sure-

Once you master slick-surface motorcycling, you'll never have to worry about getting caught in the rain miles from home and having to pull over until the rain stops and the roads dry. So hang the weather report! Hop on that two-wheeler and head out-carefully.

HOW THE TALL SHIPS SAIL

(Continued from page 80)

West Germany; Peking, U.S.A.; Sagres II, Portugal; and the host vessel, the U.S. Coast Guard cutter Eagle. Gazela Primeiro, a 186-foot barkentine from the United States, also will appear.

Largest vessel in the fleet will be Juan Sebastian de Elcano, a 370-foot four-masted topsail schooner that Spain is sending. Chile's 308-foot Esmeralda is another four-masted topsail schooner.

Smaller vessels

Most of the Operation Sail fleet will be made up of vessels between 50 and 150 feet in length. These will include smaller topsail schooners, plus brigs, brigantines and the "modern" rigs: schooner, ketch, yawl, cutter and sloop. Mon Lei, a 50-foot Chinese junk that's more than 100 years old, also is scheduled to take part.

With more than 200 craft representing some 30 nations, the Operation Sail fleet will be the largest collection of windjammers anywhere since the battle of Navarino in the eastern Mediterranean back in 1827. It is expected that the Fourth of July parade up the Hudson River will last more than 19 hours, and may be seen by more than 10 million people. * * *



METALWORKING



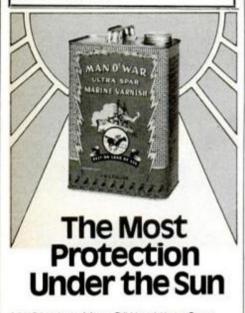
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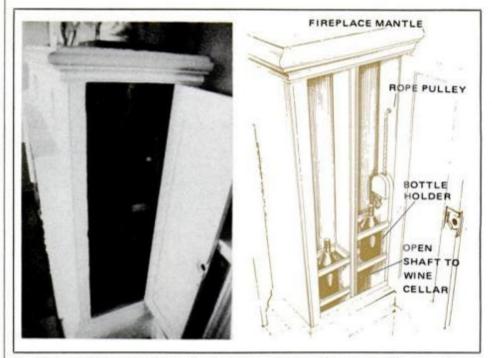
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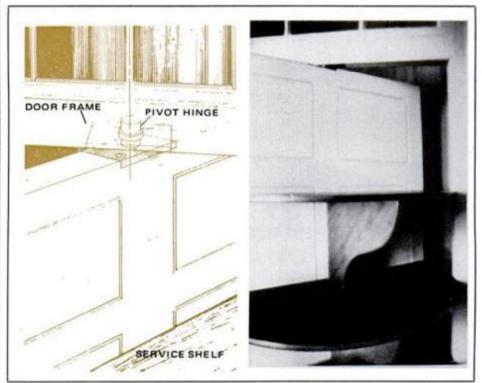
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Philadelphia, Pa. Los Angeles, Cal.



CONCEALED DUMBWAITER. While Minister to France, Jefferson became interested in the French emphasis on gadgetry and comfort. This was one feature he brought back to America. Built into the dining room fireplace, it connects to the wine cellar.



REVOLVING SERVICE DOOR. With a gentle push, this door (on central pivots) rotates to reveal tiers of shelves laden with dishes prepared in the kitchen downstairs. Almost all of Jefferson's built-ins are still operational.

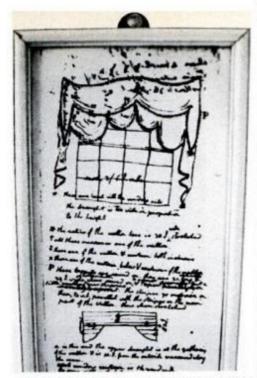
THOMAS JEFFERSON

(Continued from page 87)

rooms were placed just off the floor. From outside, they looked like an extension of the large-sash units downstairs and gave the impression of a one-story house. He designed the small 24-inch tread staircases for use between private bedrooms and the second floor. He wrote that "by

these means great staircases are avoided, which are expensive and occupy a space which would make a good room in every story." This and other of his space-saving ideas are being used more and more in the "no-frills" housing being built today.

Jefferson also added indoor plumbing. He used the wide space between interior walls as a waste connection between his bedroom and removable



Jefferson sketched this detail for design of bedroom windows, curtains, valances. Typically, he notated every dimension.

receptacles in the cellar. While this seems crude by today's standards, it was then ingenious, luxurious and, most of all, sanitary.

Jefferson's love of gardening, in every form, is best expressed in one of his own letters which reads: "No occupation is so delightful to me as the culture of the earth, and no culture comparable to that of the garden. . . . But though an old man, I am but a young gardener."

In 1776, Jefferson started his Garden Book. He added to this religiously until 1824. His landscaping plans for Monticello, were on a grand scale, including vegetable and flower gardens, walkways, service roads and an orchard. He grew an incredible variety of vegetables in a three-stage, terraced garden 80 by 1000 feet. The terraces were divided into squares, each 1/27 of an acre. Four squares were sown with peas, his favorite vegetable. There was a special area for seedlings, but herbs were grown throughout the garden. At one point, his orchard contained over 850 peach trees among varieties of apples, almonds, cherries and figs. Typically, each tree site was marked on Jefferson's meticulous plan which used a grid combining numbers and letters.

One small incident in Jefferson's life symbolizes his ingenuity and determination. He once fractured his right hand while jumping over a fence, yet managed to compose a long letter the same night, using his left hand. He was, clearly, a Renaissance man, whose revolutionary and determined genius helped give birth to American democracy.



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LOOK, MA, NO HANDS!

(Continued from page 88) \$80 model that measures to an hour in tenths of seconds and lets you check lap times individually. Others are coming, or are already here.

Just as ordinary watches have second hands, most digitals have some sort of seconds indication. Some have six-digit displays that show hours, minutes and seconds together; more common are ones that display hours and minutes together and show seconds only when you command them to (and some show both minutes and seconds only on command). The Seiko in the bottom row on page 89 (\$250) has a row of LCD bars, one of which darkens every 10 seconds.

Smart calendars coming, too

More and more digitals are either five-function models showing hours, minutes, seconds, date and month, or six-function models that spell out the day of the week as well. Clockwork watches have had these features for years-but digitals have added something new: "smart" calendars that keep track of 30-day and 31-day months, and even show just 28 days (in some models, 29) for February. Theoretically, you'd have to reset these watches just once every four years to account for Leap Year-if the batteries could last that long.

One type of watch whose batteries can last that long or longer is the solar-powered watch, available from several sources. And a Swiss company, Ebauches, has promised to show an electronic watch not using batteries sometime this year.

Still more features coming

Since calculators and watches use similar displays and technology, at least three companies have shown combinations of both. The Uranus on page 89 (\$400) has a ring of easy-topress pushbuttons that double for number entry or (when you press a shift key) to command functions such as add and subtract; the Pulsar on the same page (\$3950 in solid gold, \$550 in stainless steel) has a more conventional-looking keyboard whose tiny keys must be pressed by a pen or stylus. Optel has shown a similar one and promises memory and scientific calculator models. None are as convenient to use as a pocket calculator, but they're not as likely to be lost or left at home, either.

