

MARCH 1976 75 CENTS

# Popular Mechanics

How to pick and install the best CB car antennas

Build the ultimate workbench

Get a jump on summer gardening with a cold frame

Owners tell all about Chevette

World's most sensitive outpost

12 pages of camping fun—by car, RV and backpack!



High-flying SPIRIT OF '76 KITES you can make

20 tips from firefighting experts to protect your home

Grand Prix racing roars onto Main Street, U.S.A.



## You'll never guess which one

You're looking at three of the best places where you can buy property and casualty insurance.

Which one do you think sells the most insurance?

Hint: It's not the one that promises to put you in "good hands."

Hint: It's not the one that promises to be there, like a "good neighbor."

Surprise: The one that sells the most insurance is The Insurance Store.

But then, that's really not so surprising once you know all about The Insurance Store.

### More Kinds of Insurance for More People.

One reason The Insurance Store sells the most insurance today is because over the years it's been able to provide more different kinds of insurance for more people than Allstate and State Farm.

### Your Choice of Insurance Companies, Policies, and Prices.

Allstate sells Allstate Insurance. And State Farm sells State Farm Insurance.

But The Insurance Store offers you

a wide variety of leading insurance companies—including ourselves, Continental Insurance.

Some of the companies specialize in automobile insurance. Others, in homeowners insurance. And still others, in business insurance.

At the same time, some of the companies specialize in low price. Others, in unusual coverages. And still others, in a combination of both.

By shopping at The Insurance Store, you can select the specific companies, policies, and prices that best



Welcome to  
**The Insurance Store**

**sells the most insurance.**

This One



CD5L-FAP-9NBP

match your needs. And budget.

**Unique All-in-One Plan.**

The Insurance Store offers you the unique Continental Insurance Personal Comprehensive Protection Plan: the all-in-one plan.\*

It lets you combine separate policies on your home, your car, and yourself all into one neat package—with one premium and one expiration date.

**What's Best for You.**

Each Insurance Store is owned by an independent agent.

*Independent* means: While he rep-

resents many different companies, he's beholden to no one company.

And so if the company with which he places your business doesn't do what's best for you, he's free to switch to another company which will.

That gives him tremendous leverage to use on your behalf. And use it he does.

**Locations Coast-to-Coast.**

Wherever you live, there's an Insurance Store near you.

And it's easy to find: Just see an agent who is listed under Continental

Insurance in the Yellow Pages.

**Finally: Insurance Made Easy.**

Now that you've read this far, you know two very important things about three of the best places where you can buy property and casualty insurance:

Which one sells the most.

And why.

**Continental Insurance**  
featured at  
**The Insurance Store**



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The excitement of Grand Prix racing on downtown streets of Long Beach, Calif., is captured in this painting by Jack Doyle.

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# Popular Mechanics®

MARCH 1976 • Vol. 145 No. 3

INTERNATIONAL EDITIONS: Australia, Caribbean, Mexico, Southern Hemisphere

## SPECIAL FEATURES:

**How to pick and install the best CB car antennas.** Once you choose the right one for your purpose, the installation will be easy. Page 86.

**Special camping section.** Twelve pages of camping fun—by car, RV and backpack, plus answers to 10 major problems you face outdoors. Page 100.

**War watch in the Sinai.** Find out how 200 American technicians will carry out their assignments in the world's most sensitive outpost. Page 75.

**Get a jump on summer gardening with cold frames—**almost as useful as a greenhouse. Learn how to build one at a fraction of the cost. Page 92.

**20 tips for home fire safety.** Here are practical pointers from expert firefighters that you'll need to follow during a real emergency. Page 84.

**Old-world workbenches:** The ultimate shop tools. You'll be a better craftsman if you use one. Four styles are described here. Page 124.

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**POPULAR MECHANICS IS PUBLISHED MONTHLY** by the Hearst Corporation, 224 West 57th Street, New York, N.Y. 10019, U.S.A. Single copy for the United States and Canada, 75 cents. Subscription prices: United States and Possessions, \$7.00 for one year; \$13.00 for two years; \$18.00 for three years. Canada, add \$3.00 for each year. All other countries, add \$5.00 for each year. Second-class postage paid at New York, N.Y., and at additional mailing offices. Authorized as second-class mail by the Post Office Department, Ottawa, and for payment of postage in cash. Registered as second-class matter at the Post Office at Mexico D.F., Mexico, June 20, 1950. © 1976 by The Hearst Corporation. All rights reserved. Printed in U.S.A.

**POSTMASTER:** Please send Forms 3579 to Popular Mechanics, P.O. Box 646, New York, N.Y. 10019.

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length I want. So I get as much taste per millimeter as  
any cigarette can give. For me, Winston is for real.

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# 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 1235J.

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## Johnson sideband. Again!



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.

Write for free catalog



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Scout the other side of  
where you've never been.





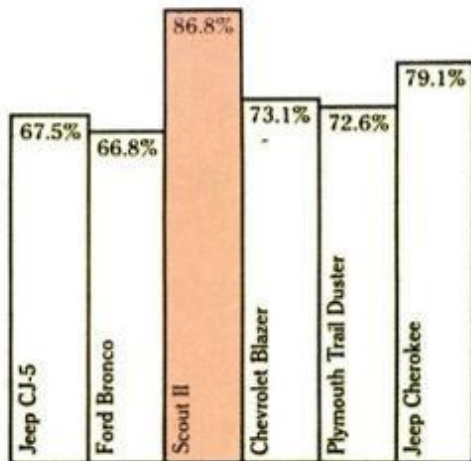
It's an incredible feeling.  
Being able to climb into the '76 Scout® II and disappear.

A 4x4 built to take you out there.

Fishing, hunting, camping or just tough off-roading it for a day.

It just feels good knowing you're in a machine uniquely designed and built to give you the kind of performance you need. You can depend on it.

That's not an idle boast.



Scout II outperformed each of these vehicles in overall performance and engineering.

Last year, in an independent off-road test conducted by Petersen Publications, Scout II outperformed every other 4x4 vehicle tested. Chevy Blazer, Ford Bronco, Jeep Cherokee and CJ-5, and Plymouth Trail Duster. For two weeks, they were all pushed to the brutal limit. Across 600 acres of deep sand, mud, broken rock and steep mountain trails.

And when the dust cleared, only Scout rated "excellent" in 15 out of the 17 engineering and performance standards.

And out-and-out superior in the seven most *critical* off-road measures. Superior in hill climbing. Ease of handling. Maneuverability. Stability. Acceleration. Gearing. And braking.

Incredible? No. We know what you need out there. So, that's the way we build the Scout II.

Tough and maneuverable.

With a heavy-gauge steel body wrapped around a truck chassis, leaf springs on all four corners and a rugged transmission.

Maneuverable as a jackrabbit. Only 166.2 compact inches bumper to bumper, 70 inches wide and a tight turning circle of 33 feet 10 inches.

Instant 4x4 traction, whenever you need it. Come sand, mud, snow or a sharp upgrade, you just pull the convenient dash-mounted knob and you're in 4-wheel drive. When trouble's behind you, just punch it back to 2-wheel efficiency. It's another Scout exclusive.

Power and acceleration?

You've got them with a wide choice. Starting with the efficient slant-4, the optional 304- or 345-cubic-inch V-8 or exclusive new 6-cylinder, 198-cubic-inch diesel. An exclusive.

But there's more. Scout II is a joy to drive for a woman, too.

It starts with the security of having 4-wheel drive when she needs it, sitting up high to see better, enjoying the passenger car comfort and ride, the easy handling, the super-wide doors. Options like air conditioning, automatic transmission and power steering, a big variety of color combinations and custom interiors.

Stop in at any IH dealer. Test drive the incredibly rugged Scout II.

While you're there, take a look at the Scout Traveler.™

She's built in the Scout II tradition. But with something extra. Just as tough, dependable and easy to handle—on or off the road. But roomier with a whopping 103 cubic feet of cargo space in back. More than any other 4x4 in its class.

Scout Terra.™ If you want more than a standard pickup with 4-wheel drive slapped on, you've come to the right place. The mid-range Scout Terra, the first pickup of its kind in America. It's smaller on the outside to outmaneuver any full-size pickup made, but has a 118-inch wheelbase to give you smooth-riding stability. With more standard, lockable in-cab storage space than any conventional pickup made.

# Scout® the America others pass by.

Scout Terra



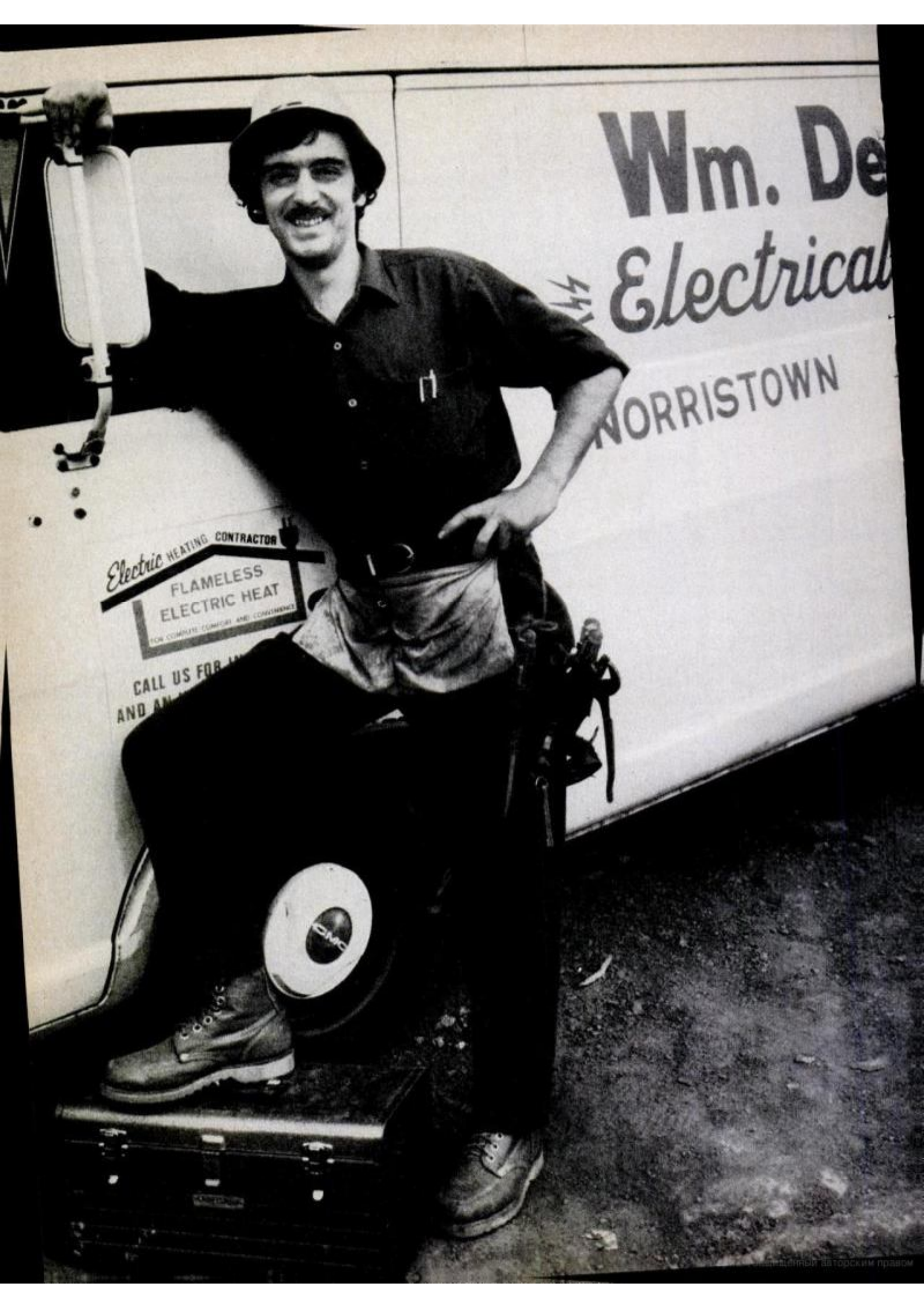
Scout Traveler



Scout II



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ELECTRIC HEAT  
FOR COMPLETE COMFORT AND CONVENIENCE

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# "Learn an honest trade," my old man used to say to me, "and you'll never have to knuckle under to any man."

(A TRUE STORY)

Bill DeMedio of Conshohocken, Pa., has it made. At 26, he's a licensed master electrician. The top of a trade where there aren't enough good men to go around.

But more important, Bill's his own boss and calls his own shots. "I just went into my own business. And even before the sign on my truck was dry, I got my first big job.

"The contractor for a new group of houses asked me to do the wiring. And there's bound to be more work from him and other builders.

"If it wasn't for my ICS training as an electrician, I'd still be in some dead-end job—hating what I was doing, taking orders from everyone, and never getting any thanks for it.

"As a master electrician, you're the boss on the job—even when you're working for someone. You get respect, good money, and like my old man said, you don't have to take baloney from anyone."

Bill De Medio is one of our outstanding graduates. He's hard working. He's in a growing field. And he has good training.

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And the ICS Center for Degree Studies is authorized by the Pennsylvania Department of Education to grant the Associate in Specialized Business degree in Accounting and Business Management, and the Associate in Specialized Technology degree in Civil, Mechanical, Electrical, and Chemical Engineering Technologies.

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## FREE DEMONSTRATION LESSON

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

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Our Sea-Horse 200 gives you all the advantages you want in big marine power:

Low weight, with the most efficient power-to-weight ratio in marine propulsion.

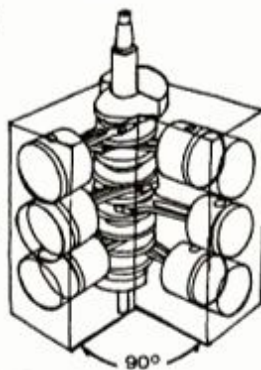
The powerful acceleration thrust and high RPM stamina of two-cycle engine design.

More usable room in the boat and easier servicing with power that's outboard.

Higher stern freeboard with a new extra-long shaft version available for 25-inch transoms.

And the same fuel efficiency we've been designing into our modern Johnson outboards.

Our V-6 is completely new, but most of its design concepts have been proved and refined over our 18 years of experience with 90-degree design V-4 outboards.

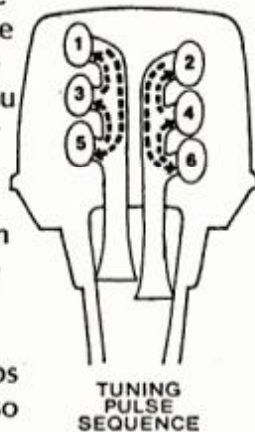


**Exhaust tuned like a racing engine for more power on less fuel.**

The combustion cycle of all our Vs is made highly efficient by using the energy of exhaust

pressure waves. To pull more exhaust gases out of each cylinder, then pack in more of the entering fuel charge. The fresh fuel charge is cleaner, more powerful. So you get more power on less fuel.

(Intake and exhaust ports on the new V-6 are oblong—extra wide and with virtually flat tops and bottoms—so pistons open greater port areas, faster. This gives extra strong tuning pulses—one key to more power on less fuel. We also pulse-tune as if each three-cylinder bank was a separate engine.)



**Our patented Pressure-Back piston rings increase engine efficiency.**

Our ring design allows combustion pressure to push the rings close to the cylinder walls to seal the combustion chambers and keep power from leaking out. These rings seal so well each piston needs only two rings, rather than the usual three. So friction and wear are reduced and the engine runs cooler. You get improved fuel economy. And longer engine life.

**All the benefits of electronic ignition.**

Our MagFlash™ breakerless, magneto-excited capacitor dis-

charge ignition system zaps a full 35,000 volts from coil to plug in about three millionths of a second. That's 30 times faster than conventional magneto systems. Spark plug voltage just doesn't have time to leak off. So our spark is hotter, faster. You get quick starts. Smoother idling and low speed running. And long plug life.

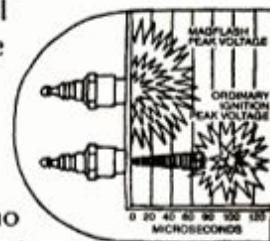
Additional benefits: the system has no breaker points or condenser to change, no moving parts to wear or adjust, ever. We introduced MagFlash eight years ago on our V-4s. The automotive industry is just starting to use similar systems.

(Our V-6 has two MagFlash power packs—one for each three-cylinder bank.)

**The business end is all business, too.**

The clean, one-piece gearcase design of our lower units eliminates gaskets and provides maximum strength. Our thru-prop-hub exhaust reduces drag directly behind the prop by filling the low-pressure area normally created by the water's spinning movement. The overall result: we use less fuel for power... more power for propulsion.

Then there's factory-installed Power Trim 'N' Tilt. Standard equipment on the V-6... on one model in each V-4 power choice.



A dashboard switch gives you control of boat trim while running. And you can tilt the motor for shallow water running, beaching and launching.

**It all adds up to Johnson performance engineering.**

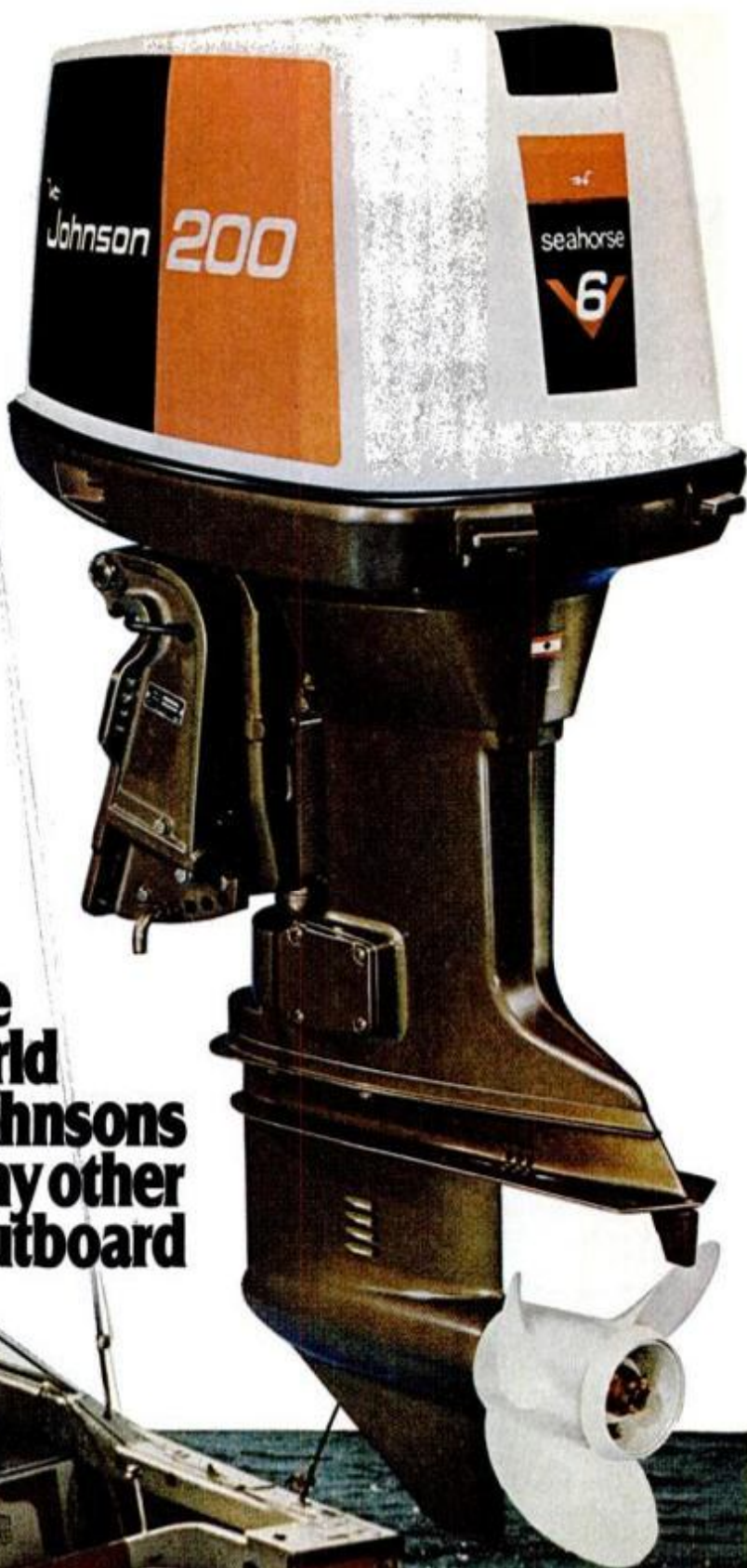
Our V-4 outboard designs have won all of outboarding's famous endurance runs: The Outboard World Championship (Lake Havasu, Ariz.), The Six Hours of Berlin, The Six Hours of Paris, and the Nine-Hour Enduro of Parker, Ariz. And prototype versions of our V-6 have stepped into the winner's circle around the world, including the Paris, the Parker, Ariz., and the Milan, Italy, enduros.

Overall, you can see why we take pride in our Vs—85, 115, 135, and 200 hp. They lead our 15 power choices, from 2 hp, plus four high-thrust electric outboards. See your Johnson dealer, or write for free catalog. Johnson Outboards, Division Outboard Marine Corporation, Sea Horse Drive, Waukegan, Illinois 60085. Department PM-36.



*First in Dependability*  
**Johnson**  
OUTBOARDS

**The world runs more Johnsons than any other outboard**



# DETROIT LISTENING POST



## New mid-size program at Ford

More medium than mini. That's the size Ford is thinking of for a new line of cars for the early 1980s. With everybody else going mini, why would Ford try to buck the tide and go medium? It's not a case of bucking the tide. It's a matter of changing the definition of medium.

By 1980, Ford figures, medium will refer to cars the size of today's Pinto, Vega and Gremlin. That isn't just a notion Ford has. The other companies see it the same way. Ford thinks the big market, at least in the United States, will continue to be for Pinto/Vega-size automobiles. Cars that can accommodate four to five people. So what's new? How will a medium of the 1980s differ from a car of the 1970s? Here are some guidelines Ford has for its planners:

- Minimum fuel economy of 25 miles to the gallon, but shoot for 28.
- Target weight not to exceed 3000 pounds, but shoot for 2800.
- Engine and driving axle to be in the same location. This means front-wheel drive. But it also means the buyer will have to take the engine-axle combination designated by the factory. You won't be able to special order different combinations.
- Substantially more glass, ala AMC's Pacer.
- Finally, reduce the frequency and expense of servicing the car because the original owner will keep it longer.

## 2 nays, 2 yeas on minis

Is Detroit really serious about building small cars? Not smaller cars. Smaller cars are a certainty. But are the four U.S. companies really committed to building Chevette (GM), Fiesta (Ford), Simca (Chrysler) and Pacer (American Motors) size cars, no fingers crossed behind the back?

There's no question about American Motors. AMC is the champion true believer in small cars among American automakers. And there isn't much question where Chrysler stands. Chrysler has never made any bones of the fact it doesn't think mini cars have much staying power and it is down-sizing the Simca to sell in the United States to stay in step with the competition. As Chrysler candidly admits, it's mostly a case

of going along for the ride.

How about GM and Ford? Are they in small cars for keeps? Or are they just taking a ride on the bandwagon, same as Chrysler but not as openly as Chrysler? GM says it is fully committed to smaller cars—but not necessarily mini size—and it is putting chips in the game at a rate of \$2.5 billion a year to shrink everything in its catalog. Ford sides with Chrysler and thinks the big market will be for medium-sizers rather than minis. A Ford exec recently described GM's Chevette as a "diversionary tactic" and said GM really has its eye on a comeback for smaller versions of Buick, Olds and Pontiac. That opinion does not square with the fact GM is readying a smaller car than Chevette for 1979-80.

It's a two-two split. AMC and GM are pro small car, Ford and Chrysler favor the mediums over the minis. The swing vote will be imports. If the small cars from Germany and Japan continue to sell in volume, the mini is here to stay. But if Chevette, Pacer and the small imports lag, the mini will go maxi and belly-up ala the Corvairs, Falcons and Valiants of 15 years ago.

## Will GM diesel go in a van?

Does a van qualify as a truck or a car? It doesn't matter, except that a GM source adds a postscript to last month's report on Oldsmobile's development of a diesel engine for a passenger car. He says if you count a van as a passenger car, GM could have a diesel "car" as early as 1980. But if you're talking a conventional car, nonvan type, the diesel won't appear before 1984-85.

## Chrysler 'close' on turbine

Chrysler is zeroing in on the last piece of the puzzle that will enable it to produce a turbine-powered car. Only holdup is discovering or developing a new type of material that can withstand the extremely high temperature (2400° F.) at which the turbine operates.

The company hasn't solved the problem yet, but is experimenting with a "promising" combination of materials consisting of a ceramic infiltrated with metal.

"We're close, but not quite good

enough," a company source reveals. But with the millions of dollars and years of research Chrysler has put in on the turbine it can't afford to risk a goof-up by being close. It has to be bull's-eye or forget it.

## Advice for fix-it-yourselfers

If you make your own car repairs and buy parts at a department or discount store, don't take the clerk's word for it that a particular part will fit your car unless it says so on the carton containing the part. The parts companies that sell both to car manufacturers and department stores tell me do-it-yourself is getting a bad name because of the way some mass merchandisers run their auto departments. Many first-time do-it-yourselfers are being turned off because of unhappy experiences with parts purchased at department stores.

In the first place, the parts companies say, many people working in the auto sections of department stores don't know beans about the products they sell, and the manager of the department who really knows the business is seldom around to answer questions.

The parts firms also say to beware of parts carrying a "Fits All Makes" label. The part may indeed fit all makes, but what they don't tell you is that in order to make it fit, you have to salvage something off the old part being replaced. You don't discover that until you have the job torn down. If the old part can't be salvaged, you have to make another trip to an auto parts store, not a department store, to get the missing piece. And in some cases you might have to buy a complete new kit—duplicating parts you bought the first time—to get the missing item.

How do you protect yourself? Don't take the word of the counter-man that a part will fit your car. Read the information on the back of the box. If that doesn't answer your questions, open the box and read the instruction sheet packed with the part. If you buy a part and can't install it on your car after following the instructions, take it back and demand a refund. Don't be intimidated and write yourself off as a dummy because the clerk told you the part would fit your car. ★ ★ ★



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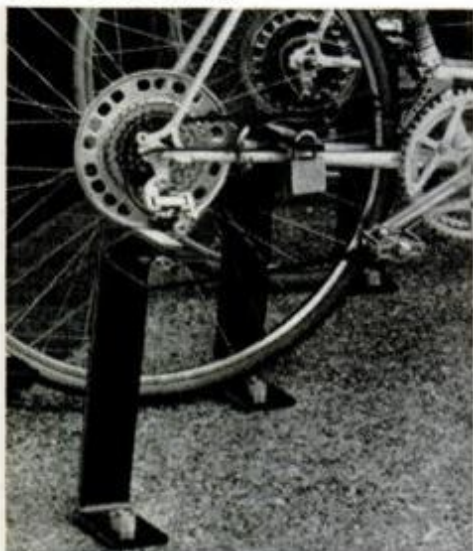
Filter Kings, 16 mg. "tar," 1.0 mg. nicotine; Longs, 17 mg. "tar," 1.1 mg. nicotine, av. per cigarette, FTC Report Nov. '75



# THE BICYCLE SHOP

GENE ANSWERS READERS THIS MONTH

## Nine-bike lockup



*Any ideas about locking up the nine bicycles our family owns? There's no room in our one-car garage and no basement.—Dee Jacobs, Erie, Pa.*

If they're expensive machines, I'd crowd them into the house somehow, if I had to stuff them under the beds or stack them in the living room. If your bikes are not terribly expensive, let's say under \$150 each, I suggest installing a special bike rack such as shown here that comes with a special bolt and its own bag of quick-hardening cement, for installation in a concrete slab (you can buy precast concrete slabs). Then you can lock your bikes through the wheel and frame as shown. These racks are Rally Racks, made by Rally Enterprises, Inc., Box 601, Mill Valley, Calif. 94941 and they cost about \$17 each.

Note that you can park and lock your bike to the unit, which I consider good security for the medium-price bike. This rack also comes with a coin-operated lock, and has been so installed in many cities.

## About the short of it

*Where can I buy a good-quality touring bike for a short man? I am five-foot-six.—Ted Barbee, Hawthorne, Nev.*

You need a true 19-inch frame bike. I say true because some makers just chop off the seat tube to shorten it, thus raising the bottom bracket,

but doing nothing for the short rider who needs to get the top tube closer to the ground so he can straddle it with both feet flat on the ground and still have an inch clearance between body and top tube.

You should be able to get a 19-inch-frame bike from a Schwinn, Raleigh, Motobecane or Peugeot dealer. Frame size is measured from top of tube (where seat post goes in) to centerline of bottom bracket axle.

## Wider gear ratio

*I recently saw an ad for the Hagen infinite-speed transmission conversion kit. Is it really infinitely variable; does it work?—Daniel Carver, New York*

It is infinitely variable and it works. It is also infinitely heavy. If you want one, you can get it through your bike shop as a replacement for your chainwheel. The Hagen unit would be one way to convert a three-speed to a wider gear-ratio bicycle.

## Side-pull vs. center-pull brakes

*Since the cheapest bikes have side-pull brakes, and bikes of better quality have center-pull brakes, how come the best bikes have side-pull brakes?—Eric Ellefsen, San Jose, Calif.*

A very good question. Until Campagnolo came out with side-pulls about five years ago, the best brakes were center-pulls. Today, Shimano, Campagnolo, Weinmann and Universal all make very fine (and very expensive) side-pull brakes which you'll find only on the most expensive bicycles.

Do they stop any better than good center-pulls? If you're the average bicyclist, no. If you're a racing cyclist or a bike freak like me, yes, because the good side-pull brakes offer very stiff, positive micro control of braking force needed for precise control of the bicycle. For absolute stopping power control, though, Mafac center-pull brakes are excellent.

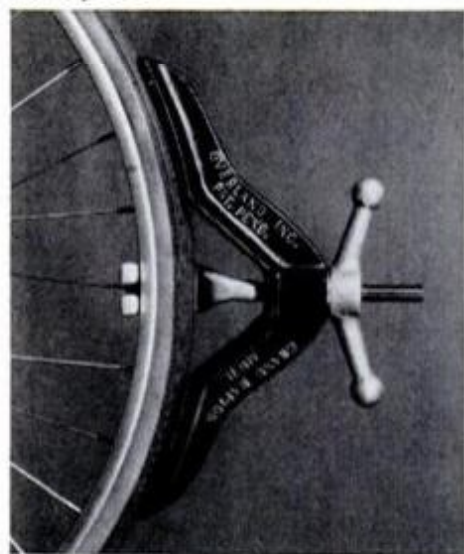
## Joints to avoid

*In my long-distance bike tours I frequently encounter railroad tracks. What is the safest way to cross them?—George Lessens, Lowell, Mich.*

Carefully and at right angles—head-on. If the tracks angle across

the street instead of bisecting it evenly, look back to make sure traffic is clear, then steer out into the street far enough to hit the tracks at a right angle. That way your front wheel will jump over the track and not get caught in the track groove. If you get caught in the groove, the bike will stop suddenly, probably throw you off, and at the least bend the fork and the top and down tubes. Bridge expansion joints are just as bad as tracks, as are street sewer gratings with bars parallel to the road. I can tell you all about these joints from hard experience.

## Thump tool



*Is there a tool for straightening bicycle rims?—Al Marcus, Sioux Falls, S.D.*

If one of my rims had a dent in it I'd snip all the spokes with a wire cutter and lace up a new rim. But I'm fanatic. Anyhow, steel rims on less expensive bikes can be straightened reasonably well with the rim tool pictured. If you (or your kids) keep hitting potholes and curbs and denting rims, it may pay you to buy the tool—about \$20 from Overland, Inc., 2785 Northville Dr., N.E., Grand Rapids, Mich. 49505. Few things are annoying as a thumping rim. ★★★

*If you have any questions about bicycling send them to The Bicycle Shop, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. Sorry, but letters cannot be answered individually. Problems of wide interest will be discussed in this column.*



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**Denim Touring Bag**  
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**Keylocks 6 foot vinyl-covered Cable**  
Laminated hardened steel shackle



# HOMEOWNERS' CLINIC

## Cures for water hammer

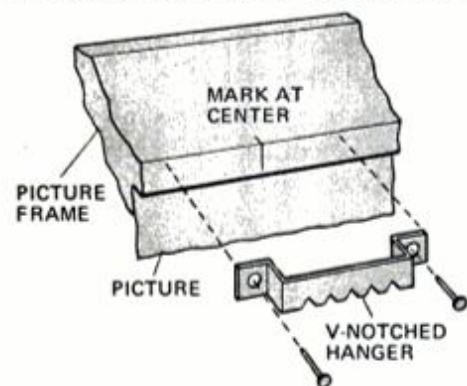
*I have a three-apartment building and get an air blast when opening a hot-water faucet. There's no air chamber on the plumbing that I know of. Would a chamber stop the air blast from the faucet?—Frank Sgro, Passaic, N.J.*

Properly installed near the meter, an air chamber is usually the best remedy. However, water that is too hot sometimes causes the same symptom. Check the thermostat on your water heater; it should be set to give a water temperature not higher than 140°. Unless you have equipment for cutting and threading pipe, the installation of an air chamber is a job for your plumber.

## Framed picture hangs askew

*I framed an oil painting, using a hanger at the center of the frame. The picture tilts slightly and won't hang perfectly level. I'm sure I located the hanger at the center of the frame. How can I remedy this?—Mrs. Jason Lowe, Mount Pleasant, Mich.*

Your picture frame was probably made with the heavier piece of wood



placed inadvertently on what is now the low side. You can correct this by using a hanger of the type detailed; you should find one wherever you bought the frame for a few cents. If not, you can easily make one with tinsnips, a small piece of sheet metal, a file and hand drill. Use tiny 1/2-in. headed nails for fastening to the frame.

## Fireplace stove

*My new home is all-electric and while this seems adequate, I've thought I*

*might save on heating cost with a stove. I have two fireplaces, one in the basement, the other on the first floor. Is there any wood-burning stove, or heater, that can be installed in the fireplace opening?—Claude E. Cowen, Independence, Mo.*

I know of no heating stove presently made that can be installed in a fireplace opening using the existing fireplace flue. I have known of one similar installation of the so-called Franklin stove, or heater, placed on the hearth and vented into the fireplace flue by carrying the top vent pipe up to an opening above the mantel. This might be done with the Franklin heaters now being made, but because of the need for venting into the fireplace flue in the manner indicated, I would hesitate to recommend such an installation. However, the Franklin heater is attractive, fairly efficient and might be installed as a space heater vented to a fabricated chimney.

## Odor in lavatory

*Recently I built a bathroom vanity, using one of the newer-type lavatory bowls. The original plumbing fit perfectly, making no changes necessary. However, there seems to be an objectionable odor, like sewer gas, when one leans over the bowl. What might be the cause of this?—Joseph Kahler, Royal Oak, Mich.*

It's difficult to diagnose plumbing problems at long range with any certainty, but I would guess immediately that the vent is partially clogged, causing a back pressure to develop in the plumbing, releasing an occasional "bubble" of gas through the trap. I'd investigate this possibility, as cobwebs, leaves and other windblown debris can, and do sometimes build up a partial obstruction. Of course, there can be other causes, but this would seem the most likely, judging from your description.

## Smoky oil-burning furnace

*Occasionally there is a puff and flow of smoke from the warm-air heating ducts, and a heavy odor of oil is present in the rooms. The furnace has been checked over by our local heating service but the trouble still per-*

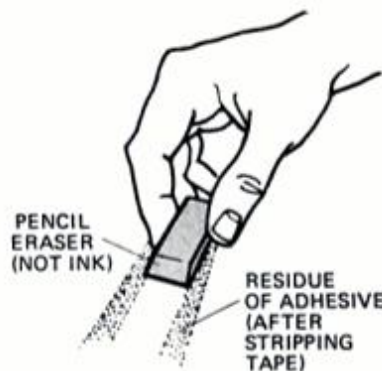
*sists. Can you suggest a cause and remedy?—Mrs. Robert Ermer, Hawkins, Wis.*

If, as you say, the installation has been checked but no operational defects have been discovered, then it would seem, judging from your description of performance, that a possible cause of a smoke and fume leak is a crack or break in the furnace. If the break is small, it usually is possible to repair with refractory furnace cement. This can be determined with certainty only by an on-the-spot check of the fire chamber. I have to assume that the burner has been properly adjusted and that all other routine checks have been carried out.

## Removing adhesive-tape

*I attached paper to a finished tabletop with adhesive tape. Now there's a residue of the adhesive on the finished surface that refuses to rub off. How can I remove it entirely without damage to the finish?—James Black, Madison, Wis.*

A rubber pencil eraser usually will do the trick neatly and without damage to the finished surface, but make certain that the eraser is clean; there should be no black pencil rubbing on it from previous pencil erasures. Also rub lightly so that the eraser picks up the residue without marking the finish. ★★★

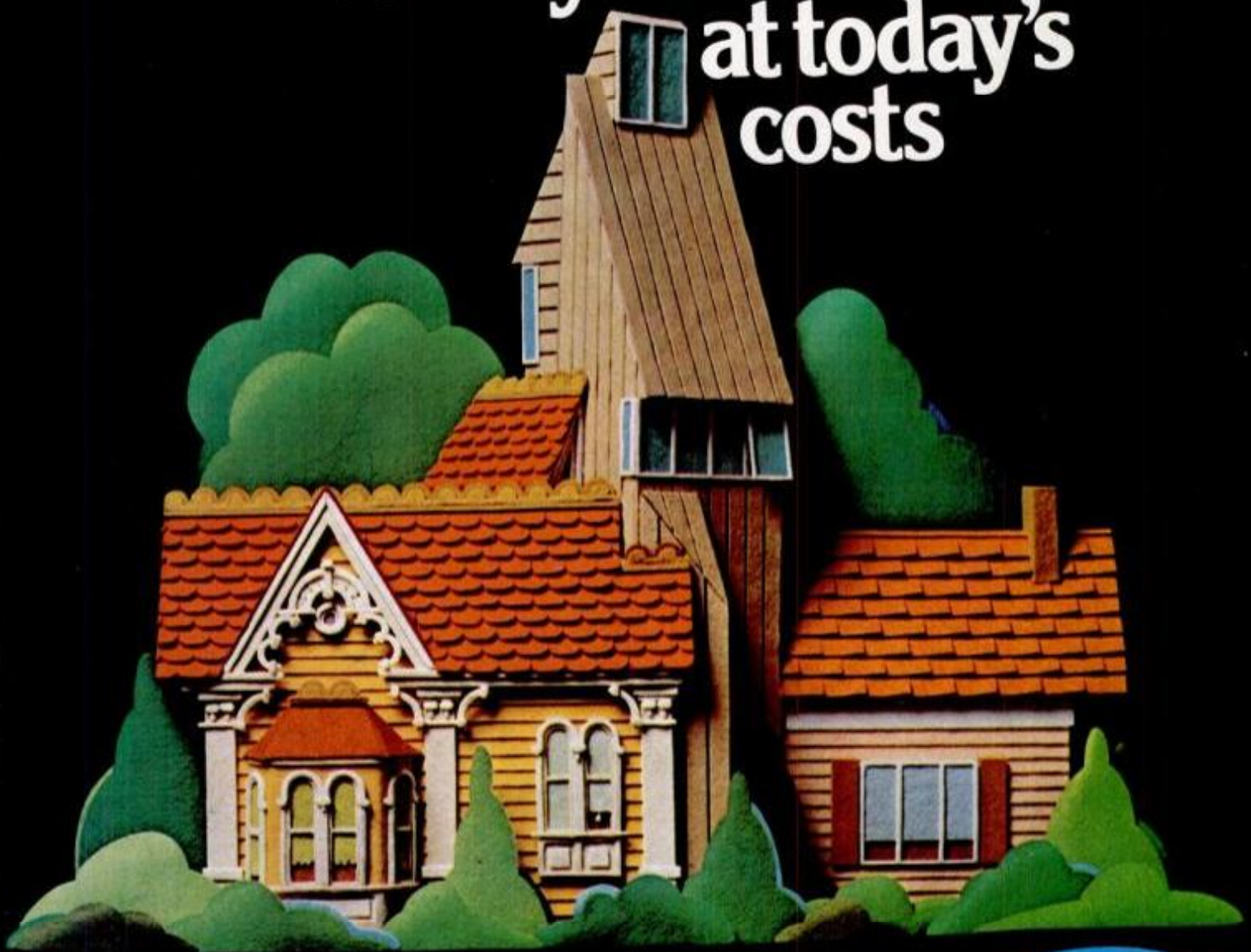


*Do you have a home maintenance or repair problem? Send it to Homeowners Clinic, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. Letters cannot be answered individually, but problems of wide interest will be discussed in this column. For more home repair and maintenance help, get PM's Home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

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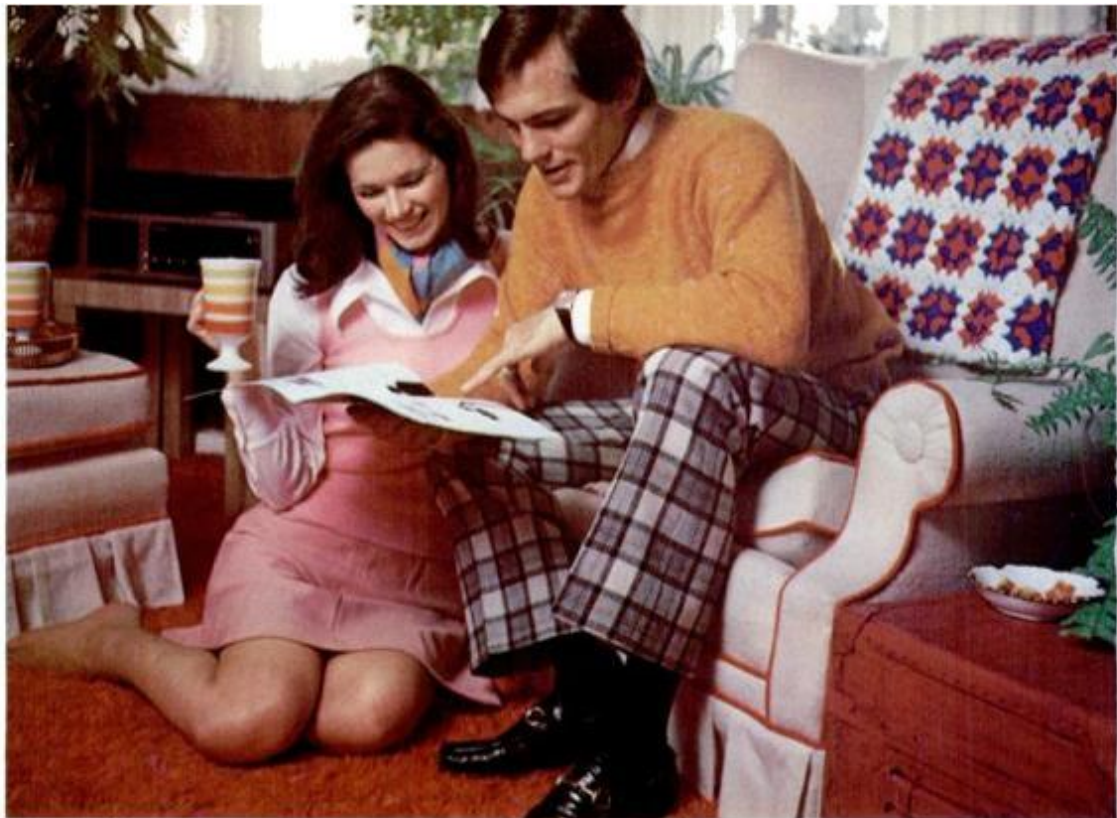
# How to keep your family comfortable at today's costs



*Carrier*

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# Family comfort and the options to consider



**Since the beginning of time,** man has sought sheltered living quarters to protect himself and his family from the elements. And that's still basically what we're trying to do today...to provide our families with the kind of home environment that is most conducive to productive living. What has changed dramatically in recent years is the quality, economy and efficiency of equipment available to achieve this goal...in response to dramatic increases in the costs of controlling our environment. When it comes down to basics...you still want to keep your family warm in winter and comfortable in summer. And you can, regardless of the type of your home, the age of your existing equipment, or the size of your income.

**What's the answer?** The answer is to have the *right* equipment to suit *your* particular needs. And the right equipment will differ from family to family depending on such personal variables as the number of people in your household, their ages, health, work and sleep schedules, your family income and even how often you entertain. These variables are in addition to structural differences, the direction your house faces, the color of your roof, and the amount of trees and shrubbery

you've planted around your house. So you can see, that it's of the utmost importance for you to work with an expert in determining the best option for you.

**Central systems come** in a variety of options to enable you to keep your home livable without draining the family budget. In its simplest terms a central system treats the air inside the house all year-round. In winter you need a heating system, and in summer you need an efficient cooling system which can cool and dehumidify your whole house. People who live in houses which are conditioned for year-round comfort tend to eat, sleep and function better than others. Here are some of the reasons why.

**Relief from heat strain. Cleaner air.  
Relief from allergies. More leisure time  
(less cleaning). Noise is removed because  
windows are closed.**





You may not realize it, but you can buy a central system for your home—or even replace an old inefficient system in the face of rising energy costs—and very likely come out ahead. It increases the resale value

of your home and may even be worth more than your initial investment to a potential buyer. If you're like most homeowners, you really have the opportunity to cut your overall energy requirements

enough to run year-round central systems, and then some. (See suggestions on following page.) The possibility exists whether you're replacing an old system or adding a system to your home for the first time. Let's take a look at the various systems available to you and what they have to offer.

**Heating system. A furnace** is the basic central heating system for winter. If your oil or gas furnace is more than 10 years old you might want to replace it even though it has a few shaky years left. Chances are it's operating well below its original efficiency and costing you additional fuel dollars. A new electric spark ignition system furnace, just announced, saves gas and also ends pilot light worries. There is no continuously burning pilot light when the furnace is off to cost you money.

**Cooling system. Central air conditioning** is a more sophisticated approach to family comfort than heating, and it adds a great deal to the year-round quality of life of the family living in the home. Quite simply, the air conditioner's job is the removal of

heat and humidity from the air in the home. Some of the qualities you should be looking for in a cooling unit are:

- High operating efficiency.**
- Low sound levels. Low maintenance costs. Easy installation.**
- Proper sizing.**

The correctly sized cooling system is of the utmost importance to you. An *oversized system* will perform inefficiently causing uncomfortable humidity and temperature fluctuation. A unit that is *too small* may not provide enough conditioned air to make your home comfortable. A *properly sized system* and low operating costs go hand in hand.

**Heat pump air conditioning.** Soon heat pump air conditioning will be for everybody. The heat pump looks and operates like a central air conditioner. The difference is: the *Heat Pump* gives efficient, reliable heating and cooling from one unit. It is an answer to economical year-round comfort. As fuel costs go up, heat pumps become more and more practical. With a heat pump you use electricity to *move* heat, not to create it. Therefore, you can save substantially on your electric bill. In summer it cools and dehumidifies the air by pumping heat and moisture from inside your home to the outside. In winter, it extracts heat from the outside air and pumps it into your home to provide warmth. (Even at low temperatures there is always a large amount of heat in the air outside your home.) A heat pump is the most efficient kind of electric heat available. A newly discovered concept is to add a heat pump to your existing heating system to save heating dollars, provide dual-fuel peace of mind, and cooling as a bonus.



### HERE'S HOW THE HEAT PUMP WORKS...

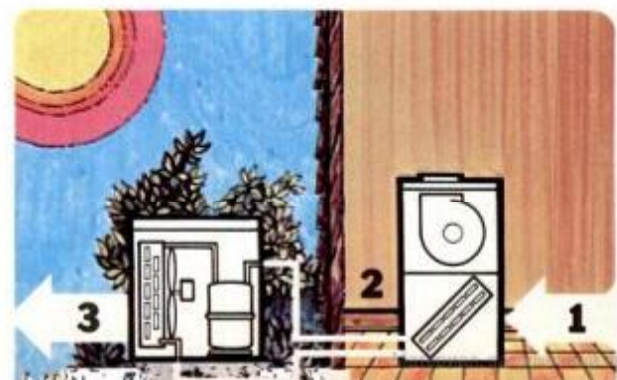
#### DURING COLD WEATHER...

- 1** Heat is extracted from outdoor air.
- 2** Heat-transfer fluid carries heat to indoor unit.
- 3** Circulating indoor air picks up heat, carries it throughout home.



#### DURING HOT WEATHER...

- 1** Heat is extracted from indoor air.
- 2** Heat-transfer fluid carries heat to outdoor unit.
- 3** Heat is expelled to the outdoors.



# Why it pays to work with an expert



No matter how expensive or good the equipment you purchase may be, it won't work right unless it is designed and installed properly. This depends entirely upon the skill and reliability of the dealer. He is the architect, material supplier, the engineer and installer all wrapped up in one. It takes a professional with specialized factory training to recommend the right type and sized system to fit your budget and the type of home in which you and your family live.

A good dealer to choose will have the engineering skill to permit proper selection and sizing, installation expertise, service and maintenance ability and represent a reputable manufacturer. He gives good advice because he has the training, the knowledge and all of the equipment options to offer only what's best for you.

Since each system needs to be tailor made for a particular house

and family, the dealer must personally survey your home to determine your family's needs as well as the structural features of the house. In preparing costs, the skilled dealer will calculate the cooling and heating capacity your house needs. That's brick and mortar engineering. A good dealer goes one step further. He "people engineers" to match your family's lifestyle and recommend not only the right system, but other possible total comfort accessories for you.





**Optional accessories.** After surveying your needs, you and your dealer may decide on certain options which can be added to a system to provide greater comfort and savings. This might take the form of a *Humidifier* which adds moisture to dry winter air, thereby permitting greater comfort at lower thermostat settings. Or an *Electronic Air Cleaner*, another possibility, removes 90% of the particles in the air passing through it, and uses less power than a 60 watt bulb.

With all these variations available in the selection and design of a system for your home, you see why it pays to work with an expert. And since the engineering he uses to design your particular system is free of charge, you should select the very best dealer available.

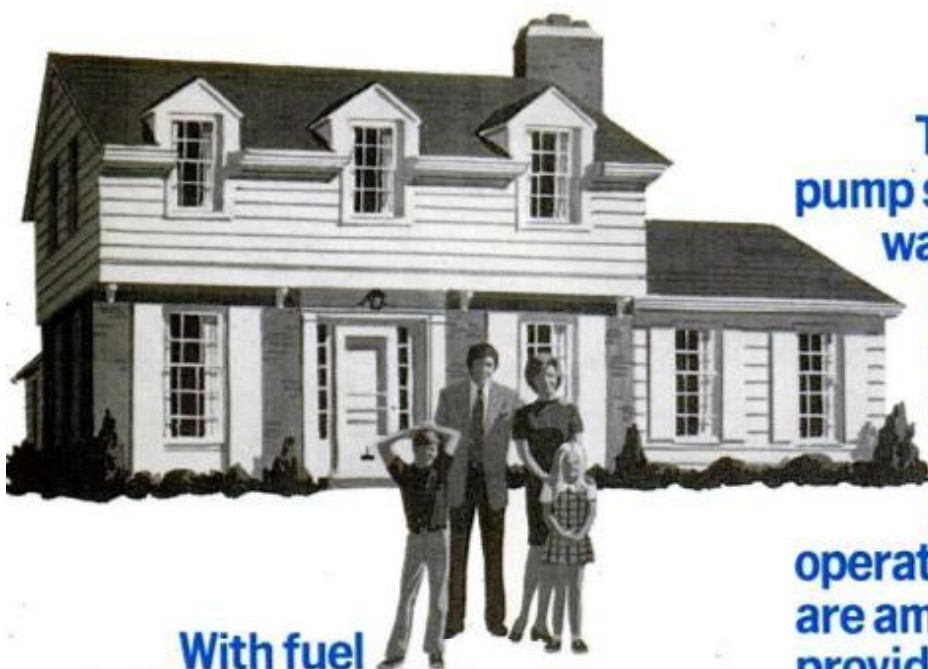


### Things You Can Do Right Now To Save Hundreds on Utilities

...and other simple ideas to make it more economical to keep your home more liveable.

- Put weather stripping around windows and doors to seal out cold air. It also keeps conditioned air from escaping.
- Use storm windows and doors year 'round.
- Lower the thermostat a few degrees in winter, particularly at night.
- Raise the thermostat a few degrees in summer.
- Keep windows shut.
- Add more attic insulation.
- Close curtains and shades on sunny side of house in summer—open curtains and shades on sunny winter days.
- Properly maintain and service energy-using equipment.
- Don't block heating and cooling ducts with furniture or curtains.
- Change filters regularly on necessary equipment.
- Keep fireplace damper closed when not in use.

# Carrier technology confronts the cost of energy.



With fuel and energy costs on the rise, the problem today is keeping your home livable without draining the family budget.

It's no longer enough to fiddle with thermostats, pull down shades, and put up storm windows. You have to get back to basics in choosing which air conditioning to add, what heating system could best supplement or replace your present furnace.

This is where Carrier is uniquely qualified to help. We're the specialists in home comfort. Summer and winter. We can give you impartial advice on your high-efficiency alternatives. We make them all.

We're deep into year-round systems, for instance. Heat pump air conditioning, for one.

The beauty of the heat pump system is that it works two ways. In summer it extracts heat from inside the house. In winter it reverses itself and puts heat back in.

Certain of our models lead the field in operating economy. All models are among the best. They also provide the most economical way yet to heat a home in more and more areas.

Ask your dealer for estimated annual operating cost savings based on local electric, gas, or oil rates.

Soon heat pump air conditioning will be for everybody.



The heat pump air conditioner.

It makes sense right now if you're building a new home. Or if your furnace needs replacing. Or you want to supplement gas or oil with less expensive heat.



While our heat pump air conditioner is one form of efficient heating and cooling, the Carrier Round One is the best-known form of high-efficiency cooling.



The Round One.

It doesn't really matter that this is the finest central air conditioning you can buy. What matters is its efficiency and long-term economy.

Suppose, for example, that you bought our most economical system as recently as 1972. And that under present power rates it is costing you \$130 for a full season of cooling.

Our newest Super-Efficient Round One would reduce your operating costs to about \$98, not to mention savings in servicing.

You'd also have the quietest air conditioning in the neighborhood.

Before you make any decision, see the man who knows—your Carrier Dealer.

He's the one to see for the Round One. He's the only one certified in Carrier heat pump air conditioning. And he's the man with other alternatives. Including high-efficiency economy air conditioning, furnaces (gas or oil), humidifiers, air cleaners, and room air conditioners.

Most important, he'll maintain your equipment the Carrier way, and keep it operating efficiently.



Carrier has a number of high-efficiency alternatives.

Where we live and work and play, more people put their confidence in Carrier than any other make.

Number One  
Air Conditioning  
Maker



Carrier Corporation

**Carrier**

## “What to do before the dealer comes”

Answering the following questions will help your expert Carrier Dealer determine the best system for your family. He'll be able to tell you about the benefits you'll get to solve these problems with a Carrier System.

### Health

- Does any member of the family suffer from allergies?
- Does winter dryness irritate skin conditions or respiratory tract?
- Is nervous tension a problem during summer months?

### Comfort

- Do you entertain frequently?
- Are cooking or smoking odors troublesome?
- Are flies, mosquitos or other insects bothersome?
- Do you eat out frequently in the summer?

### Improvement

- Do you have any rooms which are not heated adequately?
- Are there drafty areas?
- Is summer humidity a problem with doors, paneling, tools?
- Is your furnace sufficiently worn out to consider replacement?
- How much insulation is in your attic and walls?

### Protection

- Are wife and children often alone in home?
- Are there any furnishings in need of extra protection from heat, humidity, dust, odor?

## IT'S WELL WORTH YOUR WHILE TO CALL YOUR CARRIER DEALER NOW

Your local Carrier Dealer is listed in the Yellow Pages. If you need help locating your local dealer call the following toll free number and we'll tell you who your nearest dealer is.

**800-243-6100**

In Connecticut Call **1-800-882-6500**



# ALL OUTDOORS

WITH BILL McKEOWN



## Coast Guard cautions

"Do us a favor," a Coast Guard safety officer in Washington suggested to me recently. "Your readers get around. Remind them that they're often skipping floating utility poles. When they cruise unfamiliar water they should check charts for overhead clearance as well as water depth. Recently we've had too many reports of sailboat masts and powercraft antennas running into high-tension wires. You don't need a metal spar to get in trouble. Lethal voltage can come searing down wire shrouds, sail track or halyards. There is no need to add electrocution to the boating hazards."

One of the most interesting of recent boat-saving procedures is the Coast Guard's experimental work with emergency flotation bags (EFBs) currently being tested by many CG units. Designed to supplement the dewatering pump kits already in use to assist sinking boats, the device fits in a small shopping bag but unfolds to about four by five feet. Several placed in empty compartments, or lashed to the sides of a foundering craft, then inflated from small freon cylinders that come with them should be able to keep almost any pleasure craft afloat until towed to safety.

One or more bags would make a sensible addition to emergency equipment aboard an offshore cruiser. X-Tyal International, of Beacon, N.Y., is a company developing these compact inflatable flotation bags. They'll probably be about \$80.

## Scatter for skeet

A special new skeet load announced by Winchester-Western is claimed to give a pattern five to seven percent more open than standard skeet ammunition at the normal skeet range of 21 yards. Called Double A Special Skeet, the loads come in 12 gauge with a standard Double A wad but without the shot-protecting collar. Shells will cost the same as regular loads, and the cases are reported to be completely suitable for reloading.

Winchester's notable gun museum collection was recently presented to the Buffalo Bill Historical Center in Cody, Wyo. It was long an attraction

of New Haven, Conn., but space limitations there only allowed a fraction of the over 5000 guns to be displayed at one time. Beginning May 30, the entire collection will be on permanent display at Cody.

## For fishermen

Instead of a club for catching just one species of freshwater fish, the Evinrude Bass Busters have changed their name to the Evinrude Anglers Club. It is not necessary to own an outboard made by the sponsor, or any other make, and fishermen who record notable catches regionally become eligible for invitation to a national fish-off and \$5000 in prizes. Catches of bass (largemouth, smallmouth, Kentucky) over 3 pounds, walleye pike over 7, northern pike, 8 and up; muskie, 20; white bass, 3; pan fish, 1; crappie, 2; bluefish, 10; striped bass, 25; speckled trout, 5; tarpon, 60; red drum (red fish, channel bass), 20; Coho salmon, 12; Chinook salmon, 25; Atlantic mackerel, 2 and up, all can count toward qualification for the finals. Membership information is available from Evinrude dealers.

The International Game Fish Assn., recorder of world records for marine fish, will sponsor its first annual fishing contest for individual IGFA members this coming year. Contest details and membership application for this admirable organization may be obtained from IGFA, 3000 East Las Olas Blvd., Fort Lauderdale, Fla. 33316.

Squirrel hunters are reminded, once again, that fish seem to particularly favor lures trimmed with squirrel tail hair, and that unused tails can be "recycled" by selling them to Sheldon's Inc., Antigo, Wis., maker of the famous Mepps French Spinners. Their 50-cent Mepps Fisherman's Guide is also available free if you write Shep Shepherd and mention this column.

Anglers lucky enough to be heading for Florida fishing can get a head start by ordering a book titled *Florida's Charted Saltwater Fishin' Holes*. It is \$2.90 from Bureau of Maps-Charts, Mail Stop 5317, Tallahassee, Fla. 32301. Descriptions give the depth of each ocean or gulf location, what seasons, baits and lures are best, and which species of fish are supposed to be down there waiting for you.

From the same source a \$6 *Atlas of the State of Florida* provides detailed maps and listings of parks, wildlife refuges, campgrounds, canoe trails, fishing camps, boat launching ramps and many other details.

## Bicentennial bulletins

While most touring activity may center along the stretch of 13 East Coast colonies between Boston and Williamsburg, travelers who want a look at our heritage of history have a lot of other options and ways to go.

A brochure titled *Highroad to Adventure*, from American Youth Hostels, Delaplane, Va. 22025, lists near-

*(Please turn to page 28)*



Setting up camp can be as simple as adding a canvas hutch-tent extended from the hatchback of a Chevy Nova or Vega. Some dealers stock or can order this extra that keeps bugs and bad weather out.

## ALL OUTDOORS

(Continued from page 27)

ly 100 trips in this country and abroad that can be traveled by bicycle, plane, train, horseback or canoe. Want to cross the country by bike? Bikecentennial, Box 1034, Missoula, Mont. 59801, has 82-day trips starting May 16 and June 16 that pedal from Reedsport, Ore., to Yorktown, Va., along the Trans-America Trail. You'll average 54 miles a day and cover 4100 miles. Other shorter trips run from 12 to 45 days between places like Williamsburg, Va., and Pueblo, Colo., or Missoula, Mont., to Jackson, Wyo. We wish you good weather and strong legs.

Kamgrounds of America, Box 1138, Billings, Mont. 59103, has arranged Tent America and Tent Canada programs as a way to travel without a lot of camping equipment. For \$9 or less a night for families of up to four, red, white and blue 9x12-foot tents with four cots and air mattresses are all set up at selected campgrounds (Canada will feature large tepees).

However, if you would prefer to travel by recreational vehicle instead of a passenger car but don't want to buy one, send \$5 to the KOA Kamper Club at the same address. It will send you a list of RV owners in your area who rent their vehicles part time. A restricted budget these days is no longer any excuse for you to stay at home.

Backpackers who want to minimize weight and costs can now order freeze-dried and dehydrated foods in large economy institutional-size No. 10 cans, from Stow-A-Way Industries, Cohasset, Mass. Get a packing group together, split up and repackage the bulk purchases. Divide and save.

### Look before you leave

Several recent books are worth checking before a trip, or taking along for ready reference. Your hunting dog develops a limp and you're far from your home town vet? A new *Cat & Dog First Aid Guide* can help. It is \$1.50 from Animal Care Publications, Box 4000-8, Portland, Ore. 97208.

*How to Ride Just About Everything*, from Great Lakes Living Press, Chicago, covers skills from water skiing and hang gliding, ice boating and surfing, to driving vehicles that vary from hovercraft to ATVs. Good source lists for necessary equipment and instruction books are also provided by author Paul DuPre, well-known RV expert who's ridden 'em all. ★★ ★

## New and exciting for outdoorsmen



**Afloat and ashore**, the Neova 2 Hovercraft rides on air at a reported 35 mph with VW engine. Plans are sold by Neoteric Engineering, Terre Haute, Ind.



**Short wheelbase and long on style**, new Chevy Sport is colorful stepside pickup.



**Towing automatic-shift cars** can now be easy, it's claimed, with Tow-A-Matic unit.



**New Jeep pickup** with four-wheel-drive, Honcho comes in six colors, denim seats.



**Versatile arms** include Crosman's new 766 American Classic with pump-up power, \$75 Charter Arms take-down survival .22. Custom-pad sling is by Arizona Products.



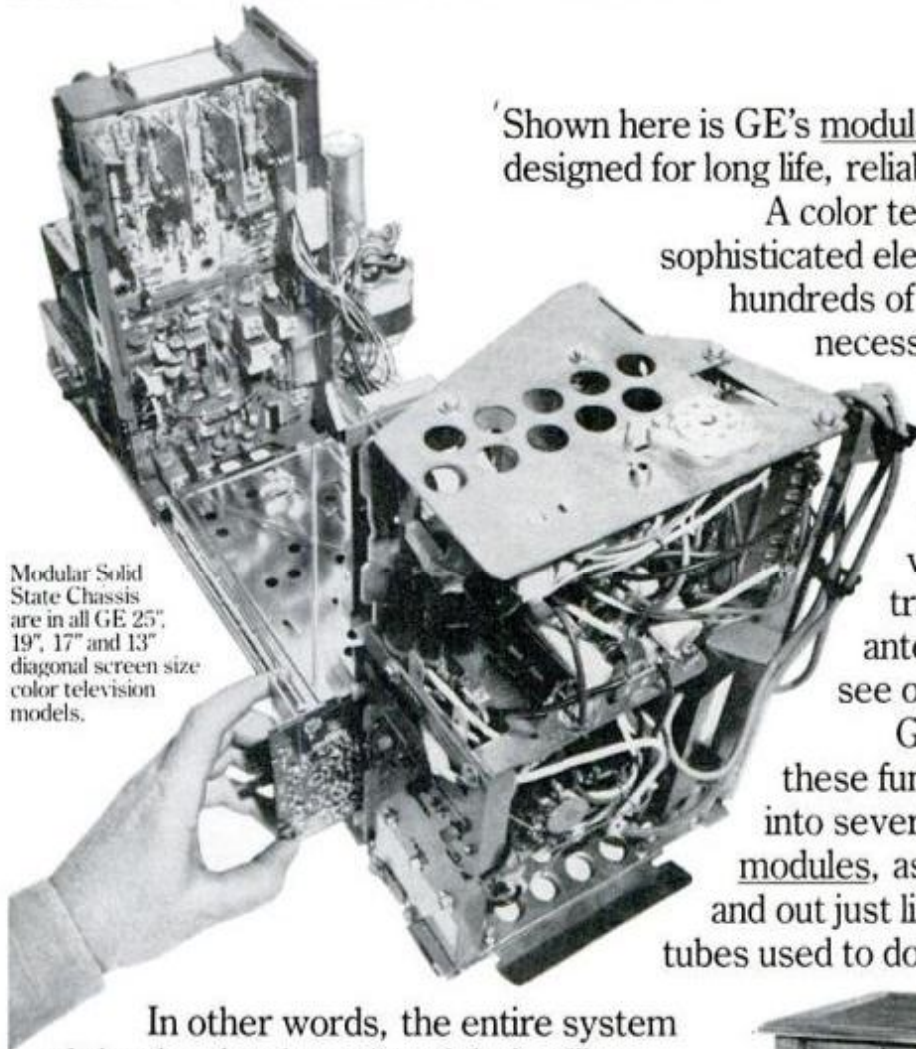
**Pickupper** from Bethany Travelers is tent camper that unfolds on truck, sleeps 4.



**Street Van**, new Dodge Tradesman, comes with optional customizing plans, templates, instruction kit, even Van Clan and National Street Van Assn. membership.

Материал, защищенный авторским правом

# GE explains why your next color TV should have a modular solid state chassis.



Modular Solid State Chassis are in all GE 25", 19", 17" and 13" diagonal screen size color television models.

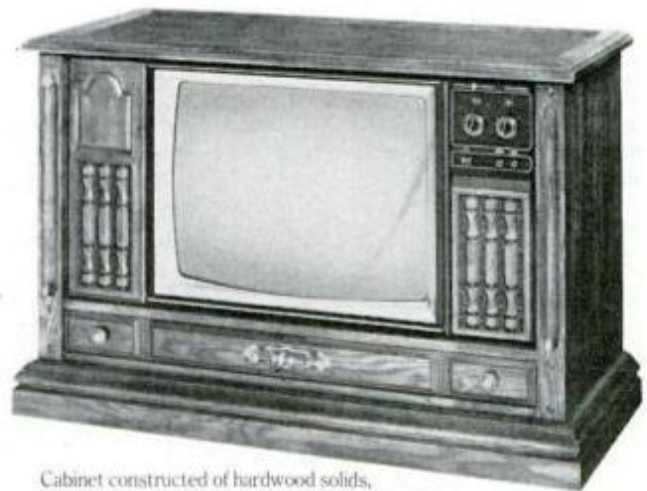
Shown here is GE's modular color television chassis, designed for long life, reliability and ease of service.

A color television chassis is a complex, sophisticated electronic machine, containing hundreds of electronic components necessary to produce a color picture on a TV screen. These components are combined into a system of circuits which control and operate the various functions required to transform the signal from your antenna into the color picture you see on the screen.

General Electric has separated these functional solid state circuits into several small circuit boards called modules, as seen here, which plug in and out just like old-fashioned vacuum tubes used to do.

In other words, the entire system of circuitry has been "modularized", or partitioned, so that operating functions are isolated for ease of service diagnosis, repair or replacement.

So compare color sets before you buy your next set. When you combine our modular solid state chassis with General Electric built color picture tubes, ease of tuning with our One Touch Color<sup>®</sup> system\* and GE's Custom Picture Control, you'll understand why...



Cabinet constructed of hardwood solids, veneers and simulated wood accents.

It all adds up to GE performance television



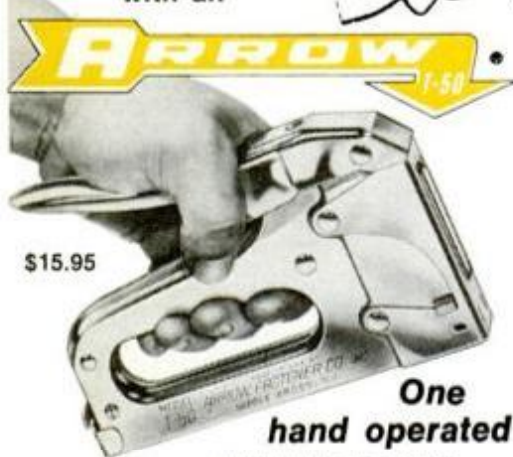
\*Available on most models.

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out?

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with an



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#### WHEREVER YOU'D DRIVE A NAIL!

One squeeze ... shoots a tight-holding, two pronged staple wherever you'd drive a nail — into the hardest woods, plywood, composition board, Masonite, plastic — even soft metals!

Your other hand is left free to hold material in place for a neater job and to balance yourself when working on ladder ... whether you're putting up ceiling tile, installing insulation, repairing a screen, upholstering a chair — or any of 1001 other home fix-it projects.

Arrow Staple Guns come in a variety of models, priced from \$7.95.



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- PRO Mart Home Centers
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271 Mayhill Street, Saddle Brook, N. J. 07662

## LETTERS

### TO THE EDITOR

#### To a spoiled environment

Thanks for helping contribute to environment deterioration in your article *New 4WDs Are Right On for Off-Road Fun* (page 48, Dec. '75).

Encouraging people to buy these expensive gas-eating hogs and take off cross-country to unspoiled areas is irresponsible to anyone who really loves the outdoors and wants to see these areas remain unspoiled.

A responsible person will stay on established roads, no matter what kind of vehicle he drives.

ROGER STANG  
SUPERIOR, MONT.

You stated that 4WDs can be used to drive to remote areas where hunting and fishing are still unspoiled. This kind of thinking is degenerative. These areas are unspoiled because they are not accessible to ordinary motor vehicles. Where 4WDs can go, despoilers of the environment can go also.

In a few years all of these "unspoiled" areas will be spoiled owing to the accessibility of 4WDs used in a thoughtless way.

FRED HARTWIG  
NEENAH, WIS.

#### More miles per dollar

I would like to know where Mort Schultz got his information for *How to Stretch Your Gasoline Dollar—Retune for Regular* (page 64, Dec. '75). If you follow his advice, you will turn a good engine into a piece of junk.

The true gas mileage tricks are the hot rodders' tricks. If you soup up an engine and drive it the same as before, you will get better gas mileage. We have two cars, both of them about 4000 pounds. One just under 400 c.i.d. puts out 375 hp and gets 15 mpg in the city. My car is over 400 c.i.d., has two four-barrel carbs and puts out an honest 500 hp, yet I get almost 13 mpg. Compare this to the six-cylinder rated at 90 hp and 13 mpg. This is why I will never buy a new car as long as they build them like they do now and why Schultz's information is all wet.

MICHAEL CIBER  
LINCOLN PARK, MICH.

I fail to see why you would want to lower the compression ratio. I have

always believed that higher compression engines will deliver more miles per gallon than their low-compression counterparts. The cost differential between premium and regular gas has not been large enough to make this a penalty.

If you have a high-compression engine that's tuned well, with the ignition pushed ahead to the point of almost detonating, isn't it true that you come out better on a miles per gallon and miles per dollar basis with the premium fuel?

BRIAN EDWARD  
SYRACUSE, N.Y.

*You can argue long and hard about the merits of low and high-compression engines, but there's no arguing with the additional five to ten cents per gallon for premium fuel. Even if the miles per gallon is little improved, or even no better, you're way ahead in miles per dollar, which is the point of retuning for regular.*

#### Anti-inflationary CB

You'd better change the price of the CB license you wrote about in *Radio on Wheels: The CB Communications Freeway* (page 80, Dec. '75). When I renewed in 1972, it cost me \$20 for five years, not \$4 as stated in the article.

JAMES SUCHA  
PHOENIX, ARIZ

*Surprisingly, some prices are on the decrease. The FCC tells us that cost of a Citizens Band license dropped from \$20 to \$4 on March 1, 1975.*

#### 'Big Brother' helmet laws

Why is it that people like Bill Hartford seem to wind up in print where they can misinform good citizens? In the December 1975 issue (*How to Stay Alive on a Motorized Bicycle*, page 56) he states: "There is an alarming campaign being waged nationwide for repeal of helmet laws. It's regretful."

Doesn't Hartford realize that the helmet law is another federal "Big Brother" law restricting freedom of human rights, and that each such law further impairs the freedom that we all enjoy and desire in this country?

It is not the wearing of helmet per se that is objected to by over 9

percent of cycle riders I have met, but the fact that it must be made a state or federal law with no freedom of choice. Any citizen with an ounce of common sense will wear protective head gear when it is obviously necessary.

NILE C. BYERS JR.  
SILVER SPRING, MD.

### We didn't forget

In your editor's note on the story, *The Christmas Day Battle That Began a Legend*, (page 45, Dec. '75) you state that Robert Smith's book *Tiger Tale* will be the first book about the Flying Tigers written by an actual member of the Flying Tigers.

However, I believe you must have forgotten one of the classic books of World War II, *God Is My Co-Pilot*, by Col. Robert L. Scott. Scott was commander of the Flying Tigers under Gen. Chennault from July 7, 1942 to Jan. 9, 1943.

PHILIPP H. BAUMANN  
CANOGA PARK, CALIF.

*No, we didn't forget that fine classic, but it was not written exclusively about the Flying Tigers, as Smith's new book will be.*

### He'll 'buy American'

Though my personal experience with a 1970 VW Squareback (with 93,000 trouble-free engine miles) does not substantiate D. Rogers claim of imported junk (*Letters*, page 6, Dec. '75), his comments on rubber components really hit the mark. In addition to replacing rotting gas hoses periodically, paying \$40 per fuel injector because of a rotted, irreplaceable piece of rubber hose is inexcusable.

I can already foresee customer reaction about three years from now when all those owners of injection-equipped VWs have to start shelling out \$160 to \$200 for a set of new fuel injectors because of the failure of a few cents worth of rubber hose. This experience alone will be strong incentive for me to "buy American" unless VW responds quickly to correcting such elemental flaws in the design and quality of both original and replacement parts.

RAD E. REAVIS  
CLARKSVILLE, TENN.



One beautiful  
smoking experience.

If you've never  
had one, have an  
A&C Grenadier.

Long, slender, mild-tasting A&C Grenadiers — in light or dark wrappers — are a unique blend of fine imported and domestic tobaccos that give you real flavor, satisfying taste. It's one beautiful smoking experience.



Antonio Y Cleopatra.

# APPLIANCE CLINIC

BY PAUL MANN



## Blackout

*We are having trouble with the oven light in our Sears electric stove. The Sears serviceman has made repairs, but they were unsuccessful. Bulbs last about two weeks, then burn out. Why?—R. Munzinger, Alton, Ill.*

If I knew the model number of your unit, I could tell you for sure, but quite a few oven bulbs that should be protected by a glass lens and gasket aren't. The lens and gasket are placed over and around the bulb to keep heat and grease—which have been found to be two causes of premature bulb failure—away from the bulb.

Possibly your stove was shipped from the factory without benefit of the lens. However, as I indicated, not every stove requires a lens assembly. To find out if yours does, get the model number of your unit. You'll find it beneath either the left rear or left front burner. Take the number to your local Sears store and find out whether your stove requires a protective lens. If it does, you can order the assembly.

## Caloric to the rescue

*One of the subjects in a recent Appliance Clinic concerns a Caloric model J071 gas range (Diffuser Needed, Nov. '75). Your reply concerning the use of part No. 90165A is thorough and quite complete. However, the application of a broil diffuser or the broil generator kit No. 90165A should not be made to an oven generator used on the model J071 range as you imply.*

The application of the 90165A generator kit and the generator diffuser cap should only be made to ultraray broil burner pilot generators. The broil generator is used with the ultraray broil burner on Caloric waist-hi broil nonself-cleaning gas ranges.

The J071 oven pilot contains a relatively "soft appearing" flame. Under certain conditions, the addition of a diffuser will cause insufficient millivolt generation which could cause malfunctioning. The addition of a diffuser within a nonaerated pilot flame will produce a carboning effect which must be avoided.

We are unable to explain the fail-

*ure of two generators on Mr. Leiser's range. However, if one or both of the generators which were removed from the appliance are still available, we would appreciate receiving the components for further analysis.—M.J. Kroninger, service operations manager, Caloric Corp., Consumer Relations Dept., Washington and Heffner St., Tipton, Pa. 19562.*

## Fusin' and fussin'

*I have a new drip-type Norelco coffeemaker Model HD 5135. The unit quit working and we found that the fuse between the two element wires had burned out. The fuse has the following information stamped on it: Microtemp, Dayton, Ohio 4377A1, 192C. I would like to know if I can get a replacement and what it would cost. The Norelco service center out here is giving me the runaround.—J.L. Smith, Lebanon, Ohio.*

Not the runaround: They were just putting you and others off until they could catch up on back orders. I heard that some 15,000 coffeemakers were waiting for new fuses.

The fuses have started to come through and maybe your service center can now fill your needs. If not, I have a source here in the East who can—Boulevard Appliance, Rte. 18 off Milltown Rd., East Brunswick, N.J. 08816. The price for the fuse kit, which consists of fuse and short leads, is \$1.50.

Why all the fuse failures? Lime in water builds up on the boil element, causing the fuse to short out. Obviously, the trouble is more widespread in hard-water areas.

To rid the element of harmful lime deposits, mix two cups of water with two cups of vinegar and run the mixture through the coffeemaker with the unit turned on. When the vinegar-water mixture has run its course, run four cups of clear water through the unit to get rid of vinegar residue. Try this cleaning monthly or more often in hard-water areas.

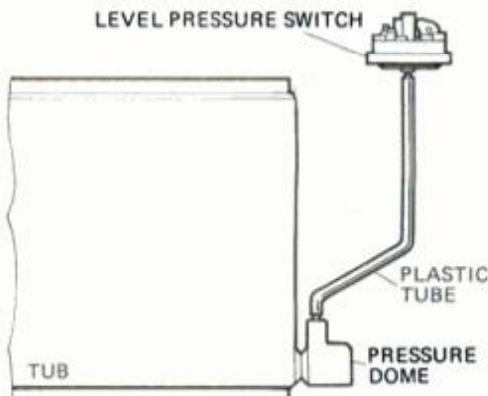
## Pressure situation

*We recently purchased a used General Electric automatic washer, which works very well except that it overfills. Adjusting water pressure at*

*the taps doesn't help, so we assume there is some sort of regulating device in the machine. How can we change the amount of fill?—Clint Werch, Van Dyne, Wis.*

The machine does have a regulating device, but it is not adjustable. The device is called a water-level pressure switch. From what you say, the one in your machine should be replaced.

The switch controls the amount of water entering the tub. As the tub fills, an air pocket forms in the plastic tube leading to the switch (see illustration). As water rises in the tub, the air pressure in the tube increases until there is sufficient



pressure to cause the diaphragm in the switch to actuate switch contacts. This opens the circuit to the water-control solenoids and stops the flow of water into the tub.

Apparently, the diaphragm in your machine's switch has lost resiliency and is sluggish when it comes to activating the switch contacts. You cannot replace the diaphragm or adjust the switch. The part must be replaced.

You can do this job yourself. Make sure the washer is unplugged. Locate the water-level pressure switch in the control box on top of the washer. Disconnect the two leads and the plastic tube at the switch and remove the switch. Install the new switch and reconnect leads and tube. ★★

*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.*





## When Delco Disc Brake pads start to go, they're good enough to say good-bye.

The Lining Wear Sensor is the early warning device Delco builds into Delco Disc Brake pads. When the pads wear down to a predetermined thickness, the sensor will trigger a high-pitched whining sound.

That's your warning that the lining is worn to the point where service must be scheduled. It's Delco's way of helping you avoid costly damage to the rotors and to your car's front end.

You'll find the Lining Wear Sensor in Delco Disc Brake pads

for General Motors applications. You'll still find plenty of quality reasons to go with Delco Disc Brakes if you drive other domestic or import cars.

Just for one example, consider the eyelet rivets in the brake pad. They permit wear



debris to fall through rather than build up in the rivet hole. This helps prevent rotor scoring and helps extend rotor life.

To complete your Delco Brake Team, go with Delco Drum Brakes. They feature linings with the Delco Crown Ground Finish, precision-built all-new shoes and more.

So stop and see your AC-Delco serviceman. And go with the name you know for dependable braking — Delco.

**Go  
with the names  
you know.**



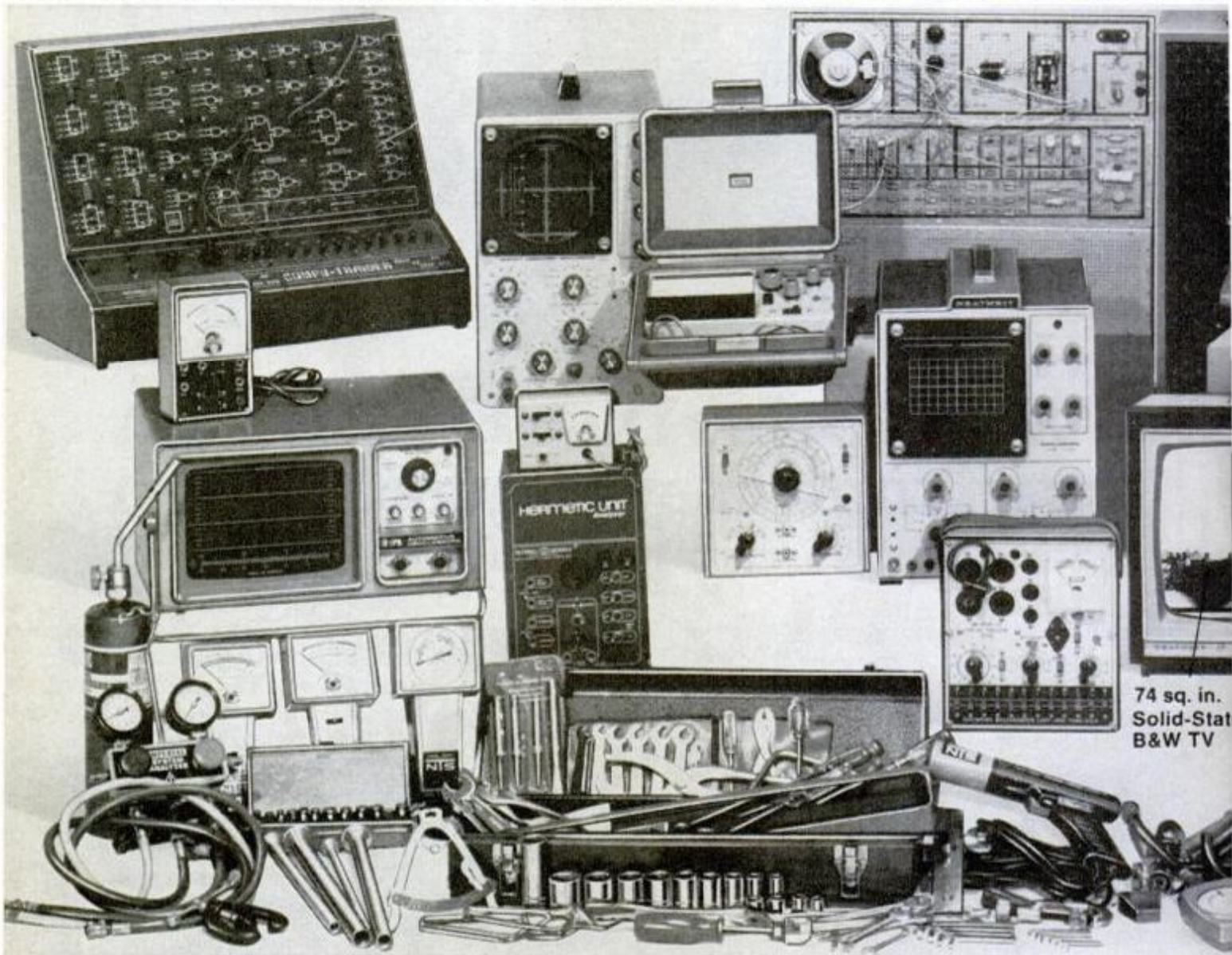
AC-DELCO DIVISION OF GENERAL MOTORS CORPORATION

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MARCH 1976 33

# The better the training the better you'll

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**Build and keep** some of the finest technical equipment made when you train with an NTS Project-Method home study course. And it's usually the same type of equipment you'll meet in the field and use on the job. It will help you acquire first-hand experience and skill — help prepare you better for a variety of exciting technical careers:

**ELECTRONICS DIVISION:** Courses include professional equipment like 5" solid-state oscilloscope, transistor and tube-tester, vector monitor scope, 74 sq. in. B&W TV, and solid-state stereo AM-FM multiplex receiver, speakers. Color TV courses feature advanced NTS/HEATH DIGITAL GR-2000 Color TV with silent varactor diode tuning; digital read-out channel selection (with optional digital clock), big 315 sq. in. screen.

**MECHANICS DIVISION:** Learn engine diagnostics, motor overhaul, transmissions, automotive maintenance. Courses include 9 in. solid-state automotive oscilloscope, testers, tools, mechanic's steel tool box, & more.

**AIR CONDITIONING, REFRIGERATION/HEATING DIVISION:** Learn servicing of commercial, industrial and residential heating and cooling equipment. Courses include hermetic unit analyzer, leak detector, charging testing-purging manifold set, tools and more.

**HOME APPLIANCES DIVISION:** Courses cover repair and maintenance of washers, dryers, ranges, smaller appliances. Equipment includes NTS Circuit-Trainer and professional multimeter.

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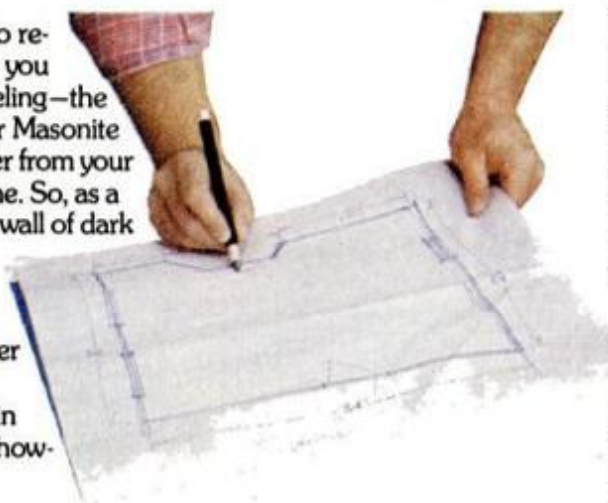
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# If you're all thumbs when it here's a helping hand

Don't let the idea of putting up paneling scare you. If you can hit a nail with a hammer, measure with a ruler, and use a saw, you can put up Masonite brand paneling yourself.

**1.** First, you'll need a plan. Measure the room you want to panel. Then draw a floor plan indicating doors, windows, stairways, pipes or beams. Then take this to your Masonite dealer. He'll help you select the amount of Masonite brand paneling you'll need.

One thing to remember when you pick your paneling—the lighting at your Masonite dealer will differ from your lighting at home. So, as a general rule, a wall of dark Masonite brand panels in your home may look darker than the one sample panel in your dealer's showroom.



**2.** Once you get your panels home, let them stand unwrapped on the long edge for 48 hours, so they'll adjust to the room temperature and humidity. Then stand them up, and arrange the panels along the wall until you find the most pleasing pattern for your room.



If your walls are flat and smooth, you can put the paneling directly on your walls. If you have concrete or masonry walls, you'll need a simple framework of furring strips (inexpensive lengths of 1" x 3" lumber). Your Masonite dealer can help you here, too.

**3.** Now you're ready to put up your panels and cut those that will need to be trimmed. If you're going to use a power saw, cut with the finished side down. If you're using a handsaw, mark and cut with the finished side up. The old carpenter's adage is good advice here: measure twice and cut once.

**4.** Start paneling at the corner of the room. Use a simple carpenter's level to make sure you have the first panel straight up and down. (That's what carpenters call "plumb.") If you use panel adhesive follow the directions on the cartridge. If you use nails, make sure they go into the wall studs. Studs are the 2"x4" boards that form the supporting inner framework for your wall. By tapping gently along the wall until you hear a solid sound, you can find exactly where they are.



**5.** When your first panel is "plumb" and secure, you're ready to put the next one up. The edge of this new panel should touch the edge of the previous panel very lightly. When you come to a door or window frame, you'll have no trouble as long as you measure carefully before cutting. A pattern drawn on newspaper first will be your safest bet.

**6.** For electrical outlets, measure from the floor up and from the edge of the previously installed panel. Then draw a pattern on your panel, drill holes in the inside corners of the pattern, and cut out the pattern with a key-hole saw.



**7.** When all your panels are in place, you're ready for Masonite brand mouldings for the floor, ceiling and around the windows and doors. The mouldings will cover up any minor measuring or cutting errors along the edge and give your paneling a finished, professional look. And since they are prefinished and color-coordinated, there's no painting or stain matching required. There's even a moulding for inside and outside corners.

Stand back and take a look. You've added richness and beauty to what was just an ordinary room.

Best of all, you've done it with Masonite brand hardboard paneling. That means your new walls can take wear and tear. Because Masonite brand paneling is tough. It resists splitting, cracking, knocks and dents. Yet Masonite hardboard paneling is easy to maintain. It's made from real wood and has all of

# comes to things like paneling, from Masonite.<sup>®</sup>

real wood's advantages, without the disadvantages. And a special process imparts an astonishing realness to every Masonite design.

Putting up Masonite brand hardboard paneling can be easy. If you have any questions just ask for our free "Masonite guide to paneling." You'll find it and more than 60 intriguing Masonite designs at your Masonite dealer.

Look for him in the Yellow Pages under "Paneling."

**When you ask for  
Masonite paneling,  
make sure you get  
the Masonite brand.**



Man-made finish on real Masonite brand hardboard.

Forester series<sup>™</sup> Butternut.



# IMPORTS AND MOTORSPORTS



## From Japan with Luv



It's the new Opel. You thought Opels were German cars? See if you can follow this: United States involvement with Opel started when General Motors bought into the Opel family's car company in Germany in the late 1920s. It wasn't until 1964, however, that GM began importing the German Opels and selling them through its Buick dealerships. Kadetts were the first models to come over, but they were replaced late in the '60s by the 1900 models with the GT and coupe (later called the Manta) having a very devoted following. But GM giveth and GM taketh away: The German Opel import arrangement ends when the last 1975 cars are sold. As owners of orphaned Opels would expect, Buick dealers will continue to provide parts and service and honor warranties.

The new Opel is made by Isuzu in Japan. It also makes the light utility vehicle (or LUV) pickup sold by Chevy dealers. GM owns a third of Isuzu, and is importing the car and calling it Opel. It goes on sale at Buick dealers on April 1. There in a hubcap you have an update on the Opel story that began with the first car in 1898 and, before that, bicycles and sewing machines.

The new Opel is available as a two-door coupe only. There'll be standard and deluxe versions, the difference being trim and interior decors. Power is from a 1.8-liter, ohc, in-line Four, with two-barrel carburetor. Standard features include four-speed manual transmission, power-assist front disc brakes, reclining buckets, tinted glass and rack-and-pinion steering. Optional are automatic transmission, air, radials and AM/

FM. EPA mileage is 23 mpg city, 36 mpg highway. Curb weight is 2136 lbs., the wheelbase, 94.4 inches—both a bit less than the German Opel.

### Can you hum '42 mpg'?

For a car that gets 42 mpg (EPA highway), Miser is a perfect name. The Mazda Miser is a stripped version of the piston engine model 808. Displacement of the engine is 1300 cc and price should be just under \$3000. Those reciprocating pistons in the



Miser engine compartment may go "boing, boing" instead of humming like the rotary engines in the rest of the Mazda lineup, but Mazda's not embarrassed—not when they can offer a really high-mpg model at the low-price end of their line and improved-mpg rotary models at the top. (I haven't had the opportunity to check the mileage of the Cosmo I've been driving, but its performance is positively outstanding.)

Mazda expects sales to be about half piston and half rotary in 1976, but still believes that the future belongs to the rotary.

### Racewatchers' calendar

The '76 motor racing season gets into a throaty roar this month. The Grand Prix West at Long Beach, which is previewed in our cover story,

goes on the 28th. Earlier are USAC races at Ontario and Phoenix, on the 7th and 21st respectively, and the NASCAR Southeastern 500 at Bristol, Tenn., on the 14th and Atlanta 500 on the 21st. There's a Formula 5000 at Charlotte, N.C., on the 21st and the NHRA Gatornationals at Gainesville, Fla. from the 12th to the 14th.

Goodyear Tire and Rubber keeps track of attendance at motor sports events every year and it has some interesting numbers for 1975: Total worldwide attendance at major races was over 6 million fans—an increase of a half million from '74. At the top was Formula 1 racing with 1.5 million fans. Second were NASCAR Grand National events with 1.3 million, and third were the Championship races of USAC. That's a lot of fans not content just to sit at the TV watching *Wide World of Sports*.

### Catchall catalog

There's a lifetime of reading listed in the Classic Motorbooks '76 Catalog. There really is the "World's Largest Selection of Automotive Literature" in this 116-pager. It includes books from over 400 publishers, with listings and descriptions of about 3000 automotive items. It's arranged in 15 sections covering everything from "Racing and Driving" to "Restoration and an "Alphabetical by Makes" section. It has an index of car clubs in its information section and much more. It's as much fun as J.C. Whitney's parts catalog, and it costs less than a gallon of gas: 50 cents from Classic Motorbooks, Inc., 3106 West Lake St., Minneapolis, Minn. 55416.

### Sniffing out diesel fuel

Most diesel car drivers know that the oil companies publish guides listing their service stations that pump the ol' No. 2. They're a help in planning your fuel stops if you run a diesel. Even better, though, is a new *Directory of Diesel Fuel Stations Coast to Coast*. It lists all the Big Oil stops, plus the independents, and all in a single, 125-page, glove-box-sized book. It's \$5.95 from Diesel Fuel Services, Inc., 330 East 33rd St., New York, N.Y. 10016. ★★★

# The proud smoke

Product of a proud land.

Tobacco. It's as proud a part of the American tradition as the Grand Canyon. At Liggett & Myers, we've made tobacco into a cigarette worthy of that tradition. The rich, mellow, distinctively smooth L&M. Smoke it proudly.

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



Filter King: 18 mg. "tar", 1.2 mg. nicotine; av. per cigarette, FTC Report Nov. '75.