If there's anything else you'd like a digital watch to do-tell tides or moon phases, for example-American Microsystems, Inc. may have the ultimate solution: They're working on a computer-based watch that can be programmed to do almost anything. This approach could allow





Price contrast: Texas Instruments watch (top) is \$20 in black plastic, \$30 in metal case. Pulsar calculator watch (above) is \$550 in stainless steel, \$3950 in gold.

rapid, low-cost introduction of new functions in the middle of a production run, without retooling, and should lower the cost of elaborate, multi-function watches. Potentially, old watches made this way could be reprogrammed to match the functions of the new models, too.

How convenient are they?

Other conveniences are inherent in digital watch design. In resetting your watch for a different time zone. for example, you can reset the hours alone, without disturbing the minute and seconds setting. (At least one firm, Mercury, has a model that can indicate either of two time zones).

But some inconveniences are inherent, too: Setting time back an hour entails setting it forward 11 hours (23 hours in watches with a.m./p.m. indicators). And though digitals are quickest at telling you exactly what time it is now, they're not as good as regular watches at telling you at a glance if you have time left to make the plane.

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Stephen Schultz - Orangeville, Penna

"I bought a batch of walnut in the rough, and after planing to the Belsaw I figured I saved enough money to pay for two-thirds the cost of the Planer. It really does a good job." R. S. Clark — Springfield, Ohio

"I make furniture, grandfather clocks and many other things. My Belsaw does nice work and I couldn't do my job without it. I really like it." W. W. Robinson — Flat Rock, Illinois

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COFFEE PERCOLATOR REPAIR

(Continued from page 103)

2. Disconnect the two leads at the thermostat (18).

3. Using a pair of needle-nose pliers, gently raise up on the top part of the thermostat's hold-down spring (not shown).

4. Slip the thermostat to the side, so the end of the spring slides through the groove in the thermostat.

5. Install a new thermostat by tipping the part so you can engage the groove in the thermostat with the

hold-down spring.

Possible difference: Some units have the thermostat and leads riveted together. To disconnect the leads from the thermostat, you must grind off the rivet heads using a small hand grinder or file and tap out the rivet with a punch. You should use steel Pop rivets to reassemble leads to the thermostat.

Pop rivets and Pop-rivet guns are available at hardware and home supply centers. Make sure the rivets you buy are steel-not aluminum.

To check a thermostat, as described in the troubleshooting guide, you'll need a thermometer that reads to at least 200° F. (not household or medical type). Such thermometers are available at hardware, photographic and auto-supply stores.

Replacing pilot light, heating element and lead assembly

Remove the base (24).

2. Disconnect the pilot light, heating element and lead assembly (17) from the terminal pins (20) and ther-

3. Using the wiring diagram shown in the main illustration, reconnect a new pilot light, heating element and lead assembly (17) to the thermostat (18) and terminal pins (20).

Possible differences:

1. Some percolators don't have pilot

2. Heating elements of some percolators are molded into the base, and the base has to be replaced to replace the element.

3. Heating elements and pilot lights of other units may be replaced individually.

Note: Large electric coffee urns that are capable of making up to 30 cups of coffee are similar mechanically to smaller coffee percolators. The information contained in this article may be used to repair them as well.

Other parts of a percolator that can usually be replaced are: Cover knob (32), cover (31), deflector (33), spreader (28), basket (27), percolator tube and pump assembly (26) and line cord (35).

162

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STICK WITH THE RIGHT GLUE

(Continued from page 106)

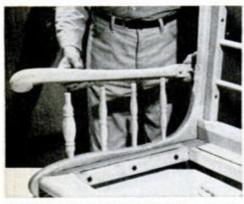
■ Contact cement, a neoprenebased, ready-to-use liquid, is an excellent adhesive for bonding plastic laminates like Formica to plywood. Also recommended for joining combinations of wood, cloth, cork, leather, ceramics and thin metal. It is applied to both surfaces and allowed to dry for about 30 minutes before assembly. The parts bond immediately upon contact and require no clamping. The regular type is highly flammable and must be used with good ventilation and no open flame. A nonflammable latex-base type is also available for use where a fire hazard is present.

■ Hot-melt glue gun is a remarkably handy household and shop adhesive tool. Special adhesive cartridges in stick form are inserted into the chamber of the electrically heated gun and provide the quickest and easiest method of bonding two surfaces. You simply press the trigger to squeeze out a bead of hot melted adhesive which sets in 60 seconds. The glue sticks to almost anything except a few stubborn plastics. It is completely waterproof and works well as a gap-filler in loose joints. A caulking cartridge is also available for use in bathrooms, outside the

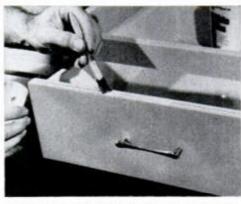
house and on boats, autos, concrete, vinyl pool liners and inflatable toys. Epoxy resin adhesive is a twocomponent resin and catalyst material that produces a very strong waterproof bond. Equal amounts of

resin and hardener are mixed together for use. Many epoxies are available with curing times ranging from five minutes to more than one hour. All have excellent gap-filling properties. Most will work even on wet lumber-especially advantageous on outdoor construction where thoroughly dry lumber is rare. Another plus: Odd-shaped fabrications practically impossible to clamp are easily

(Please turn to page 166)



Parts which must be nursed into place, such as the armchair spindles, cannot have tight-fitting joints. Here a gap-filling glue-hide or aliphatic-is used.



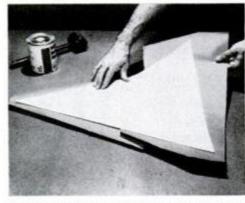
White glue cut 50/50 with water makes an excellent sealer for plywood edges which are to be painted. It keeps telltale grain patterns from showing through.



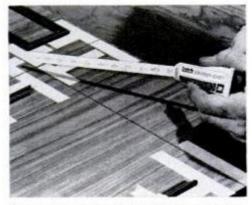
Hot glue from an electric glue gun provides quick gluing for many do-it-yourself projects and hobby crafts. You'll find it handy for gluing parts of models.



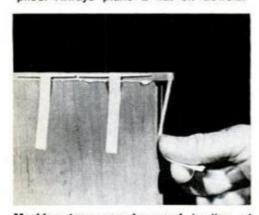
This hammer test shows how trapped glue at bottom of hole can cause work to split when clamping pressure is applied. Always plane a flat on dowels.



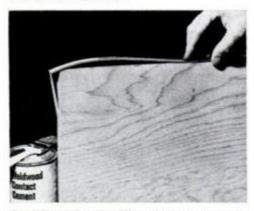
Brown paper slip sheets are used to position plastic laminate when bonded with contact cement. Parts bond with no chance to reposition.



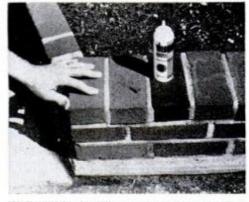
Super glue makes it possible to add decorative wood trim to slick surface of plastic laminate. This instant-setting new glue eliminates the need for nails or clamps.



Masking tape can be used in lieu of clamps for gluing edge strips. Round toothpicks are used for standoffs to keep the tape off and away from the glue line.