# THE PM GARAGE



## Illuminated clipboard



Not everyone needs a car clipboard with a built-in reading light. But it's certainly novel: The 8-foot-long cord plugs into the lighter socket and passengers can read or write (even in the back seat) while you do your night driving.

It's very practical and worth the investment if you do a lot of night driving, and especially if you've got kids. Emergency and commercial vehicles, of course, shouldn't be without them.

Mine is this Luma-Board from Smith-Gates Corp., Farmington, Conn. 06032, \$8.95, and it's a top-quality product. Now, if I could just figure out how to stow the thing so it's not floating around the car all the time.—*B.H.*

## Windshield sealer

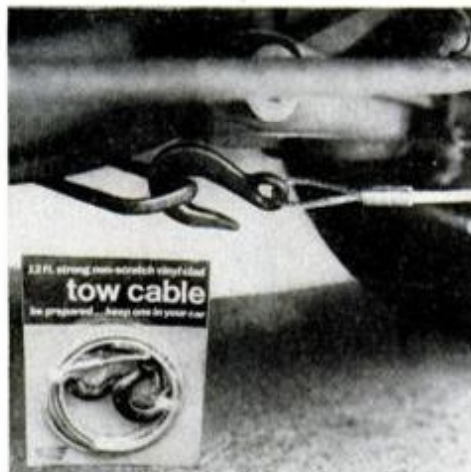


I suffered too long with the wet look until I got around to fixing my windshield leak with this product. A little dab of Duro Windshield Sealer was all I needed to close up a small opening in the rubber molding around my windshield. And even though I used only a pinch of the sealer I know I'll be needing more of it as other rubber seals start to dry up. It's easy to lay down a bead of this sealer, but it's also easy to dribble it on your car finish, and that's to be avoided if you

don't want the speckled look. A tube is \$1.25. Woodhill Chemical Sales Corp., Cleveland, Ohio 44128.—*B.H.*

## Tow cable

I admit it. When I really needed this lightweight, compact towing cable not too long ago, I didn't have it. Now I do and I've played with it enough to know it'll do the job when I really need it again. My car has towing eyes welded to the chassis so towing is easy. As shown here, the drop-forged steel hook slips through the eye. The cable is 12 feet long and is vinyl clad. Break strength of the 3/16-inch galvanized cable is 3700



pounds. The TC-1 cable is \$8.80 post-paid from Weil Service Products Corp., 2434 West Fletcher St., Chicago, Ill. 60618.—*B.H.*

## Body repair kit

Sticking a screwdriver into your car body and twisting it hurts. Until the time your sheet metal starts to rust away, the routine maintenance you do on your car is mostly mechanical. But when you have to start using body filler as routinely as hypoid grease, you know that the pastime of keeping your once-new car looking new has become a battle.



I numbly went out and bought a 3-pound, \$6 can of Black Knight. But when it came to running the old rocker panel through, I couldn't bring myself to do it, so I handed the



screwdriver to my young son and let him make the incision. He was intrigued to see the automobile crumble under his touch. After hacking away the rusted parts and filing back to clean sheet metal, I cleaned the wound as best I could, going so far as to splash Rustoleum around the inside. By this time I was really into the job and realized that a little body rot isn't that great a tragedy.

I had never worked with the plastic filler or cream hardener in the repair kit and I wondered what it would be like. I pushed some of the fiberglass screening that also comes in the kit into the hole, and then



mixed the hardener with the plastic filler. Directions say 8 to 10 minutes hardening time at room temperature. I found that working in 60° temperature the gook was still soft after 10 minutes, but at 11 it was like a rock! So, make sure that after mixing you've put it where you want it before the 10 minutes is up—sanding rock isn't easy.

The rest was easy, though: A little touch-up spray, a bit compounding and some waxing and my car was "new" again. Woodhill Chemical Sales Corp., Cleveland, Ohio 44128.—*B.H.*



# CHEVY SUBURBAN. IT'S SUPERWAGON!



**Sits more than a car, holds more than a wagon, tows more than some trucks.**

**Super seating!** Suburban combines bold good looks with great versatility. The wide front seat seats three. An available folding second seat makes room for three more. With the available third seat, there's room for another three. Nine altogether!

**Super cargo capacity!** With only the front seat in position, Suburban has room for 144 cu. ft. of cargo.

**Super trailer towing!** A properly equipped Series 20 Suburban can move up to 14,500 lbs. including itself, passengers, cargo and trailer.

**Built on a rugged chassis.**

It includes a Massive Girder Beam front suspension with coil springs, multi-leaf rear springs and counter-angled rear shocks, one facing forward, one aft. They combine to help soak up the bumps and turn out a smooth, comfortable ride.

**New improved rust protection.**

Suburban bodies are completely immersed in a bath of special primer, electrically charged to draw the protective emulsion into every corner and crevice where rust and corrosion can start.

**Chevy maintenance economy, too.**

Suburban's High Energy Ignition system delivers a spark that's up to 85% hotter than a conventional system. There are no points to require periodic replacement and no ignition condenser to wear out. The result is a system that extends time between tune-ups and helps improve ignition performance.



**YOUR MONEY'S WORTH.  
MILE AFTER MILE AFTER MILE.**

# You'd never suspect that Bob Gordon leads a double life

**By day,**  
he's a 9-to-5 man.  
**By night,**  
an explorer in a field  
that really interests him!

There was something different about Bob Gordon. Something you couldn't quite put your finger on. He was good at his job. And he took pains to do it well. But on certain evenings, at the stroke of 5, he'd be the first one out the door and on the bus.

The way he'd rush, people would often ask, "Doing something special *again* tonight?"

"Sure am!" he'd laugh. And off he'd go.

What his pals were never told was that after dinner Bob would head for his basement. There, on a simple old wooden table, was something very different from Bob Gordon's 9-to-5 routine.

It was a challenge. A challenge that seemed to change him into another person. Now, at last, he could work with his own two hands—roll up his sleeves to probe, experiment, and learn. Assemble advanced electronic equipment, including a 25"-diagonal color TV with digital features! And gaining important new occupational skills all the while.

## How he started...

Not long ago, Bob Gordon filled out and mailed a card much like the one attached to this page. At the time, he had almost no experience in electronics. But he did have two important qualifications: desire and ambition. Plus a knack with tools and an urge to put them to work.



## And that can be your starting point, too.

Right now, you stand where Bob Gordon stood when he first started out. It's up to you to provide the ability and enthusiasm. Bell & Howell Schools, a leader in electronics education, will provide the opportunity to learn and grow—right in your home!

Bob is already on the verge of having real skills in electronics. And, almost before you know it, you can be there, too.

## Exploring electronics at home—what's in it for you?

When you take any of the Bell & Howell Schools' programs, you develop a lot of important skills in electronics. You learn to troubleshoot, service—even build actual electronic equipment!

First, you master the Fundamentals by learning to experiment and troubleshoot. Then you go on to develop specialized occupational skills in such exciting fields as Home Entertainment, Communications, and Digital/Industrial Electronics.

While no school can guarantee a job or income opportunity—

these programs teach skills that qualify you to seek out an electronics job, advance in the one you may already hold, or further your education in electronics.

## How you gain so much from Bell & Howell Schools' self-instruction program...

How can you pick up skills without quitting your job or traveling to night school? You certainly won't do it just by reading a stack of textbooks. That's not the sort of thing that would make Bob Gordon (or you) rush home from work—not by a long shot!

You need actual electronic equipment to work and learn with. And that's what you'll have! We'll start you off with the Fundamentals. You'll build and test simple circuits with the Lab Starter Kit.

And then, on to the Electro-Lab® Electronics Training System! You'll actually build and use a design console, a digital multimeter, and even a solid-state "triggered sweep" oscilloscope!

## Now you're ready to specialize!

Like Bob Gordon, you might decide to choose Home Entertainment Electronics first, and build our 25"-diagonal color TV. Once you've assembled this TV, you'll understand the technology behind no warm-up tuning, automatic channel selection, on-screen time and channel digits, plus a great deal more!

Or you might choose the other Home Entertainment field, Audio



Electronics, and build a stereo tuner and 4-channel "quad" amp!

On the other hand, you might decide to get right into the fascinating fields of Communications or Digital/Industrial Electronics. Whatever you choose to specialize in, Bell & Howell Schools now has the ability to tailor a learning experience to your needs and interests.

### Home learning with a new touch.

Now, our self-instruction programs offer the same quality and content as if you had taken them at any of our eight resident schools. And that's not all!

Should a question come up, we invite you to use our *toll-free phone-in service*. Talk to one of our instructors—he'll either have your answer or know where to get it in a hurry.

What's more, face-to-face "Help Sessions" are held in fifty cities throughout the U.S. at various times of the year. You can discuss electronics in person with trained instructors, talk of your experiences and ambitions with fellow students.

### Mail the postpaid card today for the facts—decide after you get them!

We invite you to fill out and mail the attached card now, while it's within reach. It asks no commitment on your part—just offers full details on how to learn electronics at home and enjoy it.

Who knows? You may soon be leading a double life like Bob Gordon.

And when friends ask, "Can you really service TV's?"—you'll answer with a grin. "I not only know how to service them, I know how to *build* them!"

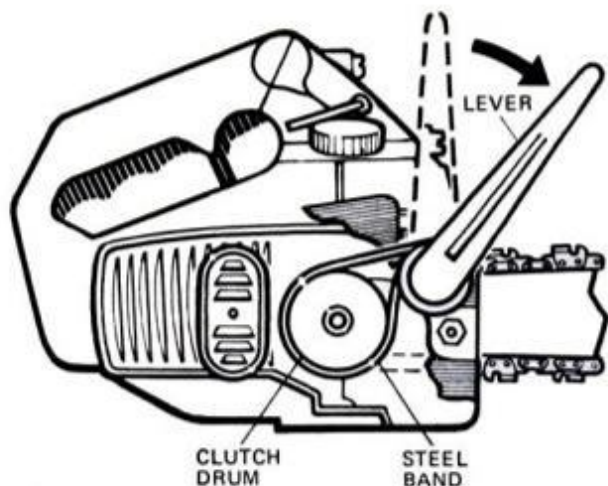
*Note: When taken for vocational purposes, this program is approved by the state approval agency for Veterans' Benefits.*

If card has been used, write to:  
An Electronics Home Study School  
DeVRY INSTITUTE OF TECHNOLOGY

806X

ONE OF THE  
**BELL & HOWELL SCHOOLS**  
4141 Belmont, Chicago, Illinois 60641

# A new chain saw that stops on a dime



**Cutaway view** shows how braking lever mounted ahead of top handle tightens steel band around clutch drum when moved forward, stopping chain instantly—a "brakethrough" in reducing kickback.

**Y**ou get a "brake" when you use the new Mini Mac 25. McCulloch has scored a first by equipping its full line of homeowner-size chain saws with a safety chain-braking device. Here's how it works.

When the cut is completed, you move a lever forward, a steel band tightens around the saw's clutch

drum and the chain stops dead in its tracks. No longer need you worry about being cut by a coasting chain after the trigger is released, or hurt by a kickback common with small saws during trimming and bucking cuts. Having less inertia than big saws, a small saw tends to jump back at you when the tip of the bar strikes

solid wood. With your hand on the lever, you can brake the saw instantly and reduce kickback.

The Mini Mac 25, a super lightweight model, is at \$109.95, the lowest-cost saw with a safety chain brake. McCulloch Corp., 5400 Alla Rd., Los Angeles, Calif. 90009.—Wayne C. Lecky, *Home and Shop Editor*.

**"IT'S FREE! FROM ME!"**

**PLAN AHEAD FOR SUMMER 25 PROJECTS**

Planters  
Fences  
Children's Furniture  
Storage  
Tables  
Hot Closet  
Plylent  
Decorating Hints  
Hanging Lamps  
Bar  
Wall Desk  
Bike Rack  
Garage  
Log Storage  
Sandbox  
Bench

**PLAN AHEAD FOR SUMMER 25 PROJECTS**

"Hello. I'm your Georgia-Pacific Registered Dealer. And I've got plans for your summer. All kinds of plans for all kinds of do-it-yourself projects. They're in a big 32-page, fully illustrated book that's free. The plans are easy to follow. And the projects are simple to build.

### Something for Everyone

"My PLAN AHEAD PROJECTS BOOK has lots of terrific things to build: a

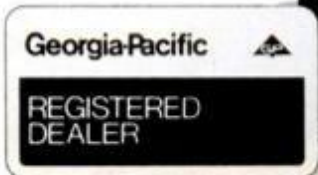


planter, decks, storage, fencing units, paneling projects—all kinds of things. There're plans for a bench like this. Neat, eh? And **you** can build it!

### We've Got All the Materials You'll Need

"We've got plywood, lumber, doors, particleboard, hardboard, lots of paneling—even tools if you need 'em. So, for your free book and all kinds of Georgia-Pacific building materials, come on in. See you soon!"

"Look for this blue and white sign."



# Redo it yourself! With Easy-Set ceramic tile.



**1** "I used to take baths with my eyes closed. Not because of the soap. It was the bathroom walls. Talk about ugly! I couldn't stand to look at them. But what's a girl to do? I mean on our budget, I couldn't afford to have it redone.



**2** "And then I heard about Easy-Set.<sup>®</sup> Do-it-yourself *real* ceramic tile, made by American Olean. It comes in wall sheets and handy tub wall kits. In six colors that look great in bathrooms, laundries, kitchens. But the best part was I could do it myself. And save money, too.

"Well, I installed it myself in just a few hours. Right over the old crummy walls. No problem, 'cause Easy-Set goes up over plastic, plaster, tile, you name it. I got the Easy-Set sheets, and just followed the simple directions. And I'm no handyman, know what I mean? I could even get the supplies I needed right where I got the tile.

**3**



**4** "Now I sit and soak for hours. Imagine! Me, with real ceramic tile walls. Not only that, but Easy-Set has this special smooth grout—the white stuff between the tile—that wipes clean as easy as the tile. So my walls stay looking new and terrific. Easy-Set. The do-it-yourself ceramic tile. It sure opened my eyes!"

For the Easy-Set<sup>®</sup> dealer nearest you, just call this special toll-free number, day or night:

**800-243-6000**

In Conn., call 1-800-882-6500.

For free information on Easy-Set do-it-yourself ceramic tile write: American Olean Tile Company, 2221 Cannon Avenue, Lansdale, Pa. 19446



**American  
Olean**

A Division of National Gypsum Company

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Had it with hot taste?

Then put down what you're  
smoking and pick up the  
extra cool taste of KOOL.

Come up to KOOL.



KINGS

SUPER LONGS

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

Kings, 17 mg. "tar," 1.3 mg. nicotine; Longs, 17 mg. "tar,"  
1.2 mg. nicotine, av. per cigarette, FTC Report Nov. '75

Материал, защищенный авторским правом

# CAR CLINIC

BY MORT SCHULTZ



## False economy

Could I damage my car by running two different-size tires on the rear wheels? The car is a 1969 Fiat 850, and I have a Michelin 165x13 tire on one wheel and a 155x13 on the other.—L. P. Kane, Martinez, Ga.

And when the spider gears in the differential go bad because of the excess strain that's being put on them, the money you've saved by not buying a tire which fits right will go down the drain, along with additional dollars for a differential overhaul. You'd better get two tires of the same size on those wheels.

## By a hare's-breadth

I am a new owner of a VW Rabbit and am one of those for whom the position of the accelerator pedal is very uncomfortable. If I set the seat back to where the accelerator is comfortable, I can hardly reach the clutch or steering wheel. If I place the seat otherwise, my leg gets cramped or falls asleep. I am five-foot-eight and have long, but not disproportionate legs. Is there a way to alter the accelerator pedal?—Cathy Cragg, Lead, S.D.

Your complaint is a common one, Cathy, and it's probably going to remain a rub with the Rabbit, because until now, at least, there has been no modification issued by the company to reposition the accelerator pedal. But I did some checking and found that a gas-pedal extension is made which adds about 1½ inches to the height of the accelerator pedal. This brings the pedal up to practically the same height as the brake and clutch pedals. The extension is clamped to the accelerator pedal.

This accessory sells for around \$2. I found one in my local Sears store. I also know that you can order it through the mail from J.C. Whitney & Co., 1917-19 Archer Ave., Chicago, Ill. 60680.

## Clunk off the old block

I have a 1975 Pontiac LeMans and a 1975 Chevrolet El Camino, and both have the same problem. Do you know what makes a clunk-type noise in the front when I apply the brakes at low speeds? The dealer tried to fix it, but

the fix lasted a couple of days and returned.—Ernest P. Daigle, Houma, La.

If the noise is the one I'm familiar with, it's being caused by movement of the disc-brake pads in their calipers. The sound is a normal condition and in no way indicates a malfunction. The dealer probably applied some grease to the pad pins, which alleviated the condition temporarily, but grease washes away and the noise returns. It's not terrible and should give you no cause for concern now that you realize that it's supposed to happen.

However, it's just possible the noise is being caused by the outer disc-brake pads not being tightly crimped to the caliper. The upper ear of each pad should be crimped with water-pump pliers as shown in the 1974 passenger-car service manual on pages 5-32.

## Repair or replace?

The exhaust manifold on my 1972 Dodge Dart Swinger is cracked. Is it possible to repair the crack? If it isn't, must I replace the intake manifold when I replace the exhaust manifold?—George Lundy, Glenview, Ill.

There's a difference of opinion regarding the repair of cracked exhaust manifolds. I've seen some that have broken their welds. It depends whether the crack is positioned on a stress point, such as near a bolt, where the forces of expansion and contraction are greatest.

There's another way of looking at this other than whether a repair will work or not. A good welder will probably charge \$15 to \$20—they do in my area. New exhaust manifolds sell for \$20 to \$30, and you can probably pick one up for half that in a junkyard.

As for your second question—there is no reason for replacing the intake manifold when replacing an exhaust manifold. One has nothing to do with the other.

## Hope for Opel

I own a 1971 Opel 1900 sedan with a 1.9-liter engine. Oil is accumulating in the air cleaner. It appears to be coming from crankcase gases being

deposited in the carburetor for burning. I looked for a PCV valve to see if it was clogged, but couldn't locate it. All I could find was a 1-inch-diameter hose leading to the air cleaner. I'm losing oil and air-filter elements. What do I do?—Jim Aldred, South Boston, Mass.

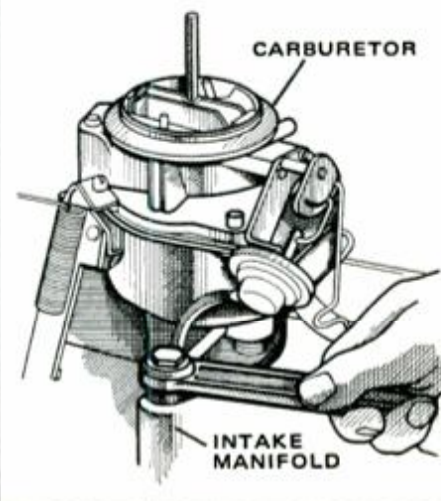
First off, you get PCV valve out of mind. Your car doesn't have one. Instead it has a crankcase ventilator metered orifice that does the same job as the PCV valve. Furthermore, if this orifice gets plugged, it's the same as having a PCV valve plugged. You know the results. You're now living with them.

That orifice is supposed to be cleaned out every 6000 miles. Obviously yours hasn't been cleaned in

(Please turn to page 54)

## Tighten hold-downs

A minute spent every so often tightening carburetor hold-down bolts may save you a lot of time, trouble and money later on. Loose hold-down bolts let air leak past the carburetor base into the engine's induction system. Air leans out the fuel mixture, making it difficult to get a proper engine idle. The engine can idle roughly and it may even stall. This could make you suspect an internal carburetor malfunction, which would lead to an unnecessary carburetor overhaul. Tighten the bolts—it's easier and cheaper.



# In between too



The AMC Hornet Sportabout is just right. It offers the convenience of a 4-door wagon with the economy of a compact car.\*

### **All the Room Most Families Need**

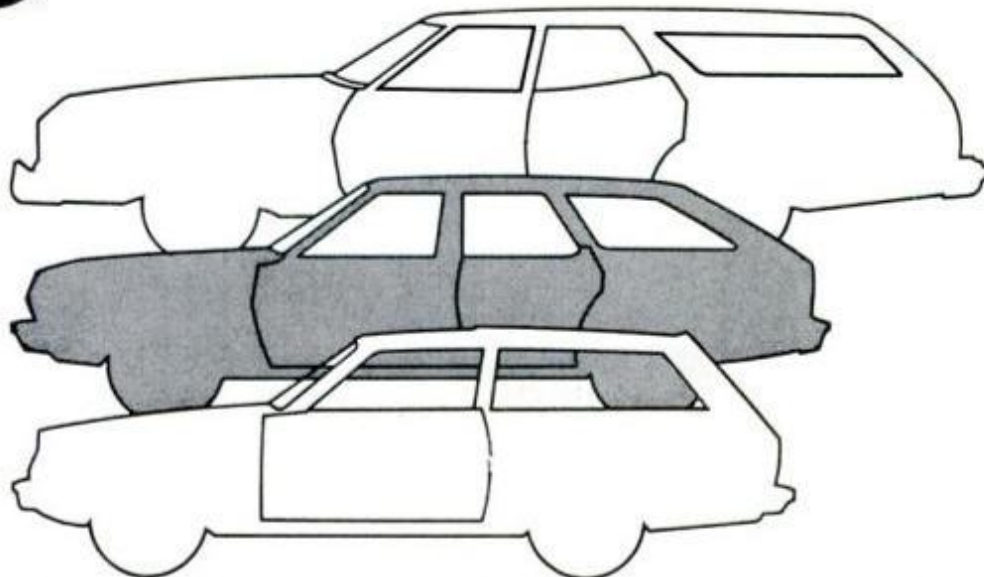
A family of five can ride comfortably in our compact without feeling compacted. But besides being comfortable, the Sportabout is also practical.

There is all the cargo space necessary to fill most families' needs.

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# big & too small.



With an in-between-size wagon, you don't need as much room to park between cars. Or to maneuver between them in traffic.

And with the Sportabout's standard economical six-cylinder engine and long driving range, gas station stops are few and far between.\*

## AMC BUYER PROTECTION PLAN<sup>®</sup>

To us at American Motors, and to our dealers, the exclusive AMC BUYER PROTECTION PLAN means a commitment to our customers.

AMC's exclusive BUYER PROTECTION PLAN means that AMC will fix or replace free any part—except tires—for 12 months or 12,000 miles whether the part is defective, or just plain wears out under normal use and service.



# \$3549.

Manufacturers suggested retail price. Destination charges, dealer prep., state, local taxes extra. W/S/W tires (\$36) and wheel covers (\$32) extra.

The following parts and services are covered against factory defects or failure due to wear for 12 months or 12,000 miles.\*

### Parts fixed or replaced free.

	AMC	GM	FORD	CHRYSLER
Engine/Drive train	Yes	Yes	Yes	Yes
Spark plugs	Yes	No	No	No
Shock absorbers	Yes	No	No	Yes
Brake linings	Yes	No	No	Yes
Clutch linings	Yes	No	No	Yes
Wiper blades	Yes	No	No	No
All light bulbs	Yes	No	No	No
Hoses & Belts	Yes	Yes	No	No

### Services provided free.

	AMC	GM	FORD	CHRYSLER
Wheel alignment	Yes	No	No	No
Wheel balancing	Yes	No	No	No
Align headlights	Yes	No	No	No
Adjust carburetor	Yes	No	No	No
Adjust distributor	Yes	No	No	No
Adjust brakes	Yes	No	No	No
Adjust clutch	Yes	No	No	No
Adjust transmission bands	Yes	No	No	No
Adjust & tighten belts	Yes	No	No	No
Tighten nuts & bolts	Yes	No	No	No
Free loaner car	Yes	No	No	Yes
Trip Interruption Protection	Yes	No	No	No

\*BUYER PROTECTION PLAN is reg. U.S. Pat. and Tm Off.  
 \*Chrysler coverage is 12 months, unlimited mileage.  
 General Motors has 5 year/60,000 mile coverage on certain 140 cu. in. engines.

\*EPA ESTIMATED MPG: 25 HIGHWAY, 17 CITY, FOR STANDARD 232 CID 6 AND OPTIONAL OVERDRIVE WITH MANUAL TRANS. CALIF. CARS EXCLUDED. YOUR RESULTS MAY VARY.

# AMC Hornet Sportabout

## CAR CLINIC

(Continued from page 51)

almost six years. Here's what to do: Remove the rubber hose from the metered orifice, located on the right side of the engine in the intake manifold fitting. Examine the hose and fitting, and replace damaged parts. Then apply air pressure to the orifice to blow out any foreign particles that may be trapped and, thus, clogging the airflow.

### Courier news

Here is one I thought other Courier owners might like to know about. My '74 Ford Courier developed this irritating squawk in the rear over the first 500 miles. The dealer made a fix and several more as time went on by working grease between the rear spring leaves. He explained that the manufacturer didn't install the usual nonmetallic material between spring leaves, and metal-to-metal contact as springs flexed was causing the noise. Lubrication was a temporary fix. A trip or two around town, and the squawk returned.

In desperation I came up with a fix that has gotten rid of the noise. I worked short lengths of lawn chair webbing between the leaves. To get as much webbing as possible between each leaf, I raised the rear end so axle and wheels hung free. To get even more clearance, I hammered a large screwdriver in between the leaves, and then I worked the webbing in, being very careful to avoid wrinkles.

Even if my fix lasts only a few thousand miles, I feel it's worth it. The webbing is inexpensive and the job takes about 30 minutes. What do you think?—Harvey J. Edens, Sr., Medford, Ore.

Harvey, I think that if it's working for you, it will work for others. Thanks for the tip.

### High Sierra

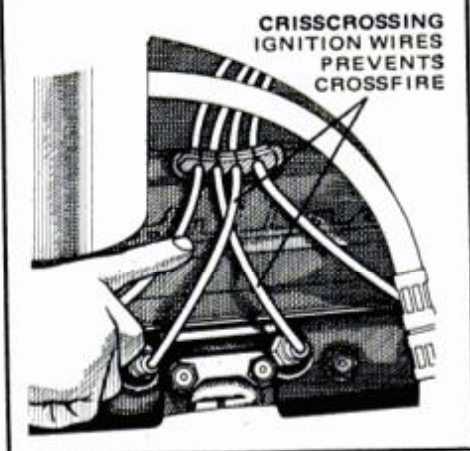
I am experiencing a problem with my 1975 GMC Sierra Classic pickup equipped with a 350-cu.-in. V8 engine and four-barrel carburetor. The trouble is a very obvious tapping noise coming from the engine on cold starts. The noise remains until the engine warms up, which takes at least three or four minutes. The engine makes noise only when I'm driving and gradually accelerating. When the engine is in neutral or idling there is no noise.

The dealer and factory representative have told me it's not the lifters, but they can't pinpoint the problem. They agree it is too obvious to have to live with, but don't seem to be

### Crossfire's bad

Ever hear the term "crossfire"? It's when a sparkplug fires out of turn because voltage is induced into its ignition cable. Crossfire is serious because of the damage it can cause inside a cylinder. The condition comes about by your being too neat and running plug cables parallel to each other. If the two cables serve cylinders that fire concurrently in the firing order, voltage can be induced from one cable to the other causing crossfire. The way to protect your engine is to be "sloppy." See that any two adjacent cables are crisscrossed—never parallel for their entire lengths.

PM CAR CARE



able to do anything about it. Any suggestions would be welcome. Thank you.—Phillip E. Morris, Alexandria, La.

You're welcome, and here's your answer: The tapping noise is being caused by the early fuel evaporation valve in the actuator to the heat riser. It seems that varying amounts of vacuum emitted by the valve cause heat-riser flutter. I guess the dealer and factory rep hadn't received the technical service bulletin issued about the time you wrote me. It's TSB 75-T-40 (10/7/75) and it calls for installing a check valve in the vacuum line to control vacuum. The new part's number is 497853. The fix applies to all GM cars and trucks with 350-cu.-in. engines having the trouble, but the bulletin's number will vary according to the GM division issuing it.

### Guide on

The timing chain of my 1970 Datsun 510 has stretched for the third time since I've had the car. Can't this problem be solved in some more permanent way than just changing the chain every year? This time I'm going to replace the chain guide and chain tensioner as well as the chain.

—Rafael Rodriguez Rivera, no address given.

If you had done the first time around, Rafael, you wouldn't have had to replace the timing chain last year or this year, for that matter. When the first timing chain wore, it also wore the timing chain guide (cam gear). Replacing one without replacing the other is no good, because a worn cam gear causes premature wear of a new chain. Although you probably didn't need a new chain tensioner the first time around, you no doubt need one now since the present tensioner is worn and not able to exert sufficient pressure on the chain. It all boils down to this:

When you must replace the timing chain for the first time, save yourself a lot of future headaches by also replacing the chain guide.

## SERVICE TIPS

■ Cadillac Sevelles undergoing front-end alignment must have the proper control-arm shaft-to-frame shims used if looseness of the upper control arm-to-frame attachment is to be avoided. The specially hardened shims are issued by GM under parts Nos. 6270717 (.030 in.), 6270718 (.060 in.) and 6270719 (.120 in.). If I owned a Seville and was having the front end aligned, I would ask the technician about the shims he was going to use, making sure they were the right ones.

■ Ford Motor Co. advises that you can lose cooling because of a refrigerant leak at the condenser of your 1974-76 Torino, Elite, Montego or Cougar. The leak occurs on cars with power steering, because of interference between the power steering oil cooler tube and front surface of the condenser. The power-steering oil-cooler bracket should be bent to provide 3/4-in. clearance to the front surface of the condenser.

■ Before the rear brake linings wear out prematurely in your 1975 Fury, Coronet, Charger or Cordoba, get the car back to your dealer for diagnosis under the provisions of service bulletin 05-10-75 (11/10/75). The trouble is occurring because of prolonged exposure of linings to high operating temperature, and the first indication you have is when it's too late—when linings have worn enough to allow metal brake shoes to scrape drums. A new heavy finned and flared brake drum which more efficiently dissipates heat has been issued. Its part number is 4049661. If you need this drum, make sure that your dealer installs one on both rear wheels. ★★

### 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.

# Where do the pros get their training?

Almost half of the successful TV servicemen have home study training, and among them, it's NRI 2 to 1! A national survey\* performed by an independent research organization showed that pros named NRI most often as the recommended school and as the first choice by far among those who had taken home study courses from any school.



Why? NRI's 62-year record with over a million students . . . the solid training and value built into every NRI course . . . and the designed-for-learning equipment originated by NRI are part of the answer.

## Training Geared for Success

NRI training is aimed at giving you a real shot at a better job or a business of your own. You learn at home, with "bite-size" lessons. "Power-On" kits, designed to give you practical bench experience, also become professional instruments you'll use in your work.

## Includes 25" Diagonal Color TV and Quadraphonic Stereo

As a part of NRI's Master Course in TV/Audio Servicing, you build a 25" diagonal solid state color TV with console cabinet. As you build it, you perform "Power-On" experiments that demonstrate the action of the circuitry. And, you



also build a 4-speaker Quadraphonic System! Instruments include a triggered sweep 5" oscilloscope, digital integrated circuit color TV pattern generator, a CMOS digital frequency counter, and NRI's electronics "discovery" lab. You get both TV and Audio training for hundreds of dollars less than for audio alone at the next leading school!

## Free Catalog... No Salesman Will Call

Choose from the five different courses in TV/Audio servicing

. . . or you can learn Computer Technology with a real programmable digital computer; Citizens Band Radio; Communications; Aircraft or Marine Electronics; Mobile Radio, and more. Send the free postage paid card for our free catalog. See for yourself why the pros select NRI two to one! If card is missing, write to:



**NRI SCHOOLS**  
McGraw-Hill Continuing Education Center  
3939 Wisconsin Avenue,  
Washington, D.C. 20016

\*Summary of survey results on request.

# Omega Pro-Lab B66

The last word in medium-format enlargers.



For sheer ease of operation, no photo enlarger surpasses Omega's Pro-Lab B66 for 35mm and 2 1/4" negatives.

The spring-loaded negative carrier opens wide when you lift the lamphouse, letting you advance negatives without disturbing their alignment. The lamphouse assembly is counterbalanced for smooth, easy movement. And a sliding panel allows instant access to the lamp, condensers and filter drawer. The rigid, inclined girder keeps negative and baseboard perfectly aligned, and leaves maximum room to center your easel.



CARRIER OPENS EASILY



SLIDING FRONT PANEL

Yet the whole unit will come apart quickly and easily for storage.

The B66 comes with three condensers, for optimum light distribution with negs to 35mm; or switch to two condensers to match the 2 1/4" format optical requirement. Or get the optional dichroic color head and dial in the exact filtration needed for color or variable-contrast printing.

Priced as sensibly as it's designed, and for even greater savings, there's our "Two-Lens Outfit" for 2 1/4" square and 35mm formats.

Write for literature to Omega Division, Berkey Marketing Co., Inc., Woodside, N. Y. 11377. In Canada, Berkey Photo (Canada) Ltd., Ontario.



RIGID GIRDER DESIGN



OPTIONAL COLOR HEAD

**Ω OMEGA**

The Greatest Name in Your Darkroom.

## PHOTO HINTS

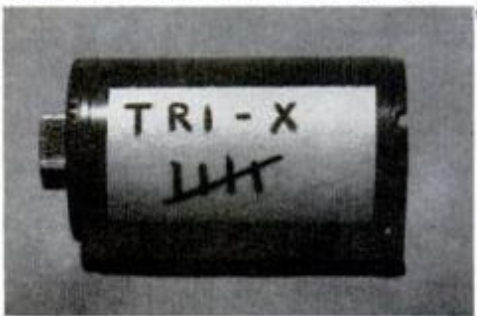
### FROM READERS

#### A perfect, free vignetter



Many portraits gain a certain old-fashioned charm when "vignetted" so that the picture fills an oval area in the center of the paper, fading to blank white at the corners. All you need to do is hold an oval mask between the enlarger and the paper, moving it to blur its outline. The trick is to cut a precise oval for the mask. I found one, precision-cut, on the front of a Loving Care hair-coloring box, mounted it over a hole I cut in the cardboard bottom of an old printing-paper box, and there was my vignetter. If no one in your family uses Loving Care, check your supermarket or drugstore for an oval-fronted box of something else you use.—Grace Weinstein, Los Angeles.

#### Tape labels save film scratches



The more a film cartridge has been used, the more likely it is to scratch the film. Label all your cartridges with tape and mark the tapes each time you use them. After five uses, I throw them away.—Lane C. Sander, Yakima, Wash.

# THE GRAB SHOT CAMERA.



Whether you're trying to photograph a Stone rolling across the stage at a concert, or a favorite plant blowing in the breeze, you can be sure of a good shot with the new Konica C35-EF compact camera.

Because it's the only 35mm camera with a built-in electronic flash.

Just press a button and the flash pops up, ready for instant use. No matter where you are; how dark it is; how fast the action.

Just focus and shoot.

You get perfect available-light pictures each time because your Konica C35-EF automatically sets the correct exposure for you.

Or perfect flash pictures because your Konica C35-EF automatically sets correct exposure as you focus.

With this camera you always have a flash, in a flash.

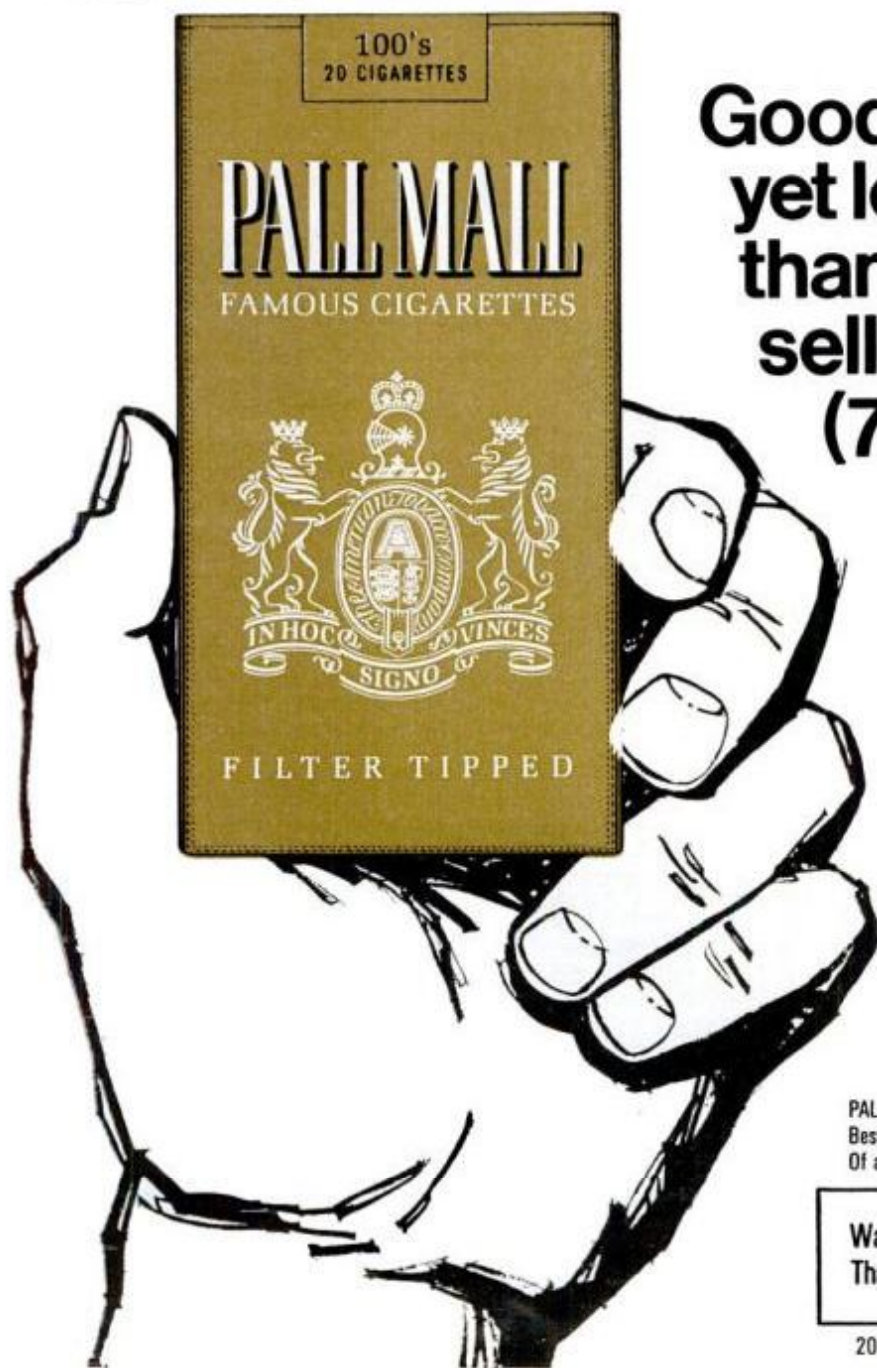
That's why we call it the Grab Shot Camera.

See your Konica dealer for a startling demonstration, or write for "grab-shot camera brochure", to Konica Camera, Woodside, New York 11377.

**THE SUN NEVER SETS WITH A KONICA C35-EF.  
THE CAMERA WITH THE BUILT-IN ELECTRONIC FLASH.**

**Decisions...decisions...  
Make your decision**

# Pall Mall Gold 100's



**Good rich flavor,  
yet lower in tar  
than the best-  
selling short  
(70 mm.)**

Not too strong  
not too light  
not too long  
tastes just right.

PALL MALL GOLD 100's ..... "tar" 20 mg. nicotine, 1.4 mg.  
Best-selling regular size (70mm) ..... "tar" 23 mg. nicotine, 1.6 mg.  
Of all brands, lowest ..... "tar" 2 mg. nicotine, 0.2 mg.

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

20 mg., "tar", 1.4 mg. nicotine av. per cigarette, FTC Report Nov. '75.

## Now is the time to Road Test RISLONE

Engines get sluggish and noisy with miles and time. For 40 years RISLONE has been cleaning rings, valves and guides, oil screens and passages to make engines run better again.

That's the whole idea behind RISLONE. Treat the engine, not the oil. Dissolve and disperse the gums, varnish and sludge that alter tolerances, interfere with efficient operation. That's why RISLONE works, and how it promotes better compression, easier starting, cooler running and helps get more miles out of every gallon of gasoline.

And RISLONE is a super bargain on your auto retailer's shelf. The big quart can costs only a dime or two more than the mini-products. Saves a quart of oil too! So it's a treat for your engine and your pocket book. Road test RISLONE now!



RISLONE National Championship Racing Jacket . . . \$9.95 prepaid

Quality polyester & cotton wash/wear. RISLONE yellow with black & red emblems & stripes. S, M, L, XL. Send check or money order to: RISLONE Racing Jacket, The Shaler Company, Waupun, Wis. 53963.



**THE SHALER CO.**

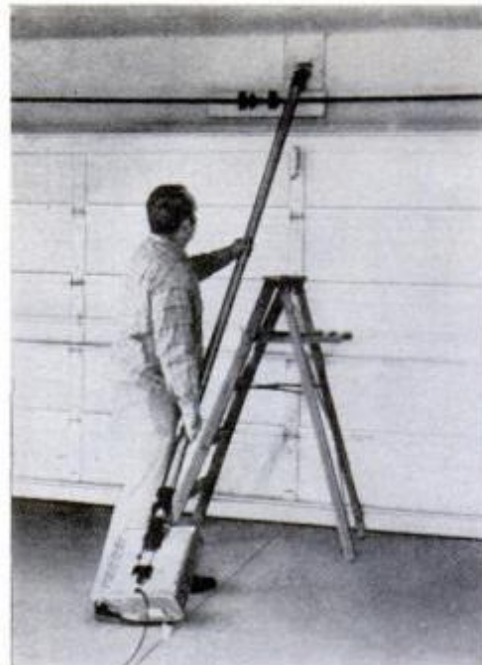
Waupun, Wisconsin 53963  
In Canada: Warren Packaging Co. Ltd.  
Scarborough, Ontario

## PM PRODUCT REPORT

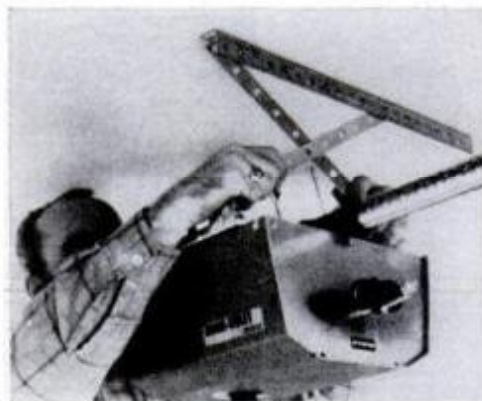
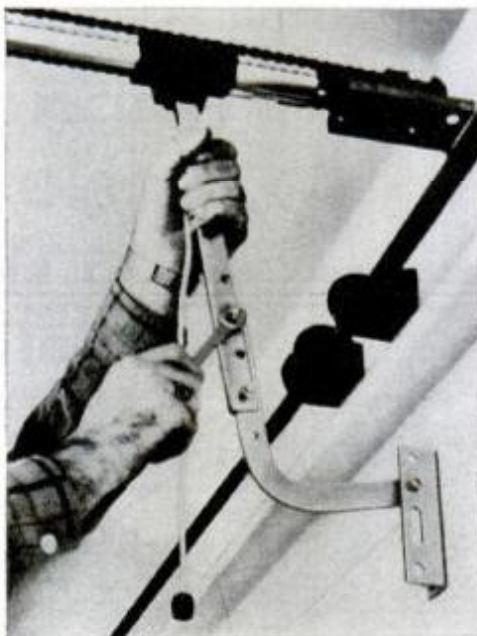
# You can install this door operator in 2 hours

**A**utomatic garage-door operators have become so simple to install, and offer so much security, you can hardly afford to be without one. Being able to open, close and lock the door electronically in foul weather or late at night from the comfort and safety of your car should be reasonable enough to install one.

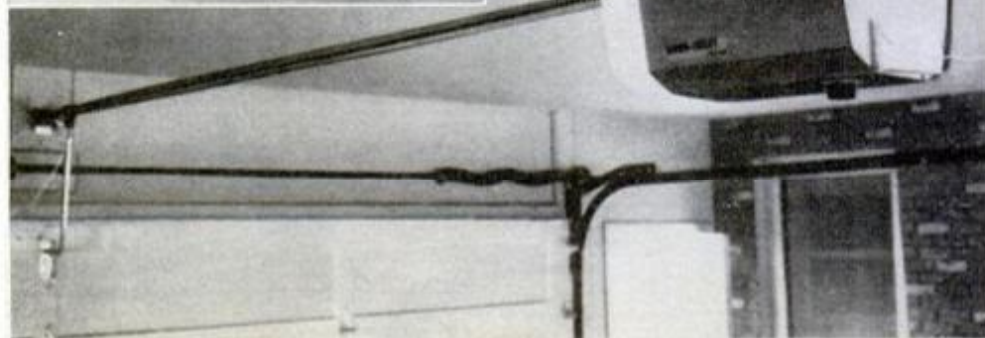
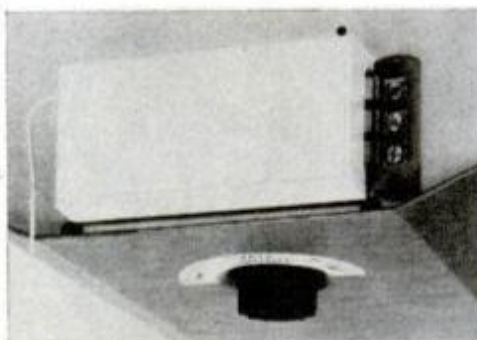
I found you can install Stanley's new solid-state Door-Valet in a little [\(Please turn to page 173\)](#)



1. Assemble operator per instructions, then attach to bracket over top of door.



2. Hang power unit from ceiling with the perforated mounting strips provided.  
3. Attach traveler assembly arm to top of door; tighten linkage as shown (left).  
4. Mount and wire radio receiver to rear of case, then wire wall button to receiver.  
5. Plug operator's power cord into ceiling outlet; operator is ready to use (below).



# Dodge is 3 up on every other pickup made in America.

## 1. Dodge has the lowest-priced pickup. Lower than Ford. Lower than Chevy.

If you know trucks, then you know Dodge. You know all about how tough we build our trucks. And you know how well we engineer them. But maybe you didn't know that Dodge makes America's lowest-priced full-sized pickup. The Dodge D-100.\* (Based on comparison of manufacturers' suggested retail prices for 6 cylinder half-ton pickups excluding optional equipment, state and local taxes, destination charges.)

## 2. Dodge got the best gas mileage. Better than Ford. Better than Chevy.

Getting great gas mileage is getting to be a habit with Dodge.

In the latest EPA tests, a '76 Dodge D-100 powered by a 225/6 cylinder engine with a manual transmission turned in an estimated mileage of 25 miles per gallon on the highway. And 18 in the city. Of course, the actual mileage you get will vary depending on the type of driving you do, your driving habits, your truck's condition and optional equipment. In California, see your dealer for mileage data for California equipped vehicles.

## 3. Dodge has the biggest standard payload. Bigger than Ford. Bigger than Chevy.

Dodge has a payload that can make small work of the biggest jobs. Without beefing it up one bit, you can haul off a whopping 1,505 pounds.



3 big reasons why the man who'd rather drive a truck than a car would rather drive a Dodge.