Applying edge banding with contact cement is tricky. Position both ends and let the center bow outward. Tape down far end, then proceed to press strip in place.



Welbond looks like regular white glue but is quite different in what it will glue. It can be used to bond almost anything. Here it is used to reset loosened brick.

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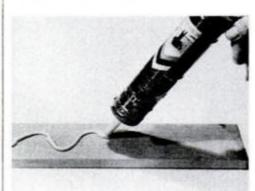
NAT'L. GUARD PRODUCTS - SHUR-LOK DIV. Box 7353-PM Memphis, Tenn. 38107

STICK WITH THE RIGHT GLUE

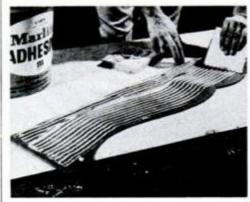
(Continued from page 164)

put together with fast-setting epoxy. Ordinary hand pressure for a few minutes does the trick.

■ Mastic adhesives are heavybodied pastes that are extremely tacky and fast-bonding. They are available in cartridge tubes for easy application with a caulking gun when you're installing wall panels, stair treads, metal thresholds, ceramic tiles, parquet flooring and other building materials. Specialized varieties are designed for masonry work such as brick and block laying, patching and repairing. Some mastics are



Heavy-duty guns like this Swingline make hot-melt glues indispensible for quick, lasting repairs around the home. Large tip issues generous bead when needed.



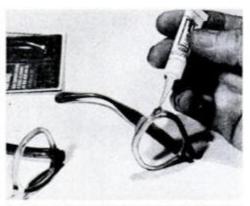
Bulk mastic adhesives will prove more economical for large jobs like gluing paneling and similar wallboards. Serrated tool is used to spread the mastic evenly.



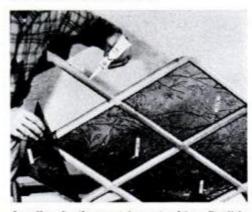
Spray adhesive is a great way to stick cloth to wood. Coat both of the surfaces and allow them to set for a few moments before bringing them together.

available in five-gallon cans, and for big jobs are more economical than tubes.

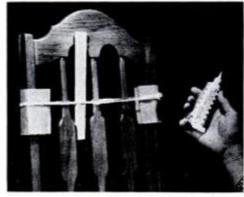
 Superglues are modern adhesives with amazing holding power, particularly suitable for bonding nonporous materials such as metals, g'ass, ceramics, porcelain, rubber and most plastics. Among them are the cyanacrylates, urethanes and si'icones. Most live up to the claims made for them provided they are used precisely according to the manufacturer's instructions. A word of caution: These superglues stick to anything including human skin so they must be used with care to avoid getting on your hands during use.



Quick setting and strong, super glues are good for repairing eyeglass frame. Some supers won't work on some kinds of plastic; check the labels first.



Acrylic plastic must be set with a flexible sealant to permit expansion and contraction. A silicone seal not only holds well but it stays flexible.



A unique quality of Grip-Wood glue is that it repairs furniture joints by swelling the wood fibers, thus locking the parts securely. Tourniquet clamp will do nicely.

When the wind stops, Turbomate starts! Your roof turbines can now cool all year long!

NOW...WISPERCOOL GIVES THE **WIND A HELPING HAND!**

Turbomate*...the most exciting innovation in ventilation in 132 years!

Here's the ventilator that makes sense! With a fan that runs only when you need it! 80% of the time Wisper Cool Ventilators let the wind do the cooling free.

Only when the wind stops and the attic tempera ture reaches 110° does the Turbomate motor quietly turn itself on-and when the job is done, turns itself off. And of course, with Triangle's famous Wisper Cool turbines on the roof keeping attic temperatures down-it's a rare day when the Turbomate is needed at all.

Two turbines on the roof without Turbomate are keeping millions of attics cool now! They save energy, increase comfort, get rid of damaging moisture!

TWO TURBINES WITH ONE TURBOMATE FAN IS THE BEST OF BOTH WORLDS!

The Congressional Record of October 30, 1973, quotes John Muller, U.S. Department of Interior, on conserving energy: "Reduce air conditioning loads through better ventilation of attics. Louvers or wind powered roof ventilators are preferred over motor driven attic fans."

COOL HOUSES START WITH COOL ATTICS

Recent ASHRAE and American Ventilation Association studies show that a house with an average family of four will condense 7 to 18 gallons of moisture into the attic each week! Wet insulation can't insulate! Proper ventilation removes moisture. Turbine ventilators work for you all year long! A dry attic makes roofs last longer, too.



READ THIS FAMOUS TRIANGLE GUARANTEE:

Fits -12" thru 16" vents" Thermostatically operated *Can be added to any ventilator, not just Wisper Cool

Watts-166 CFM -750

Triangle's Wisper Cool turbines are guaranteed to last as long as the building on which they are originally installed. Motors and controls are guaranteed by their respective manufacturers for one year. This is a limited warranty, does not include freight or installation.

ONLY ONE TURBOMATE IS REQUIRED!

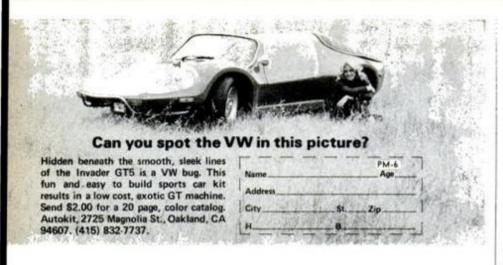
Two turbines on the roof-but only one needs a Turbomate! When the heat-activated Turbomate starts spinning, the temperature in your attic drops and a second Turbomate would never come on!

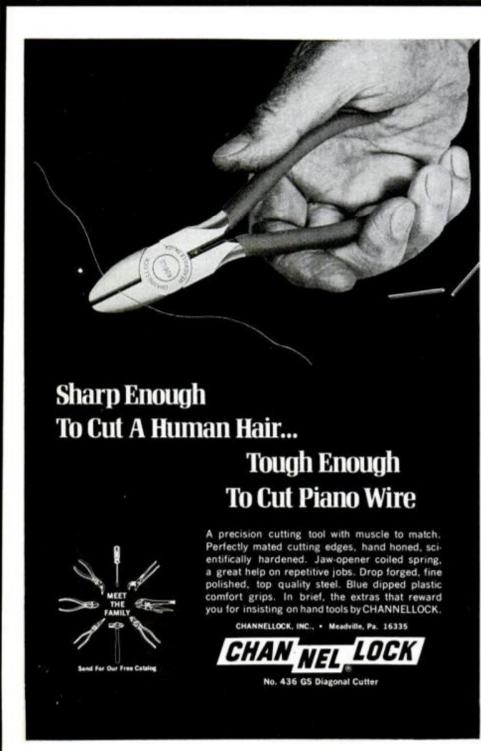
Shipped disassembled. **EASY TO ASSEMBLE EASY TO INSTALL** Complete instructions included. U.L. APPROVED.

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NEW SEE-THROUGH GRINDER

(Continued from page 113)

hour's practice will make the user an "expert grinder." Even less practice gave me the courage to tackle the sharpening of a wood-lathe gouge successfully. And I encountered no difficulty in surface-grinding a steel block: It showed no tendency to snag on the wheel slots.

The slotted wheel seemed to cut more coolly than a conventional type. The manufacturer says the slots produce a cooling action, and visual control makes it easier to maintain a light, even pressure.

Versatile slotted wheels

Four types of slotted wheels, each available in a range of grit sizes, can handle structural steel, alloyed tool steels, cast steel, malleable and gray cast iron, aluminum and other non-ferrous metals, as well as a variety of nonmetallic materials.

I did not test for wheel life because each wheel has two abrasive surfaces, and since grinding action can take place over a band nearly 234 in. wide, reasonably long grinding life would seem likely. As with any grinder, however, wheel life is influenced by the operator's habits and the material being ground.

Eye protection desirable

One of the labels cautions that a wheel should be used only when the protective hood (guard) is in place. When using any grinder, the operator should wear either protective goggles or a face shield; a dust mask might also be desirable. I found that the wheel-locking knob can loosen if it has not been tightened sufficiently.

The grinder base measures 5% x 614 in. and is anchored by four bolts or screws. The motor has factory-lubricated ball bearings. Most parts of the machine are finished in gray enamel.

The lamp is an essential part of the grinder because it makes the seethrough features possible.

Available by mail

The grinder, a West German product, is distributed in the United States by Leichtung, Inc., 5187 Mayfield Rd., Cleveland, Ohio 44124 and is priced at \$249.95 ready to run. Most abrasive wheels are \$17.95 each; the one for hardened steels and milling cutters is \$27.95. Polishing wheels range from \$14.95 (for a 6-in., hard-felt, general-purpose type) to \$19.50. All wheels are somewhat less costly in lots of three or more. Prices include shipping charges anywhere in the Continental United States.



By an Attorney at Law and a Tax Accountant

You will learn among other things. How to completely avoid paying income taxes at all on your business income.

on your business income.

How to protect your business as well as yourself from malicious and unlawful tactics.

How to transfer earnings from one family pocket into another and save many hundreds of dollars in taxes

How to arrange working with a lawyer and pay him only after he is successful in winning your case. How to turn your savings account into a tax shelter. Almost 200 names and addresses of U.S. Foundational state and alphabetically.

tions listed state by state and alphabetically. A code on each Foundation listing to help you identify the ideal Foundations able to grant cash to you

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How to avoid paying taxes on earnings from your stock investment.

How to avoid paying taxes on earnings from your stock investment.

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How to construct your own contract so it is legal and binding. How and when oral contract is binding.

How to make home improvements, repairs, depreciate your home, go on vacations, dine out, etc., and write them off as tax deductions.

Tax shelter of the Cayman Islands.

Where to get 22.8% interest on your time deposits. How to save \$32,000 on a \$41,000 home.

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How to profit from todays economic crisis. Four ways real estate can make you rich.

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Build a multi-million dollar apartment free.

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How to legally guarantee you will not get fired or layed off.

How to get a 10% tax-free return on your investment

layed off.

How to get a 10% tax-free return on your investment

with virtually no risk on your invested capital. How you can qualify as a lawyer and save the cost of

an outside attorney.

How to contribute to your retirement and get a tax deduction on your current income.

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You will learn the 35 questions used by the I.R.S. to

How to avoid paying a parking ticket.
You will learn of the 25 personal tax deductions most frequently audited.

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Have you ever wondered how people

People become wealthy because they

have learned how to benefit from the legal system we live under. They have also mastered the secrets of offsetting their salaried or business incomes--

become and stay wealthy?

income taxes while you have to pay a

much larger portion of your income? Did you know that it's impossible for anyone to become wealthy without having a clear-cut understanding of how the legal system we live under works or how to tip the scales of justice in your favor while

financially benefiting from it? It is a fact that many millionaires do not pay a cent in Federal taxes because they have mastered the tax loopholes that are unknown to most wage earners and

small businessmen.

Letting the system work for them, instead of working for the system, is how people become and stay rich, while the tax burden stays on you. And believe it or not, the tax laws allow it. Now it's possible for you to tap into this large annual reservoir of taxed earnings that you were previously forced to give up. Now you can benefit from the mighty forces known as the legal system. Now, hundreds, even thousands of tax dollars can flow to you instead of Uncle Sam.

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Because cordless power lets you whiz through jobs that used to be tedious.

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One charge gives you enough power to drive up to 105 one-inch #8 screws into soft pine without pre-drilling. And since there's no cord, you can use it anywhere —

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From Disston, the number one name in cordless tools.



DISSTON
THE CORDLESS COMPANY

SURFING ON CONCRETE

(Continued from page 95)

again, this time, nationwide. New superperformance features were developed like high-speed urethane wheels, adjustable truck suspensions and superflex boards. They became highly maneuverable. Incredible stunts were developed. Specialty boards were made for speed and slalom riding. The time was right and skateboarding made a full-fledged comeback.

This summer, the USSA championships will get national TV exposure on CBS's Sports Spectacular. The WSA (World Skateboard Assn.) is holding its first world Masters Invitational (with \$15,000 prize money) June 19 and 20 at the Nassau Coliseum in Uniondale, N.Y. There are about 8 million riders now, and Jim O'Mahoney, editor of Skateboard magazine, predicts this number will double by the end of the summer from all the national publicity.

Your first board

Skateboards range in price from \$8 to \$80. If you want to make your own, use a hardwood like ash or maple and follow the silhouettes shown in scale on page 95. A 25-inch board is a good size to start with. Use 34-inch stock and do a careful sanding job on the cut edges. Before applying a wood sealer, either score the foot surface with a wood rasp or glue down a rubber tread for good traction.

One note of caution: If you're going to street ride, use extreme care. Believe me, motorists will be baffled, if not downright panicked, by the sight of a kid shooting down a grade at 30 mph. Your best bet is a driveway, playground, storm drain or any



The stag handstand: This girl is not a beginner, and she is very strong. Many skateboard moves come from surfing, and some, like the arabesque, attitude and leg lift, stem from ballet.

other hard surface that's off the road. Protect your elbows and knees when you're learning to ride, especially if you're going to try some stunts. For skateboard sources, see listings below. And don't forget to signal when you go into a one-hand power * * *



It's not the soapbox derby, but a crash helmet is called for when high-performance boards reach speeds up to 40 mph.



The high jump: Here's a hard way to get off the ground. Competitions are starting to draw large crowds and, with thousands in prize money, the stakes are getting higher.

MORE INFORMATION ABOUT SKATEBOARDS

Top Makers

- Bahne, Box 327A, Encinitas, Calif. 92024. Gordon & Smith, 5465 Gaines, San Diego, Calif. 92110.
- GrenTec. 2820 North Hollywood, Burbank, Calif. 91502.
- Hobbie, Building 1-RD, 33012 Calleperfecto, San Juan Capistrano, Calif. 92675.
- Roller Sports, 1855 Cassat, Jacksonville, Fla. 32210
- Road Eider Wheels, 140 Uxbridge, Cranston, R.I. 02910.

Things to see

- WSA Masters Invitational, Nassau Coliseum, Uniondale, N.Y., June 19-20.
- National Skateboard Show, 108-18 Queens Blvd., Forest Hills, N.Y., June 19-20.