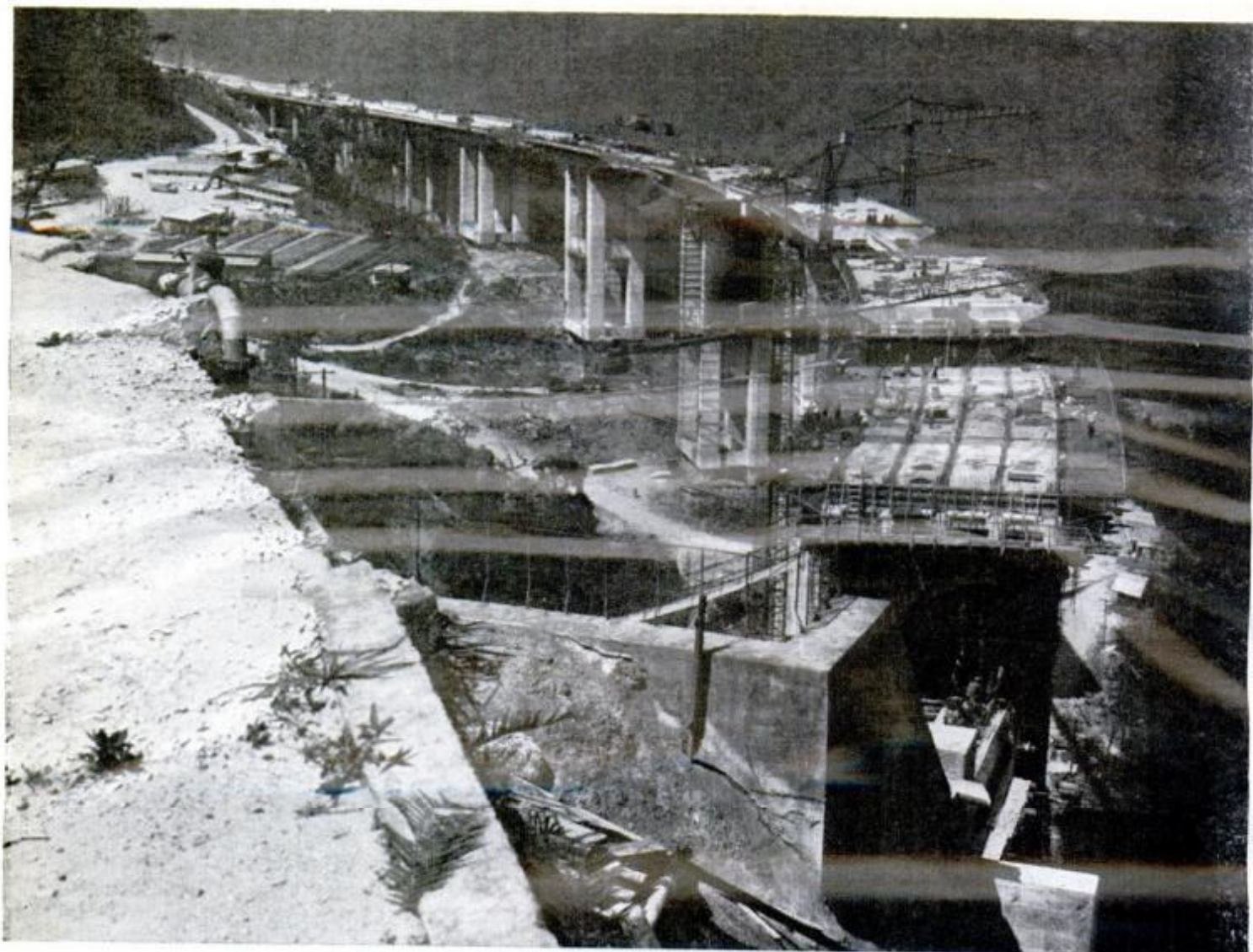
CHRYSLER CORPORATION

\*Pickup shown - The Dodge D-100 Adventurer. Will be priced higher because of optional equipment.



Dodge

Dodge Truck

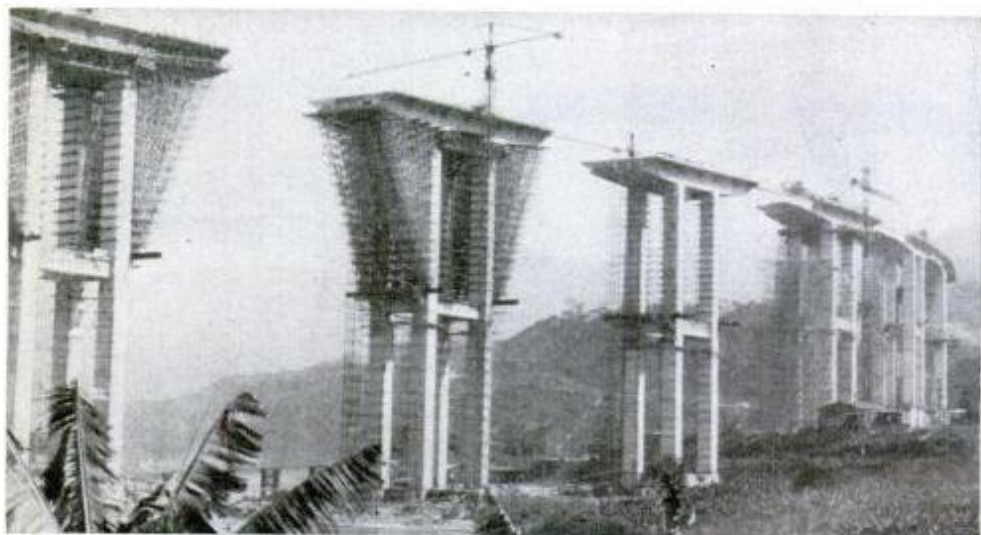


# SUPER, SUPER SUPERHIGHWAY

by Robert Dymnt

It's only 34 miles long, but it represents one of the world's most amazing roadbuilding feats. It's the new Immigrants Highway in Brazil, connecting the inland capital city of Sao Paulo with the vital seaport facilities of Santos on the Atlantic Ocean. Carving its way across some of the earth's most treacherous mountain terrain, the road, also known as the Sao Paulo-Santos Expressway, will pass over or through 30 bridges, 15 tunnels, 21 elevated viaducts and a  $\frac{3}{4}$ -mile-long dam.

The main part of the superhigh-



**Towering piers**, some more than 300 feet high, will carry new Immigrants Highway in Brazil across steep mountain gorges. Footings for piers go 100 feet deep into the ground. Roadway is built in T-shaped sections atop piers, then sections are gradually connected to form a continuous surface. Note in photo at right how the expressway passes through one mountain tunnel after another (in background).





# Rockwell presents two hard-working tools at one hard-working price.

The Rockwell Model 46-011 Lathe.

Turns wood, plastic, and light metals. Use it to buff, sand, grind, polish, even to drill.

The 46-011 lets you work pieces up to 37 inches between the headstock and tailstock (like more expensive lathes).

Tough tubular steel bed, ball-bearing spindle, precision-ground tool rest, a 10-inch turning capacity.

You get the features and capacity of lathes costing much more. For just \$169.99\*

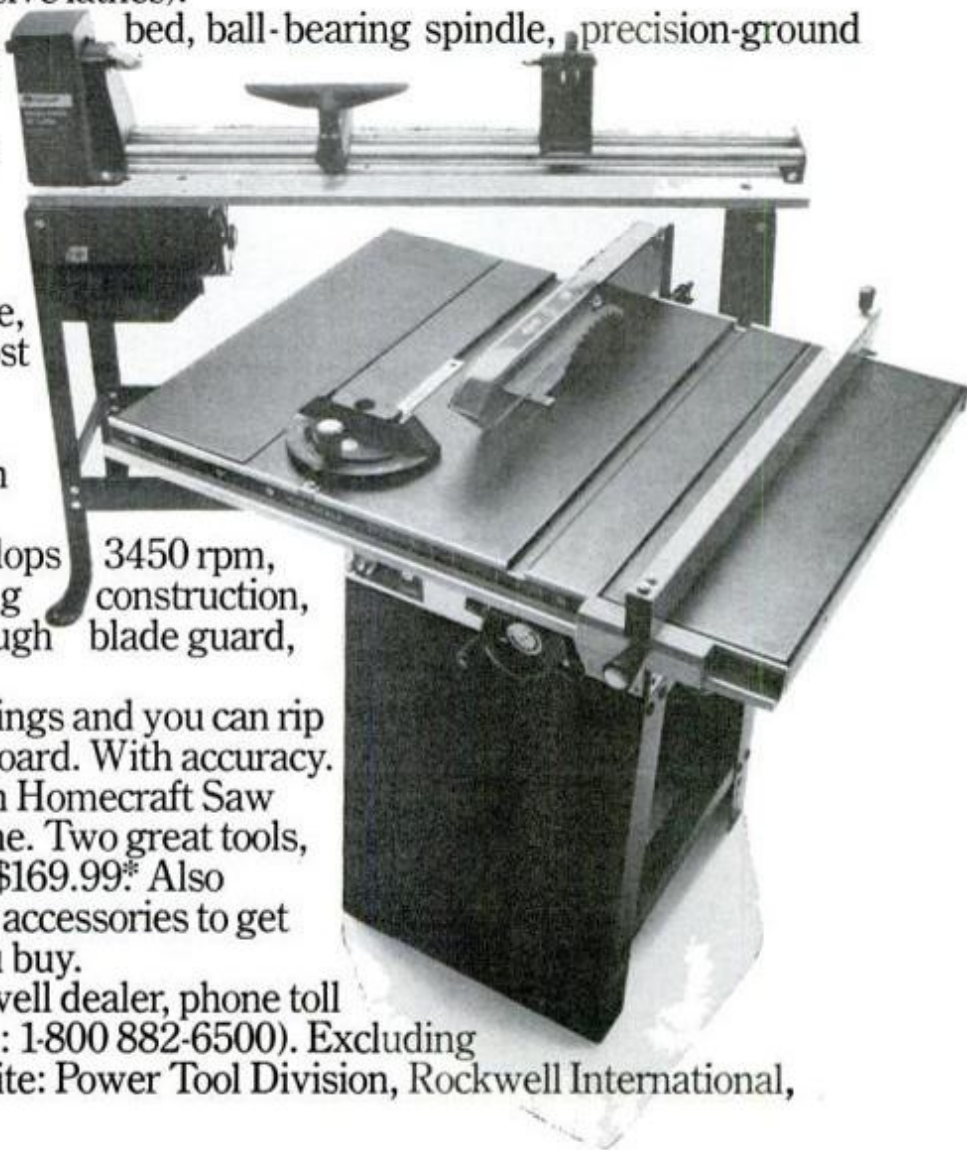
Or, for the same price, you can own one of the most versatile motorized table saws on the market.

The Rockwell 9-inch Homecraft® Saw, with a 1½-hp motor which develops 3450 rpm, complete ball-bearing construction, up-front controls, see-through blade guard, self-aligning rip fence.

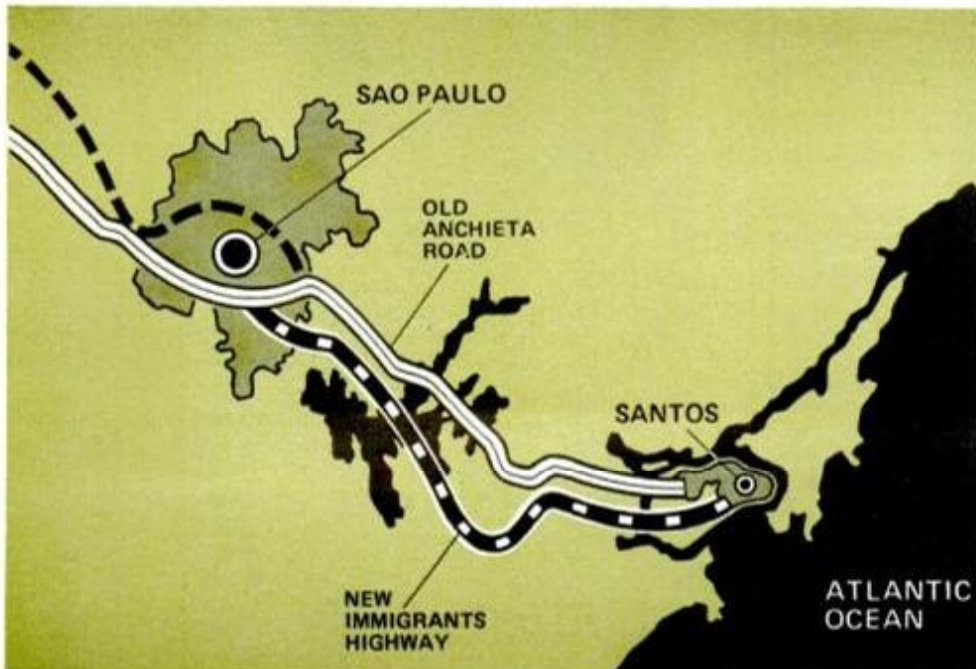
Spread its built-in wings and you can rip to the center of a 30-inch board. With accuracy.

The Rockwell 9-inch Homecraft Saw and the Model 46-011 Lathe. Two great tools, each for the great price of \$169.99\* Also check the Rockwell line of accessories to get the most from any tool you buy.

For your local Rockwell dealer, phone toll free: 800 243-6000 (Conn.: 1-800 882-6500). Excluding Hawaii and Alaska. Or write: Power Tool Division, Rockwell International, Memphis, Tenn. 38131.



**Rockwell International**



way through the high country is, in fact, virtually one long series of stepping stones from one mountaintop to another, using dizzyingly high viaducts to bridge deep valley gorges and tunnels bored through solid rock to pierce towering peaks. Average height of the elevated viaducts is 240 feet, with some exceeding 300—taller than a 30-story building. Underpinnings for the giant road-supporting piers go another 100 feet deep in the earth. The result is a high-speed expressway almost straight and level, with none of the tortuous switchbacks, steep grades, precipitous dropoffs and dangerous hairpin turns of conventional mountain roads. Speeds up to 120 km/h—about 75 mph—will permit travelers to make the normally slow, winding run between the two cities in little more than half an hour.

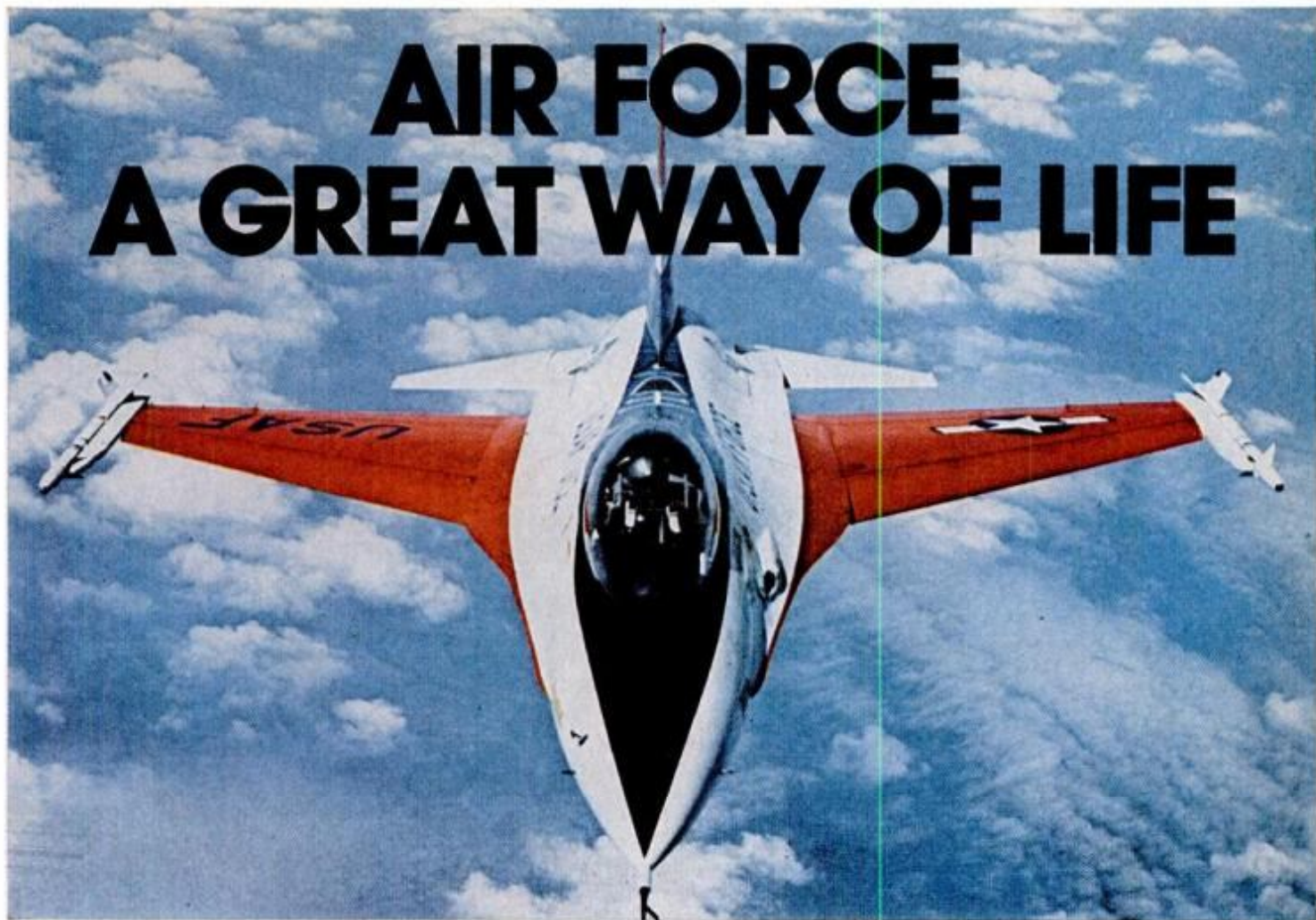
### New passage for booming trade

The new Immigrants Highway parallels an older existing roadway, the Via Anchieta. Built more than 25 years ago, this narrow, twisting mountain route is now overcrowded and unsuitable for modern-day traffic. The elevated expressway will open up a brand-new passage for booming trade and tourist travel between Sao Paulo, Brazil's largest city, and the shipping center of Santos.

Though costly—more than \$500 million—the bridge-and-tunnel scheme is considered cheaper in the long run than the mammoth earth-moving job that would have been required to bulldoze a ground-level route through the almost impassable terrain. It will also be shorter, straighter, faster and safer. The huge thoroughfare is six to eight lanes wide, cleverly designed in some sections with “reversible” lanes so traffic can be channeled in either direction depending on which way the flow is heavier. Begun in 1969, it is expected to be completed in 1978—a nine-year project. It will, however, be a monumental accomplishment—one of history's truly great engineering achievements. ★★★

**Map at left** shows route of amazing new Immigrants Highway that will link Sao Paulo, Brazil's largest city, with busy seaport of Santos on Atlantic Ocean. The expressway parallels old Anchieta road, but is elevated (photo at center left) to avoid steep grades and sharp turns. Speeds up to 75 mph will be possible along some stretches of the spectacular six to eight-lane highway. Photo at top left shows one of the 15 tunnels that allow road to go straight through the mountains instead of the long way around them. The 34-mile project will cost more than \$500 million, is expected to be completed in 1978.

# AIR FORCE A GREAT WAY OF LIFE



In the Air Force you can get outstanding training in a skill you're interested in and qualified for, as an airman or officer ....while serving your country with dignity and pride as part of the worldwide Air Force community.



Also, there's part-time duty in the Air Force Reserve for those with or without prior service. Or, if you're going on to college, a great opportunity as a student in the Air Force ROTC or at the Air Force Academy.

In the Air Force, we stress self-improvement through education and service. Also,

there's good pay, and 30 days of paid vacation each year. It's a great way of life for those young men and women dedicated to the continuation of 200 years of American freedom. If you are one of these people and believe you could meet our high mental and physical standards and want to help make a great Air Force better, call toll free 800-447-4700 (in Illinois call 800-322-4400) for the location of your nearest Air Force representative. Or send in the attached card.

## AIR FORCE A GREAT WAY OF LIFE





# THE WINNEBAGOS YOU



At Winnebago, we don't believe in change for the sake of change every model year. But we do believe in listening to the right people. People who own motor homes, drive them and live in them. People like you.

## **Over 250 live-in experts helped us.**

Last year we questioned owners of Winnebagos and other makes from all across the country. They told us what they wanted in a motor home and what they didn't want. We heard their compliments and complaints — loud and clear. That's why this year's compact Minnie Winnies,\* full-sized Braves, king-sized Chieftains and luxury-sized Customs are practically made to order for you.

## **Improved water, holding tank and gas capacity.**

It's no fun to run out of gas or water, or be stuck with a full holding tank when you're off the beaten path on

your own. So we've redesigned our tanks to give you more water and holding capacities on several models. And now, all models 23 feet long and longer carry at least 50 gallons of gasoline.

## **Better storage space inside and out.**

When you go Winnebago, you don't have to travel light. To our already generous inside storage we've added extra tuckaway space in places like new bunk/cabinets and dinette seat backs. Outside, there's more weather-tight storage space on every model. The luxurious Custom even boasts a separate, key-locked trunk.

## **New open-space floor plans.**

This year's Winnebago fleet offers you 16 different floor plans, including several new designs specifically aimed at creating an open, uncrowded look. Strategically-placed divider curtains push back to open up large areas for living and entertaining; closed, they provide sleeping and dressing privacy. On the new Minnie Winnies, cab roof cutouts add head room, too. You can enter or leave the cab without ducking.



# ASKED FOR ARE HERE.

## More built-in liveability.

On the practical advice of owners we talked to, we've made dozens more "little" changes that add up to a big improvement in comfort and convenience all across our line.

A low door step, padded cabinet ends and corners save you nasty head bumps when entering. Cabinets and drawers latch securely for traveling, yet open easily with one hand. Improved venting systems carry moisture and odors away, yet keep bugs outside. Other improvements include single dump outlets, simplified wiring systems, spacemaking counter arrangements. The more you live in a new Winnebago, the more you'll appreciate them all.

## All this plus the Winnebago Homeowners Plan.

Now, the number one name in motor homes brings you another, most important "first." The 1976 Winnebagos — every style and model — are the first and only homes on the road that come with a Homeowners Plan. This unique, comprehensive package



of benefits travels with you wherever you go. It protects your investment, inside and out. Locates some 300 factory-authorized service centers coast-to-coast.

Explains the Winnebago safety program. Details customer relations service. And makes you a member of the Winnebago International Travelers Club, at no charge, for one full year.

Add it all up: a choice of 16 models, dozens of solid improvements and the exclusive Homeowners Plan. That's how the 1976 Winnebagos give you what you asked for in a fine motor home — and more!

## WINNEBAGO

The name that means the most in motor homes.  
Winnebago, Box 152, Forest City, Iowa 50436

Dc 10

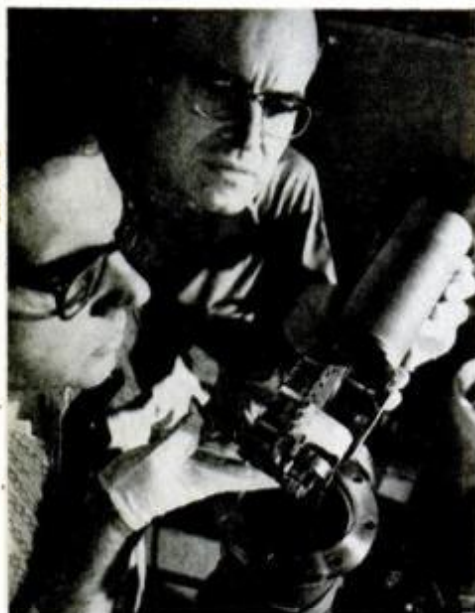
Please send me free literature and the name and address of my nearest dealer. I am interested in...  Motor Homes  Travel Trailers  Check if student

Name \_\_\_\_\_

Address \_\_\_\_\_ Phone \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

# SCIENCE WORLDWIDE



## More valuable than gold

Crystals of germanium—a silvery metallic element in the carbon family—are used for detecting such high-energy radiation as X-rays and cosmic rays. Crystals made by a new process developed at the General Electric Research Center, Schenectady, N.Y., are expected to measure radiation with greater accuracy and operate at 50 percent less voltage than detectors now available.

The germanium crystal about to be tested in a cryogenic chamber by the GE scientists (above) represents one of the purest materials to be found on Earth. Such crystals are said to be worth three times their weight in gold.

## 'Starched' plastics break down

By adding starch to plastics such as PVC, polyethylene and polystyrene, researchers at Britain's Brunel University have succeeded in making these very stable materials biodegradable. Tiny starch granules are embedded in the plastic. When the plastic is discarded—burying it in soil is best—microorganisms penetrate the polymer and gobble up the starch. This causes the polymer structure to break down to the point where oxidation processes take over, reducing the material to water, carbon dioxide and other nonpolluting substances.

Uses for the "starchy" plastics include food bags, bottles, trays, twine,

mulch films for the garden, shrouds and even coffins. Because starch is a cheap material, the finished products are said to cost less than if made solely of plastic.

## New window reacts to heat

A self-fogging window designed to keep out excessive heat is under development at Pennsylvania State University. The pane is composed of two transparent plastic sheets that have a slight separation between them. The space contains a solution that is normally clear but that turns cloudy when a certain temperature is reached. A lowering of temperature restores transparency. Researchers believe that the new window could save millions of dollars for greenhouse operators who must whitewash their windows by hand at the start of each summer season. If they don't, the sun may burn up their plants.

## How do you like your yogurt?

Among the many surveys conducted last year, one was clearly of critical importance—at least to yogurt manufacturers. Four hundred households in Pennsylvania were queried about their yogurt-eating preferences. Of the 161 families who said they eat the stuff, 74 percent preferred the fruit-flavored type, 5 percent liked yogurt in nonfruit flavors, such as vanilla, and 21 percent leaned toward the plain.

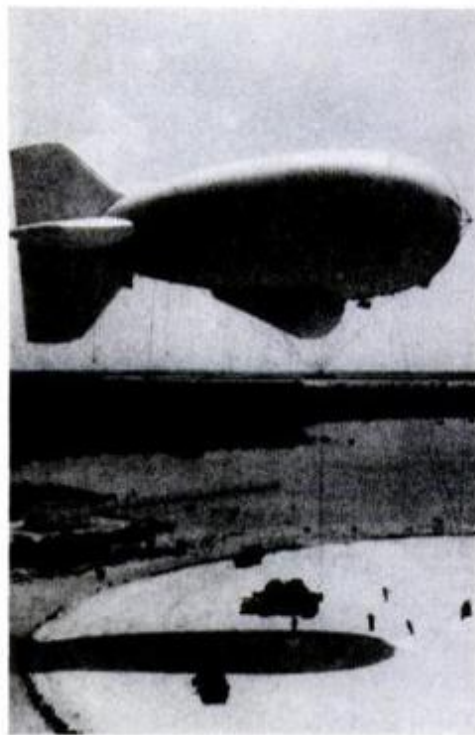
Among the fruit fanciers, almost 50 percent said they liked their berries at the bottom (the so-called inverted sundae), 40 percent liked the fruit mixed throughout the yogurt and 11 percent had no preference. Yogurt consumption in North America has increased spectacularly in recent years, according to the Milk Industry Foundation.

## Just like the good old days

An unusual radar system that uses a concept dating back to the Civil War is being developed by the Air Force to improve the North American Air Defense Command's low-altitude surveillance of the Florida straits. In project "Seek Skyhook," the radar is carried aloft by a tethered aerostat—balloon—that will normally hover

at about 12,000 feet. The radar and associated gear are suspended below the aerostat in a streamlined pouch, as seen in photo. Data on unknown aircraft will be relayed from the balloon base, 20 miles northeast of Key West, to the NORAD Combat Operations Center at Colorado Springs.

When fully operational, the system will include three 200,000-cu.-ft. balloons. Since the radar depends on a gasoline-driven generator aboard the balloon for its electrical power, the gas bag will be pulled down periodically to allow for refueling. To provide continuous radar coverage, a



second aerostat will replace it. A third balloon will be kept ready as an emergency backup. In the Civil War, both armies used tethered balloons to give observers a better look at the enemy.

## Calendar helps save energy

How to make an audit of the energy consumed by your household appliances is one of hundreds of conservation tips contained in the 1976 Family Energy Watch calendar, published by the Oregon Department of Energy. For a copy, send 25 cents in stamps and a self-addressed label to: Education, 201 East Colfax, Denver, Colo. 80203. ★★★



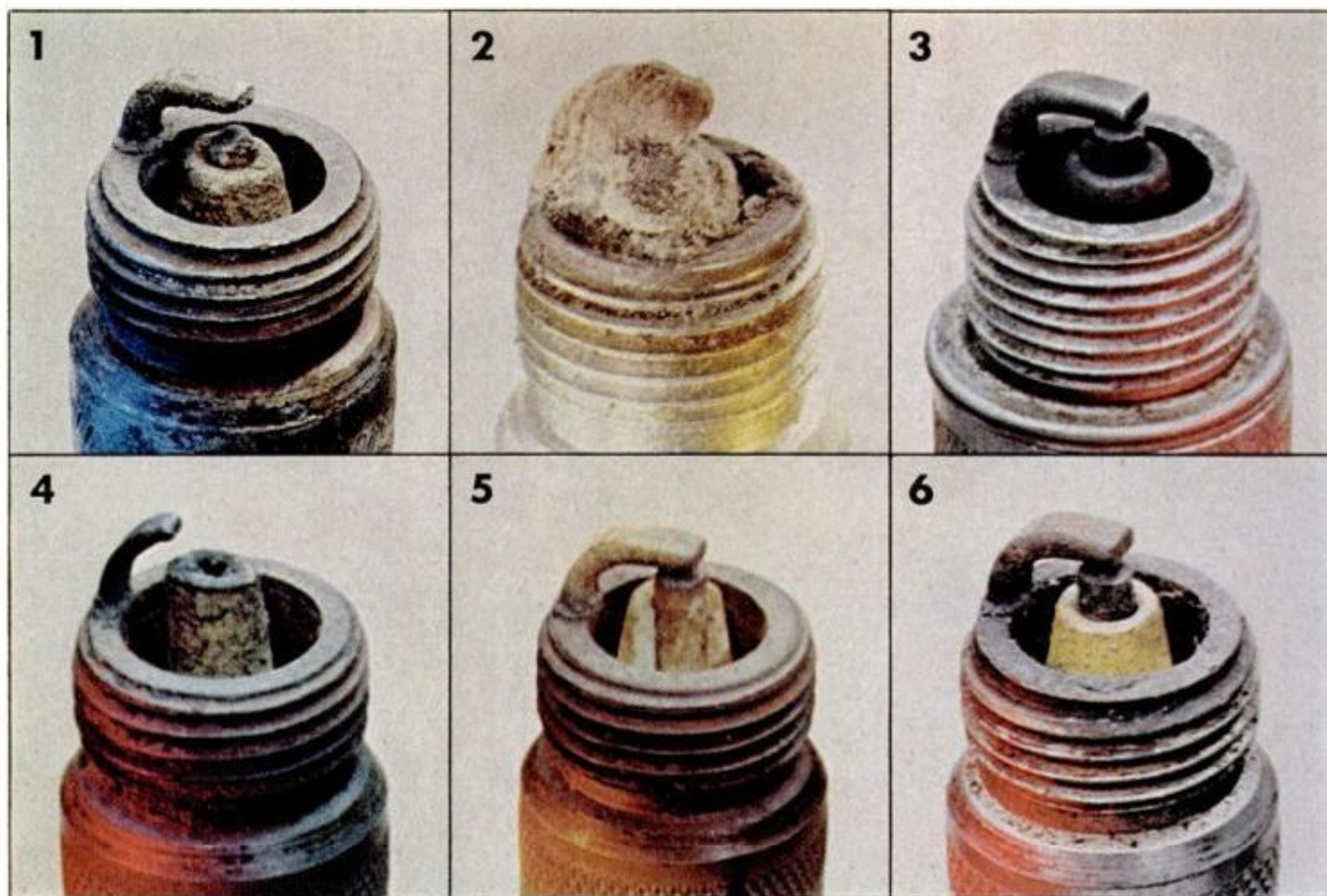
*Le Cat Black. The Sexiest Capri III. Flashes of gold on sleek, sinewy, black.*

Le Cat Black: Sexy handling with rack-and-pinion steering, wide rear track, special suspension system and steel belted radials. Overhead cam engine, golden steel wheels, tachometer. Le Cat Black. Imported for Lincoln-Mercury.

**CAPRI II "S"**

LINCOLN-MERCURY DIVISION

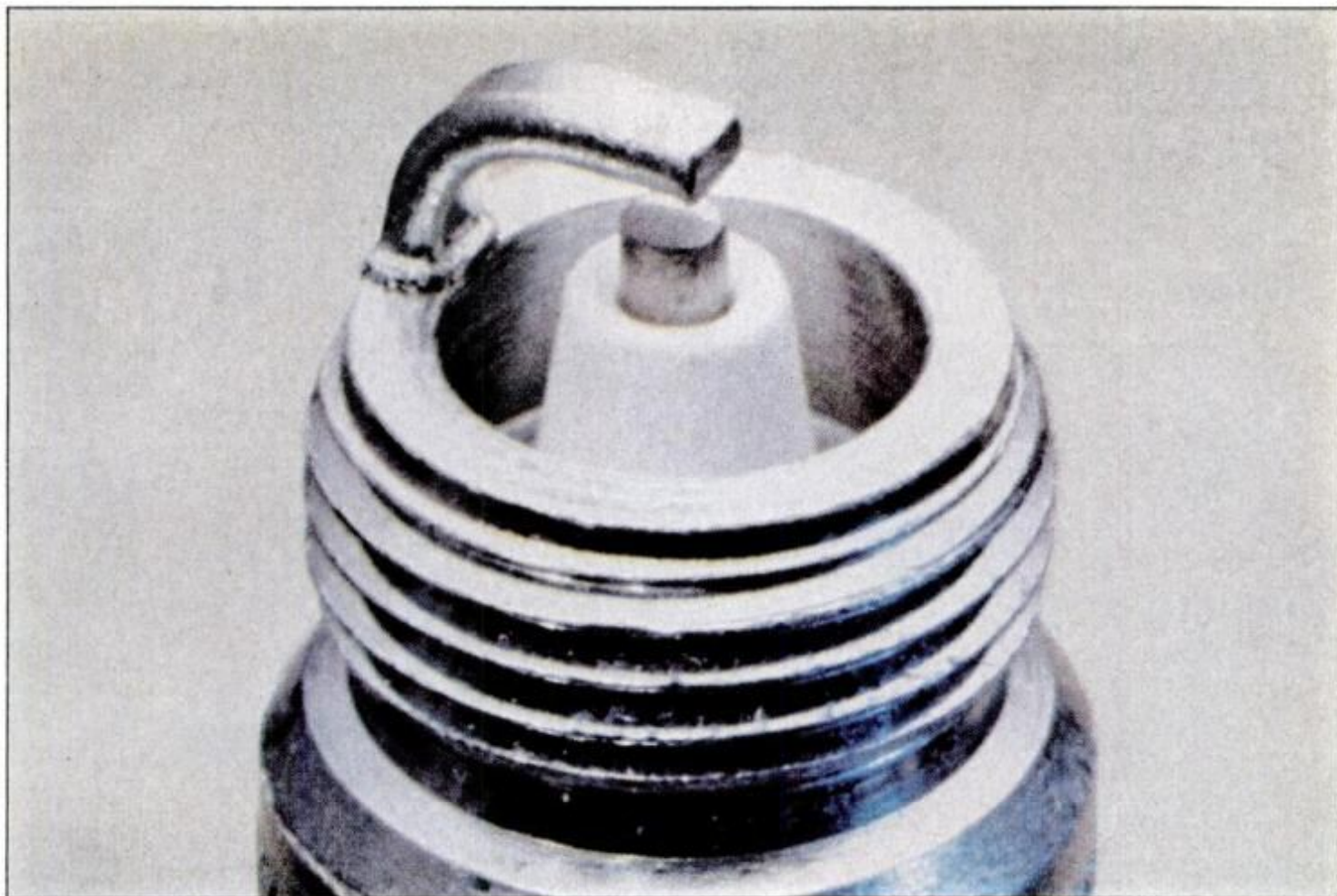




## Six spark plugs that can nickel and dime you to death...

- 1.** The worn-out plug. 12,000 miles or more of normal driving has worn this plug to a nubbin. Result: wasted gas.
- 2.** The ash-deposited plug. These deposits are left over from certain oil and/or fuel additives. They can interfere with the spark. Result: wasted gas.
- 3.** The carbon-deposited plug. This is a result of a too-rich gasoline mixture or a weak spark. Result: wasted gas.
- 4.** The preignited plug. This plug has been burned away by excessively high temperatures. This can be the result of incorrect timing or improper heat range. Result: wasted gas.
- 5.** The chipped plug. Either somebody regapped this plug with a hammer, or it's been in an engine that knocks badly. Result: wasted gas.
- 6.** The glazed plug. This plug could be too "hot" for your driving habits. So at high speeds, the plug tends to cook itself. Result: it will misfire, and—you guessed it—waste gas.





## and the cure.

If you read about those six disreputable-looking plugs on the left, you've probably noticed that they all waste your gasoline.

How come? Simple. Spark plugs are directly responsible for burning the fuel in your engine. If they do a good job, they'll help get the most mileage out of your fuel. But if they're worn, damaged or fouled, there's just no way. You may get a partial burn—wasting some of your fuel. Or worse yet, you may get a total misfire. With the cost of gasoline today, that seems a waste.

**What if your plugs don't look this bad?**

Not all gas-wasting plugs look like they came from the Black Lagoon. In fact, we've

been running a series of nationwide tests on everyday cars like yours.

In these tests, we replace the car's spark plugs with a fresh set of Champion spark plugs. And in most cases, a fresh set of Champion spark plugs alone has increased mileage. Increased it anywhere from .04% to 17%. Which means that a fresh set of Champion spark plugs can earn their keep in short order.



### The moral.

Change your plugs more often. Because the money you think you're saving in spark plugs is probably being spent many times over at the gas pump. Pull a plug at the first sign of trouble. Check it against the conditions shown at the left. And replace your plugs at least every 10,000 miles like clockwork.

You'll wind up saving money. And we'll both be happy.

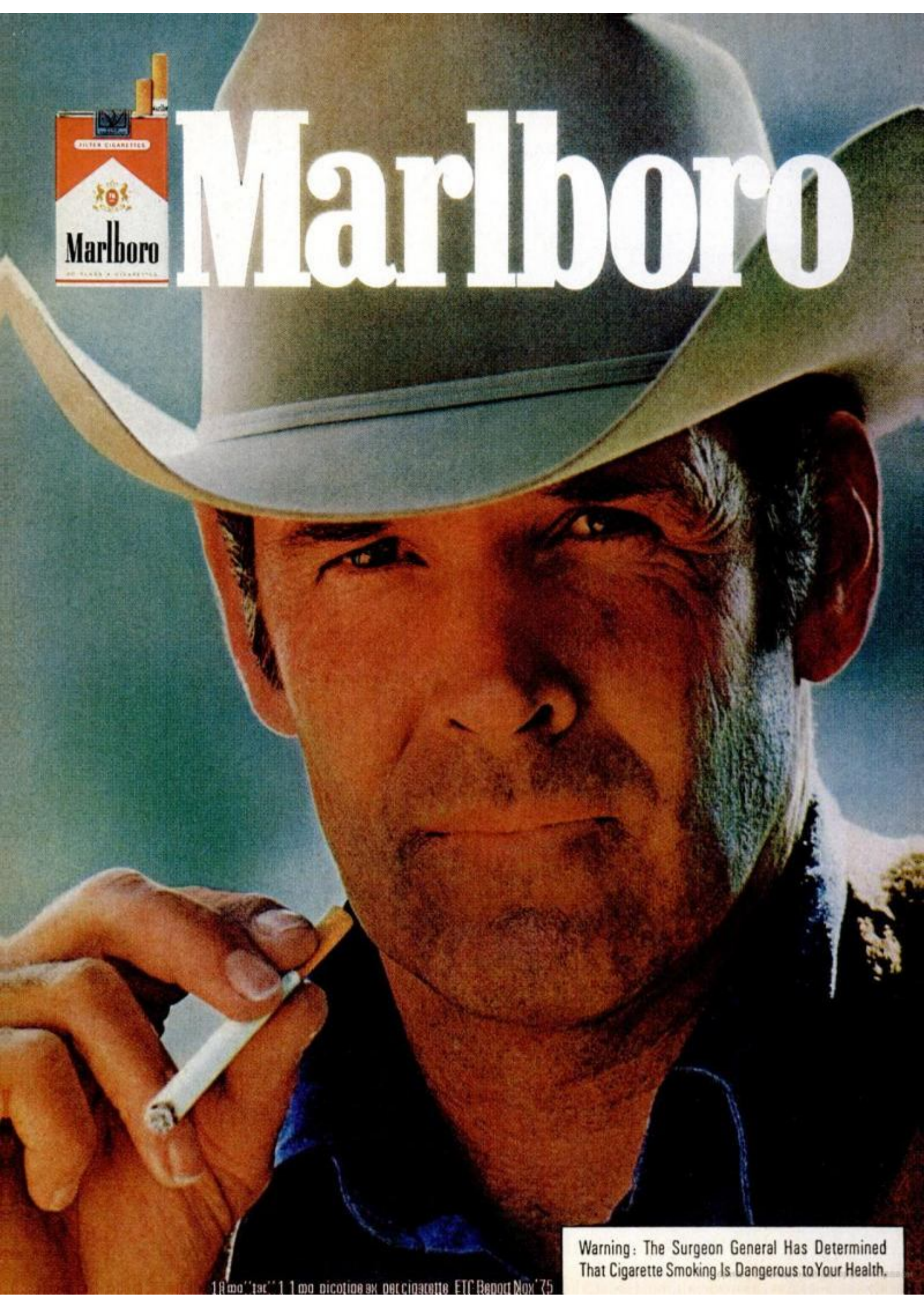


**Fill 'er up  
with Champions.**





# Marlboro



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

18 mg "tar," 1.1 mg. nicotine av. per cigarette. FTC Report Nov '75

# War watch in the Sinai

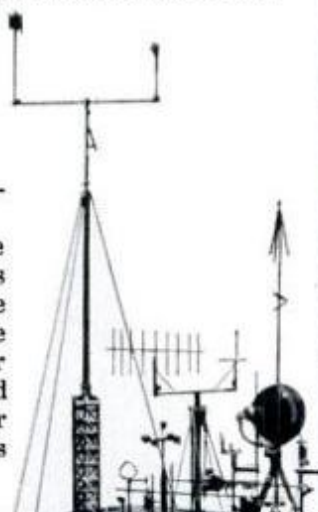
by Edward Hymoff

**A**t about the time this issue of *Popular Mechanics* hits the newsstands, a group of American electronics technicians will be settling down to their new jobs in the Mideast—and perhaps wondering if they made the right decision.

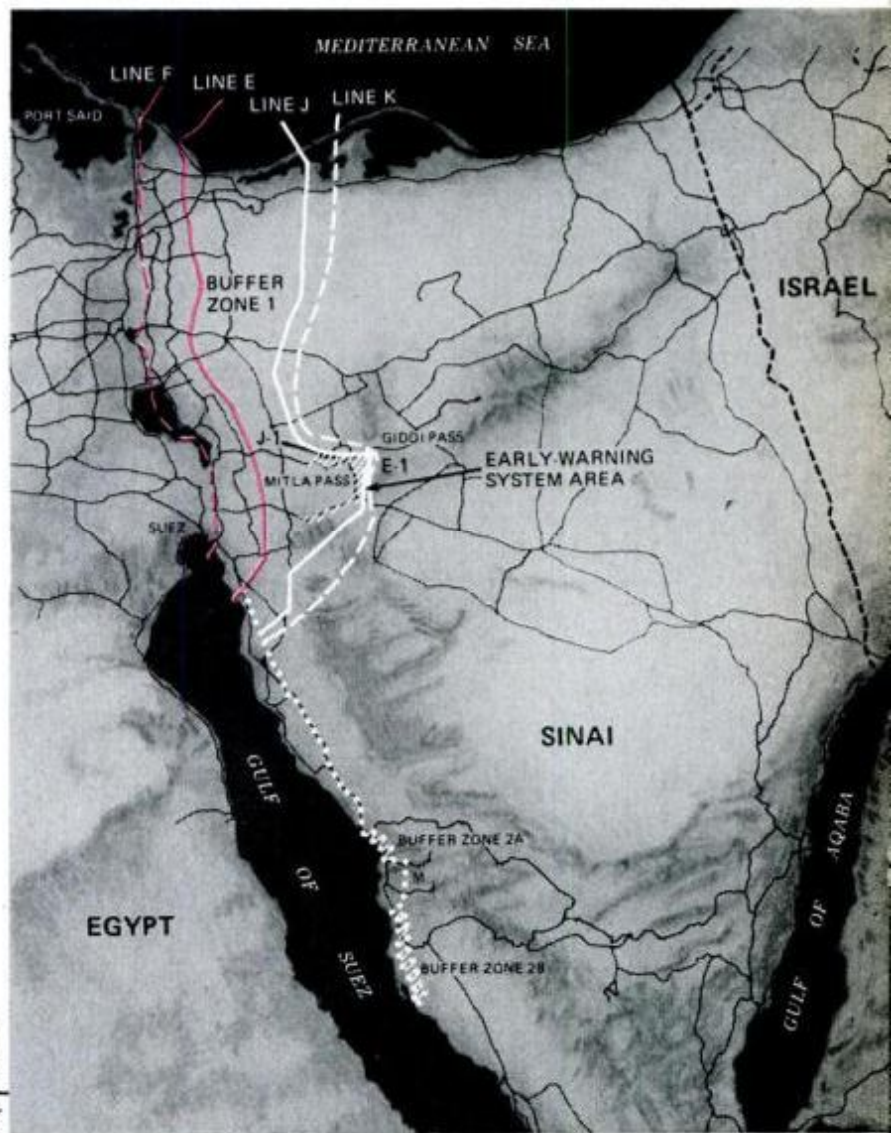
The jobs, filled earlier this year, became available last October when the United States Congress passed a joint resolution authorizing 200 Americans to participate in an early warning system designed to keep the peace between the armed forces of Egypt and Israel. The resolution carried a major stipulation: The technicians must be civilians and they must be "individuals who have volunteered to participate in such a system."

By the end of December, more than 2000 applicants, many of them Vietnam veterans, had written to the State Department and the Pentagon in response to news reports about the undertaking. The flood of mail came in despite the fact that the jobs might be of limited duration and in a place that had been a battlefield many times in the past and could become one again.

This is the Sinai, the biblical land where Moses is said to have received the Ten Commandments, where temperatures often soar above 110° F. in shade and drop below freezing after sunset, where sandstorms



Nerve center of American operation is sensor reporting post (SRP) similar to installation shown. Here, signals from sensors are analyzed for signs of aggressive moves by Egypt or Israel.