Good sources

- Skateboard magazine (\$4 for four issues). 246 North Fries, Wilmington, Calif. 90744.
- Handbook of Freestyle Skateboard Tricks
- (\$1.75 from above address). U.S. Skateboard Assn. (membership \$1), 236 Pacific, San Pedro, Calif. 90731.

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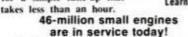


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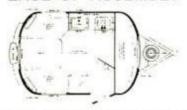
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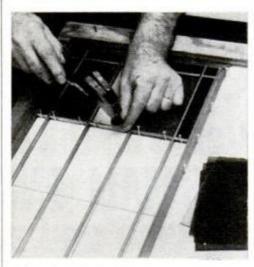
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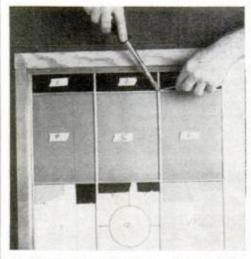
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STAINED-GLASS WINDOWS (Continued from page 112)



9. The border leads that encase the window are mitered 45° at the corners. Leave one border of the design open so that the glass pieces can be fitted into the channels of the leads. Use small nails to hold each section together.



10. To begin, solder two corners of the border leads. Clean lead intersections with wire brush and coat with oleic acid. Tin iron tip with thin film of 60-40 solid-core wire solder. Solder each intersection and points where leads join border.

tongue for mounting in a kerfed or rabbeted wood frame.

Inside lead is double-channeled and in section is shaped like a capital I. Inside leads are available in widths from 1/4 to 3/4 in, and are measured across the width of the leaf. Border lead is cut on the flat; inside lead is cut with the leaves in a vertical position. Hold the knife in a vertical position and cut the lead with a rocking motion, pressing the blade firmly and quickly through the leaves and heart. Keep the knife sharp; a dull edge will only bend the thin leaves. To straighten a bent leaf, run a ruler or thin wood strip between the flanges to open them up.

How to cut glass

Glass cutting is a misnomer—glass is not "cut"; it is broken. In cutting

glass, the metal wheel of the cutter "scores" or fractures only the surface of the glass, weakening the molecular structure along the score line and permitting the glass to be broken cleanly when pressure is applied evenly to both sides of the cut. Glass should be cut on a flat but not hard surface since it is elastic and will bend considerably in the cutting process.

Use carpet for cutting

A piece of short-pile carpet makes a good cutting surface as the pile offers support but permits the glass to bend without shattering when scoring pressure is applied. If glass is cut on a nonresilient surface, it can shatter along an invisible fault line. Always wear eyeglasses or protective goggles when cutting glass.

A glass cutter has a hardened steel wheel, beveled on both sides and set in a metal frame. The frame is notched to "nibble" glass of ½, ¾6 and ¾8-in. thickness; "nibbling" refers to breaking away small irregularities that sometimes remain and do not break cleanly from a cut. These can also be removed with square-nose pliers in a pulling motion.

Stained glass is generally sold in sheets averaging 18x36 in., 24x36 in. or larger. Use a 24 to 30-in. draftsman's T-square for cutting small blanks from a large sheet of glass. A small tri-square is handy for cutting pieces to size from blanks.

To begin, clean the glass with a product like Windex and dry with paper towels. Dip the glass cutter in kerosene to clean and lubricate the cutting wheel. Hold the cutter perpendicular to the glass and begin the score line a fraction of an inch in from the far edge of the glass. Make the score toward you in an even stroke without lifting the cutter. Reduce pressure as you reach the end of the score line so that the cutter does not chip the edge.

Immediately after the glass is scored, place it on the worktable with the score line projecting slightly over and parallel to the edge and press down firmly on both sides of the score. The glass should separate evenly. (Glass can "heal" itself along the score line if it is not broken immediately, resulting in a jagged cut. Practice on common window glass.

Do not retrace a score

Never retrace a scored line as tiny glass fragments will dull the edge of the cutting wheel. To make a curved or radius cut on glass, a different method is used. Score the cut freehand by placing the glass over the paper pattern, or cut a paper template to use as a cutting guide. After scoring, tap along the score line on the underside with the ball of the cutter. As you tap, you will see the glass fracture along the score line. When the score line is completely fractured on the underside, the glass will break evenly when a pull is exerted on both sides of the cut.

Drawing the pattern

The pattern of a leaded-glass window is drawn full-size on white paper and used as a substrate on which the components of the window are assembled. Lay out the pattern first in pencil, then ink the lines with a 16-in.-wide felt-tip pen. The inked

CREATE A SUNLIT PICTURE

Your stained-glass creation need not be a window. It can be a handsome framed hanging like the 21x21-in. depiction of a Bicentennial flag on the cover. Hung like a picture in a window, it sparkles in sunlight.

lines, called "heart" lines, approximate the 1/6-in.-thickness of the lead heart on the inside leads.

Staple the pattern to 34-in.-thick plywood and assemble the window on it. Nail wood cleats at a 90° angle along two sides of the plywood workboard to hold the window components together and insure squareness as the window is assembled. Place three sides of the border lead in position on the pattern, leaving off the fourth side so the glass and inside leads can be fitted into place.

Beginning at the inside corner where cleats intersect, fit a 1-in. border glass into the channels of the border lead and of the inside leads across the width of the window. Now cut the shorter leads that form intersections between the full-length leads and position them across the width of the window, completing the top border. Proceed with the second row of glass and leads, tapping each glass section gently and snugly into place with a hammer and wood block.

Nails hold pieces in place

Use shingle nails across the width of the window and along the border lead to hold the design together. Proceed with the third row of glass and leads. As each glass is fitted into the lead channels, remove the two nails of the preceding row and renail it at the end of the third row. After two or more glass sections have been nailed, soldering can begin.

Solder the two 45° mitered corners of the border leads, then the intersections of the inside leads. To solder an

"open" glass section, use scrap glass held with nails to keep solder from running into the channels of open intersections.

After a couple of window sections have been soldered, the remainder of the window is assembled and nailed up to complete the soldering. When all joints and intersections have been soldered on one side of the design, turn the window over and solder on the opposite side.

Tips on soldering

The leads of a stained-glass window are soldered at each intersection on both sides of the design. If the leads are precisely fitted at the intersections with no excessive gaps, a drop of solder the size of a matchhead is adequate for each intersection and where the inside leads join the border leads.

Use a 40 to 80-watt soldering iron -a high-wattage iron can melt the leads as there is only about a 10° difference in the melting point of 60-40 solder and leads. To tin the iron, coat the tip with a bit of oleic acid (liquid flux), then melt a thin coating of solder on the four sides of the tip. Before soldering, scrub each lead intersection with a toothbrush-size wire brush to remove oxidation, and coat with oleic acid.

Using 1/8-in. solid-core wire solder (rosin-core will not adhere), melt the solder onto the intersection with a tacking motion. Do not preheat the lead intersection as in regular soldering and keep the tip of the iron a fraction of an inch above the lead, dropping the solder onto the lead. If the melted solder "peaks" after soldering, the iron is not hot enough; if the solder bubbles, the iron is too hot. Let the iron cool for a few seconds; then begin again.