## EGYPT-ISRAEL AGREEMENT—SEPTEMBER 1975

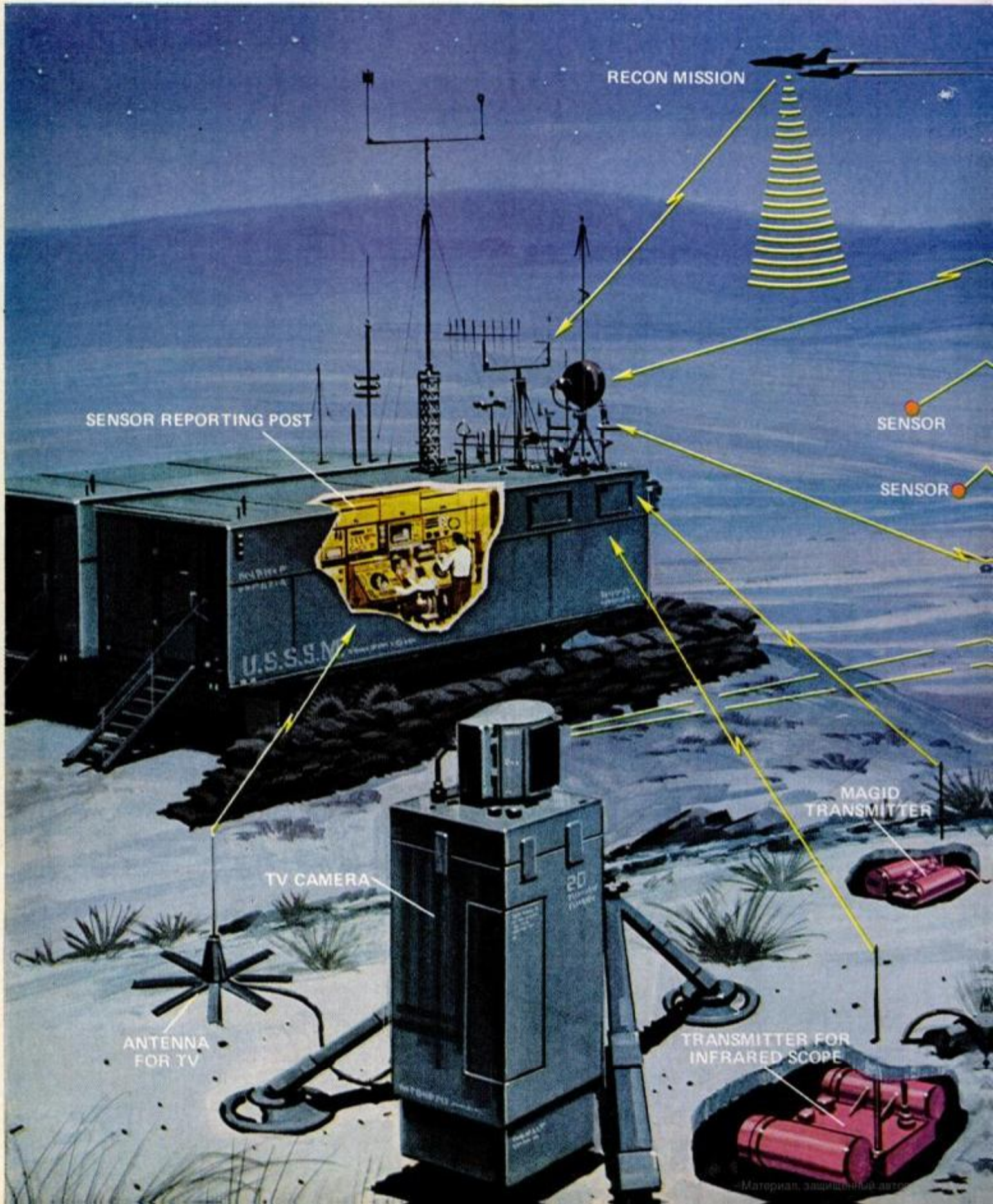
- Line E:** The Egyptian line.
- Line J:** The Israeli line.  
The lines E and J extend 12 nautical miles into the Mediterranean Sea perpendicular to the direction of the coast; the area between the lines is the U.N. buffer zone.
- Line K:** The limit of the Israeli area of limited forces and armaments.
- Line F:** The limit of the Egyptian area of limited forces and armaments.
- Line M:** The line separating the Israeli-controlled area from the area south of line E and west of line M, and the areas of buffer zones 2A and 2B.
- B.Z.-2A, B.Z.-2B:** The buffer zones along the Gulf of Suez.
- E-1:** Egyptian surveillance station.
- J-1:** Israeli surveillance station.

scour ravines and passes, only to give way to calm winds and clouds of mosquitoes and sand fleas. It is a harsh, bleak, unforgiving land, better suited to the ways of scorpions and vipers than to man.

The Sinai is a triangular-shaped region that stretches some 240 miles from north to south and 150 miles from east to west. The northern part is a relatively level desert. In the south the land rises, breaking into

granitic ridges, some of them more than 7800 feet high.

But the focus of world attention is now directed at a small pocket of the Sinai, located some 30 miles north-east of Suez, the southern entrance to the Suez Canal. This pocket is the gateway to Egypt from the east, and the historic invasion route to Israel from the southwest. If all goes according to schedule, by late February of this year two key passes through the hills—the Giddi



and the Mitla—will have been sowed with antennas, microwave dishes, and other “seeds” and “plants” that see, hear, and feel.

These exotic surveillance devices were developed in the mid-'60s for use in Vietnam. They were planted in jungles to warn GIs of Vietcong intruders, were dropped by aircraft to pinpoint targets for Air Force and Navy bombers, and were concealed in marshes and riverbanks

The electronic battlefield became a reality in Vietnam. As illustration shows, sensors, transmitters and other gear—similar to equipment developed for Indochina—are used to “wire” the two key passes in the historic Sinai.



to warn of enemy troop movements on waterways.

U.S. bombers were able to strike targets at night or even those hidden beneath the jungle canopy of the Ho Chi Minh trail, thanks to sensors that picked up the sounds of marching feet, truck motors and even the voices of enemy soldiers as they moved south through Laos and into South Vietnam.

Sensors also proved their worth

Though this ambitious project was never completed, the United States continued to develop sophisticated surveillance hardware for future battlefields. From an R&D project code-named JASON came an exotic assortment of devices: imagers that react to body and engine heat, people sniffers that respond to body chemical odors, sensors that detect human and vehicular movements and provide a count of each, and super-

east ultimately led to a somewhat different application of our sensor system: to help monitor the cease-fire between Egypt and Israel. After both sides had consented to a phased withdrawal, to guarantee that no offensive moves would be attempted, it was agreed that an early warning system would be set up in the pocket at the points where the Mitla and Giddi passes guard the roads and trails that crisscross the central Sinai plateau.

This early warning system, according to the agreement, would consist of one Egyptian and one Israeli station, each "manned by not more than 250 technical and administrative personnel" performing the functions of "visual and electronic surveillance only within their stations."

Supporting each of these stations, the agreement continues, "three watch stations shall be established by the United States in the Mitla and Giddi passes . . . operated by United States civilian personnel." These Americans will monitor four unmanned electronic sensor fields in and around the passes as well as the



**Israeli tanks** operating near Mitla Pass move to new positions under the 1975 withdrawal agreement between Israel and Egypt.

**Night surveillance** made easy. Tank and soldier are readily spotted by means of light-intensifying scope that was originally developed for the U.S. Army.

during the siege of Khe Sanh, a stronghold defended by U.S. Marines for almost two and a half months in early 1968. Sensors emplaced on the perimeter tipped off where the enemy was attempting to mass and attack. Later in the same year, the 25th Infantry Division, aided by sensors, repulsed a Vietcong attack on an American firebase. Though enemy casualties were heavy, not one GI was even scratched.

### Electronic battlefields

America's venture into battlefield surveillance systems began in 1966 when the then Secretary of Defense Robert McNamara decided that it was technologically possible to build a "wall" across the northern region of South Vietnam and seal off enemy incursions.

Dubbed the "McNamara Line" by critics, the combination barrier and defense zone was to be an electronic and infrared detection belt of sensors, sniffers, barbed wire and guardposts stretching from the South China Sea into Laos, and ultimately across Laos and continuing into Thailand.

sensitive microphones for detecting voices.

### Monitoring the cease-fire

Plans developed by the JASON researchers called for aircraft to receive signals from sensors and transmit them to communications and tactical centers that would also be "wired in" to battlefield TV cameras and Earth-orbiting satellites carrying monitoring devices. By 1975, the electronic battlefield was a reality.

The explosive situation in the Mid-

perimeters of each station and the roads leading to and from the stations. They will also observe operations taking place within the Egyptian and Israeli early warning surveillance centers.

According to the Sinai Support Mission, an interagency group, Americans were to begin operations in late February following a survey of the area by a team of technicians and other experts assembled from the Pentagon, State Department, the intelligence community, Agency for In-

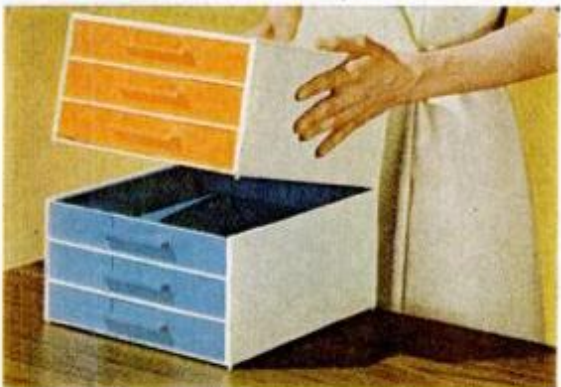
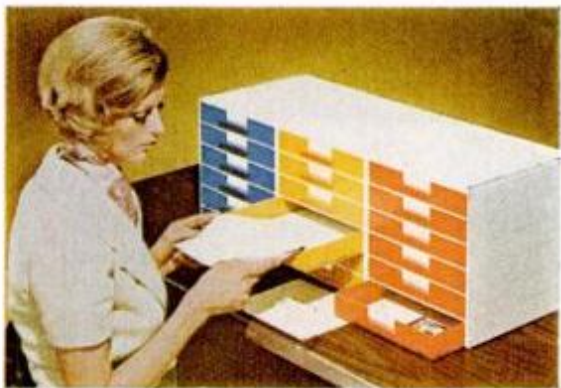
(Please turn to page 152)

# IT'S NEW NOW



## Tennis anyone? Well, sort of

You can play this paddle-ball game in a small space because the ball doesn't go anywhere except around and around on a pivoted arm. The idea is for one player to swat the ball and the other to try to trap it as it whizzes past by raising a lever with holes in it that catch a pin under the ball. Called Trap Tennis, it's made by Ideal, is available at toy and department stores.



## Stacking drawers for flexible storage

You can arrange these colorful stacking drawers in any order and number to suit your needs and space. Each three-drawer unit can be used by itself or snapped into the top of the one below it to create a tier of drawers. The molded plastic drawers are 9¼ inches wide by 11¼ inches deep to take standard 8½ by 11-inch sheets, are handy for storing household records, catalogs, shop plans, photographs and the like. In orange, gold and blue, Stac-A-Drawer units are \$8.99 each at stationery and office supply stores. Akro-Mils, 1293 South Main St., Akron, Ohio 44301.



## Doors with wood look

The deep, rich walnut finish on these bi-fold doors gives the appearance of natural wood, but they're really made of polyurethane. The tough, high-density plastic actually eliminates disadvantages of wood like warping, cracking, peeling, scratching, chipping, denting. Steel reinforcement adds structural stability. Doors are of standard 6-foot, 8-inch height, come in two and four-door sets to fit any opening width. Also available in white wood grain. Grander Corp., 35 Market St., Elmwood Park, N.J. 07407.



## Special drill at a special price

This new ¼-inch electric drill from Skil—a Bicentennial special—goes all out to celebrate the anniversary this year. Sporting a red, white and blue color scheme, it's tagged Model No. 1776 and is priced at—you guessed it—\$17.76. The low-cost tool has variable speeds to 2100 rpm and a 2½-amp. power rating. Skil Corp., 5033 Elston Ave., Chicago, Ill. 60630.



## Fancy fishing for the well-outfitted angler

Foot-steered Silvertrol electric trolling motor (left, above) provides easy, no-hands navigation for fishermen sneaking into shallow, twisting backwaters in search of the big ones. The mini-outboard operates on 12 or 24 volts. The fancied-up control console on this Ranger bass boat (right) boasts the latest in lunker-locating gear, mounting speedometer, tachometer, water-temperature gauge, gas gauges and Lowrance depth and fish finder above the steering wheel. Hidden from view is fuse panel and switch for charging boat batteries and delivering power to the trolling motor. Console also has storage space for fire extinguisher, tackle boxes, life jackets.

# Rush hour on Main

---

Yup . . . a Grand Prix this month right through the streets of Long Beach, California.

---

**T**hey laughed when a race promoter with a name straight from Alice In Wonderland, Christopher Robin Pook, announced a Formula 1 race through the gentle streets of downtown Long Beach, Calif.

Formula 1 is the most precise and deadly of all modern forms of

motor racing. Formula 1 is fast, tricky, sophisticated—and dangerous sometimes for spectators as well as drivers. And Long Beach is the home of the venerable *Queen Mary* and thousands of retired folks who enjoy the fine climate and who dislike loud noises and fast cars, even on racetracks. Long Beach is a city with ramps at the curbs for the profusion of little electric cars used by senior citizens.

High-speed auto racing through these streets? Never, not even if high-powered (though soft-

spoken) racing promoter Pook was trying to sell the idea. No, not even if the city council favored the plan as a way to shave a few years off the elderly image of the pleasantly slow-moving city.

## Another Monte Carlo?

Turn Long Beach into the world's only other Monte Carlo? Not on your chromium-plated wheelchair!

Still, last September they had a Formula 5000 race over the proposed course as a "tryout" for the faster Grand Prix cars. They

*(Please turn to page 130)*





# Street

by Ross R. Olney



Emerson Fittipaldi



James Hunt



Jacques Laffite



Teddy Mayer, Fittipaldi, Tyler Alexander



Carlos Pace



Carlos Reutemann



John Watson



Ronnie Peterson



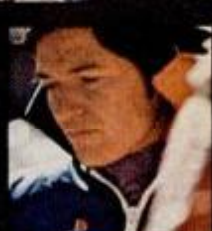
Mario Andretti



Patrick Depailler



Ronnie Peterson



Lella Lombardi



Vittorio Brambilla



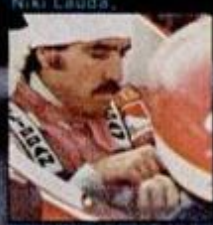
Niki Lauda



Jody Scheckter

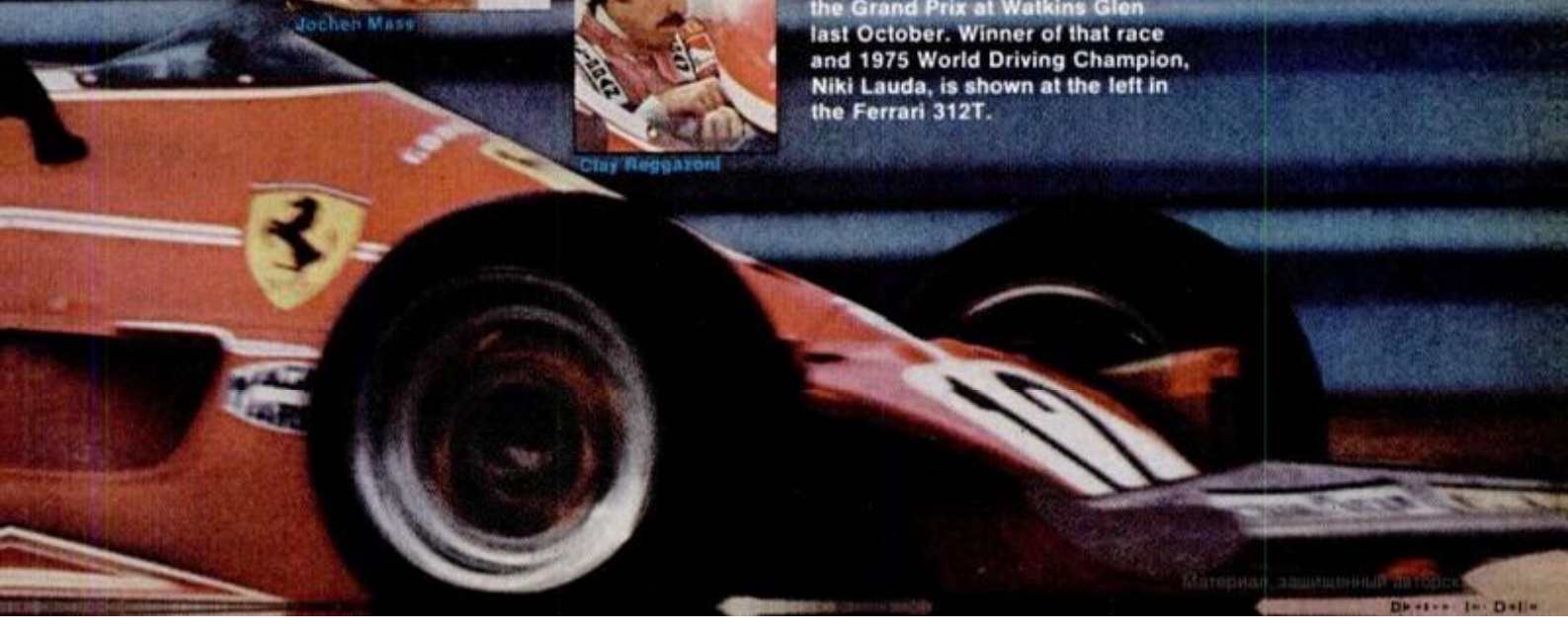


Jochen Mass



Clay Reggazoni

Some of the international drivers and exotic Formula 1 cars that will be in Long Beach on March 28 are shown here as they prepared for the Grand Prix at Watkins Glen last October. Winner of that race and 1975 World Driving Champion, Niki Lauda, is shown at the left in the Ferrari 312T.





**Firefighting experts** at Ansul training school demonstrate correct way to put out fuel-fed fire—aim extinguisher at base of flame first (above) to cut off fire at its source, then follow stream upward (upper right) to finish off remaining burning material. Author (lower right in white hat) tries using high-pressure extinguisher hose, finds nozzle gives unexpectedly mulish recoil kick. Huge raging infernos of gasoline-soaked debris (below) are deliberately set for students to practice on.



# They go to school to fight fires

by Gurney Williams

Smoke blots out the top of the TV picture and flames dance madly across the bottom as the silhouetted figure of a hard-hatted firefighter enters the scene with a 20-pound, hand-held extinguisher. It looks like a disaster movie except that the "brave" firefighter doesn't seem to be acting very heroically.

The reason is that the silhouetted figure is me, and I'm no fireman. I have trouble putting out those little tabletop burners they use for chafing dishes. And my performance in this videotape at the Ansul Fire Training School in Marinette, Wis., is more Peter Sellers than Paul Newman.

I'm sitting in the classroom of what firemen tell me is the best fire school of its kind in the country, watching a TV tape of an actual fire I had tried to put out earlier. Like a football coach, an Ansul instructor, Jim Anderla, is critiquing my technique, occasionally stopping the tape to make a point so I often appear frozen in a stark, ridiculous tableau as everyone else in the class watches with glee.

"This guy's trying to sneak up on

## A PM reporter takes a course in professional firefighting and finds a few surprises—also some things you can learn about fire safety in your own home.

the fire," says Anderla. (Snickers.) "He figures if he sneaks up on it, it won't see him coming." (More snickers.) "Look at this! Look at this! That's the greatest posture I've ever seen." On the screen I'm caught in a bizarre position, apparently about to fall down. (Outright laughter.)

Ansul has been running this kind of class for 28 years, training more than 15,000 men in the serious art of firefighting. Lately, classes have been packed with people from fuel-related industries—natural gas pipeline companies, for instance—concerned about the increasingly higher costs of fire damage. For \$325 in tuition, students get close enough to roaring fires to singe their hair and redden their noses. Each fights more than 25 fires of different types on a scorched field, ranging from simple spill fires to ground-shaking high-pressure gas blazes.

### Fires are costly

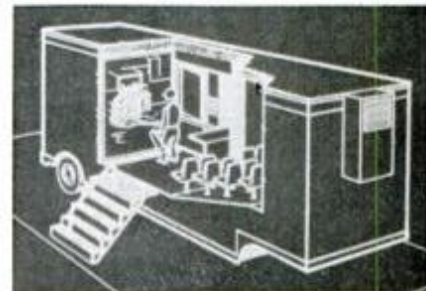
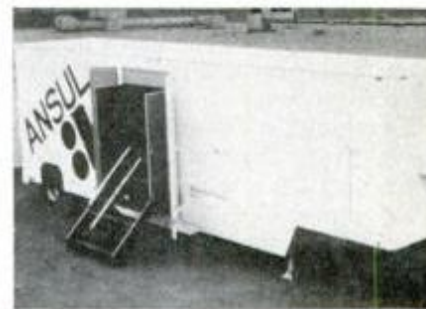
Ansul, a major maker of firefighting equipment, says it doesn't make any money on its school because its fires are expensive. In a typical three-day course, it burns up more than 2400 gallons of gasoline, 1000 gallons of fuel oil, 1000 gallons of propane and miscellaneous amounts of other fuels, wooden crates and old rubber



**Double-teaming a fire**—a standard industrial and military practice—two instructors advance together (above), aiming hoses at edge of flame and sweeping side to side so streams overlap slightly. Fire (below) is out in seconds; only smoke remains.



## School on wheels simulates real fires



With its new mobile fire simulator, Ansul can put its training school on the road for use in remote locations. Housed in the 40-foot trailer van is a 16-seat mini-classroom (drawing at center above) where students study instructional films and videotapes. Most spectacular, however, is a computer-controlled rear-projection screen that displays simulated fire scenes. To add realism, heaters blast down from the ceiling as a tape recording plays roaring sounds. A student (bottom) blasts away at screen with an extinguisher just as if it were a real blaze (floor vents suck out the spray). If the student hits the screen correctly, the flames appear to die out, the temperature drops and the noise quiets. If he makes a mistake, the fire bursts into renewed fury—and he gets the message.

tires. To put out these fires, students use up more than 17 tons of dry chemical extinguishing agent—every three days.

When a class is in session, the training ground looks like a battlefield and the air above is filled with thick, black smoke (Ansul has been given an exception to antipollution laws so it can train with real fires). Square pits the size of small swimming pools are filled with oil and gasoline, constantly being ignited, then extinguished. Old burned-out trucks, the twisted wreckage of an airplane, metal sheds and other structures serve as props for fighting various types of realistic fires. Innocent-looking pipes jutting up out of the ground like periscopes become giant flame throwers as they blast out fuel under high pressure. Students are told to bring rugged clothing and a long-sleeve jacket to protect them from the searing heat. "Don't bring sneakers," advised training manager Thomas R. Slater. "They'll melt." Heavy work shoes with reinforced toes are recommended.

### Big fires start small

After a couple days as a student, I had learned an important lesson as useful to homeowners as firemen: With training and the right equip-

ment, you can often put out a near-inferno in seconds. "Almost all large fires start small," says Ansul, "but they don't remain small for long. By the time professional firefighters have arrived on the scene, those fires have often become uncontrollable. In fire emergencies, the first two minutes are most critical." Catch a fire fast, attack it properly and you can usually beat it—that's the message Ansul continually emphasizes.

The classroom adjoining the training field is equipped with slide and movie projectors in addition to videotape hardware. My class of 25 included pipeline company foremen, safety personnel, chemical company super-

visors and a 28-year veteran of the Chicago Fire Department. Students in previous classes have come from every state in the union and 55 foreign countries. The course is open to anyone. Government personnel and even members of the Secret Service have attended.

Everyone looks alike when you move from the classroom to the training field, donning hard hats, heavy gloves and safety goggles. Outside, instructors turn into football coaches and company presidents become rookies. Instruction starts with what is called the simple spill fire. An Ansul trainer opens the valve on



Like a football coach, instructor points out good and bad firefighting techniques on TV monitor screen showing videotapes.

a hose and sprays enough gasoline on the ground to get a Volkswagen from New York to Chicago. Then he pushes a little burner on the end of a long pole toward the gasoline-soaked patch. Suddenly the patch bursts into a roaring inferno.

### How a pro fights a fire

Anderla raises his voice slightly and starts off as if presenting a play to the Green Bay Packers. "Gentlemen, you approach the fire from the upwind side, holding the nozzle at a 45° angle to the ground, and direct the stream of chemical six inches

ahead of the flame edge. Then you move in, sweeping the stream side to side, bracketing the fire about six inches out on each side."

He opened the valve on his 30-pounder and approached the raging fire. With a stiff wrist, he swept the nozzle side to side, pushing flames back as he walked forward, making about two steps a second. In less than 20 sweeps, the fire was out. The patch was relit and Anderla put it out again—in a little under eight seconds.

Now it was our turn. It wasn't as easy as it looked. Most of the class were like me—few had ever handled a fire extinguisher before. We each approached the flaming patch nervously, with Ansul instructors hollering advice from behind: "Don't start



Refilling extinguishers from giant hopper is frequent chore—school uses 17 tons of dry chemical agent each three-day course.

walking until you start sweeping. You had two steps before you began your sweep. Bend that elbow; make it easier to sweep. Rap your chin down into your chest if you get hot. Down, down on the ground, point that nozzle down. Wider. Let's get some life in those nozzles. . . ."

With lots of coaching, most of us put out the fire and began to relax—until they changed the ground rules for us. They put an oil drum in the middle of the gasoline-soaked patch, poured gas in the drum, then relit the blaze. Now flames could hide from the extinguisher, behind and inside the drum.

### Double-teaming a fire

This type of obstacle spill fire is one of the most common, according to Ansul. The drum represents an object in the middle of a fire. It can be anything from a flaming power mower to a burning 747. The "obstacle" splits your extinguisher stream as well as shielding flames behind it, making it more difficult to fight than the simple spill fire. Fighting the drum fire required two men double-teaming it, walking around the flames from opposite sides to cover

*(Please turn to page 144)*

## 20 TIPS FOR HOME FIRE SAFETY

The following pointers on good home fire safety practice were compiled from such authoritative sources as the National Safety Council, National Fire Prevention and Control Administration, National Fire Protection Assn., Johns Hopkins' fire research laboratory and makers of firefighting equipment like Ansul. First, some vital statistics: According to government surveys, 85 percent of all fires occur in the home. There are an estimated 4½ million household fires in the United States every year, resulting in 6000 deaths and 600,000 serious injuries. Of those killed, 80 percent do not die from burns, but are overcome by smoke, superheated air and deadly carbon monoxide gas.

The single, most important thing to remember in a fire is that invisible gas is the greatest killer. You can't see it or smell it and thus have no warning of its presence. Studies also show that 75 percent of all household fires are discovered by women—not men (mostly because women are home more of the time). Thus it is especially important that your wife, as well as all other family members, know these critical points:

**1. Don't attempt to fight a fire yourself** unless it is relatively small and contained, firefighting equipment is close by and you're reasonably sure you can handle the blaze. In any case, be sure all other family members are out first and call the fire department immediately—call even if it doesn't seem necessary. Better to have the firemen come and not be needed than to need them and not have them. Also, professional firemen should check a fire after it's out to be sure it is out and stays out.

**2. If you do elect to fight a fire yourself**, be sure you have the right extinguisher and know how to use it. Home fire extinguishers should be rated to handle all three Class A, B and C fires (see accompanying article for details on these classes). In general, the so-called multipurpose dry chemical type is most frequently recommended and will work on these three types of fire.

A typical 2½-pound home extinguisher lasts only about eight seconds, so work fast but not in a sloppy, panicky way. Start the extinguisher operating before you actually approach the fire, aim its stream at the base first, sweeping back and forth, then follow upward or forward until the remaining area is extinguished. If the extinguisher empties before the fire is out, or the fire seems to be getting ahead of you, don't try other methods. Get out—immediately.

**3. Have an emergency escape plan ready.** Train your family to think of—and use—exit routes that might not normally be considered—windows, back doors, through a porch or garage. In a panic situation, there's a tendency to rush to the nearest, most familiar doorway—and that may be blocked by fire or lead right to where the fire is worst. Check windows to be sure they will open and are clear of sharp rocks or other dangerous obstructions below—they may offer you your best and quickest escape. If you're on an upstairs floor, it's often better to go out a window onto a porch or garage roof

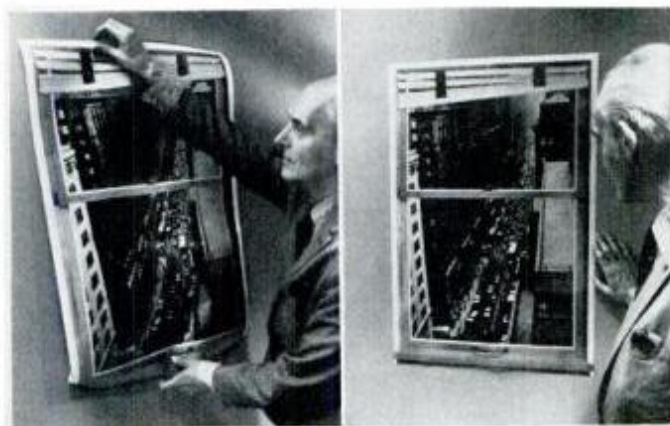
*(Please turn to page 146)*

IT'S NEW  
**NOW**



### It looks cumbersome, but boy can it fly!

The lumbering giant above is a lot more agile than it may look. Latest and largest tactical transport for the Air Force, the McDonnell Douglas YC-15 is the first to use "externally blown flaps" for STOL performance. Exhaust from the four jets is directed against lowered flaps and deflected downward to increase lift and shorten landings and takeoffs. It can use runways as short as 2000 feet!

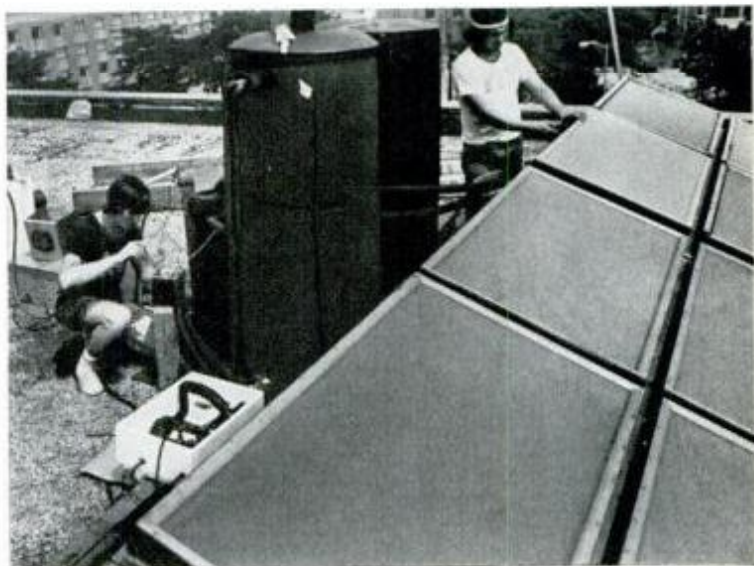


### Paste-on windows with a 'view' from the top

If your office or apartment doesn't have a window where you'd like one, just paste one up. These photographic posters are so realistic—complete with slightly droopy blind—that casual observers will swear they're looking out on a street scene 20 stories below. The views—this one of Madison Ave., New York—come in several types, are \$2.95 each. Poster, Box 98, Elk Grove Village, Ill. 60007.

### Thief-fooling tape

This continuous-loop cassette tape plays an endless stream of voices and family activity sounds to fool burglars into thinking you're home. \$8.98, Meola Studios, Box 4733, Hollywood, Fla. 33023.



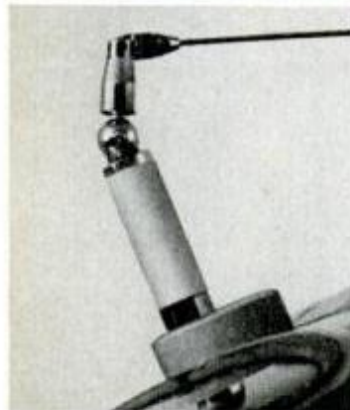
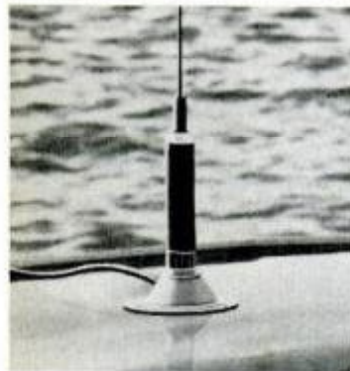
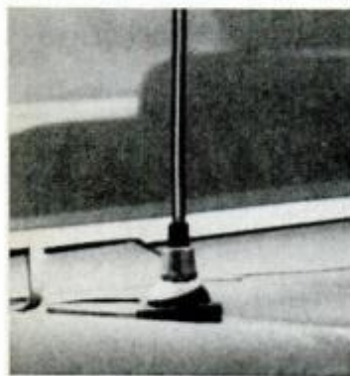
### Prize-winning solar collector can heat a house

This unusually efficient solar collector not only captures sun heat, but also captured the grand prize in a recent nationwide competition on alternate energy sources sponsored by SCORE (Student Competitions on Relevant Engineering). Developed by engineering students at Illinois Institute of Technology, it won out over entries from more than 30 other major U.S. universities. The collector supplies enough hot water for both heating and domestic use for a small cottage in a moderate climate.



### Eyeglass toolkit

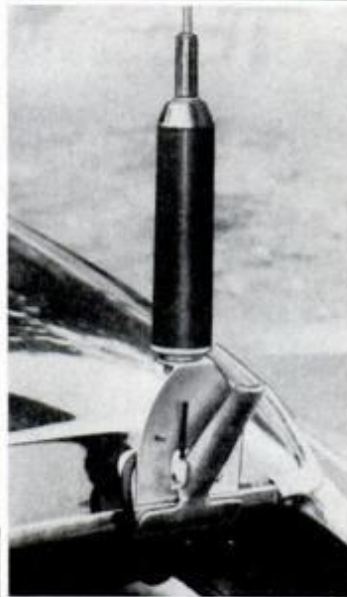
There are toolkits for almost every need, and now there's even one for eyeglass repair. This kit includes a tiny screwdriver, assorted hinge screws, magnifier for easy viewing and instructions—all in a pocket case. \$1.49, Optico Mfg., 4645 Stello Rd., Saginaw, Mich. 48603.



**Short antennas** adapt to a variety of mounts (from top): Breaker base-loaded trunk rim mount; telescoping, cowl-mount "disguise" antenna; Antenna Specialists magnetic roof mount; Hy-Gain foldover adapter (for center-load antennas only; shown here on base-load coil for demonstration).



**Hatchbacks** can take regular trunk-mounts like this Radio Shack one (top), but angle may be wrong; one solution is to bend it (center) or use Hustler's ball-mount (above).



**Gutter mounts** include screwdriver-locking type (this one with built-in flip-over to clear obstructions) and temporary clip-on; both from Antenna Specialists.

If the thought of gashing up your car's bodywork to mount an antenna is what's been keeping you out of CB radio, you can stop thinking about it and get on the air. There's now a host of antennas that are easy to install—and to remove later with little or no trace.

Antennas are available in all lengths from 2 to about 9 feet, with hardware for permanent or temporary mounting on your fenders, bumpers, roof, rain gutters or trunk lid. And the shorter, more modern types are quickly supplanting the old, bumper-mount, 9-foot-tall whips.

These modern antennas are practical, but not ideal. The ideal—a good, old 9-foot whip mounted on the car roof—is hardly practical.

The impracticality is obvious: An antenna topping out 13 or 14 feet above ground would be a major

# How to add the right ears to your wheels

Today's mobile CB antennas are easy to install—but choosing one is a bit more difficult.

by Ivan Berger  
ELECTRONICS EDITOR

inconvenience—while it lasted. But the "ideal" part demands a little explanation:

The antenna you buy is really half of an antenna. The other half is your car. So reception and transmission will be strongest in the directions where there's more of your car to help. As the diagrams on page 88 show, centering the antenna on the roof gives you even results in all directions (or as close as you can get without owning a circular car). A roof mount also gains a slight advantage from its height above the ground.

### The good old whip

On a moving car, a 9-foot whip antenna (\$20 to \$35) will live up to its name—it will whip. According to some antenna authorities, this won't cause problems. But according to others, the whip effect changes efficiency as the antenna waves closer to or farther from the car's body, and the angle at which it polarizes the waves it transmits will seldom agree with the angle of the antenna trying to receive them, especially if that's another waving whip.

On the other hand, the whip's length, a quarter of a 27-MHz CB wave's, makes it more efficient than shorter types. And modern bumper mounts make it possible

to install a whip without drilling holes. Those "soft," five-mph bumpers can pose problems, though; you may have to run a ground wire from the mount to either the bumper's metal frame or to the car itself. Bumper mounting also reduces overhead clearance problems, though it won't eliminate them. For garaging (few garage doors open 10 feet high), you can tie down the antenna's tip with an inexpensive gutter clip (about \$2); but as whips become less popular, the clips are getting harder to find.

### Shorter versions

Shorter antennas are less efficient than whips, but a technique called "coil-loading" minimizes this loss. If you need only a slightly shorter mast, Hustler makes 74-inch and 82-inch models (about \$35) that are rigid to eliminate the whip's limber sway, and which fold down at about the height of the car's roof, for easy garaging. These can be strap-mounted on bumpers, or mounted through large holes in the car's side or deck.

But most of the antennas sold today are shorter, coil-

loaded models, between about 2 and 4 feet in length and selling for about \$20 to \$25. Because of their small size, they offer a wide choice of mounting positions.

### Roof mounts

Mounted on the roof, an antenna produces a directional pattern that is roughly an oval, with a bit more response to the front and rear (desirable, where you're most likely to talk to other cars on the same highway), but plenty to both sides as well. That's enough to make a short, roof-top antenna a better bet, at least to some experts, than a longer one back at the bumper.

Though a permanent roof installation will require a hole in your roof, we've heard no complaints about antenna holes leaking—and when you sell the car, inconspicuous rubber plugs are available from Antenna Specialists and Radio Shack.

The tricky part is snaking the antenna cable down from the roof to the dash under the car's cloth or plastic headliner. If your car has a center dome light, it may be easier to remove the light temporarily and work from the opening it leaves.

Ordinarily, antenna cables are best snaked from the radio end, with its big plug, toward the antenna, since the plug at the anten-

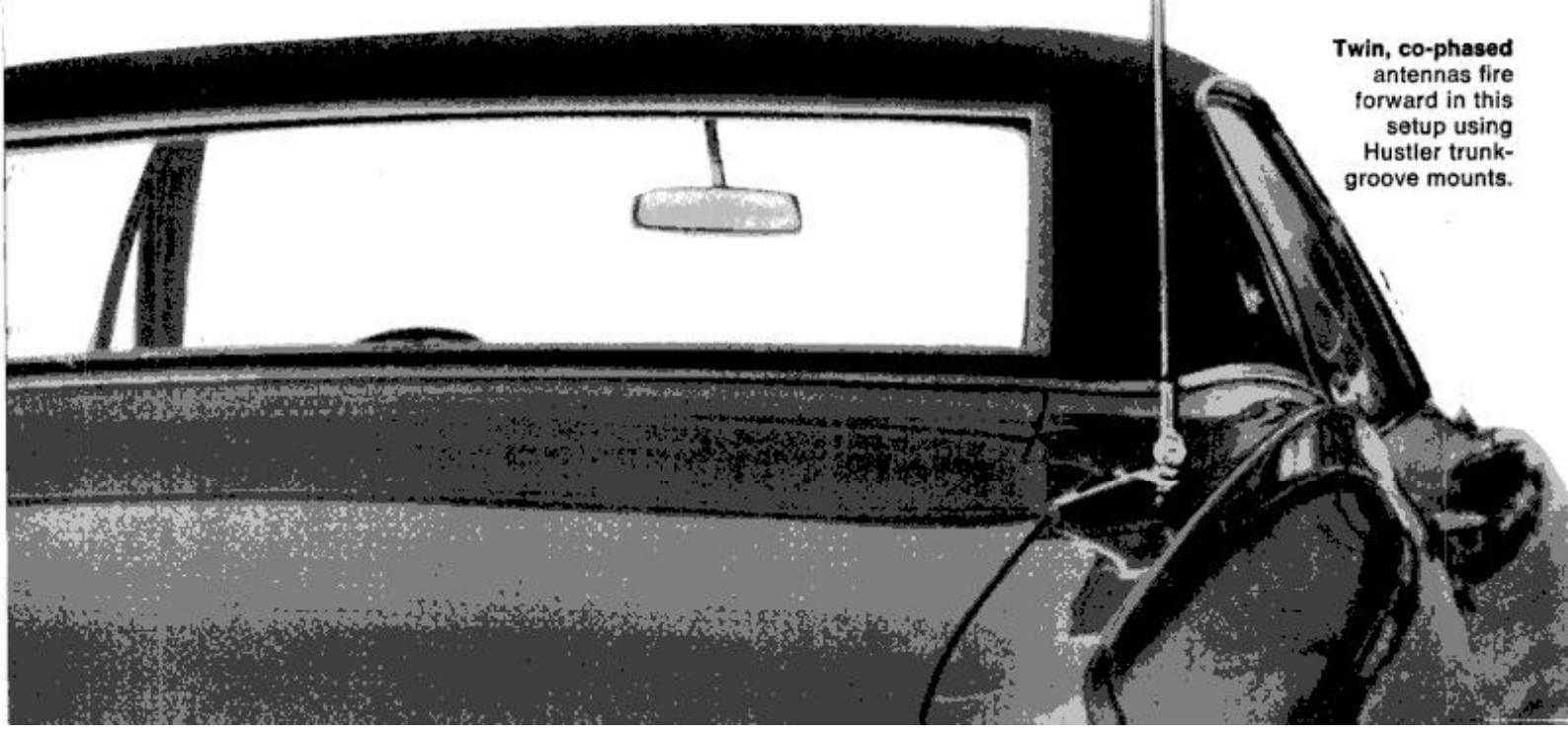
na end, if any, is usually slender. Roof antennas are probably an exception; you might do better to cut off the plug (shortening the cable as little as you can), snake the cable from the top, and put on a new plug.

### Magnetic mounts

Easier to use are antennas with magnetic mounts. Just stick such an antenna to the middle of your steel roof, and snake the cable through a partly opened window, a vent, or through the opening between the door and frame, if there's enough foam gasketing around the door to keep the wire from kinking. This is an ideal solution if you want to hide your antenna between uses to keep it from attracting vandals or CB-set thieves. It's also ideal for travelers who want to use their CB sets in rental cars away from home.

### Rain-gutter mounts

Antennas designed for rain-gutter installation have spring clamps for temporary mounting, or are screwdriver-tightened for more permanent locations. But gutters on some modern cars are weak or nonexistent altogether. And one temporary clip-on couldn't stay upright on our test car's steeply curved roof;



Twin, co-phased antennas fire forward in this setup using Hustler trunk-groove mounts.

the Antenna Specialists Flipper shown, though, had an adjustment screw that kept it upright.

Because they're mounted on one side of the car, gutter mounts give asymmetrical results, stronger on the car's opposite side than on their own. Front-back symmetry is a function of how far back they're placed on the car.

### Trunk mounts

Trunk-lip mounts are an even better compromise in terms of installation ease and radiating pattern, especially on hatchbacks where they ride at the rear center of the roof and radiate in a sort of symmetrical, forward-projecting oval.

No holes are required for such a mount: It fits over the lip of the rear-deck lid, secured in place by set-screws that also bite through the paint to ground it to the metal of the lid. (On the few cars where the deck lid isn't grounded to the body, an ad-

ditional grounding strap or wire will be needed.)

The cable can be run from the CB transceiver under the floor mats and along the sides or center hump (or beneath the sill plates of cars without mats) to the rear seat. On sedans, it will then go under the seat, through a hole (drill it yourself, if need be) into the trunk; line the hole with a rubber grommet to protect the cable. In hatchbacks, there's no trunk partition to hole through, but you'll have to either feed the cable up under the headliner or fasten it to the headliner with some sort of cable clamp. Leave enough slack in the cable for the lid to open without pulling your connections out; any remaining excess can probably coil up under the back seat. Don't try to shorten the cable—its length has been calculated for the best possible match between transceiver and antenna.

### Trunk-groove mounts

Also available are trunk-groove mounts that attach to the rim of the trunk opening rather than to the lid. They're not as streamlined-looking as the lid mounts, though, and they do require a little drilling (two small holes in the groove), so they're losing popularity to the lid types.

### The co-phased array

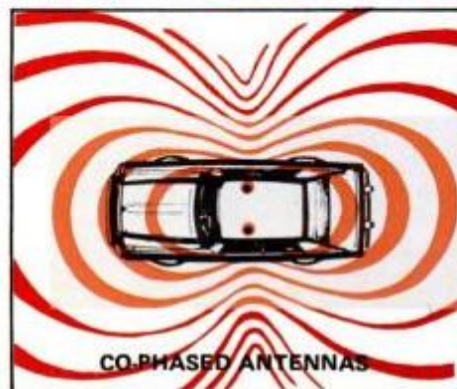
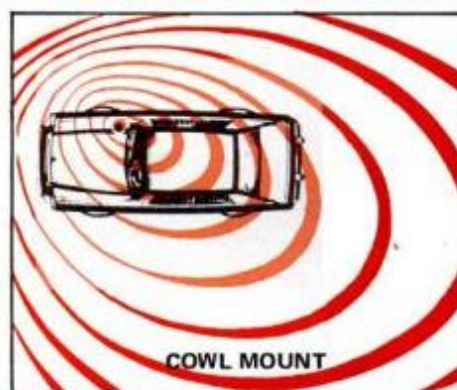
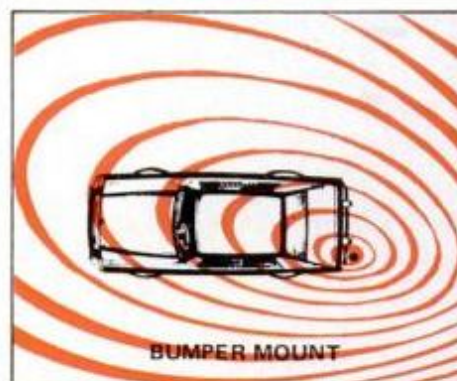
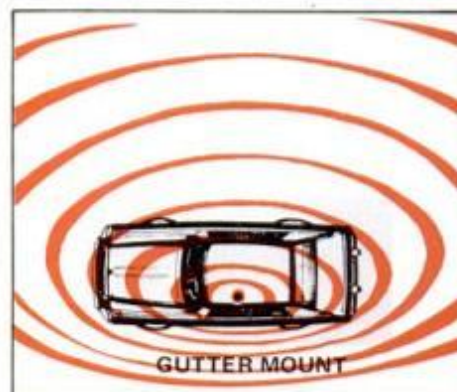
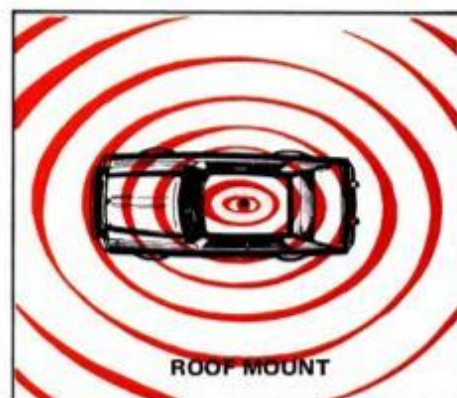
You'll see a lot of trucks (and some cars) sporting pairs of matched antennas that face each other across the vehicle's roof, trunk or back bumper. These are "co-phased" so that they reinforce each other's output toward the front and rear. That puts more of your signal on the road ahead of and behind you (more ahead than behind, if the antennas are toward the car's rear), and less of it off to the sides. Antenna Specialists, though, has a switchable model that lets you squash the pattern up for more side radiation when you want it, at the expense of less radiation front and rear.

For best results, co-phased antennas should be just about 9 feet apart, which makes them better performers on trucks and motor homes than on cars. And to work properly, they must use special, co-phased cable sets, usually provided with the antennas,

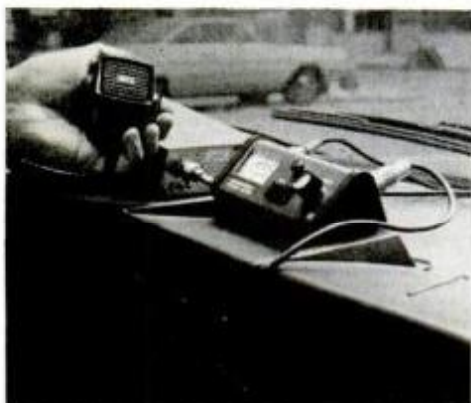
*(Please turn to page 172)*

**Antenna placement** doesn't affect range so much as how that range is distributed; extra signal projected in one direction will be at expense of signal sent in others. Overall range depends on many factors: antenna, CB set, terrain.

## Antenna directional patterns: Where you mount it counts



**Matching** antenna involves minor length adjustments (top) using SWR meter like this Radio Shack model (below) as guide.





# Driving the 1976 Volvos



by Bill Hartford AUTO EDITOR

The wet pylons became a blur on my fastest run around the slippery test track. But the fact that they were still standing convinced me how difficult it is to push any of the '76 Volvos to the point of no return. I knew that I wouldn't have been able to drive that fast in the rain in my '68 Volvo 145. In fact, I knew that driving the old wagon would never be the same for me again.

## Volvo's theory of evolution

When the 140 Series was introduced in 1967 it had what was already standard for Volvo: easy-to-use, three-point safety belts; anatomically designed seats and so on. New that year, though, was a dual-diagonal, fail-safe braking system with discs front and rear. In safety, visibility and in other ways it was an improvement over the 122 it replaced.

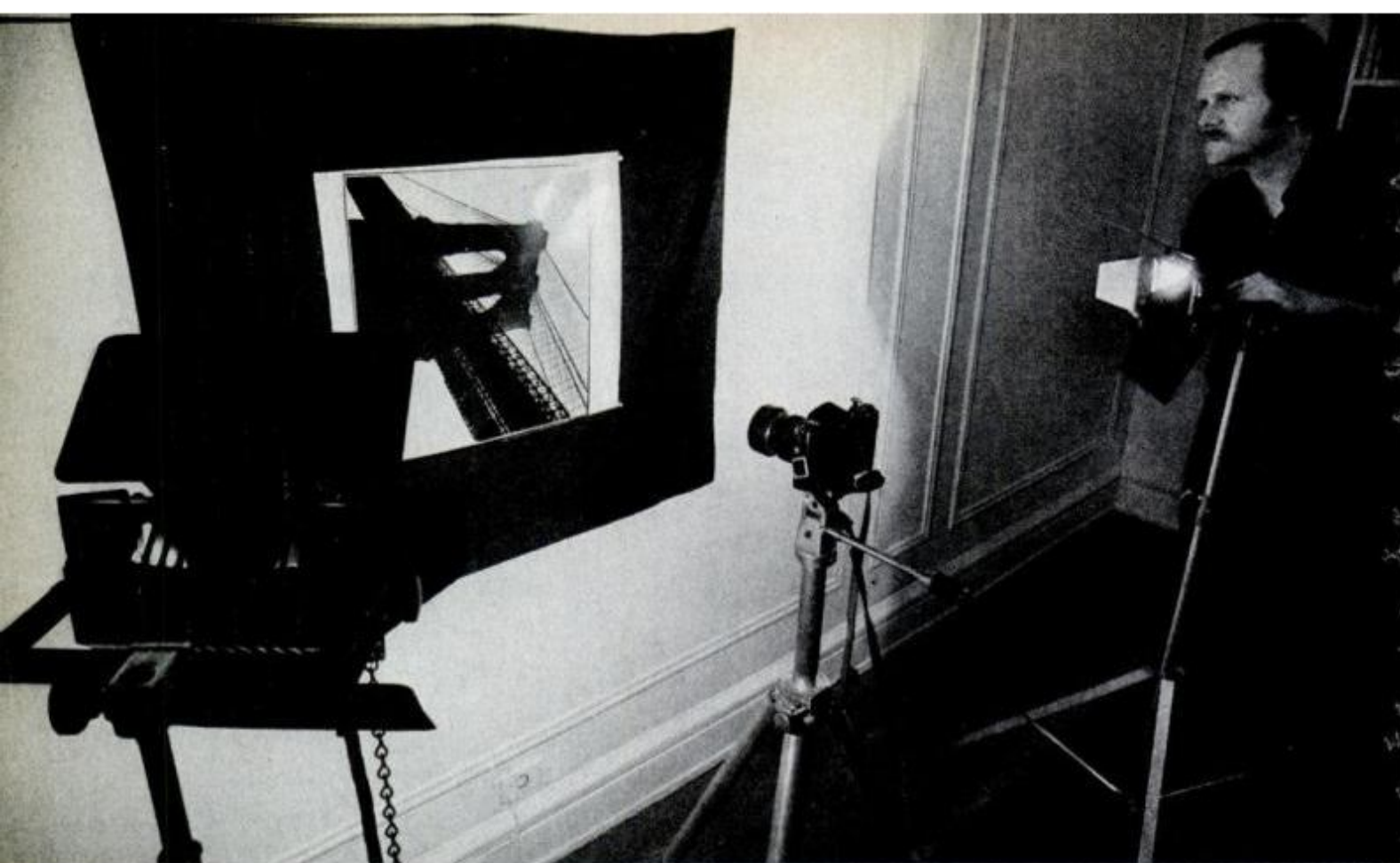
With the '76 line, the evolution of Volvo's transportation boxes has reached the point where I can no longer fool myself about the Volvo I bought new for \$3400 in 1968: It's a remote ancestor of current models—

*(Please turn to page 168)*

A V6-powered 264GL leads a 242 through the handling circuit at Volvo's test track in Sweden. The 260 Series of cars are the top-of-the-line and include 264GL and 264DL four-door sedans, 262GL 2-door sedan and 265DL station wagon models. The 240 Series includes a 242 two-door sedan, 244 four-door sedan and 245 station wagon. At right is the new B-27, 2.7-liter, aluminum V6 standard in the 260; instruments and controls are below.



The 265DL, with a base price of \$9495, is the most expensive station wagon available in the United States. It's V6 powered and includes many luxury items as standard. It's smooth and prestigious, but the lower-priced, four-cylinder, 245 wagon offers better value for the dollar.



**Basic copy setup** uses two lights at 45° angle to subject. To prevent contrast-reducing glare, lights are *behind* the camera, and subject is on black background. Professional lights shown aren't necessary—you can even make your own units.

# Copy photography

by Dave Sagarin

**C**opy photography is one of the most useful things you're probably *not* doing with your camera. But once you get into the swing of it, you'll find its uses almost endless. For example:

- Copy old family photos, so the relatives can have prints even though the negatives have long since disappeared.
- Improve old faded photos by making copies that improve the contrast and minimize the spots and stains.
- Add images from postcards to your travel slide shows.
- Copy maps, artworks, and pictures in books for school or reference purposes.
- When a negative is so badly exposed that it's impossible to make a good, big print of it, make a good small one (which won't be easy, either), retouch it, and make a good copy negative for use in making future prints.
- Copy multiple-image and other experimental prints that would take you hours to duplicate in the darkroom.
- Copy on high-contrast or lithographic film to separate images into tone value levels for use in silk-screen and other graphic processes.

You don't need a macro lens, a copy stand, elaborate equipment or unusual films for copy photography either. But you do need to work slowly and carefully.

And you'll soon know just how good a job you're doing. A photograph of a scene looks like a picture of the scene, not like the scene itself. And a *copy* of the picture of the scene should look exactly like the original photo. That means you can always compare your copy with the original to see just how well you've copied it.

## What you need

Work in a large room with a minimum of furniture, traffic and windows. Shoot against a black cloth or cardboard background to minimize flare in the lens.

Fasten your original, with its larger dimension horizontal, to the backdrop. If the original is translucent, back it with heavy white paper, to keep the black background from showing through.

Set your camera on a sturdy tripod, just far enough

away so that the image of your original doesn't quite fill your viewfinder or focusing screen. Your lens is less sharp at its edge, and this loss of sharpness will be more apparent when you copy flat materials.

Make sure your lens is exactly perpendicular to the center of the original. Once that's measured and set, mark centerlines on the backdrop for use in setting up each subsequent copy.

If you're copying something you can't hang on the wall (a book, for instance), use a vertical setup with the camera pointing down from a tripod or copy stand and the original face up on a table. To flatten book pages, use a clean, heavy glass plate with black strips laid on the glass to mask off the copy area.

### What lens to use

If you have a choice, use your sharpest normal or moderate tele lens. A macro lens is even better, if you have access to one, but it's not absolutely necessary.

For very small originals (roughly speaking, anything less than about 10 times the size of your negative), you will need close-up gear. A macro lens is best, but an enlarging lens mounted on a bellows will do about as good a job for a lot less; just be sure to add exposure to compensate for the fall-off in light due to the bellows's extension (a through-the-lens meter does this automatically).

If you only have your standard lens to use, get a reversing collar (available from Spiratone, Vivitar and others) so you can mount it backwards on your extension tubes or bellows; at very close distances, it's sharper that way. If your camera's lens isn't removable, then you'll have to use supplementary close-up lenses, but avoid them if you can: Putting more glass in front of your lens can only cause additional flare,

loss of sharpness and added aberrations.

Whatever lens you use, it should be very clean, and have a big lens shade. As you've probably gathered from my frequent mentions so far, light flaring in the lens is the biggest single enemy of apparent sharpness in the final print.

### Lighting and filtration

The basic lighting setup for most copy work is simple: light at each side of your original with each light set behind the camera lens and aimed at about a 45° angle toward the original's far edge. Check each light individually for glare, and move it further over, if need be, to get rid of a glare. Make sure the light is balanced by pointing your finger at the center of the original—almost touching it. If the shadows your finger casts are equally dark, then the light is balanced. Textured originals take a different setup (see page 91).

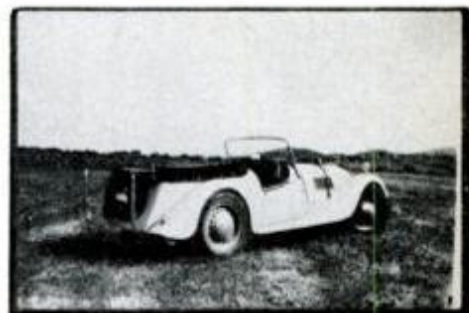
You don't need professional studio lights like the ones I'm using on page 90. You can make a perfectly good unit using a 250-watt photoflood bulb, a clamp and socket unit from the hardware store, and a stand made by setting a six-foot pole in a paper paint bucket filled with plaster.

You can even make your own reflector from about 30 inches of heavy aluminum foil. Fold and flatten a three or four-inch hem along one long edge for stiffening, then wrap the hemmed edge around the socket, so the rest of the foil extends past the bulb in a rough cone. Shape it with your finger until it reflects fairly even light onto the wall. Such home-brew reflectors can be better than the spun-aluminum, store-bought ones, since you can easily mold the foil to control light spread and eliminate hot spots.

Filters are also useful in copy

work. A filter lightens its own color and darkens its opposite. A yellow filter, for example, could be used to either partially bleach out a yellow stain on an old print, or to increase the contrast of a faded blueprint by darkening the blue background.

In making black-and-white copies of color originals, filters can help maintain contrast between opposite colors that might print as the same shade of gray, as in the example of the red car on the green background in the photos below.



Filters control contrast in black-and-white copies of color originals. Red filter lightened red car (top), darkened grass; without filter (above), car and grass show as similar tones of gray.

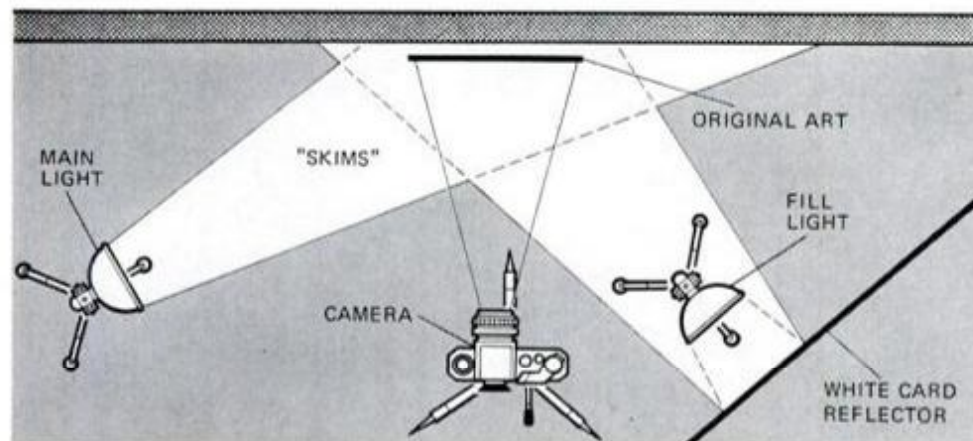
On the other hand, filters can help reproduce the tonal relationships between colors more exactly. Since panchromatic films tend to lighten reds and darken greens, a light, yellow-green No. 11 filter is needed to restore the tonal balance—if you're perfectionist enough to care.

Polarizing filters are often recommended for "cutting glare," and they do help. But it's always better to remove the source of the glare, if you can, by shading the glare spot with a black card, moving a light, or pulling a shade over an offending window. If your original is glossy, or is mounted behind glass, block reflections from its surface by aiming the camera through a hole in a big, black card.

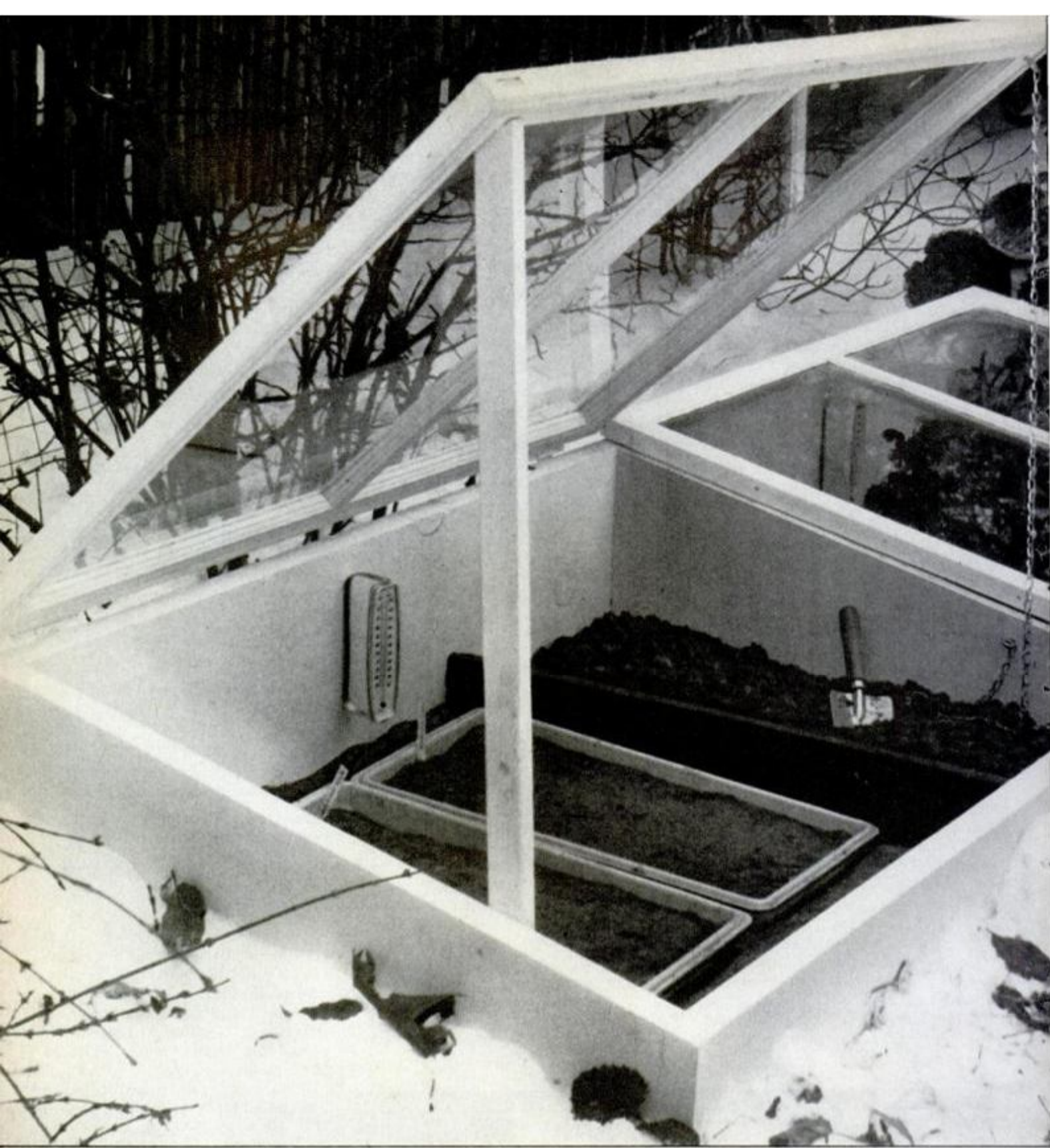
### Line and tone originals

There are two different kinds of originals. *Continuous tone images* that are made up of series of gray values or colors, as in a photo print

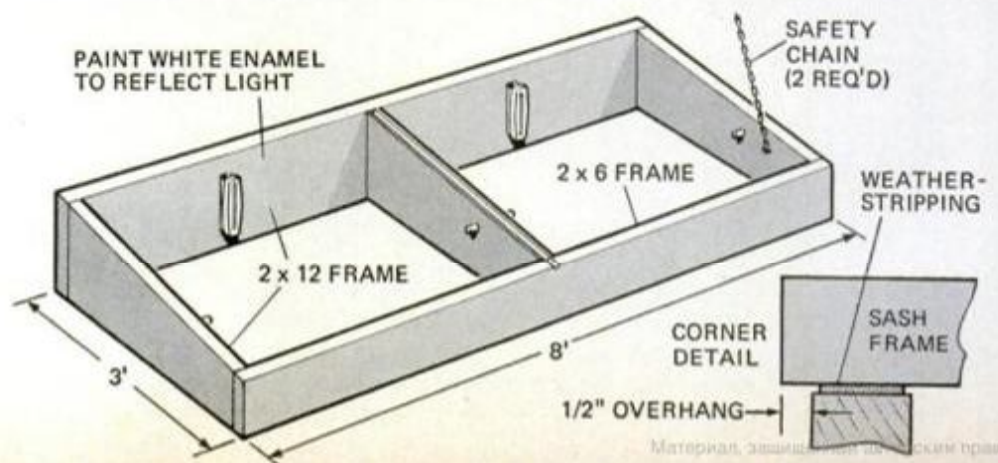
(Please turn to page 170)



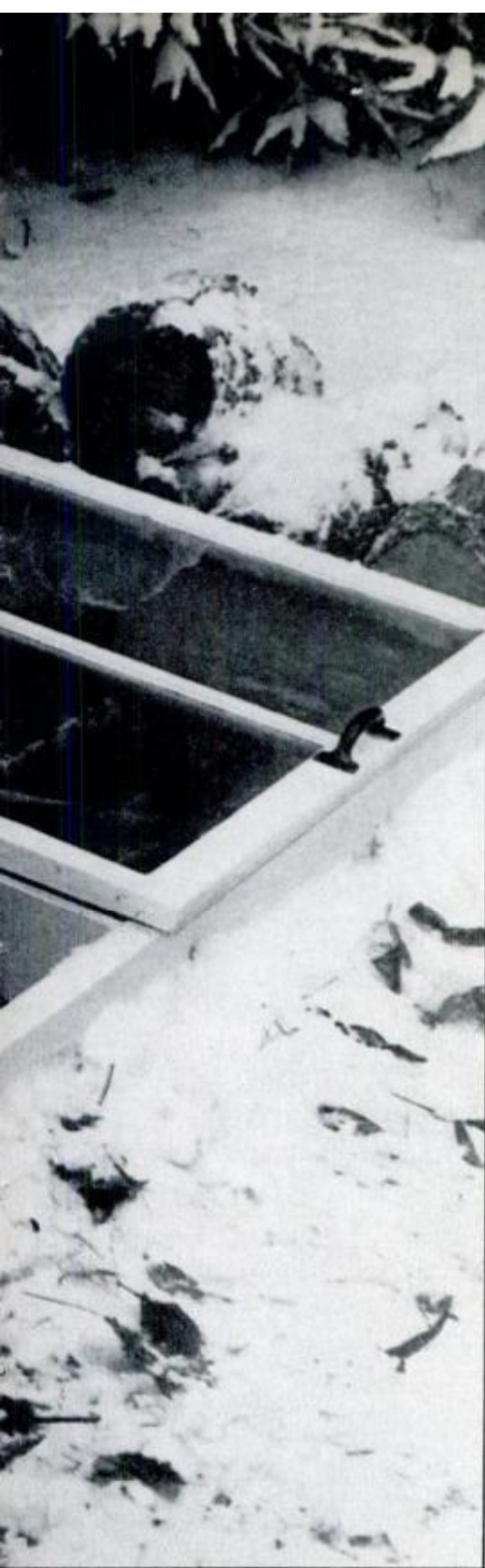
Reproducing textures of oil paintings, textiles and some other originals requires a main light that skims the original's surface at a shallow angle, to produce surface shadows, plus a soft "fill" light at a 45° angle, to open but not erase them.



**This unit is half cold frame, half hotbed.** Follow drawings (right) to build either side independently or a custom-sized gardening plans.



Материал, защищенный авторским правом



# Get a jump on summer gardening with cold frames



by Mike McClintock ASSOCIATE HOME AND SHOP EDITOR

**T**he most inexperienced woodworker can build a cold frame suitable for the most experienced gardener. And if you like gardening, you'll find that a good cold frame is almost as useful as a small greenhouse, at a fraction of the cost.

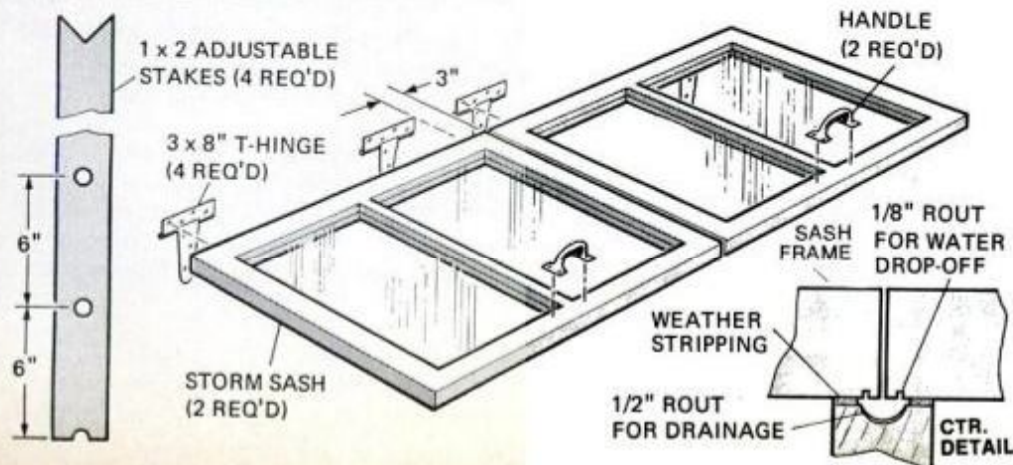
I built the most versatile unit possible, really a combination of cold frame-hotbed. Separate storm sash and a center partition create two different areas. On the left is a cold frame heated by the sun's rays. On the right is a year-round hotbed with an auxiliary heat supply. Most garden supply centers sell heat cable in different lengths that can be snaked over a two-inch sand base. The wire has a built-in sensing switch that automatically calls for heat if the in-frame temperature

falls below 74°. You can build either side of this frame as an independent unit, or build the double sash size as all cold frame or all hotbed.

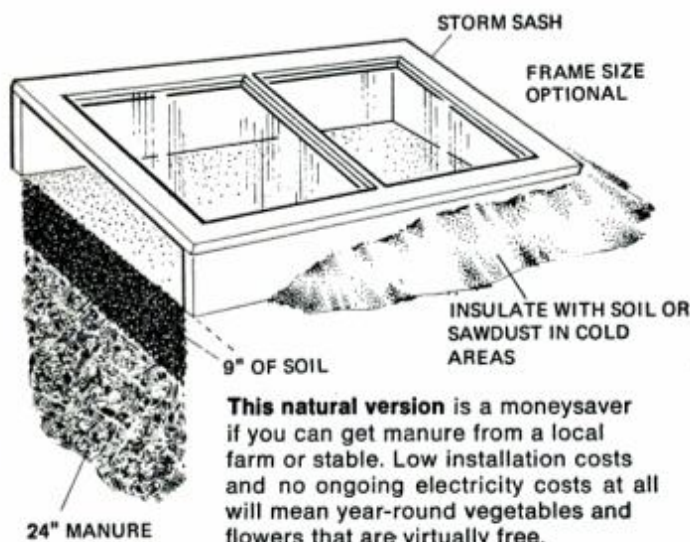
## A lot for a little

I tried to keep construction simple and efficient and, depending on how enterprising you are, you can use scrap wood and used storm sash to help keep the price tag for the complete setup below \$100 and as low as \$50. A cold frame is simply a slant-sided box with a transparent, hinged lid. Take a total dimension for the storm sash and make the frame 1/2 in. smaller on all four sides. This gives you a nice overhang to keep rainwater from dripping inside the frame. It also gives you a margin for error. If you're not an experienced woodworker, don't worry; you're not building a finished cabinet and a little enamel paint will make this unit look pretty good. Most garden books recommend cypress or redwood. But you can save some money with fir or any scrap wood on hand. Soak it well with two coats of a preservative like Woodlife and finish with two coats of exterior white enamel. Here are some tips for a successful installation:

- Locate with sash facing south.
- Provide a windbreak on north side.
- Make sure site is well drained.
- Install a thermometer.
- Maintain a temperature range of

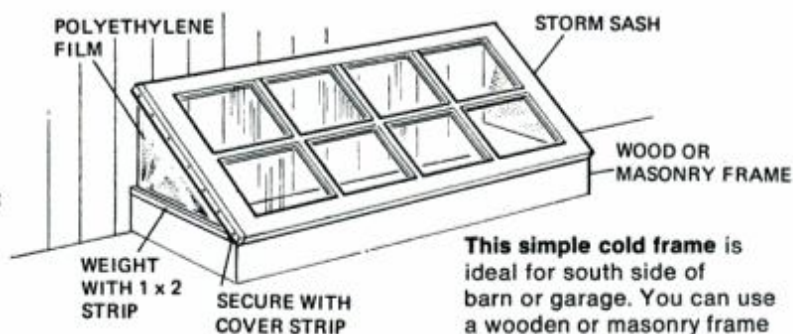


## Organic hotbed



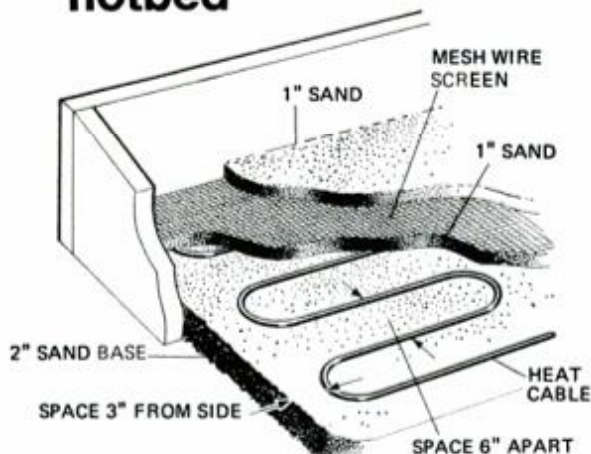
This natural version is a moneysaver if you can get manure from a local farm or stable. Low installation costs and no ongoing electricity costs at all will mean year-round vegetables and flowers that are virtually free.

## Lean-to



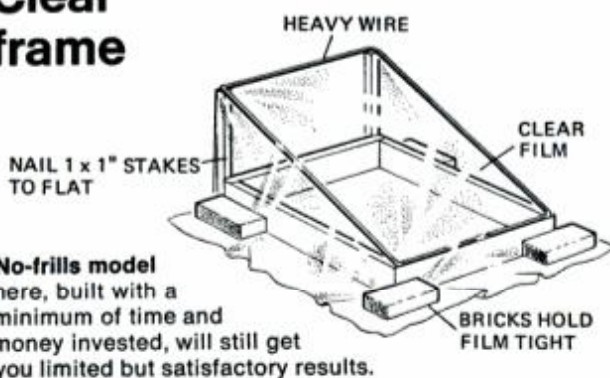
This simple cold frame is ideal for south side of barn or garage. You can use a wooden or masonry frame at the bottom and plastic sheets along the sides.

## Electric hotbed



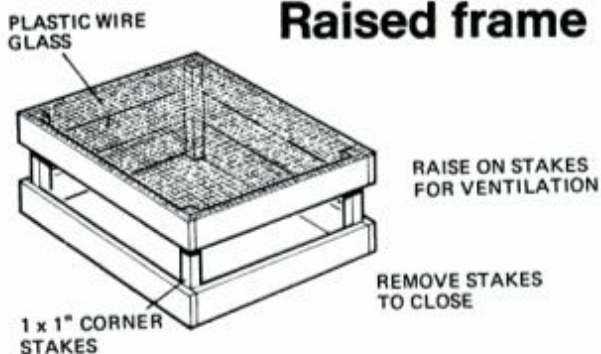
This year-round frame will do some gardening on its own by automatically controlling the temperature level.

## Clear frame



No-frills model here, built with a minimum of time and money invested, will still get you limited but satisfactory results.

## Raised frame



Four corner stakes are used to raise and lower this primitive but functional model. Construction is so simple that it makes a great project for a child.

### YEAR-ROUND USES FOR COLD FRAMES

Early spring

Hardening-off plants—ease transition for young seedlings from greenhouse to garden.

Spring and summer

Seed sowing.  
Early start for hardy and half-hardy annuals and perennials.

Late spring and summer  
Autumn

Use sand or peat moss for propagation of cuttings.  
Seed sowing for dormant winter until early-spring germination.

Winter

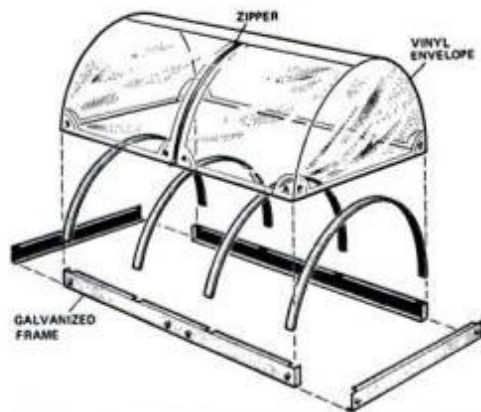
Protection for newly started perennials.  
Growing tender bulbs.  
Storage for bulbs and plants to be forced.

of 40° to 100° F. (85° optimum).  
 ■ Keep airtight; use weatherstrip.  
 ■ Prevent sash blow-over with safety chains.  
 We've outlined different cold frames you can build down to the simplest and most temporary varieties. You can even dig a hole and spread plastic across the top secured with a few rocks.

### 365 days of summer

You'll get your investment back from the extra harvest of vegetables

## Vinyl dome kit assembly



Spring will arrive early at your house with this growth dome from Arrow Industries, 100 Alexander Ave., Pompton Plains, N.J. It provides 12 sq. ft. of heated space under a zippered vinyl envelope. The lightweight galvanized steel frame can be set up in 15 minutes and add 60 days to your growing season. Cost: \$17.

and flowers you can start ahead of schedule with a cold frame. Check the seasonal chart for year-round advantages of hotbeds. With either organic or electric versions you can have fresh chrysanthemums on a Thanksgiving table or a centerpiece of poinsettias for Christmas morning. The next step in year-round gardening is a greenhouse. We'll cover them soon with a close look at types as efficient and practical as the invaluable gardening tools on these pages. ★★★

### COLD FRAME VARIATIONS

#### TYPES

- Wooden frame and sash
- Masonry frame and sash
- Wooden frame and plastic cover
- Organic hotbed and conventional frame
- Electric cable hotbed and conventional frame
- Kits, growing dome
- Lean-tos, wooden sash and frame

#### ACCESSORIES

- Thermometer
- Electric-heat cable element
- Lath (snow fencing) for summer sash
- Safety chains

## IT'S NEW NOW

### Easy going—up or down

If you live on a steep hillside and want to get up and down easily, you can install your own private cable car like this one. The motorized lift is actually a modified boat hoist and can be used for that purpose as well merely by unhooking the seat. The hoist by itself—you supply your own seat—sells for about \$6500, depending on terrain. A landing deck at the top is included in the installation. Kem Boatlift, Inc., Box 386, Miller Place, N.Y. 11764.



### Pull-apart ski boot

The newer rigid-type ski boot is easy to get into with this clever flip-open feature. The entire boot pivots apart in two halves to let you slip your foot in (far left), then is tightened closed by adjustable cam-action toggles. Turning knobs on top varies force on an instep pressure plate for just the right firm, snug fit. The Olin T/1 is \$155 a pair at ski shops.

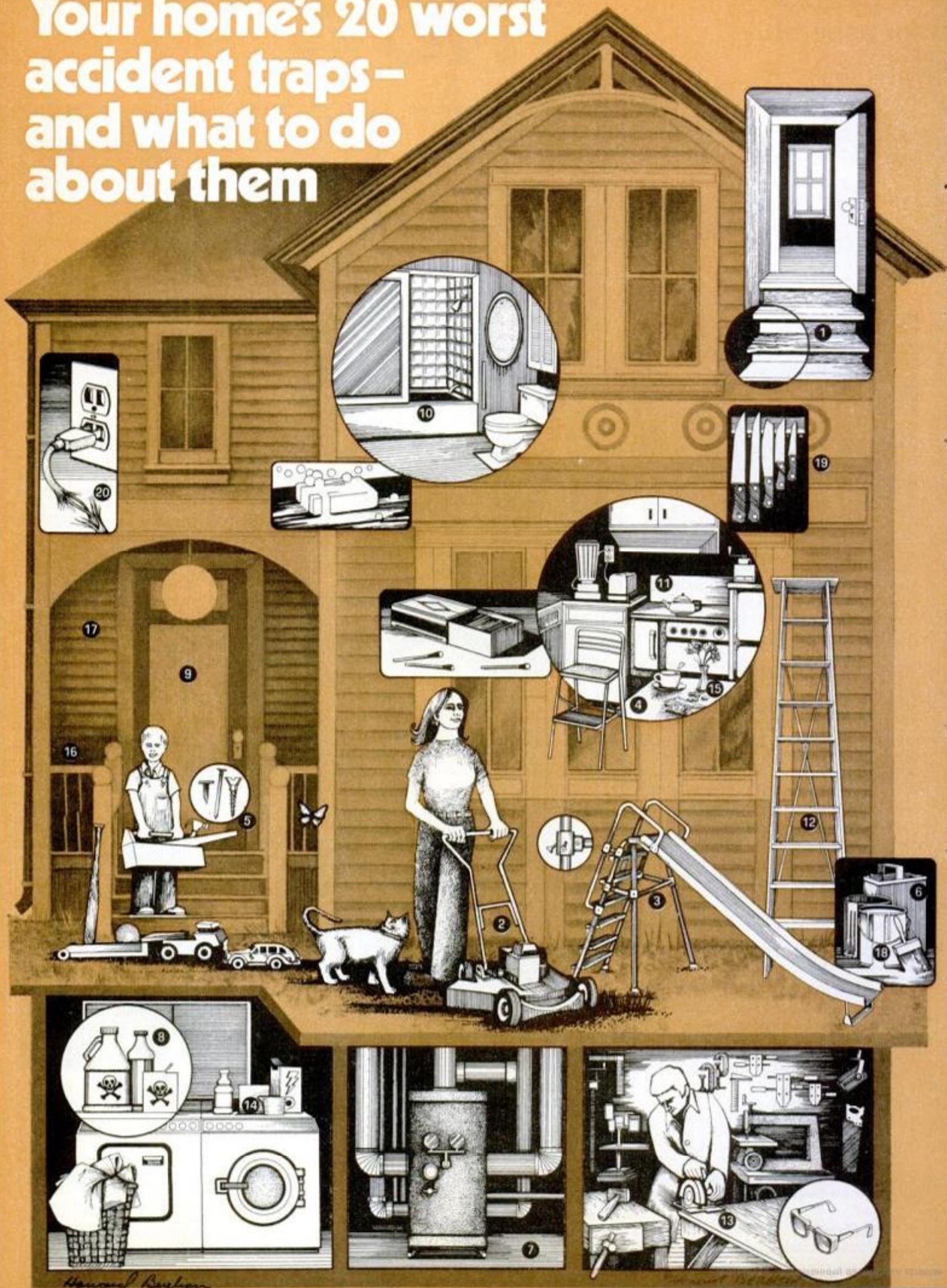


### Whatever it is she's doing, you can't fault her form

What's she doing whirling those weights around her head? No, she hasn't gone bananas. She's trying out a new tennis aid said to improve your serve. Tennis pro Frank Malhas originally devised it as an exercise device for people with painful "tennis elbow," then discovered it also helped develop a better swing. You can

tell from the action of the weights whether your form is good or bad. If they stay together, you're okay; if they fly apart, you're doing something wrong. Called T-Bags, they also double as handy ball carriers (right, above). They're \$9 from Frank Malhas, Georgetown Tennis Club, 3607 R St. N.W., Washington, D.C. 20007.

# Your home's 20 worst accident traps—and what to do about them





Is your home safe? The Consumer Product Safety Commission says there are 7 million product-related injuries every year, and the most dangerous category is home structures and fixtures. How many times can you go up and down your stairs without becoming one of the 465,000 people who have accidents on them?

The annual figures in this area are staggering, but they don't tell the whole story. The CPSC uses a system of rating each type of accident by combining its frequency with the severity of the damage it causes. This is called the Age Frequency Severity Index and, as you can see in the charts on page 178, the worst hazards statistically are not necessarily the most dangerous. For instance, accidents with lawnmowers, although they are 20th on the list by number, are generally so severe that they are rated No. 2 on the severity list. These trouble spots around the house make you a prime candidate for an accident (don't say it can't happen to me). Check this list for the best ways to stop these hazards from making you a statistic.

## 1 Stairs, steps, landings

- Accidents per yr.: 465,000
- Severity index No. 1

### PROTECTION:

- Provide adequate area landings
- Replace loose or worn treads
- No door without a 2-ft., 6-in. landing
- Make railings usable for all ages

You probably spotted the worn tread, but may not have noticed the built-in problem. No landing here means you have to deal with the door, light switch and first step at the same time. This can easily cause you to lose your balance and fall.

## 2 Lawnmowers

- Accidents per year: 39,900
- Severity index No. 2

### PROTECTION:

- Adequate shield protection below blade
- Maintain the drag shield
- Use a funnel to fill the gas tank
- Don't leave running mower unattended

Use your good judgment and check over the lawn for rocks or kids' toys before you start mowing. Remember that the blades spin fast enough to throw a small rock 10 feet away, so keep the area clear.

## 3 Play equipment

- Accidents per yr.: 143,000
- Severity index No. 3

### PROTECTION:

- Clear the path of moving equipment
- Use nondeteriorating swing supports
- Don't let metal joints rust through
- Cover protruding nuts and bolts

Maintaining swings, slides and other play equipment is the key. You can't keep a child from falling off a swing, but you can keep the swing from falling off the supports. Use chain link or nylon rope that won't wear away in the weather. On metal, use a wire brush and a coat of rust-resistant paint.

## 4 Tables, chairs

- Accidents per yr.: 151,500
- Severity index No. 4

### PROTECTION:

There are no easy answers for these nonglass table and chair accidents. The main difficulty is with children. If you bump into a table it might cause a bruise on your hip or leg. But a small child will hit the table with his upper body (rib-cage damage) or head (concussions). Be aware of this danger and try to place tables away from heavy traffic areas.

## 5 Nails, tacks, screws

- Accidents per yr.: 280,000
- Severity index No. 5

### PROTECTION:

- Keep securely stored out of the way
- Clean up after jobs
- Hammer protruding heads on flooring
- No exposed points on furniture

Even one, small, shiny nail, left loose after a repair job, can easily attract a child's attention. Unfortunately,

small children have a habit of putting found objects into their mouths. So careful cleanup and secure storage have a high priority.

## 6 Liquid fuels

- Accidents per year: 24,200
- Severity index No. 6

### PROTECTION:

- Use childproof hardware on storage
- Don't mix fuels or other chemicals
- Use in well-ventilated areas
- Don't repackage into innocent containers that could be mistaken for something harmless.

You may think that you've found a more efficient storage container, but you never know who might pick it up when you're not around. That skull and cross bones is there for a good reason. You may not know that most communities have a poison control phone number that can be reached 24 hours a day. Post this by your phone so you can get fast and accurate first aid advice in case of an accident.

## 7 Flooring

- Accidents per year: 84,800
- Severity index No. 7

### PROTECTION:

- Use nosings at floor-thickness changes
- Don't overwax tile floors
- Sand down rough spots and splinters
- Level depressions and knotholes

Be careful of old floorboards. As they age and shrink, the gap in between them will grow larger. Different boards may warp or cup in patterns that create an edge to trip over. Plane down the high edge to make the surface level.

## 8 Bleaches, dyes

- Accidents per year: 36,000
- Severity index No. 8

### PROTECTION:

- Follow guidelines for liquid fuels above.
- (Please turn to page 177)

**C**apture the spirit of '76 with one of PM's easy-to-make, fun-to-fly Bicentennial kites. Both the fabric Scott sled and the paper box kite are scratch-built projects which even a beginner should be able to test-fly just two or three hours after he begins construction. You won't have to spend valuable time searching for expensive, hard-to-find materials to duplicate these kites. Both are made of readily available materials, some of which you may already have on hand. Neither should cost more than \$5 to make.

Mark Skwarek of Go Fly a Kite Store, Inc., in New York City decorated and assembled our kites.

### Finding design ideas

You can either duplicate Skwarek's stars and stripes motifs or design your own. Early American flags and state and national seals are excellent sources for decorations that you may modify as desired. Decorate boldly. If colors appear startling at arm's length, remember that they will be greatly subdued when the kite is airborne.

We used quick-drying acrylic paint

# High fliers with the spirit of '76

by Carole Miller

on the box kite and for the striped portions of the Scott sled. Use paint sparingly; too much makes the kite needlessly heavy. The circle of stars and "76" design on the sled are fabric cutouts affixed with iron-on Pellon fusible web. Decorate your cutout kite pieces before assembling.

### Build a flying sled

Of the two, the Scott sled, developed by the son of Sir Walter Scott, is quicker to assemble. Without horizontal struts, it relies on only the pressure of the wind to keep it open in flight, and it resembles a sled.

Make a full-size pattern from the pattern shown and cut any lightweight, woven (not knit) fabric or 1-mil polyethylene to match the pattern. We used thin polyester for the center panel and painted the wing stripes on an old cotton sheet, al-

though the kite can be made of one piece, without seams.

To join wings to the sled, lap each wing  $\frac{1}{2}$  in. over center and glue in place or fuse with Pellon web, following instructions on the package. Glue  $\frac{3}{16}$ -in. dowels to the wrong side of the fabric over seams. Turn a  $\frac{1}{2}$ -in. hem on the wings and glue or fuse in place. Fold the wingtips to the inside and make eyelet bridle holes in the center of the folded corners.

Tie a 10-ft. cord through the holes for the bridle. To ready for flying, tie a loop in the bridle so that each half of the string is of equal length.

### Making a winged box kite

The box kite, while a bit more complicated, can still be assembled in an afternoon. Ours is made of bristol paper, but inexpensive butcher paper is also flightworthy.

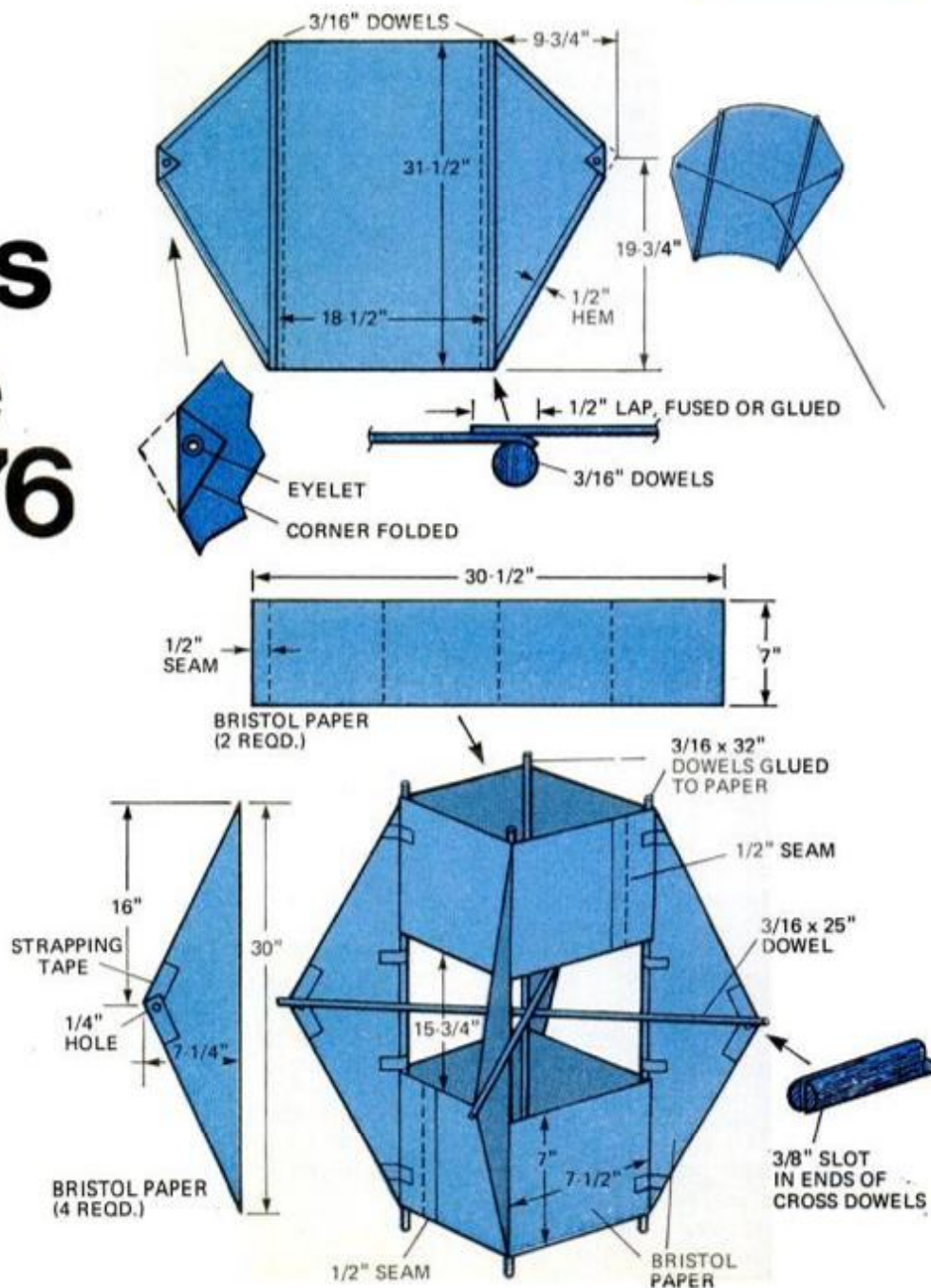
Before assembling the box kite,

you may wish to edge the cells and wings with strapping tape to help prevent tears when flying in strong winds. To assemble, lay the two  $7 \times 30\frac{1}{2}$ -in. strips  $15\frac{3}{4}$  in. apart. Leaving 1 in. of dowel exposed at each end, glue the first 32-in. dowel 2 in. from the end of the strips; place remaining dowels  $7\frac{1}{2}$  in. from preceding ones. When all dowels are glued in place, lap the paper  $\frac{1}{2}$  in. and glue.