Sealing the window

After the window has been soldered on both sides and before framing, it must be sealed before being exposed to weather. Even with careful fitting of glass, small gaps may remain between the glass and the lead leaves, with an occasional glass section that is loose. Use metal sash putty (gray) to fill gaps in the lead channels. With your thumb, force the putty in between the glass and the lead leaves on both sides of the win-

When puttying is completed, remove putty oils and residue from the oleic acid by scrubbing both sides of the window with dry sawdust and a stiff brush. Let putty set overnight before installing window in its frame.



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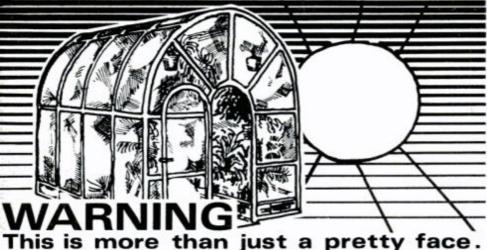
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LETTERS

(Continued from page 6)

for use with the grinding grit and one for use only in the prepolish and polishing stage. One single piece of grit remaining in the bowl after the grinding steps could easily ruin the finish on the stones during the polish

> CHARLES S. MORTON GALESBURG, ILL.

"All that is required to grind and polish in the same barrel is a thorough cleaning before proceeding with the polishing," writer R.S. Hedin assures us. He's been using a single barrel for years, with excellent results.

Solar furnace 'really works'

I built your plug-in solar furnace (First Plug-In Solar Furnace for Your Home, page 102, Feb. '75), and it really works! We live in central Pennsylvania, and saved 37 percent of our heat in a five-month period, from July through November. We live in the mountains and do not get much sunshine.

You made me a lot of work, but I appreciate it.

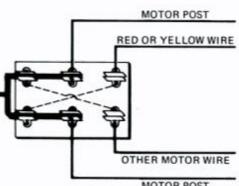
> L.H. SMITH MILLHEIM, PA.

Improved reversing switch

You can make a motor-reversing switch more easily than the way William Waggoner describes in Motor-Reversing Switch You Can Make (page 104, Jan. '76).

Leave the power line connected to the motor posts. Bring two wires from the posts to the center contacts on the DPDT switch.

Extend the yellow and red wires,



MOTOR POST

connecting these to a pair of end contacts. Cross those end contacts with the other end. This eliminates altering the switch with extra con-

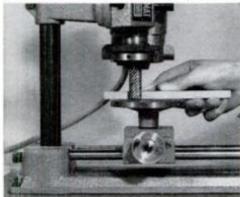
It also eliminates a good portion of the motor current from the switch, giving it more capacity.

> HARRY SINCLAIR METUCHEN, N.J.

HINTS

FROM READERS

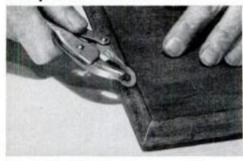
Free cutter from throwaway



Before you throw out an old pencil sharpener, remove the cutter. It makes a dandy high-speed rasp when chucked in your drill press.

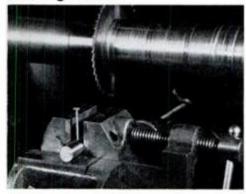
-Ken Patterson

Scraper from washer



A sharp-edged washer clamped in locking-type pliers does a great job of scraping old finish from the cove around a tabletop. A few strokes of a file across the washer will keep the cutting edge sharp.

Nail aligns work



How can you drill a cross hole at one end of a rod and saw a slot at the other so both will be aligned? Simple. Drill a pilot hole to hold a nail, clamp the rod in a milling vise so the nail is vertical and align the nail with the slotting saw by sighting.

-Walter E. Burton

HENRY MORGAN SAYS:

"Good appliance repairmen are scarcer than doctors who make house

Did you know that there are over a billion appliances in use in the United States today? And three repairmen. At least that's the way it seems when one of mine goes on the blink. With more than two dozen electrical gadgets in my house going snap, crackle and pop, I finally got tired of trying to locate a guy with enough ambition to take my money and I decided to learn how to make the repairs myself.
When a well-aged comic like me de-

when a well-aged comic like me decides to go back to school, you can bet the family jewels it won't be back at P.S. 93. I'm going to learn at home, or not at all. So I sent away for NRI's home study course in Appliance Repair

. and I took the course. With a mechanical aptitude slightly below that of King Kong, I needed a course that started at the beginning and didn't move ahead too fast. Well, NRI did just that. They started with electricity—what it is and what it does —and went from there. You proceed at your own rate of speed. Whip through it if you want to, or take your time. What counts is the fact that you learn,

in a way that it sticks with you. You learn two things: how to repair appliances-from little one cylinder gas engines to refrigeration and air conditioning equipment; and how to get started in your own appliance business. That can mean money for you either way. If NRI can turn old ten thumbs Morgan into a reasonable facsimile of a repairman, think what they could do

NRI's no fly-by-night outfit. They've been training men for more than sixty years . . . and they've had over a million students. It's the oldest and largest home study school in the field of elec-tronics and electricity, so they know it better than anyone else around.

The NRI course is really easy to understand . . . with lots of pictures to show you what they're talking about. They even send you a professional ap-pliance tester at no extra cost.

With the tester and a few basic tools you probably have already, you're ready to service most electrical appliances. After a few months, you'll be fixing your own appliances like I do, or you can start earning spare time money fixing them for your friends and neighbors. Before you know it, you can have your own full-time business and be independent. be independent.

Take my advice and clip the coupon. Even if you don't know which end of a screwdriver is the handle, they can give you real professional training that'll help you break into the appliance re-pair field. It's one of the few things I've ever sent for that was even better than they said it would be . . . so why not invest a postage stamp to see if it's right for you. The NRI catalog is free and there's no obligation. No one will knock at your door or bug you at home. NRI doesn't use salesmen. They don't need them.

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Beltone Designs Tiny Hearing Aid

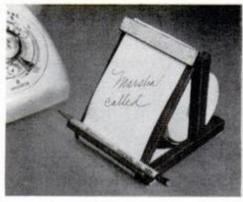
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Chicago, Illinois-A tiny hearing aid has been designed by Beltone Electronics Corporation, world leader in hearing aids and hearing test instruments.

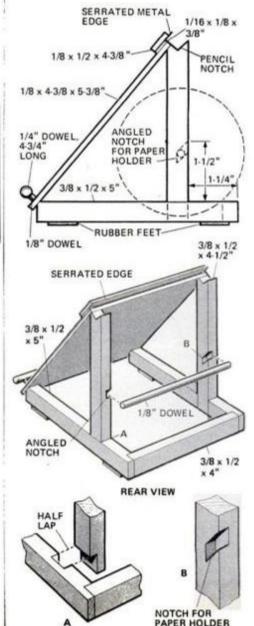
It was made especially for the person who can hear but cannot understand. This hearing instrument enables the wearer to pick up speech, sounds, television, and radio at his ear.

A free, non-working sample of this tiny Beltone aid will be given absolutely free to anyone sending in this advertisement. Thousands have already been mailed, so we suggest you send for yours now. Write to Beltone, Non-Working Sample, Dept. 4808, Chicago, Illinois 60646.