Using strapping tape, fasten the wings to dowels at each end and secure again between the two cells. Reinforce the outer corners of the wings with tape and punch a hole as shown.

Make a  $\frac{3}{8}$ -in.-long slot in the ends of the two remaining dowels and assemble as in diagram. Be sure that the dowels are slotted no more than  $\frac{3}{8}$  in. or the wings will not be taut. Attach the bridle to the end of one

*(Please turn to page 150)*



**Revolutionary in design** because it has no horizontal struts and relies entirely on wind pressure to remain open in flight, our Scott sled took less than an afternoon to decorate and assemble. The fabric flier is a challenge to get up out of ground winds and into the air, but is a reliable performer in stable winds of about 5 mph.

Photo: Benn Mitchell



**Decorations to make ordinary kites into All-American high fliers** are inspired by designs on colonial flags, emblems and national seals. Our winged box kite, made of inexpensive bristol paper and dowels, is collapsible for easy transport to and from flying sites.

## FAMILY WAGON

Even compact new station wagons like the Dodge Aspen, can pack aboard all the equipment for an extended outing or provide room for at least two to sleep inside.



1. Stag Bicentennial tent
2. Bicentennial sleeping bag
3. BernzOmatic heater
4. Gloy cooking kit
5. Pyrawa sport canoe

**Y**ou can take any car this year and instantly convert it into a recreation vehicle, thanks to a great variety of new developments and improved products. Today, no car is too compact or too large to convert to a car camper. Even 50 percent of all light trucks and vans are used from

time to time as recreational vehicles.

And what with the energy crunch, increased fuel prices and the zooming costs of weekend or vacationing, car camping is looking better and better.

Fifty years ago, car camping meant the back seat of the touring

car loaded level with grub boxes, blankets, cots, suitcases, kids' toys, tools, pots, pans, tent, a repair kit and sometimes firewood. Into luggage racks clamped along the running boards went spare tires, cans of gas and oil, plus water for the radiator, ax, shovel, towrope, chains, and



29

22. Thermos pop tent
23. BernzOmatic campstove
24. L. L. Bean utensils
25. Picnic basket
26. L. L. Bean cups
27. Thermos Cup Gaddy Jug
28. Sears Pac Rod
29. Chevrolet Chevette

22

23

28

27

26

24

25

## COMPACT FOR COUPLES

Make your getaway in a mini. Chevy's Woody Chevette is shown; there's still room for all you need.

# Start camping the easy way -by car

Get a load of the new gear, and even a mini-compact becomes a recreational vehicle.

by Bill McKeown  
OUTDOORS EDITOR

6. Johnson Messenger CB
7. Dodge Aspen
8. Camp Trails backpack
9. Stuff Sack sweater
10. Goldberg sleeping bag
11. BernzOmatic stove
12. Ice chest
13. Thermos Six Packer
14. Coleman Inflate-All
15. Stainless-steel Thermos
16. Camp table-chair set
17. Nikon binoculars
18. BernzOmatic Thermo Fogger
19. BernzOmatic lantern
20. Insect repellent
21. Lowrance Nightwin light



a plank to get out of the ditch. And then the additional gear was lashed on the back.

Since those days of 50 years ago, so many improvements have been made that many would-be campers feel they now need a trailer or motor home in order to be comfortable. True, nothing equals the convenience of modern recreational vehicles. But anyone can camp without the exertion of the hiker-backpacker or the bankroll of the big-rig owner.

### Bring basics from home

Basics, of course, are food and shelter, and these can be brought from home. A small thermal bag with sandwiches and thermos bottle is a start. Station wagons and some hatchbacks can fold down enough rear-deck space for you to stretch out on blankets overnight.

But that is minimal comfort, and a check with local or mail-order auto-supply houses will show improvements like station-wagon mattress pads for about \$25 that unfold to provide a daytime playground for kids or nighttime foam foundation for sleeping. Some of the same stores also stock station-wagon curtains that can be pulled around to provide extra privacy.

Sporting goods departments will have a variety of sleeping bags from about \$10 up that are more convenient to travel with. Many models have full-length zippers that open the bag into a comforter or allow zipping two together into a double-size bag. There are, in fact, so many sleeping bags available to suit such a variety of temperature ranges that it's hard for a beginner to choose.

### The rental route

Today you don't even need to own a car to go car camping. Rental outfits around the country have a broad selection waiting. Your local rent-a-car branch can teletype your reserva-

**Essential** for outdoor appetites are campstove, cooking utensils, a sturdy icebox.



tion on ahead. Ship your gear or have it in hand as you step off the plane, bus or train. Some airlines that service resort areas can have a car or recreational vehicle waiting. Consult them or a travel agent about such package deals. By checking ahead, you can also locate equipment rental stores. That way you can arrive ready to start your car camping trip with simply spare clothes and a toothbrush.

The bonus rental advantage for the beginner is your chance to try out equipment before buying it. You may find the tent you liked is too difficult to set up on a windy night, or that the campstove is too hard to light.

Check, as well, with some of the campground chains. Kampgrounds of America, Box 30558, Billings, Mont., lists in its KOA directory the growing number of campgrounds in its system that rent tents, all pitched and ready for your arrival—a camping-out “motel” chain at one quarter of the regular motel price.

### Your food—unlimited choices

No rule says a car camper has to prepare meals along the way. You can stop at restaurants for every meal or shop at markets, cook the local specialties you buy and save a lot of money. Refrigeration is no longer a problem. Today's ice chests can keep perishables for several days or longer if they have been pre-frozen. The car camper has the added advantage of room to carry large and heavy supplies. The expensive dehydrated quick-frozen camping foods are ideal for backpackers, but unnecessary for driving campers.

And though cooking over a campfire is picturesque, it's also difficult unless you have had practice. A better choice is one of the modern two-burner stoves. LP gas models are easiest to use. Add a propane lantern using the same fuel and you are ready to set up a tailgate kitchen, although cooking away from the car is safer and better. Again, since there is room inside or on top of the car to carry extra gear, consider bringing a small folding table to cook on and folding chairs for seats when no picnic table is handy.

### Pick a tent that goes up fast

Though it may be possible to sleep in your car, you can often save unpacking everything by stowing a tent on top. Consider two, in fact, if you have children along. Old-time tents had guy-lines that came unpegged in a storm or that tripped you in the dark. They had no flooring to keep out water, rodents and mud, no mosquito netting to discourage bugs or

## CAMP CAR BASICS

- Spare tire and jack
- Tool and flares, spare parts
- Towrope, jumper cables
- Flashlight, shovel, board
- Ax and rope
- Double mattress pad
- Blankets, sleeping bags
- Camping stove
- Pots and utensils
- Paper plates and cups
- Water jug
- Ice chest
- Lantern, catalytic heater
- Warm clothes
- Car screens, bug spray
- Tent
- First-aid kit
- Nylon cord
- Maps, campground guides
- Tire pump and gauge
- Radio for weather

fire-retardant treatment to help prevent that hazard.

When you shop for the tent for car camping this year, figure about \$100 and look for one that sets up quickly and easily in the dark, that normally requires no stakes, ropes and extra poles to keep it up and tie it down. Pick one that has enough room inside so you can dress standing up, has screened windows to let air through, and is waterproof enough to keep rain out. The tiny extra-light models are the right choice for backpacking mountaineers, but with your car to carry the weight you can choose more comfort.

For warmth inside your shelter, (and campgrounds can get cold at night anywhere any time of year), consider buying a good catalytic heater, about \$25 and up. The new models burn LP gas so no flare-up is necessary when they are lighted and, once burning, there is no flame or carbon monoxide. They do burn up oxygen so they must not be used in a completely closed car, but they are certainly the safest heaters around. Don't sleep in your car with all the windows closed, incidentally, and particularly don't leave the motor and heater running to warm the car on a cold night. Carbon monoxide can seep in, especially if you are surrounded by drifts of snow. If you've stalled in a snowstorm, car camping gear in your trunk, like sleeping bags and catalytic heater, can be lifesavers.

### Plug-in accessories

Give up smoking if you want to, but not that handy dashboard accessory; the cigaret lighter. Into that

## EXTRAS THAT ADD A LOT

Folding chairs  
Folding table  
Citizens band radio  
Backpack  
Camera  
Binoculars  
Extra tent

Extra lanterns  
Tire chains  
Block and tackle  
Power inflator  
Inflatable boat  
Bug fogger  
Sports gear

Outboard motor  
Portable toilet  
Small TV  
Hammock  
Electric refrigerator  
Roof rack  
Foul-weather gear

socket you can plug a remarkable assortment of new camping aids.

Want coffee while driving late to reach your campsite? Auto suppliers now offer a choice of a plug-in heater coil that boils water for instant coffee, tea or cocoa, or an actual percolator, mounted on a bracket that swings out from under the dashboard, to brew fresh coffee in four-cup amounts.

Check the same outlets for a small map light for reading campground guides without blinding the driver. It plugs into the lighter socket, and so does a quartz spotlight on an extension cord that can throw a long beam to check street signs and campground markers far off the road. You

can also get a small fan to clamp on the sun visor on hot days and take its power from the lighter plug, or an evaporation cooler that works well in arid desert areas.

And then, of course, there are the demountable radios, electric shavers, mini-TVs, makeup mirrors, tape decks and citizens band radios that plug into the lighter, if you use models that are not built-in and wired-in and are easy to remove so they won't be stolen.

### Fitting out

When you know before you buy your car that you'll be camping, there are additional accessories worth specifying. Since a heavy load of gear

can weigh down the springs, heavy-duty suspension is worth ordering, especially if there is a chance you may want to tow a trailer at some later date. Many models can now come pre-equipped with frame members to take an equalizing trailer hitch plus extra transmission cooling and a radiator overflow recirculating system to handle long hot climbs through steep mountain passes. Pre-wiring to plug in trailer lights, turn signals and brakes is an additional option.

Like the suspension, the tires should be heavy-duty to handle backcountry gravel trails and occasional low inflation of about 15 pounds when you want extra traction while driving over soft ground or sand. Look for a car with reclining seats or a station wagon with flat afterdeck if you expect to be sleeping inside sometimes.

Screens are available from auto-supply stores, or you can fashion your own with mosquito netting and the magnetized strips from sewing stores to hold the netting. Bulletin-board magnets will also work.

Be sure your jack and lug wrench

*(Please turn to page 160)*

## Camp car of the future?



**C**amping families like a double-duty car, one that is low enough to park inside the average garage and yet it is large enough to let a family live aboard, a model that can do both weekday chores and weekend camping.

Latest entry in this league is a new design from Majestic Motorhomes, San Jacinto, Calif. It's called the SL-18 station wagon, though it also has a kitchen, dinette and beds and is reported to handle like a sports car. As a share-the-ride commuter

vehicle, it will carry nine passengers. Then, with top raised to provide 22 inches of added height, it offers six feet, three inches of headroom. The SL in the name stands for this split-level feature, and the 18 is the 18-foot, 10-inch overall length—shorter than some of the large station wagons and sedans.

Unlike recreational vehicles that are built on converted standard truck or van chassis, this one was designed for its purpose from the ground up and the body and frame are built in

Taiwan. Motor and drivetrain, however, are from Dodge, brake system and forward suspension by Ford, steering by General Motors Saginaw Div. and axle by Dana-Spicer, with final assembly completed in the United States. Majestic claims that the Taiwan fabrication allows quality limited production without high assembly-line cost. Available in Dinette or Lounge Car models, the vehicle will have a basic sticker price of approximately \$13,850.

Standard equipment and options will include stove, refrigerator, toilet, shower, water heater, space heater and beds to sleep five. A plush Club Car for business meetings adds refinements like a bar and color TV, and about \$4000 to the price.

Since there is nothing like it, who will want it? Majestic reports many drivers, particularly women, are hesitant to handle large recreational vehicles but that the SL-18 has the size and feel of a station wagon and the look of a limited-production sports car. Its test as a camper car will come this summer as it becomes available nationally and buyers carefully look over an expensive recreational vehicle that doesn't look like one. ★ ★ ★

**S**tark, brutish, tough and notoriously underpowered on the pavement has been the reputation of the Toyota Land Cruiser. "They're great off road," I was told by most four-wheel-drive enthusiasts, "but watch out on the highway." Though it was rated as the "most for the money" by the *Whole Earth Catalog*, some drivers felt the Land Cruiser wanted to shake itself to pieces at 60 mph. Detroit has built its 4WD vehicles with the U.S. Interstates in mind. But the early Land Cruisers were designed to provide reliable transportation in underdeveloped countries, and they've had a hard time competing in the turnpike-cruising department.

So I was dubious when I had a chance to test a brand-new model. But after 2000 miles under all types of driving conditions, I've come up with some new impressions of my own.

I picked up my Land Cruiser in Los Angeles at Toyota Motor Sales U.S.A., and headed north into the High Sierras to put it through its paces on the old logging trails which crisscross the mountains surrounding the Lake Tahoe Basin. First impression was that Toyota has done much to dispel the Cruiser's reputation for highway anemia. No engine options are offered, but the displacement of the rugged straight Six has been increased from 236.7 to 251 cu. in. which upped horsepower to 125.

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**First impression was that Toyota has done much to dispel the Cruiser's reputation for highway anemia. Displacement and hp have been increased.**

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A number of additional mechanical changes have greatly improved overall performance, and best news proves to be a replacement of the old three-speed nonsynchro first gear transmission with a nifty short-throw full-synchro four-speed unit. Combined with the larger displacement, the four-speed trans has radically smoothed out the Land Cruiser's highway operation. Acceleration now is easy, and the machine can cruise all day at legal maximums and there is plenty of power in reserve. Even in thin mountain air, there is no problem maintaining 55 mph.

By reputation, the Land Cruiser was supposed to be noisy and unstable at high speeds. I found there is still some transmission whine through the gears while shifting, but the machine proves remarkably quiet once it's cruising in fourth. Yet there has been no sacrificing of torque;

# Tahoe test for Toyota's 4WD

Four-on-the-floor and more cubes help the new, quieter Land Cruiser hustle down highways as well as up hills.

by Peter Barmonde



**Now successful** on and off-road alike, the new Land Cruiser took easily to mountain tops above Tahoe Basin without strain or overheating and handled over 1000 miles of freeway tests. New dashboard (at right) shows style improvements. New rear doors (far right) allow easier access to back, though restrict ventilation when closed. A roof vent would help, tests showed. Total rating was excellent.





downshifting was rarely required.

The Toyota drives more like a car than a truck, because of such standard items as light manual steering, power brakes and steering stabilizer. Despite its top-heavy appearance, the Land Cruiser proves stable at speed and is relatively unaffected by wind gusts and passing semis. Visibility is good from the high greenhouse, and the driver can see over most standard cars down the freeway.

But highway manners aside, the main business of the Cruiser is still to transport people over rough terrain, and it does this superbly. My rig was fitted out with optional locking front hubs. Four-wheel drive is activated through a two-speed floor-mounted transfer case that, in effect, gives you eight forward speeds and two in reverse. On several occasions I drove within 200 feet of the summit of Mount Genoa at 9300 feet with four adults in the Cruiser. There was no sign of engine strain or overheating after several hours of steady

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**In effect, the Land Cruiser transfer case gives you eight speeds forward and two in reverse, and after hours of climbing in low, no overheating.**

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climbing in low range. In fact, there were times when I lost my nerve before the Cruiser showed any sign of faltering.

We did have some ground clearance problems which larger tires could correct, and on one occasion broke off the rear step-up while fording a

stream. But there are very few obstacles which it can't surmount. Toyota engineers have eliminated the tailgate in favor of side-hinged swing-out doors to make loading and rear entry easier. Front doors have been beefed up, although windows rattle considerably when subjected to vibration.

Interior design has been upgraded;

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**There were times when I lost my nerve before the Cruiser showed any sign of faltering.**

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Land Cruisers now have soft bucket seats and a padded roll cage. In the hardtop model, however, there is a lack of adequate flow-through ventilation, a major drawback since airconditioning is not an option. There is no way to ventilate the rear compartment, and swing-open rear windows or a roof vent would be a real improvement.

Gas mileage is also a disappointment. Freeway driving took 11 mpg, while off-road and around-town runs dropped it to nine. Though this is more than most V8 4WDs get, the 16.4-gallon fuel tank makes planning ahead necessary.

Despite these minor matters, the Land Cruiser is an enjoyable machine. Toyota has cured its highway sickness, and it's a bull off the road. It is solidly built, reasonably comfortable, and has a good finish. And it doesn't come with, or need, a mind-boggling list of options. It can be purchased as a hardtop on or off-roader for about \$5500. It's a great buy. ★★



## I took the high road



Four-wheel-drive Land Cruisers often became three-wheelers on boulder fields along rugged Sierra trail.

If I had been suddenly transported to the steep, rough, boulder-strewn trail called the "Sluice Box" in the Sierras, I would have bet anyone that no motorized vehicle could ever traverse it—but that was before last August.

I had had no experience with a four-wheel-drive machine on such terrain until I joined the Toyota Land Cruiser Jamboree that month on a 70-mile trek along an old stagecoach trail between Georgetown, Calif., and Lake Tahoe. The Sluice Box is one of the more memorable sections of the trail.

Along a road that twisted from elevations of 2600 to 7000 feet, some 60 or 70 Land Cruisers climbed the smooth surfaces of huge rock outcroppings, ground through dust and water and—most surprising to me—picked their way slowly through boulder fields that were extremely difficult to cross even on foot.

Some of the worst terrain (or most challenging, if you look at it that way) was on steep mountain grades where rushing water had carried away the soil and left jumbled beds of boulders scattered along slopes that appeared to drop off at a 45° angle.

Difficult hairpin turns often took the efforts of one driver and six or seven stalwarts who pushed, tugged and sweated. Land Cruisers were periodically hung up on their undercarriages, with no wheels touching solid ground, or caught in a squeeze as they slid sideways into trees and boulders.

By patiently piling up more rocks under the tires or applying huge logs as levers, crews got the vehicles positioned so they could pull away under their own power.

Yes, there was some damage. Dinged fenders, bent running boards and all that—but all the vehicles got through under their own power.

The jamboree troupe spent a night on the trail at Rubicon Springs, where stagecoach travelers slept in 1875. I have no idea how the old-timers fared; I found a modern air mattress and sleeping bag barely disguised the fact I was reclining on granite.

Oddly enough, most bruises and scratches occurred in the campground when the travelers tried to walk on the rocks at night. It just seems that you're safer inside the Land Cruiser, even at times when your wheels are within a few inches of a dropoff.

—John Linkletter



# '76 RVs: Better living inside, better looking outside

by Bill McKeown  
OUTDOORS EDITOR



Better accommodations, looks, comforts are features of the new Bicentennial RVs. Tioga II, at right, is 17-foot motor home from Fleetwood's extensive line. The Travco L'Esprit, above, is streamlined 22-foot, four sleeper. Upper right, Winnebago has enlarged, upgraded RV model line.

**More room, more recreation, more accommodations are being planned into this year's compact rolling homes.**

**T**here was a rumor that Americans were going to stay home. Gas and money shortages were given as reasons—and for the last couple years there certainly has been a slump in recreational vehicle sales. But now the trend seems to be swinging back. Campers are spending carefully, but seem to be shopping for the best RV—rather than the smallest or cheapest.

Most popular rig around? That's still the travel trailer, although the biggest rebound in sales goes to motor homes. Industry predictions for '76 indicate we'll be buying nearly 40 percent more of these in all sizes than last year. During one recent month, 70 percent more mini motor homes were sold than during the same 30 days one year ago. The compact conversions seem to offer enough living space to make camp-travel fun without the feeling of driving a truck. Not that truck driving is unpopular, however. Surveys show that over 50 percent of all pickups are used at some time for recreation, and all the major manufacturers are offering styled-up small and full-sized pickups, some with four wheel drive, this year.

The big fifth-wheel trailers that hook up to a hitch in the bed of a pickup truck are expected to increase previous sales by 20 percent. One model will even extend an added bedroom out over the pickup cab.

**Clever layouts add space**

Standard travel trailers, many with ingenious layouts like the bunkhouse models, should continue to be the biggest sellers in the RV business with sales increases of a predicted 12 percent. Camping trailers, with their fold-out canvas or solid sides, should increase marginally in popularity over recent years. Light enough to trail behind most small cars, they are also favored by 4WD campers who like to try back trails.

Pickup campers mounted on truck cargo beds should stay about the same in sales. Covers that enclose the back of a pickup will have substantial sales but probably less than this past year.

Inside and outside these assorted rigs we've noted a number of innovations and improvements. So-called park models, the big trailers that often settle down for a season in one

sunny spot, now are making tip-out room expanders popular. Skyline's 35-foot Nomad features two tip-outs. The Carriage Phaeton slides out a bay window. Full-sized bathrooms used to be a luxury of the big rigs, but now even some of the minis mount bathtubs.

Small improvements can add a lot of livability. Apache has added a dark glass to some of their rigid camping trailer models. It lets in plenty of light, but provides welcome privacy since neighboring campers can not see in. Airstream trailers now feature disc brakes. Winnebago has smoothed the contours of some of their motor homes for a sleeker streamlining while maintaining roomy interiors. Living Van has stretched a van body to provide this popular style with a marked increase in interior space. Tent campers now have the option of installing a Talon zipper that can be popped open in case of emergency with a quick push, and then immediately returned to perfect condition with a run up and down of the slide.

**Add-on tents for RVs**

Adding extra living space by setting up an adjoining tent is not new. Several designed especially for vans are available, however, and are free-standing so you can drive away and leave the tent to hold your space. The Stag Van Tent from Hirsch-Weis is flame-retardant and fits against the van with magnetic tape. ILC Stein-



**Trailers under 20 feet**, like this new Free Spirit from Holiday Rambler, can now sleep families of up to six yet be towed behind a compact passenger car.

thal also makes a Sun Van RV tent.

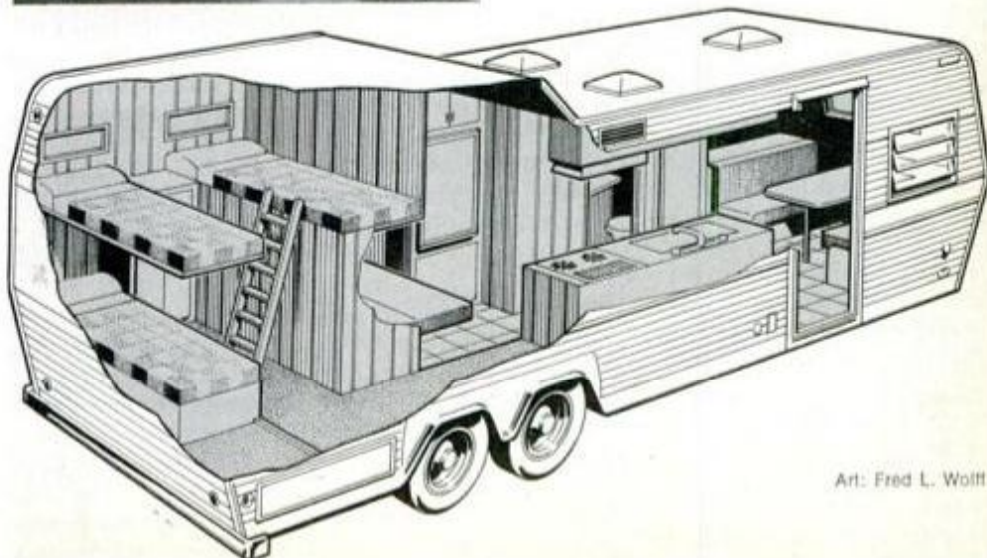
Customized vans have become so popular that a number of RV companies have added models to their lines. Many are as gaudy as those from a local customizer, and do-it-yourself components are now available from mail order companies and various suppliers. Wood Fabricators, in Elkhart, Ind., offers slide-in dinette-bed and galley units that can convert a van or pickup into a camper in 20 minutes, they report.

Several builders are packing extra berths into trailers with double-decker arrangements and names like Bunkhouse or Astrolounge. Large families and small groups should find these particularly appealing.

And to add camp shelter to a mini-compact or motorcycle, another Elkhart builder named Time Out, Inc., makes a tiny 3x5-foot tent camper that opens to offer standing headroom and seven-foot bunks for two. ★★★



**Dormitory design** adds extra sleeping space arrangement to some new trailer models with names like Bunkhouse and Astrolounge. Usually a raised roof indicates the added room, as shown on Swinger model at left. Cutaway of a typical layout (below) shows double-decker and single bunk aft, plus pull-out gaucho double forward of partition and front dinette to sleep total of seven.

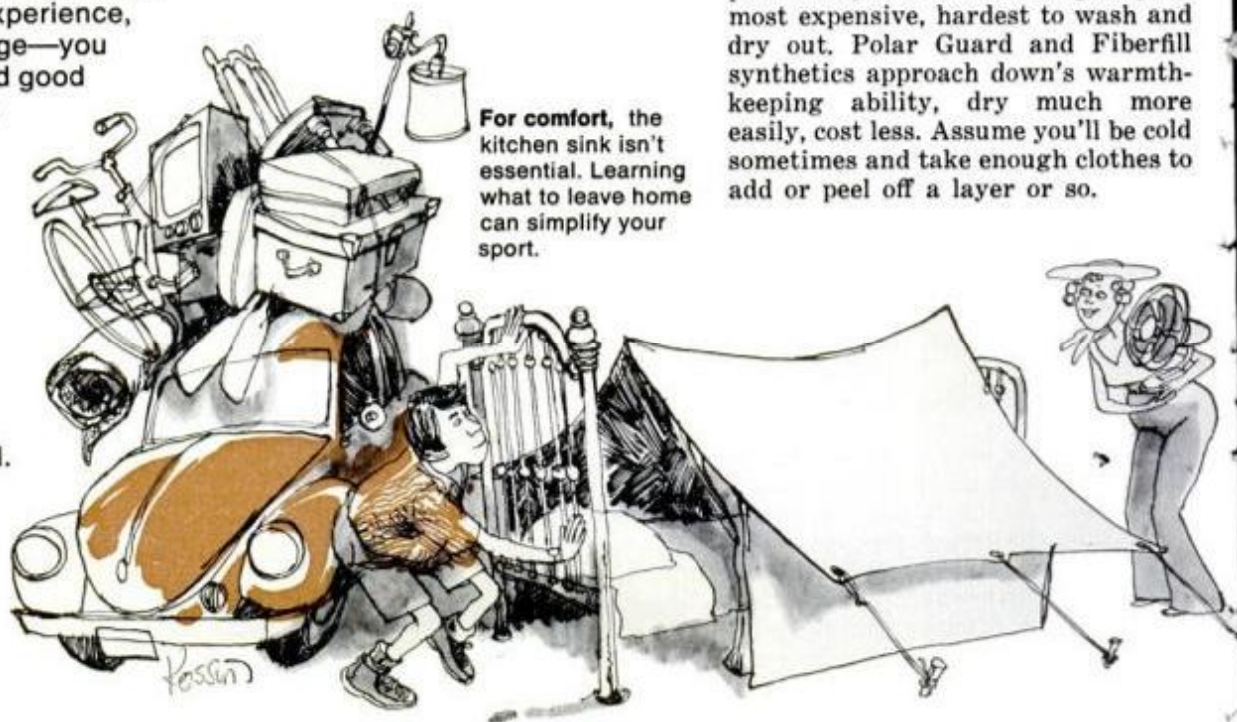


Art: Fred L. Wolff

# The answers for camping's 10 big problems

by Vic Harris

Living outdoors is different. That's its appeal, plus the source of a lot of its problems. With experience, the challenges change—you may learn how to find good campsites but arrive in the middle of a rainy spell, or get things so well organized the youngsters are bored. Check this list of solutions to major problems; the answers can solve many minor emergencies as well.



**1 Where to camp.** For first-timers, there's a special apprehension about where they'll end up for the night. At the start, pick a spot close to home, call or write for reservations, try to arrive early for a better choice of location. A letter to the tourist department of a state should get you a list of public and private campgrounds. Buy the Rand McNally (\$6.95) and Woodall (\$6.95) guides at camp and sporting goods stores to study and mark up. Use their rating systems with caution, however; a recommended campground may mean floodlit volleyball until midnight, great if you have teen-agers along and noisy if you don't. Ask the advice of other campers.

**2 What to take.** Though recreational vehicles now make it possible to travel with everything and the kitchen sink, that can make for cumbersome camping. For a start,

find a rental outfit or borrow basics from a friend. Keep two lists: one of items to take along and another of gear you see and wish you had. Change both lists as you go. Add equipment you really want, but except for first-aid kit, safety and foul-weather needs, leave home items you'll never use.

Select quality gear and study mail order catalogs like Herter's, Cabela's, Recreational Equipment, Eddie Bauer, L.L. Bean, EMS, Laacke & Joys and others for an idea of what you should budget, and buy.

**3 A good night's sleep.** Almost all the problems of the day can be handled better after a restful night in bed well protected from real and imagined discomforts. For kids and backpackers, that means at least a hip-to-shoulder pad under blankets or sleeping bag. Some adults prefer a cot that keeps them off the ground.

Avoid camping on rocky, sloping or swampy ground, and unless you are sure there will be no rain, wind, dust, cold spells, hard spots, or bugs, snakes or rodents around, consider taking along a tent or RV, bug spray, and enough bedding to keep you warm and comfortable above any lumps.

**4 Keeping warm.** Even on a mid-summer desert or tropic seashore, a raw chill can set in after dark. Best answer is the layer system: You add or remove a wool shirt, sweater, down jacket, wind shell, knit cap, extra socks and gloves to keep comfortable without sweating. Sleep in any or all of them if necessary.

Down gives the most insulation per ounce, stows most compactly, is most expensive, hardest to wash and dry out. Polar Guard and Fiberfill synthetics approach down's warmth-keeping ability, dry much more easily, cost less. Assume you'll be cold sometimes and take enough clothes to add or peel off a layer or so.

**5 Keeping dry.** Match your gear to your climate. Campers from the southwest find it hard to believe the occasional nonstop rain of the northwest or east. Boating foul-weather gear is too heavy, and light plastic wear will shred during your first walk through the woods. Choose



a large medium-weight poncho or rain jacket and chaps. Watch out for "waterproof" gear; such clothing will make you sweat and a tent could drip condensation and restrict air for breathing if tightly closed. Note how experienced campers rig rain flies over tents, tables, storage areas.

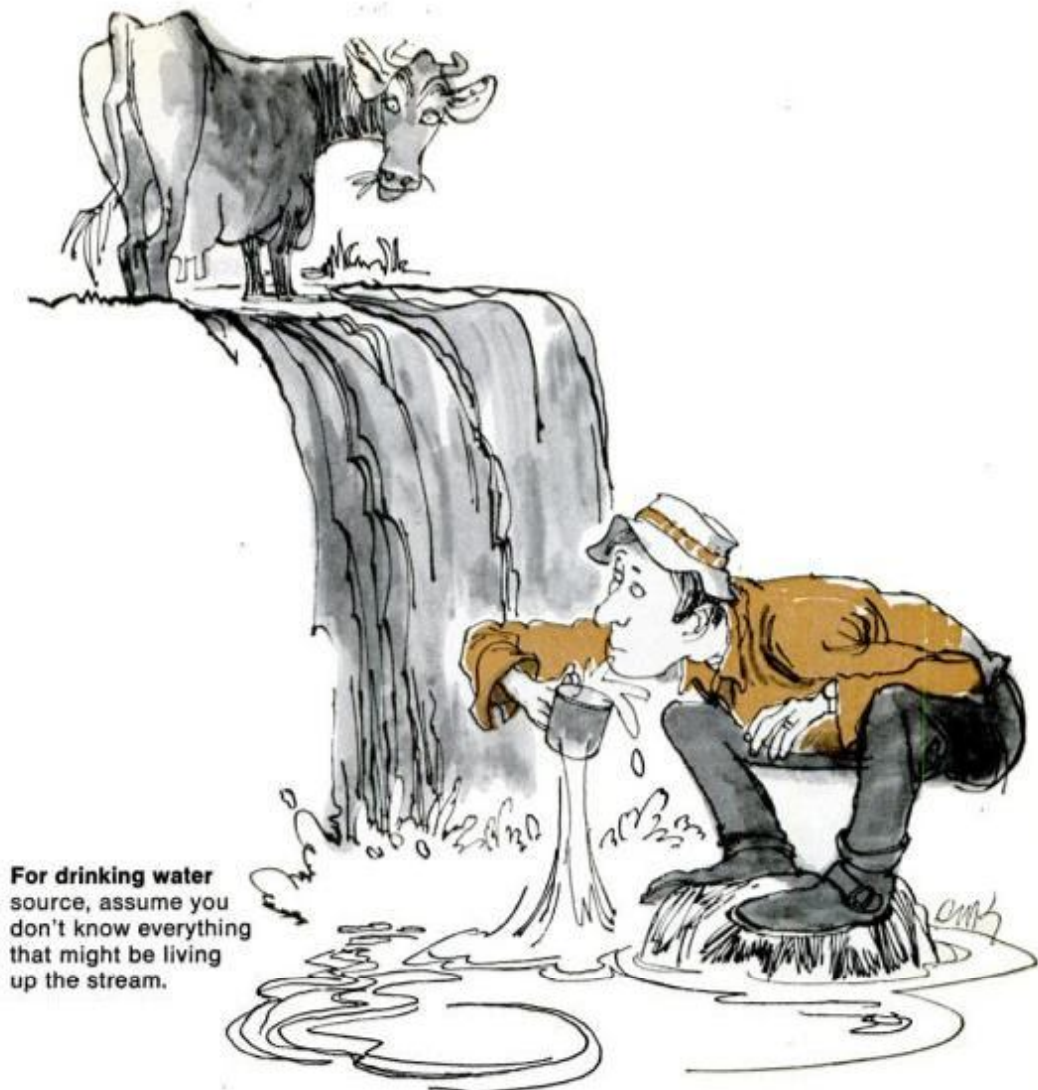
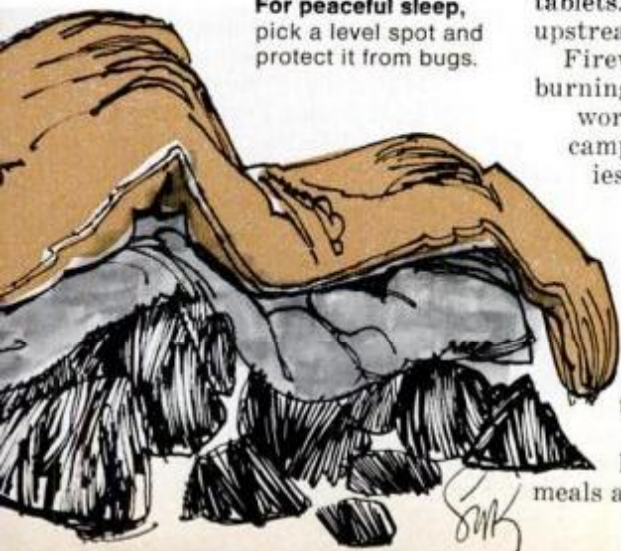
**6** **How to beat crawlers and fliers.** Few things can turn off camping fun like a cloud of no-see-ums, sand flies or mosquitoes. Avoid sheltered campsites during bug season, and take shelter behind screens and mosquito netting, long-sleeved shirts and pants and even a head net and gloves if the bugs are bad. Foggers, smudge coils, sprays and creams are getting better. Vitamins even seem to help some people.

Hornets, ticks, wasps and yellow jackets can be discouraged by strong sprays, but avoiding them is best. Good housekeeping with food and garbage well covered helps you keep from attracting flies, squirrels, raccoons, and other unwanted guests. Snakes are rare but should be avoided. Putting a hand or foot under a rock ledge or a fallen log is looking for trouble. But the average camper has never seen a poisonous snake.

**7** **Gadgets to go.** Many campers buy the best in lights, stoves, heaters, tents and fully equipped recreational vehicles and then don't try out the gear until they camp for the first time. "I was afraid it would flare up in the kitchen," they explain. Modern gear shouldn't flame up anywhere, but for that first trial you can light in in the back yard, driveway or picnic ground. Learn ahead of time how to replace a mantle, assemble the stove, prime a burner, charge batteries, fuel up, or replace an LP tank. Today's gear is easy to use, but not for a start in the dark.

Carry backup items like a few stubby candles for light, warmth and

**For peaceful sleep,** pick a level spot and protect it from bugs.



**For drinking water** source, assume you don't know everything that might be living up the stream.

cooking heat. A small LP catalytic heater can also supply safe heat.

RV owners should do particular homework with the instruction manuals for all their rolling appliances. Experience shows they should know how to service their plumbing, cooking, heating and lighting systems.

**8** **Camp cookery.** What to take to eat and drink becomes more simple with experience. Except in deserts, good water is usually available at most campsites, but it's wise to carry an emergency jug. Wilderness travelers and backpackers, however, should use water purification tablets. Today you never know what's upstream.

Firewood is seldom supplied, and burning campground trees is the worst form of vandalism. Bring a campstove instead. LP gas is easiest and safest to use; gasoline is cheapest; the little alcohol and heat tablet burners are compact for packers; charcoal is inconvenient for everymeal cooking. You can choose the same foods you favor at home, repacking them into a grub box if space is limited. For backpackers, light freeze-dried precooked meals are convenient—but expensive.

**9** **Emergencies.** Outdoor problems are half-solved when you figure good answers in advance. Get a doctor's checkup and any necessary prescriptions before you leave. Carry a well-stocked first-aid kit, and note the nearest telephone location so you can call for help if necessary.

Consider, also, the new advantages of carrying along a Citizens Band radio. Though limited in range, it can often reach someone who can relay a telephone call for aid.

**10** **The unknown.** Uncertainty is often the most worrisome problem for today's camper. Experience and a healthy respect for the wild are the basic answers. With practice, you'll find coping with camping can be relaxing fun. ★★★

#### WHAT TO TAKE

**For cars:** The camper who drives should carry along an ax, tire chains, basic spare parts and tools, tow rope, jumper cables, shovel, hand winch, blanket, flashlight, matches, water, flares, CB radio.

**For kids:** Youngsters need not rate as a major camping problem, but they can become one. Bring along a couple favorite toys, games, books, playing cards, warm change of clothes, possibly a small portable TV. Assign gear for the young ones to care for and chores for each to handle.



# Pointers for picking packs

Now you can choose a new  
backpack to carry only  
rain cape and camera —  
or lug cargo up a cliff.

by Richard Dunlop

**Y**ou don't have to be an equipment freak to be concerned about the pack for your back. The wrong one can yank you backward just when you want to lean forward into a hill to let gravity help you on a steep climb, and it can catch in the brush and hang you up just as helplessly as if you were a fly caught in a spider's web. A poorly fitted pack can give you more varieties of backaches than you ever imagined existed, and make you wish you'd stayed home despite all the fun and inspiration just waiting for packers in the great outdoors. On the other hand, you don't have to take a money's-no-object approach to achieve backpacking comfort. The idea is to match the kind of pack you use to the kind of backpacking you plan to do.

Again this year, the extensive exhibits at the National Sporting Goods Assn. trade show last month showed that there is renewed controversy over the pros and cons of soft packs, packs with frames, and which designs of each are best. You'll hear a lot of talk about inside versus outside framing, contour frames and flexible frames. Almost every one of the nation's 5-million backpacking enthusiasts seems to have his own surefire suspension theory. A little common sense discussion of the facts may help.

## In the beginning, backpacking was not recreation

From the first North American use of a pack frame by Sioux and Cheyenne Indians—even back to the vineyard workers of Europe carrying baskets of grapes—it was obvious that the frame distributed weight more evenly across the back and shoulders. As Mic Mead, president of Adventure Pack at El Cajon, Calif., explains, "It provides fixed points to attach the load to the wearer." Eventually recreational hikers took up the pack frame of the mountain men. As long ago as 1878, Henry Merriam constructed a pack and frame with good hip-suspension, something that all modern packs attempt to achieve with greater or lesser success.

In 1922, Trapper Nelson, a Seattle hiker, began to manufacture a pack frame made of spruce covered with a tightly laced piece of canvas to act as a back pad. This frame, and countless frames copied from it during the twenties and thirties by Boy Scouts and other outdoors-minded people, were popular until immediately after World War II when A. I. Kelty invented the arc-welded contoured aluminum pack frame with padded shoulder straps. To go with the frame, Kelty created a nylon pack with easy-to-get-into pockets, compartment design allowing for variable load placement and a waist that would help distribute weight more evenly on the hips. A Kelty, or a not-too-different Camp Trails, frame pack is lightweight and allows a load to be carried high and close to a backpacker's center of gravity so that he doesn't have to lean forward like a Neanderthal when he walks. These packs soon became the most popular designs used on North American trails, and they remain among the favorites today.

## Stay loose, says one designer

"Modern pack designers, however, always overlooked one critical factor," says Murray Peltz, director of research and development at JanSport in Everett, Wash. "The human body does not remain rigid while walking. Merriam had made this simple observation

when he designed that 1878 pack so that the bag and frame could move independently on the hiker's body."

One answer to the rigidity problem was the soft pack. The Germans invented the rucksack. A good rucksack fits the body well and moves with it. Eventually it replaced the American knapsack because it was suspended from the strongest part of the shoulders and thereby put less strain on the back. With most of the load on the shoulders, nevertheless, this meant muscle fatigue not only in the back but in the legs as well.

Today's rucksack is fashioned of tight canvas to make it light in weight, but since it is only a sack with a draw cord to bring the top together, its interior is usually a jumble of articles. And since it is close-fitting, it also is often too warm on the back during a hot day's hike. Pack it properly, or sharp and hard objects inside can poke and rub against your back.

### Frame up

A pack frame makes it possible to ignore placement of objects in the pack except for the usual necessity of placing heavy objects high and close to the body. Most backpackers today find the frame pack invaluable for long-distance hikes because it keeps its shape well and is easy to live out of. Not everyone agrees about its superiority, however, because soft packs are now available that control the distribution of the weight through compartmentalization. They are a far cry from a simple rucksack. Lawrence Horton of Rivendell Mountain Works, Victor, Idaho, is an advocate of the soft pack, and is blunt in his criticism of the frame pack:

"The idea of a frame was originated for the purpose of carrying heavy, awkward-shaped objects too hard, sharp or bulky to carry against one's back. They are ideally suited for carrying giant loads—75 pounds and up. In fact, if one is not carrying at least this much weight, or something like oxygen tanks, gasoline drums, or maybe pig iron, the advantages of a frame pack are questionable. They are bulky, cumbersome, heavy, fragile and expensive. Current designs, loaded with gadgetry, tend to become more and more cumbersome."

### Inside job

To Horton, it appears that the backpacking public has become so conditioned to the necessity of a frame that "when confronted with a soft pack, they have no no idea where to put their sleeping bag—no frame extends below the pack!"

The soft pack began its present popularity rise in the early 1960s when Don Jensen, a Harvard student with a penchant for climbing Alaska's peaks, worked out a design for a pack that would perform well over rugged Alpine terrain. The Jensen pack transfers much of the load directly to the hips. It is a compartmentalized shaped pack which fits snugly into the contours of the back when properly loaded. Its adherents say that its weight seems to become part of the hiker's body and that the pack does not move or sway, a very important feature in off-trail backpacking, ski touring and climbing. On the negative side, because it hugs the body so closely, it can be hot on a torrid day.

It is limp when unloaded and gains vertical shape only when it is stuffed. Many long-distance backpackers say it can be hard to live out of. Whatever its draw-

backs, however, it has been widely imitated. Rivendell Mountain Works makes the original in four lengths to insure proper fit to a hiker's back. The first Jensen pack was built to carry about 50 pounds comfortably, and held approximately 3100 cu. in. Now there is also a Giant Jensen with 4400-cu.-in. capacity, designed to carry upward of 75 pounds in competition with the biggest pack frames.

The internal frame pack is also popular with many, particularly for relatively short backpacks. It does not hug the back as well as does the Jensen soft pack, but it keeps vertical shape better when it is empty.

### Adjustable fit

This spring there is a strong trend toward pack frames that employ adjustable fittings on the shoulder level cross bar instead of arc-welds in order to make the frame more flexible. JanSport, a leader in the manufacture of frame packs employing this kind of frame, and the firm that first introduced it in 1967, claims that the "mechanically secured joints allow the frame to flex with the body's motion while hiking." High Touring, the Salt Lake City backpack manufacturer, also makes its frames adjustable.

"If the trail is long, points of wear on your body must be constantly changed to prevent sore spots. The more points of adjustment, the better," comments Frank Cunningham Jr., of High Touring.

Lowe Alpine Systems of Boulder, Colo., also makes a flexible frame that is winning much favor from veteran backpackers. LAS claims that "for the average backpacker who sticks only to established trails, the rigid design is fine. But for the advanced hiker, the extreme lack of versatility and flexibility of a rigid frame may outweigh its few advantages." LAS-designed packs are intended to offer greater versatility through rough country, when climbing or on a ski tour.

When it comes to strength, JanSport refers to multi-cycle torque tests performed by Ron Barstad and Dr. Stanley Chen of the Engineering Department, Arizona State University, that indicate their frame had not failed when the test was halted at 500 cycles, while the next strongest frame failed at 350 cycles. The Alpine Designs Adjustable Frame was also tested at Arizona, and was the only frame rated superior in quality of

*(Please turn to page 162)*



**Packs for every purpose** range from daypack rucksack (left) and soft-stuff sack pack (center) to a full frame pack (right). Three shown here are sew-it-yourself packs from Frostline.

# How does Chevy's baby stack up against the minis from abroad?

**N**ot since Powel Crosley Jr. has any American automaker pinned so much hope on so small a production automobile.

Those few owners who bought Crosleys back in the late '40s and early 1950s swore by their cars. Trouble was, there simply weren't enough buyers to keep the Crosley in business.

Today, Chevrolet has no problem finding Chevette buyers. The question becomes: Do owners of the new Chevette love and swear by their cars the way Crosley owners used to?

Economy prompted most Chevette sales—80.5 percent of our respondents list economy as their primary reason for buying. Economy also happens to be the car's best-liked feature, with 58.4 percent ranking it above all other attributes.

Handling comes in second among specific likes, with styling, comfort, and size third, fourth, and fifth in that order.

For most owners, the Chevette serves as a second car, yet over a third list it as their only set of wheels. That's a bit surprising, because owners are mostly between 20 and 40 years of age, so we assume most are married and have families.

Complaints are relatively few. Gas mileage disappointed 15.5 percent, who felt it didn't come up to expectations. Our survey indicates owners are getting 15 to 20 percent fewer miles per gallon than the EPA.

Let's turn now to random but representative comments from owners in the areas of economy, handling, performance, workmanship, comfort, repairs, dealer relations and so forth.

"I bought two Chevettas," says a South Carolina radio program director, "because I was able to do that for nearly the same monthly payments as I used to shell out for my previous Monte Carlo. With these two Chevettas, my gas bills are down. Headroom seems better than the old Monte Carlo, and

There's resonance above about 55, say many owners, but below that the car is relatively quiet.

Most Chevette owners do love and swear by their cars; a minority swear at them.

Lots of dissatisfaction with paint jobs, especially with cars sold early in the model year.

Gas mileage in real-world driving is always less than the EPA figures, and the fact that owners loaded their cars with extras doesn't help.

Detroit thought Americans would balk at column controls, but it's just the opposite. Owners think they're terrific.

no complaints from the back seat. Car B is smooth as silk; Car A has a good bit of vibration at 55 mph. Sounds like driveline resonance and is most annoying. The dealer promised to look into it."