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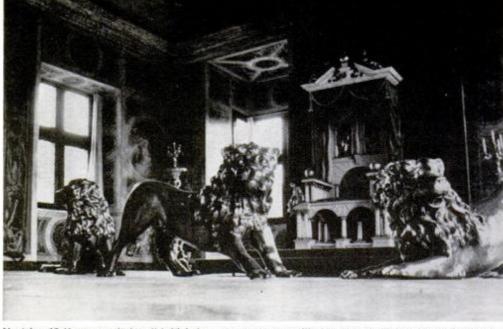
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Bring your vacation back with you on film

There's more to good vacation shots than Grandma in front of the Grand Canyon, squinting in the sun.

by Dave Sagarin



No tripod? If you can't (or didn't) bring one, you can still shoot even dim museum interiors. I shot this lion-guarded throne in the Rosenborg Palace, Copenhagen, by resting my camera on the floor and using its self-timer to set off a one-second exposure without any movement.



kay, so you've shot your wife in front of the Grand Canyon, and she's shot you. Now what do you do to make your travel and vacation pictures really recapture your vacation?

The first step is to decide just what photo equipment to take with you. Gather everything you think you'll need. Put it in your bag and lift. Now think of what it would be like to carry all that around with you, day after day, and take out everything you can do without.

What to take

You will want to take your filters (UV or haze and polarizing for color, plus yellow, orange or red filters for black-and-white), a pocket tripod (see page 142, June '74 PM), and a real tripod if you're traveling by car. Take a set of jeweler's screwdrivers, too, to tighten up all those little screws that keep vibrating loose on your equipment. And take a 'ens cleaning kit: a bulb/brush unit, fluid and lens tissue.

Take Zip-lock plastic bags, too. They hold small things like flash cords and adapter rings together, keep equipment from getting dirty and protect the camera when you're shooting in the rain. I also keep my film in a Zip-lock bag when flying, so I can take it out of my carry-on bag and pass it over the X-ray machine instead of through it.

If you're going abroad, you may also want to take lots of your favorite film with you, but check with that country's consulate before you go. Some countries have restrictions on how much film you can bring in with you.

Don't be afraid to shoot a lot of

An overall view of a





Shoot what you see, even if it means shooting through train, bus or (as here) plane windows. Use a fast shutter speed to prevent motion blur, and when shooting from planes use a UV or haze filter to keep the ground in the distance from taking on a bluish cast.



Signs, shop fronts and posters, especially in foreign languages, add local flavor and serve as built-in titles to tell people where the pictures were taken. Occasionally, as here, they may add a touch of humor. This, too, was taken on run, through bus window.

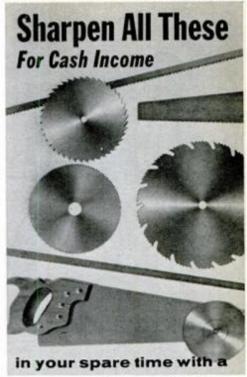
film, either. Film costs money, but it's still cheaper than flying back to take that shot you now regret not shooting.

And train your family to shootthat's the only way you'll ever get into your pictures. Let the kids shoot once in a while: It not only keeps them happy-it sometimes even results in good pictures.

When you shoot your family, don't pose them: Catch them doing whatever interests them, and you'll have more interesting pictures. The same goes for people in the places you visit.

Whatever you shoot, vary your approach to it, especially when similar subjects keep coming up again and again. Don't just shoot a church's sunlit facade-if the skyline is clear, stop down and shoot a silhouette of it from the shadowed side. Don't just shoot from eye level, either. Crouch down to get low-angle

Please turn to page 180



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I love tobacco. I don't smoke.

Walt Garrison, football and rodeo star.

If I'm a guy who loves tobacco, how come I never take a puff?

Well, because I use "smoke-

less tobacco."

All it takes is a pinch of "smokeless" in between my cheek and gum. Feels real relaxin' in there. And I get full, rich tobacco pleasure.

Another thing is, "smokeless tobacco" can't tie up my hands. So I can use it no matter

what I'm doing.

If you'd like to go "smokeless," here's what you do. Just look for three great brands.

There's Skoal, my favorite, which has a wintergreen taste.

Copenhagen, a straight tobacco.

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Smokeless tobacco. A pinch is all it takes.



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. P99, Greenwich, Connecticut 06830.

VACATION FILM

(Continued from page 179)

shots or look for places you can stand for high-angle views.

Anything really interesting will probably have a crowd around it, so learn the pros' technique of holding the camera above your head to shoot the action. Use a wide-angle lens. grasp the camera strap firmly in one hand as a brace, and pull against it with the hand holding the camera.

Take close-ups, too, of details like shells, jewelry, carving-or even shrimp (see page 178). Extension tubes or close-up lenses don't weigh much and take up little room.

Shoot transition slides

If you're shooting color slides, look for transition shots to carry your slide show over from one subject to the next. The view from the plane, in the train station, or from right behind the bus driver tells the audience quickly that the next slides will be from somewhere else; but since that's all they usually tell, get them on and off the screen fast. They're for flavor, not basic nourishment.

Whatever you do, try to shoot pictures which represent the memories you'll want to take back with you (even the bad times; they're often funny once you've had time to cool down).

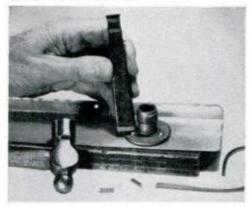
More tips

- If the weather's a bit glum, warm up your color photos with an 81 EF filter.
- Whenever you travel, carry a list of all your photo gear, complete with serial numbers, in case any gets lost or stolen. And if you're going abroad. register the list with U.S. Customs to avoid duty charges when you bring
- Never travel with new or newly repaired equipment you haven't checked out first to make sure it's working. It's not a bad idea to check all your equipment, either.
- Engrave your name or Social Security number on equipment as a safeguard against theft. And insure
- Everyone tells you not to put a camera in your car's glove box or trunk. So where should you put it? Wrap it in aluminum foil or a refrigerator bag and put it on a pad under the front seat, in a bag taped to the back of the seat, or in a bag hung from the headrest.
- If all of those technical details about exposure, lenses and the like make you feel lost, stop worrying and use an Instamatic. Even box camera photos are better than no pictures at all.

HINTS

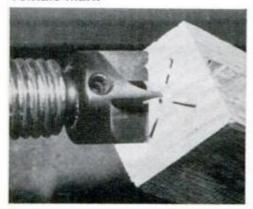
FROM READERS

Wire-solder rivets



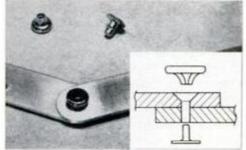
For temporary fastening and where strength is not important, short pieces of ½-in. solid wire solder make fine rivets. Heads are formed by peening.—Walter E. Burton

Telltale mark



Notch one tooth of your spur lathe center with a file and you'll be able to replace a turning in the same position between centers, no matter how many times you remove it.—R. S. Tupper

Rivet for pivot



A two-part tubular rivet makes a neat free-swinging pivot for two metal pieces. Simply drill a hole through both, countersink and lock the rivet in place with a hammer. Metal thickness determines size of the rivet.



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Quick power for sailboats

A little outboard gets you there when the wind doesn't.

by Bill McKeown



Extra-long shaft, horizontal or vertical pull starter, a reported 200-percent increase in reverse thrust, remote electric start for 10 hp are Chrysler features.

Sailors still feud with the powercraft cowboys who race around making waves. But the smart windjammer skipper these days usually figures a way to take a small outboard along; stinkpotting may not have the glamor of sail, but it can get you home when the wind goes down, and burns minimum gas along the way.

The builder of your sailboat, in fact, may recommend the outboard horsepower that you'll need and, if you're lucky, he may have provided a cut-down transom or inboard motor well where you can mount your auxiliary power. If not, and if no stern







bracket is offered as an option, there is still a selection available at marine supply shops and mail-order outlets in sizes to take up to 40 hp and prices from \$15 to \$100.

Because a sailboat is slowed down by the propeller and lower unit dragging through the water when not in use, the best brackets are hinged, sometimes spring-loaded, and lift the motor up and out of the way when it More dependable than windpower, a little kicker clamps on easily to push you home in a calm or aid docking in close quarters. Fixed-height bracket (above) is suitable for low transoms. Hinge-up unit (left) helps lower shaft clear water. Transom cutout (lower left) lets motor tilt up and provides space for pull rope starter.

is not needed. If you have a stern cutout for the motor, you may be able to tilt up your outboard instead.

Steering your sailboat under power or sail is usually handled by the boat's rudder. The motor is left in a straight-ahead position with the tiller handle hinged up. An extralong-shaft lower unit, available for some models, will keep the powerhead above most following seas. A manual pull cord that allows starting from above as well as in front of the motor is particularly convenient, and some small units offer remote pushbutton starting now, too. A tiller extension that allows push-pull shifting as well as steering and throttle control has also been announced. Outboards designed for sail use have recently been introduced that have special reverse locks and claim more thrust for quick stops and backing up or docking.

Don't pick a big outboard, however, when a smaller model has been recommended. The big job will be heavier and more awkward to lift aboard and stow under a cockpit seat. More power adds little speed to a sailing hull. It will just cost more to buy and feed gas.

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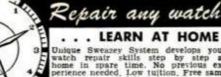
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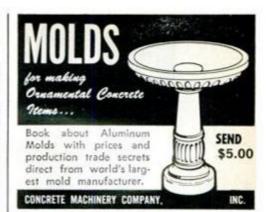




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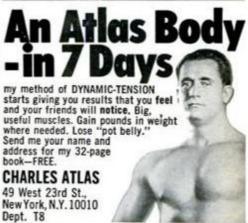
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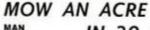
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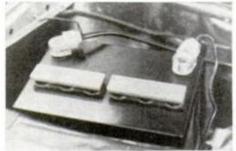
"Huey," backbone helicopter of the Army, will be replaced by a new UTTAS (Utility Tactical Transport System). Two aircraft makers are vying to build it. Above is Sikorsky's YUH-60A version at hover, employing a proven articulated rotor system. Boeing's YUH-61A entry uses a hingeless rotor technology, plus a tricky "flexstrap" tail rotor installation (right) and controllable tailplane that becomes a workstand for rotor service.



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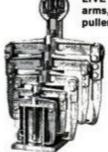
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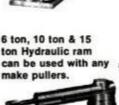
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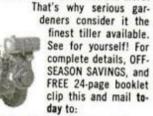
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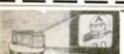
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My name is Sid Rosen. I've been a wheeler-dealer all my life and I've been involved in hundreds of successful businesses. Let me tell you what I can do for you

I will make you appear to be a millionaire...in just four weeks! I will teach you how to GET SMART AND LIVE GREAT! I will teach you how to capitalize on human nature, human emotions and human greed. I will teach you to open previously locked doors, create unlimited opportunities and place yourself upon the glittering path to financial prosperity and success. I will help you to acquire and enjoy all the marvelous things in life you've always dreamed of having but felt you would never get—like a luxury cruise around the world, a color TV in every room, expensive cars, luxurious homes, beautiful clothes, gourmet foods, cameras, gadgets, you name it. I will show you how to get it!

I have learned (the hard way) that it is possible to create the "illusion" of great personal wealth quite easily in today's credit oriented economy. Notice now, that I have used the term "illusion"... for that is exactly what our entire capitalistic society is based upon.

People, including you and I, believe what they see! We presume a person to be wealthy when seeing his expensive home, high priced cars, well tailored clothes and luxurious lifestyle.

You've probably heard the saying, "It takes money to make money" and you probably have also heard the saying, "You can only borrow money when you have money." The truth that I will teach you is that in today's economy it only takes "THE ILLUSION OF HAVING MONEY"... to make money and it only takes "THE ILLUSION OF HAVING MONEY"... to borrow money. Remember this, in today's financial marketplace, most money transactions are merely bookkeeping entries and nothing usually changes hands but scraps of paper. This is one of the secrets I will reveal to you in great detail."

Are you having trouble borrowing money? Making loans? Getting mortgages? Leases? Credit cards? Charge accounts? I will change all that! I will start you on the road to building an AAA+ credit rating that will enable you to get cash, mortgages, houses, property, credit cards, furs, jewelry, airline tickets, just about anything . . . in hours on just your signature or even on the telephone!

I will teach you to wear the hat of a millionaire no matter what your present situation, occupation or past history. My "Smart Money Plans" will enable you to drive a luxury car for which you paid nothing: move into a luxurious home with no money down; walk into a bank and get a \$10,000.00 signature loan and mingle in the top financial and social circles of your community. S'M/P will even cover your tracks if necessary; misdirect credit investigations. It will even show you how to disappear and become another person to start all over again if necessary free from past obligations.

I'll tell you this . . . I call many of my plans "secrets" because I don't think that more than one person in a thousand knows any two of them and perhaps only one person in fifty thousand knows all of them. And believe me, most of my secrets are astonishingly simple, just requiring the right knowledge and a little brains, guts, gumption, time and effort!

My exclusive S/M/P manual will explain my many techniques in detail with step-by-step instructions on how to make them work. With this information in your possession, you will have the knowledge to get everything you desire in a matter of weeks, not years. There has never been a revealing insider manual published like this before. Everything... and I mean EVERYTHING you need to know is in my manual, which will be sent to you in a plain envelope.

The price of my manual is \$10.00 plus your signed pledge that you will not duplicate or otherwise reproduce or resell my secrets.

Now. I know that most of the people who read this letter will not act upon it. They will be suspicious, timid and unmoved by what I have revealed here. They will reject it quickly as some kind of con game or a lot of bull. This is good and this is as things should be, because if there were too many people with enough faith in themselves to act on my "Smart Money Plans," it could be made useless to the rest of us.

So to you who will not act, please accept my thanks. Your indecision and inaction will help make the rest of us rich! I will leave you with this closing statement. Every word in my manual is true! Every technique workable exactly as stated and can be put into immediate operation. I offer my manual to you only once! I have no future discount deals or the like My offer is \$10.00 for the complete manual and you gamble that \$10.00 on yourself. There are no refunds and I guarantee you no extra charges or come-ons for additional money. I have absolutely nothing else to sell and, of course, I will keep your name completely confidential. completely confidential

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