From a Bronx legal secretary: "I especially like my Chevette's fuel economy and ease of handling. Rack-and-pinion steering is much appreciated. On the other hand, I feel the 1.4-liter engine gives insufficient pickup, and the car cannot go comfortably upwards of 55 mph. There's also a variety of body rattles, but it is easy to park and handle."

And another secretary, this one from Burton, Mich.: "Great gas mileage, easy and fun to drive, great turning ability, easy in and out of seats, quick-start engine, excellent heater, and it handles fine on snow and ice. It's a very cheap interior for the money, though, and a terrible paint job—runs, streaks, fog marks; looks amateurish."

A retired New Yorker puts it this way: "We wanted a small, economical car. I'd read that the Chevette had been sold in Brazil for some time, so most of it was tried and tested. I'd owned a 1970 VW and a 1972 Vega, and this time I wanted something smaller but American-made, with a good service network. I find the Chevette's workmanship good—doors close solidly, paint seems good, no water leaks, interior trim tight, engine compartment neat and uncluttered. On delivery, three tires leaked (no big deal), and the thermostat didn't work. The dealer repaired everything promptly, with no arguments. I especially like the small thoughtfulnesses, like dimmer on the turn-signal stalk and the inertia latch on the front seatbacks that don't make you search for the release; also the service-free ignition system."

Here's a Maryland electrician: "We went to Wisconsin and found that a 325-mile trip was no more tiring than in any other auto. Also we went through a few 6-inch drifts of snow on icy roads and found the Chevette to handle very nicely on slippery surfaces. It makes a beautiful car for around town and for shopping because of the large amount of storage. There's more space for groceries



## How PM Gets Owners Report Information

For this Owners Report, PM mailed out questionnaires to 1000 1976 Chevette owners nationwide through R. L. Polk, an independent statistical firm in Detroit. All questionnaires returned were computer-tabulated by PM's statistical service in New York. This article presents an objective view of the 1976 Chevette in actual use by average owners.





Photos by the author



A nationwide survey based on 793,615 owner-driven miles.

by Michael Lamm  
WEST COAST EDITOR

Detroit styling inside and out, good gas mileage, lots of carrying space, front-seat comfort, and acceptable quality leave most Chevette owners happy with their choice.

than in the trunk of our Buick Century sedan."

And a Virginia administrator: "No mechanical problems at all. We wanted a second car for city use with the best possible gas mileage. Great fuel economy and good handling once the engine warms up. My only major complaint is that it's hard to keep the engine running when cold, and it's also sluggish then, but maybe with more miles it'll straighten out."

An Alabama insurance salesman: "Gas mileage is not even close to advertised. I get only 24 to 26 mpg on the highway in careful driving. The dealer stinks. Once the sale was made, I was treated like they never saw me. Once they made a joke of my complaint."

A New Mexico Air Force sergeant comments, "Prior to the Chevette coming on the market, I planned to buy a VW Rabbit. While the Rabbit has several plusses like front-wheel drive and greater power, I selected the Chevette because of its lower initial price, cleaner styling, and the fact that it is, after all, the first sensible American car to come on the scene in many moons. I've owned VW, MG, Volvo and Fiat and am satisfied with everything about the Chevette except workmanship on the interior."

Then there's this hard-luck story from a Helena, Mont., teacher: "Car came with a cracked radiator, erratic shifting into reverse, and a nonfunctioning tachometer. Dealer never fixed transmission nor tach, says he can't find anything wrong. My main complaint, though, is that the engine (1.6-liter) has no get-up-and-go for the Rocky Mountains. Once car slows down going uphill, it's out of power. My 1966 Toyota had more guts than this."

A Tennessee retiree: "I bought the car to save on gas, and I really like the way it performs. I've had it up to 70 mph passing trucks on the highway, and it's real smooth and gets up to speed fast. When I got it, the transmission had two leaks. They told me to bring the car in at opening time, and I did, and they got to it right away, and I didn't have to wait long, and they were very nice. I also had a tire losing air, which they



Chevette's 1.6-liter ohc Four has cast-iron block, 60 bhp, peaks relatively quickly with standard 4.1 axle.

Several Chevette owners would have preferred fwd. Ford's 1977 subcompact, the Fiesta, will have it.

Most owners weren't so impressed with acceleration.

A fair number of radiator leaks, some requiring replacement of the whole unit.

No doubt that quite a number of Chevetttes were bought in protest against the imports.

fixed, too. My two grandchildren ride in the back and are very comfortable. It's a fuel saver with quick getaway, easy steering, quick stopping, and great for getting into small parking spots. I like the seat belts—they let me move my shoulders—and all the controls on the turn-signal lever."

An 18-year-old Louisiana secretary writes, "It's the perfect size for a single person, with a style of its own. At first I wanted a classier car, but I'm happier now because of the money I save. Except for a radiator leak, no problems."

From an Indiana horticulturist: "The mixture of metric and regular nuts causes some confusion for mechanics. Dealers are short on parts. Workmanship seems excellent, but I don't like the plastic glovebox door. I've never been happier, though, with any new car I've purchased."

A California bicycle mechanic: "The Chevette has the styling inside and out like the big boys, not like a tin-can import. I bought the car for that reason plus gas mileage, size, space to carry things, and the fact that it's made in the good old U. S. of A."

A Colorado Springs airconditioning installer: "I have the Woody version with 1.4-liter engine and manual trans. It needs a better job of bonding the fake wood to the metal; same with interior trim and rain gutters. It's

(Please turn to page 172)

## Summary of 1976 Chevrolet Chevette Owners Reports\*

<b>Total miles driven</b> 793,615	<b>Styling</b> 8.5	<b>Dealer service attitude:</b>	<b>Good to excellent</b> 91.6%
<b>Average miles per gallon</b>	<b>Price</b> 7.2	<b>Good to excellent</b> 60.3%	<b>Fair to poor</b> 8.4
1.4-liter engine		<b>Average to poor</b> 39.7	<b>Rear seat</b>
In town (EPA, 28 manual) 25.4	<b>Specific likes:</b>	<b>Had any mechanical trouble?</b>	<b>Good to excellent</b> 39.6%
Long trips (EPA, 40 manual) 32.0	<b>Economy</b> 58.4%	<b>Yes</b> 63.3%	<b>Fair to poor</b> 60.3
1.6-liter engine	<b>Handling</b> 54.3	<b>No</b> 36.7	<b>Number of vehicles owned:</b>
In town (EPA, 30 manual) 23.5	<b>Styling</b> 22.0	<b>What type of trouble?</b>	<b>Chevette only</b> 33.8%
Long trips (EPA, 39 manual) 29.9	<b>Comfort</b> 18.9	<b>Oil leaks</b> 19.7%	<b>Two cars</b> 52.4
<b>Models owned by respondents:</b>	<b>Size</b> 11.0	<b>Electrical</b> 12.2	<b>Three cars</b> 10.3
<b>Woody</b> 3.9%	<b>Specific dislikes:</b>	<b>Transmission</b> 11.2	<b>Four or more cars</b> 3.5
<b>Rally</b> 5.3	<b>Poor gas mileage</b> 15.5%	<b>Brakes</b> 10.1	<b>Makes of other cars owned:</b>
<b>Sport</b> 5.6	<b>Ratt'les</b> 13.7	<b>Shifting</b> 6.9	<b>Chevrolet</b> 36.5%
<b>Coupe</b> 78.9	<b>Lack of power</b> 9.7	<b>Did you repair it yourself?</b>	<b>Oldsmobile</b> 15.3
<b>Scooter</b> 6.3	<b>Poor workmanship</b> 5.4	<b>No</b> 93.6%	<b>Pontiac</b> 12.2
<b>Engines in above cars:</b>	<b>What changes would you like?</b>	<b>Yes</b> 6.4	<b>Ford</b> 10.6
1.4-liter Four 66.1%	<b>Better gas mileage</b> 8.2%	<b>Dealer repairs satisfactory?</b>	<b>Volkswagen</b> 6.3
1.6-liter Four 33.9	<b>Different seat shape and size</b> 7.5	<b>Yes</b> 59.9%	<b>Age distribution of owners:</b>
<b>Transmissions:</b>	<b>More legroom</b> 7.1	<b>No</b> 40.1	<b>15-29 years</b> 32.7%
<b>Manual four-speed</b> 71.9%	<b>More power</b> 6.7	<b>Workmanship opinion:</b>	<b>30-49 years</b> 42.4
<b>Automatic</b> 28.1	<b>Fewer rattles</b> 5.2	<b>Good to excellent</b> 65.9%	<b>50 and over</b> 24.9
<b>Why did you choose the Chevette?</b>	<b>Wider gas pedal</b> 5.2	<b>Fair to poor</b> 34.2	<b>Would you buy another Chevette?</b>
<b>Economy</b> 80.5%	<b>Dealer sales policy</b>	<b>Comfort opinion:</b>	<b>Yes</b> 67.5%
<b>Size</b> 18.1	<b>Good to excellent</b> 67.1%	<b>Front seat</b>	<b>No</b> 32.5
	<b>Average to poor</b> 32.9		

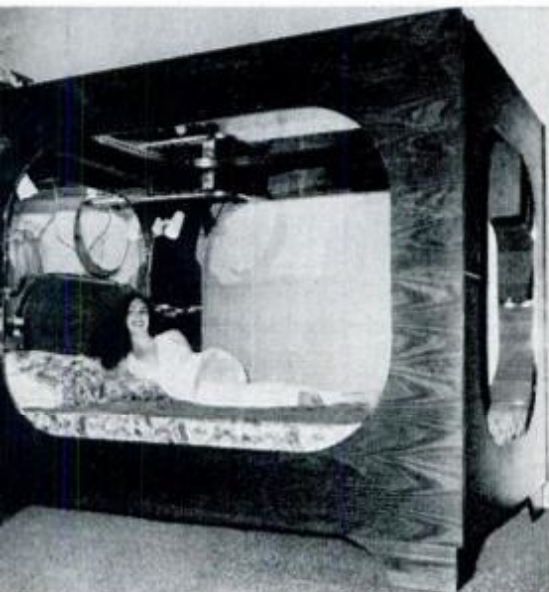
\*Percentages might not equal 100% due to rounding or insufficient data.

# IT'S NEW NOW

## Now it's a jelly bed and sleep box—with built-in sound

How do you top a water bed? With a jelly bed, what else? This latest in far-out mattresses is filled with a jellylike substance said to provide the same squishy sensuousness as a water bed but with a firmer, more comfortable support. What's more, it's one-third the weight of a water bed and can't spring a leak. Gel Bed can be bought separate-

ly or teamed up with what looks like a modern version of the old four-poster (left, below). Sleep Box contains such luxury appointments as mirrored ceiling, lights and stereo or quad sound. Gel Bed is from Robinson Systems, 69 S. Devoe Ave., Yonkers, N.Y. 10705. Sleep Box from Loftcraft, 120 W. 20th St., New York, N.Y. 10011. From \$625.



## Portable picks up CB—and more

Citizens band is one of six radio bands you can hear with this new portable from Panasonic. Tech 1000 tunes in all 23 CB channels, plus AM, FM, shortwave (in two bands from 3.9 to 30 MHz), and the 1.6 to 3.9 MHz marine band. Other features include switchable AFC and local/distant sensitivity, a beat-frequency oscillator (BFO) for single-sideband and CW (Morse-code) reception, two antennas (including a gyro antenna for AM/MB and a whip type for the remaining bands), fine tuning, a tuning meter, a 6½-inch speaker and separate bass and treble tone control. \$130.



## Kodak cans the can opener

You don't need a can opener to open Kodak's newest package. Scissors will do the job for snipping off the corners of packets containing powdered chemi-

cals for black-and-white work in the darkroom. A variety of developers, fixers and other chemicals used in film and paper processing now are available.



## Keys to a good TV picture

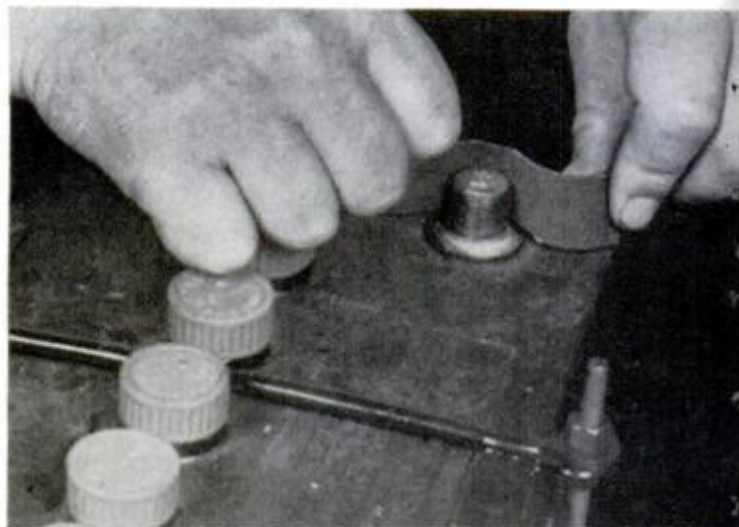
That's not a calculator—it's the remote control from an RCA ColorTrak television set. You just punch in the digits of the desired channel number. With the remote, you can also adjust the color, sound and switch the set on and off, as well as get the time flashed on the screen. Set performance looks very good in demonstrations. ColorTrak has a new TV tube and new contrast and color-control circuits.

# How to take care of



Battery terminals and cables that are dirty or not tight cause most no-start problems. Use wire brush tool to clean terminals (as shown above) and posts.

Sandpaper is an effective substitute for a battery wire-brush cleaning tool if you don't have one.



The starting system in your car has to crank the engine at a speed fast enough for it to start. If it's cranking too slowly or not at all, you've got a problem.

## Major parts of starting system

As shown in the drawing on the opposite page, all starting systems have two major parts: battery and starter motor. In addition, most have a starting relay that connects the battery to the starter motor, but in some cases you will find that the battery is connected directly to the starter motor.

A fourth component, the neutral-start switch, is found in starting systems of most (not all) cars having automatic transmissions. You will have to check your car to see if you have one.

Cars with manual transmissions usually do not have neutral-start switches.

## Sounds to listen for

Some starting-system components are less likely to cause trouble than others. The starting relay, for instance, is less likely to break down than the battery, but it's more likely to fail than the starter motor. Cables are more likely to cause trouble than all other starting-system parts except the battery.

You can usually judge which components are causing a problem by listening to the way an engine *doesn't* start. Let's sum it up this way:

■ **If you hear a "clicking" sound** as you activate the ignition switch or the engine cranks too slowly to start, examine and/or test battery cables,

battery, starting relay and starter motor in that order.

■ **If the starter motor spins** (whines), but the engine won't crank, remove the starter motor. There is probably a malfunction in the drive-gear assembly.

■ **If the starter motor engages** ("clunks"), but won't crank the engine, remove starter from the car to test for open and short circuits.

■ **If you get absolutely no sound** as you activate the ignition, test the neutral-start switch, and then if that doesn't help, the battery cables, battery, ignition switch and wiring.

## A troubleshooting procedure

You should, of course, have some logical approach to starting-system troubleshooting if you're to uncover and repair the cause of the problem quickly, easily and inexpensively as possible. The following outline, we feel, offers a sensible procedure:

**1. Examine battery cables** for integrity and cable connections for corrosion and looseness. Let's not gloss over this step with a single sentence as many manufacturers' service manuals do. It's too important.

The starter motor converts electrical energy provided by the battery to mechanical energy. To crank the engine fast enough so it can start, the starter motor needs every bit of current it's supposed to get.

If resistance in the starting circuit reduces the amount of current available to the starter motor, the starter motor can't do its job. As you might guess, the major cause of resistance is battery cables which have seen better days.

Resistance increases when cable connections loosen or get covered with acid salts. Perhaps your starting problems can be easily overcome just by disconnecting the battery's negative (ground) cable, and cleaning acid salts from the battery post and from the cable terminal.

Leave the ground cable disconnected and remove the positive cable for cleaning. Reconnect the positive cable, making sure it is connected tightly. However, don't tighten it with all your might. You may distort the battery post.

If the cable won't tighten securely, the terminal may be chewed up. In this case, replace the cable.

Turn your attention to the starter motor, cleaning and tightening cables. This end of the starting system is frequently neglected, and may be at the root of trouble.

Now, reconnect the battery's ground cable, securing it to the negative post.

While you are doing all this, keep an eye peeled for broken cables. Flex cables back and forth to see if any break in insulation is revealed. Cables break most often just behind terminals. Replace a broken cable with a new one.

**2. Check the battery**—it is the heart of the starting system. Most starting failures are caused by weak ones. However, it's also true that too many batteries still in good shape are discarded when starting problems occur.

Since a new battery costs \$30 or \$40, you ought to make very sure the old one is bad before throwing it away. Making sure is simple enough, but you will need a battery hydrom-

# your starting system

by Mort Schultz



Replace terminals on starter motor posts after cleaning, making sure that they are tightened securely.

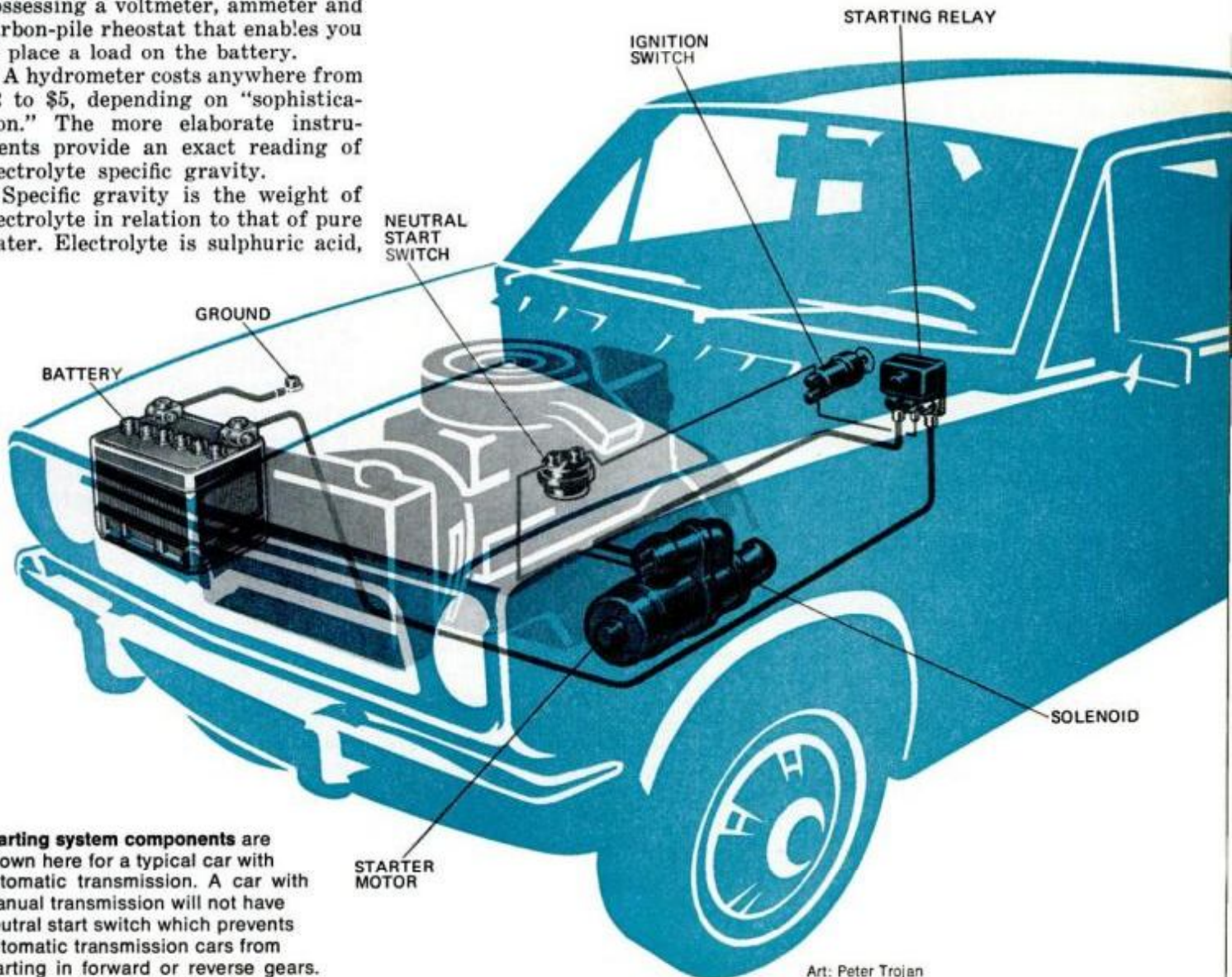


Starter motor terminals must also be clean and tight to prevent current loss and possible no-start problems. Remove terminals and clean with sandpaper.

eter and a battery-testing instrument possessing a voltmeter, ammeter and carbon-pile rheostat that enables you to place a load on the battery.

A hydrometer costs anywhere from \$2 to \$5, depending on "sophistication." The more elaborate instruments provide an exact reading of electrolyte specific gravity.

Specific gravity is the weight of electrolyte in relation to that of pure water. Electrolyte is sulphuric acid,



Starting system components are shown here for a typical car with automatic transmission. A car with manual transmission will not have neutral start switch which prevents automatic transmission cars from starting in forward or reverse gears. Locate these starting-system components on your car.

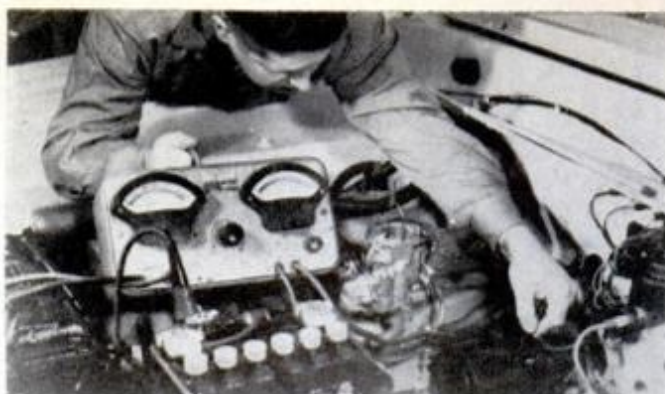
Art: Peter Trojan



**Battery is put under load** using a voltmeter and ammeter with carbon pile rheostat. Instrument can also be used for checking starter-motor circuit and the charging system.

**Starter motor must be removed from car** if your troubleshooting has isolated the problem to the motor. Here, motor is bench-tested for internal short circuits with an instrument called a growler.

**Voltmeter can be used for checking cable resistance.** Here, measurement is made between the battery and starter motor. A voltage reading of 0.1 or more indicates excessive resistance. Install new cables and recheck.



which weighs about two times as much as water.

A more expensive hydrometer also possesses a scale that compensates for temperature. Electrolyte readings have to be interpolated for a temperature of 80°F; if a temperature compensator is not included in the instrument.

Less expensive hydrometers measure specific gravity "by color." If electrolyte level falls in the green zone, the battery is assumed to be adequately charged. If it falls in the yellow zone, charge is questionable. If it falls in the red zone, the battery is discharged.

The more accurate hydrometer is worth the extra few dollars. On top of everything else, it allows you to detect if a battery has a dead cell. The "color-coded" hydrometer will not do this.

This dead-cell business is important. After taking and comparing hydrometer readings of all cells, if you find that one reading is .050 specific gravity points less than any of the others, it means the cell is shorted and the battery should be replaced to clear up your starting problem.

### Using the hydrometer

Follow these rules when you check specific gravity:

- **Make sure the hydrometer is clean** inside and out to assure getting an accurate reading.
- **Don't take readings right after**

adding water to the battery. Water should be thoroughly mixed with electrolyte by either charging the battery for at least 15 minutes at a rate that will be high enough to cause gassing or by driving the car for a half hour.

- **Hold the hydrometer straight** and draw in just enough electrolyte from a cell so the float rides free. Hold the instrument at eye-level to take the reading. Disregard the slight curvature formed by the electrolyte resting against the float when you take readings.

- **After taking and recording** a reading from one cell, return electrolyte to that cell and proceed to the next cell.

- **If your hydrometer is equipped** with a built-in temperature compensator, draw electrolyte into the hydrometer from a cell; then discharge electrolyte back into the same cell. Do this a few times to stabilize temperature in the hydrometer before taking the final reading.

- **If your hydrometer does not have** a built-in temperature compensator, insert a thermometer into the battery's middle cell and note the stabilized reading. After taking hydrometer readings, make calculations as follows: For every 10° above 80°F, add four (.004) specific gravity points; for every 10° below 80°F, subtract four (.004) points.

- **If you drop electrolyte on the car,** your skin or clothing, wash it off im-

mediately with baking soda solution. Electrolyte is highly corrosive. If you accidentally get some in your eye, flush with water and consult a physician at once.

A fully charged battery has an overall specific gravity of 1.260-1.280. If specific gravity is less than 1.230, charge the battery using a slow (trickle) battery charger. Determine if there is an increase in specific gravity after charging.

If you are not able to get your battery up to a specific gravity of at least 1.200 in all cells, it is finished and should be replaced.

### Putting the battery under load

Another battery test you should perform, whether or not specific gravity meets standards, is the so-called load test. It reveals whether the battery is able to deliver sufficient energy to the starter under the load imposed on it by starting. Do this test as follows:

- **Warm up the engine.** Take a temperature reading of the battery electrolyte. Electrolyte should be 70° to 80° for this test.

- **Remove the battery cables** from posts—ground cable first.

- **Connect the battery tester** to the battery posts.

- **Adjust the carbon pile rheostat** to provide a reading on the ammeter that is three times the ampere/hour rating of the battery. (The amp./

(Please turn to page 180)

# How to repair fancy picture molding

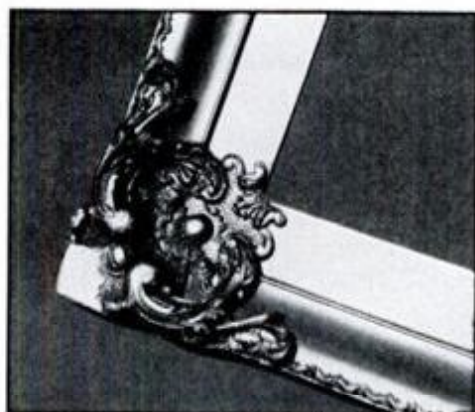
by Robert S. Topper

**O**rnate picture frames with fancy overlays can be repaired even if much of the composition overlay is missing. All you need is one overlay intact or partially intact and repairable. The frame shown had corners which were badly damaged but one of them could be repaired by building it up with water putty so that a mold could be taken of it to recast the other three.

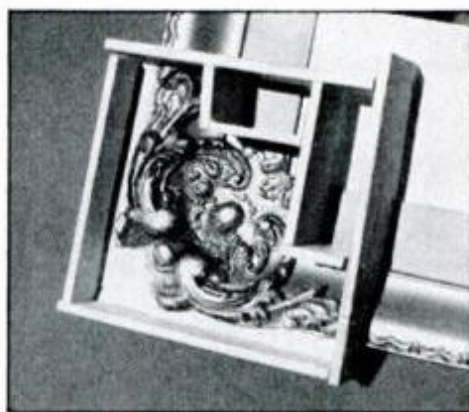
After the corner is repaired, it's surrounded with a wood form. I used InstaMold (available at craft stores) to fill the form. It's a powder you mix with water to a fairly thin consistency so it can be brushed into crev-

ices and valleys of the overlay without leaving air pockets. It dries in approximately 30 minutes, after which the form can be removed. Remove the form first, then gently lift off the mold.

I used Durham's water putty which dries rock hard. I mixed it to a thick cream and poured it into the mold. Then I placed the frame corner upside down on top of the mold, pressed down to force out excess putty and left intact for 12 hours. When you lift off the mold, a facsimile of the missing overlay remains which is difficult to tell from the original. ★★★



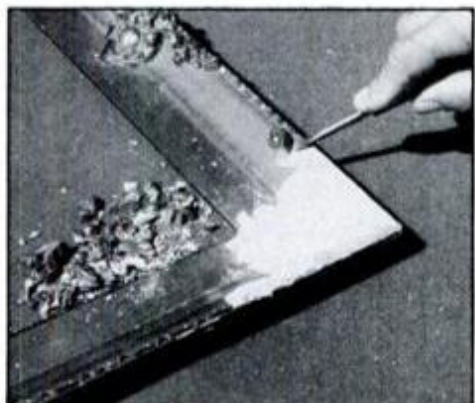
1. Rebuild the partially missing corner as close to the original as possible with water putty. Let this dry about 30 minutes.



2. Assemble wood frame around the corner overlay, fit as close to picture frame as you can and dam with wet paper wads.



3. Mix casting powder with water, fill mold, let it harden 12 hours, then carefully lift casting from the frame overlay.



4. Chip off old overlay to bare wood. Then make undercuts with chisel to help anchor new overlay casting to the frame.



5. Pour water-putty mixture into inverted mold level with top. Mix putty until it reaches the consistency of thick cream.



6. Place filled mold right side up under face side of the frame corner, press down frame into wet putty to force out excess.



7. If more than one corner needs to be replaced, continue to use the mold since it shrinks as it becomes thoroughly cured.

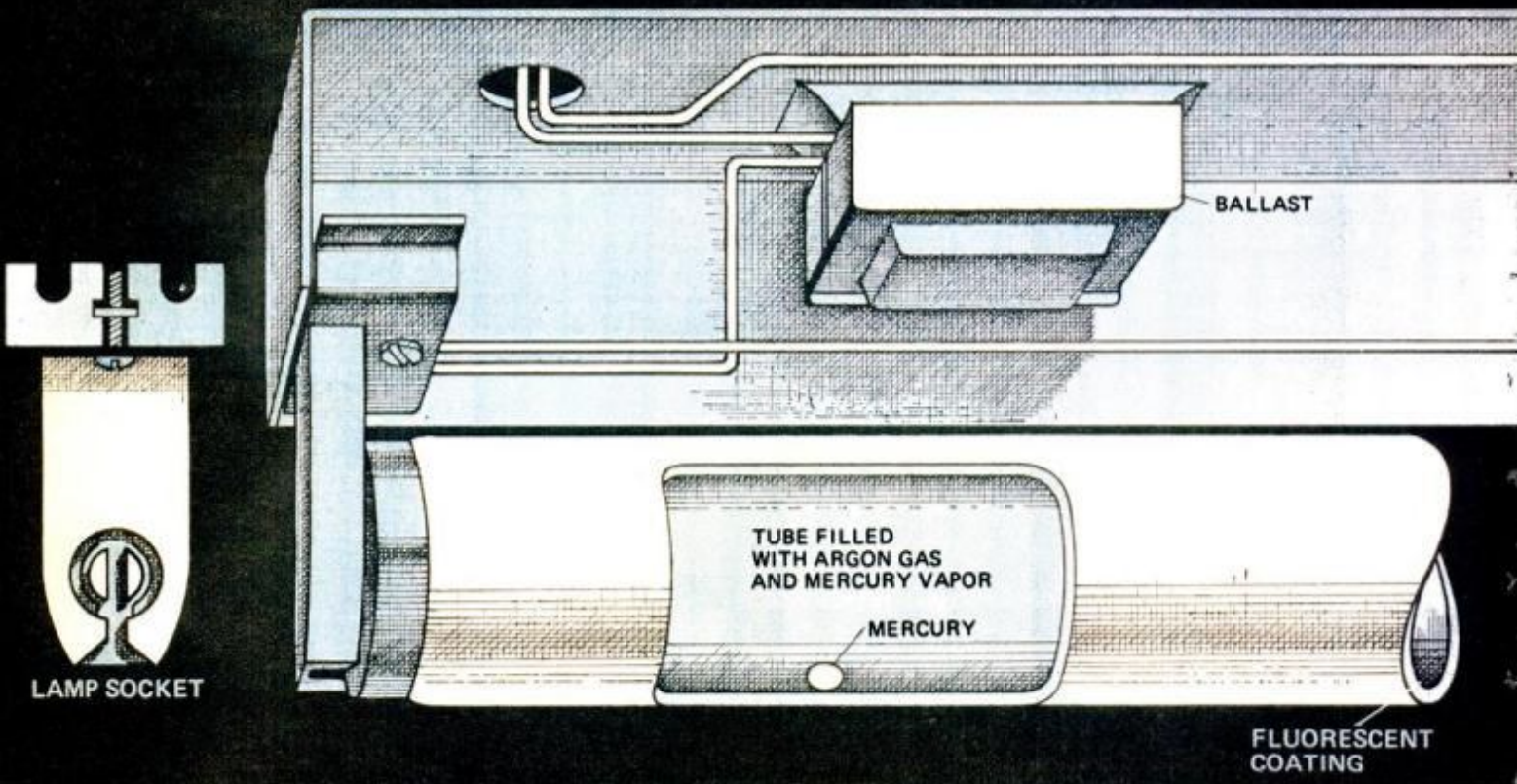


8. When this much of embossed overlay is missing, the overlay must be replaced with a new casting. It's beyond repair.



9. Coat new overlay with clear sealer (Deft), wipe frame with a lacquer thinner, then spray entire frame with a gold paint.

# What you should know



by Ed Franzese

The fact that it saves energy—as well as money—makes fluorescence an increasingly popular alternative to incandescence in office and home. Energy-saving fluorescent lamps give two to four times as much light per watt of power as incandescent bulbs. They also have low surface brightness. Unlike incandescent lamps, which are bright in just a single spot, fluorescents have a lower brightness over a larger area, resulting in fewer shadows, less eyestrain and better light distribution.

## Two styles available

Tubular in form, fluorescent lamps are usually called tubes and come in straight and circular styles. Straight fluorescents vary in length from 4¼ to 96 in. and from 4 to 215 watts. Circular fluorescents are known as Circlarc or Circline lamps and are available in outside diameters of 8¼, 12 and 16 in. with popular powers of 22, 32 and 40 watts.

The ends of each tube contain a cap with two terminals as shown above. These terminals connect to an internal tungsten filament inside each end of the tube. Inside the tube is a small amount of argon gas and a drop of mercury; the inside surface

*(Please turn to page 140)*

## Blackening

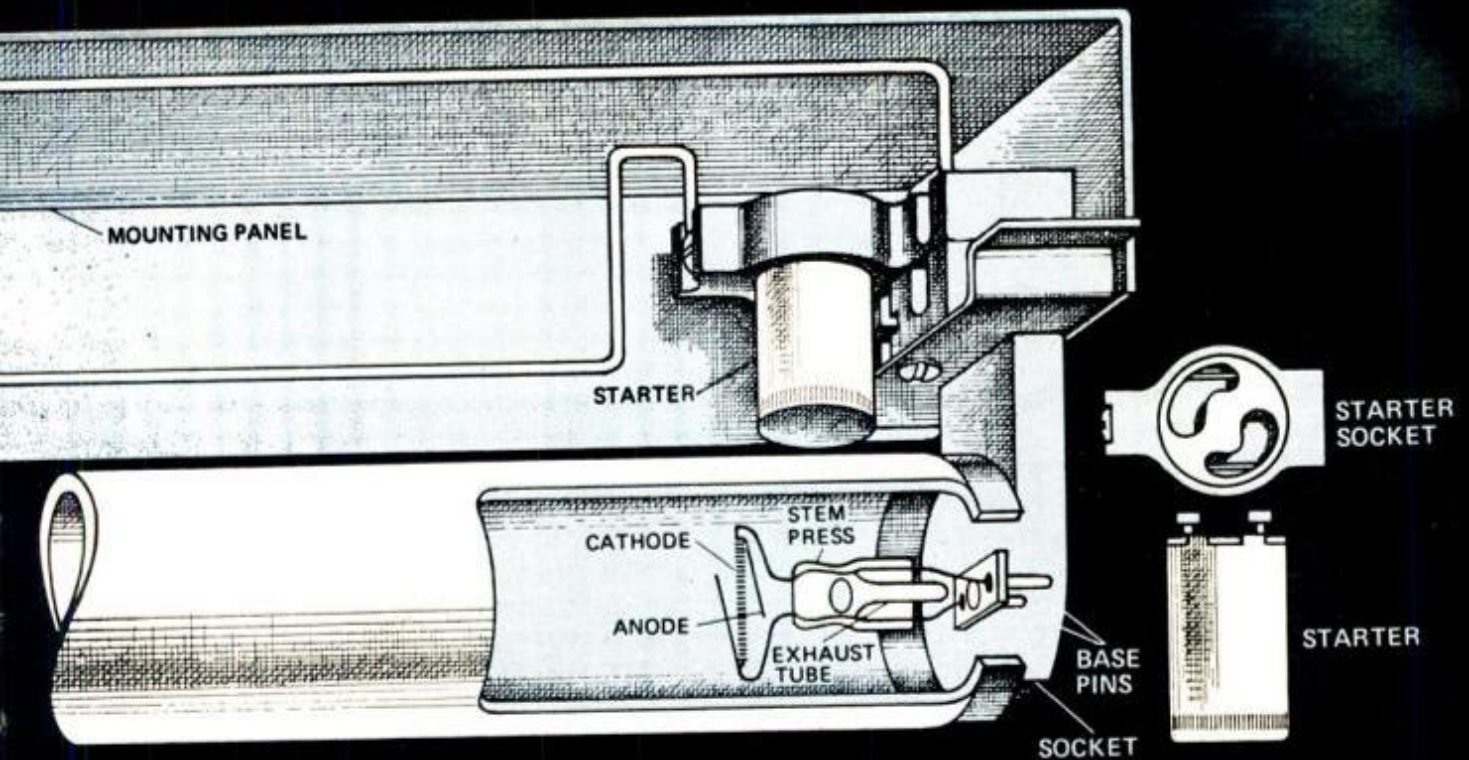
POSSIBLE CAUSES	WHAT TO TRY
1. Mercury deposit inside of tube.	Normal.
2. Lamp failure.	Replace lamp.
3. Frequent starting.	Limit number of times lamp is turned on and off. Allow three to four hours of lamp operation.
4. Wrong-size ballast.	Check fluorescent specifications.
5. Low line voltage.	See "Lamp slow in starting," page 140.

## Swirling and spiraling inside of lamp

POSSIBLE CAUSES	WHAT TO TRY
1. Lamp failure.	Replace lamp.
2. Improper or defective starter.	Check starter against fluorescent lamp circuit specifications. Replace defective starter.
3. Wrong-size ballast.	Check fluorescent specifications.
4. Low line voltage.	See "Lamp slow in starting," page 140.

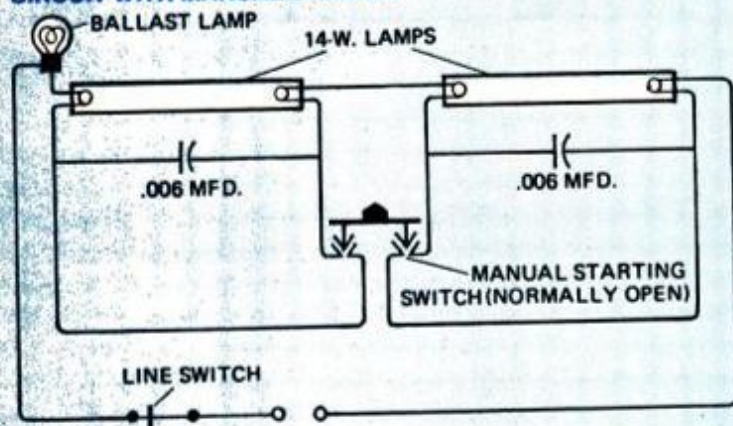


# about fluorescent lamps

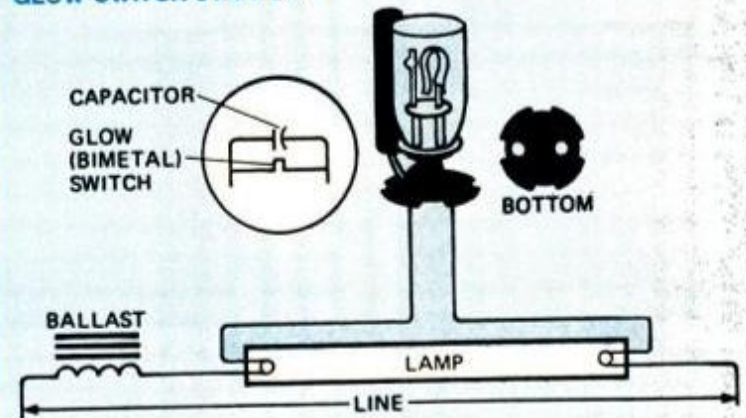


Art: Adolph Brotman

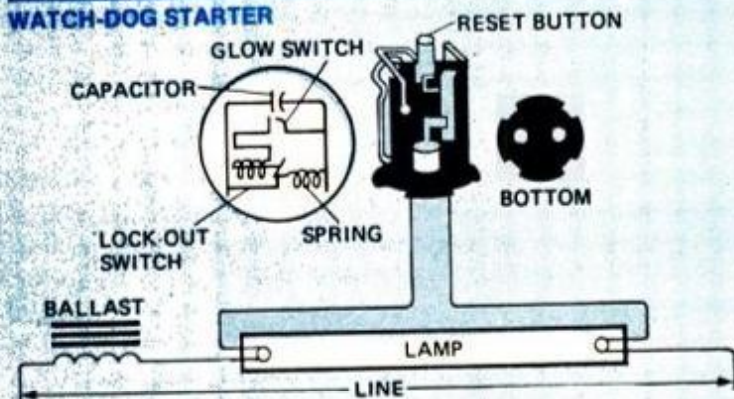
## CIRCUIT WITH MANUAL STARTER



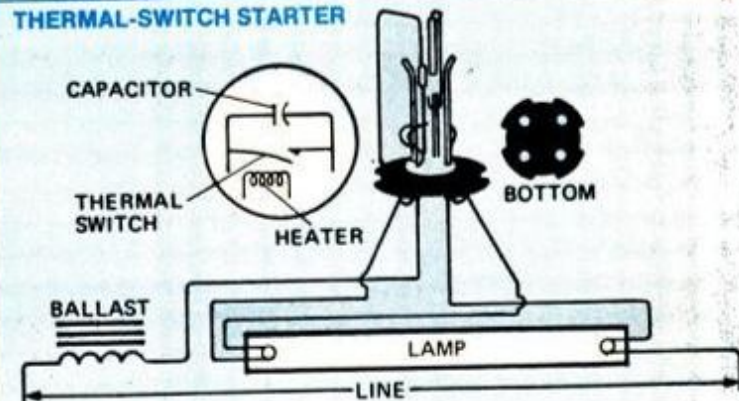
## GLOW-SWITCH STARTER



## WATCH-DOG STARTER



## THERMAL-SWITCH STARTER



Four different starter circuits available for use with fluorescent lamps are shown above. When you "turn on" a fluorescent light by throwing a line switch, the circuit is closed, but the light does not appear immediately. The

job of the starter element is to hold up the flow of an electrical current until it has heated the two filaments in each fluorescent lamp on the circuit to their proper temperature. The delay may take a second, more or less.

# HOW TO READ A HOUSE

Use this guide to diagnose the symptoms of decay in your house and prescribe the remedy.

by Mike McClintock  
ASSOCIATE HOME AND SHOP EDITOR



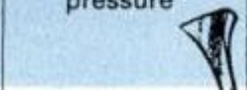
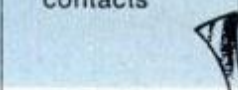






**Y**ou can read your house the way a doctor reads X-rays. He knows what to check, and you can too if you know how and where to look. For instance, if rain starts dripping through the ceiling, you can figure on repairing or replacing the roof. But if you knew how to read your shingles and flashing, you would know when to replace your roof before it started leaking. Maintaining gutters by cleaning out the leaves should extend their life. But when you see rust spots along the trough, you can bet that before long the water will be emptying there instead of at the downspout.

Reading some vital signs will save you money on repairs. Recognizing others may prevent a catastrophe. How long has it been since you had your furnace checked? Most manufacturers recommend annual maintenance. This is particularly crucial in older units that are not burning efficiently. They are more likely to have faulty burner nozzles, cracked flues, or accumulated deposits in the vent system. I found this out the hard way shortly after we moved into our house and suffered a furnace puffback. No combustion process is totally clean, and little by little, soot and ash deposits had accumulated along the metal exhaust duct leading to the flue. Apparently there was such a backlog that deposits had built up from the ashpit all the way back to the top of the heat exchanger. Luckily we were home when the whole vent system ignited and I was able to contain the fire inside the duct. But what a mess to clean up!







This is one case where an ounce of prevention may save your entire house. These charts aren't maintenance manuals, but they will help you locate trouble spots before they become disaster areas. ★★★

## MECHANICAL




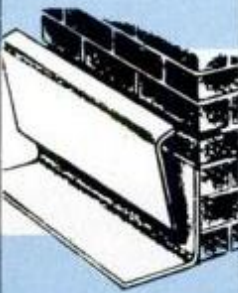


Art: Bill Rudrow

MATERIAL	NEW	LIFE	WORN	SYMPTOMS	RESULTS
<b>Flues</b>		Indefinite (if cleaned)		Soot deposits Cracked masonry	Puff-back Leaks
<b>Water pump</b>	Steady pressure 	5 yrs.	Corroded contacts 	Off and on pressure	Burned out pump
<b>Water heater</b>		10 yrs.		Low pressure Sediment in water	Rusted-through tank
<b>Fuses</b>	Clean face 	Indefinite (no overload)	Burned face 	Blow frequently Overloaded circuit	Possible fire
<b>Electrical plugs</b>		Indefinite (not moved)		Frayed wires Cracked insulator	Possible fire

## INTERIOR

MATERIAL	NEW	LIFE	WORN	SYMPTOMS	RESULTS
<b>Floor finish</b>		3 yrs.		Dull spots Heavy scratches	Splinters Cupping
<b>Paint</b>	Flat skin	5 yrs.	Peeled	Cracking Brittle edges	Wall board deteriorates
<b>Wallboard seams</b>		May open after first heat cycle		Ridging Nails popping	Bad appearance
<b>Doors</b>	Even fit	May move as new house settles	Latch misses strike	Hinges bind Door rubs jamb	Won't close May warp
<b>Bath tile</b>		8 yrs.		Cracks in grout Leaks outside tub	Tiles will fall

## EXTERIOR

MATERIAL	NEW	LIFE	WORN	SYMPTOMS	RESULTS
<b>Shingles</b>		10 yrs.		Edges curled Stone worn off	Leaks
<b>Paint</b>	Flat skin	5 yrs.	Peeled	Cracking Brittle edges	Siding decay
<b>Flashing</b>		10 yrs.		Masonry cracked Protruding nails	Leaks
<b>Sills</b>	Sealed	Indefinite (if protected)	Split	Paint peeling Caulk eroded	Rot
<b>Caulking</b>		Indefinite (if butyl)		Cracking Dried and brittle	Leaks Rot

# Old-world workbenches: The ultimate shop tools

by Mike McClintock  
ASSOCIATE HOME AND SHOP EDITOR



Photos: Tom Grill

Front vise (right) has 22-inch bearing against bench. Nylon shoulder clamp (far right) fits into slotted bar (at any height) clamped into tail vise.



Материал, защищенный авторским правом



### SWEDISH CRAFTSMAN BENCH

This bench is loaded with good features. The rugged side vise has a heavy-duty nylon shoulder that swivels to hold angled shapes securely. A row of bench-stop holes (used with the tail vise) can hold long work up to 57 inches. If you need the storage space, the five tool drawers and a large cabinet make this just the bench for you.

Photos: Dick Frank

**G**etting one of these workbenches for your shop is like getting a Rolls-Royce for use as the family car. They have more strength than you'll ever need and more durability than you'll ever wear away—really an artisan's heirloom that you can pass on to your children.

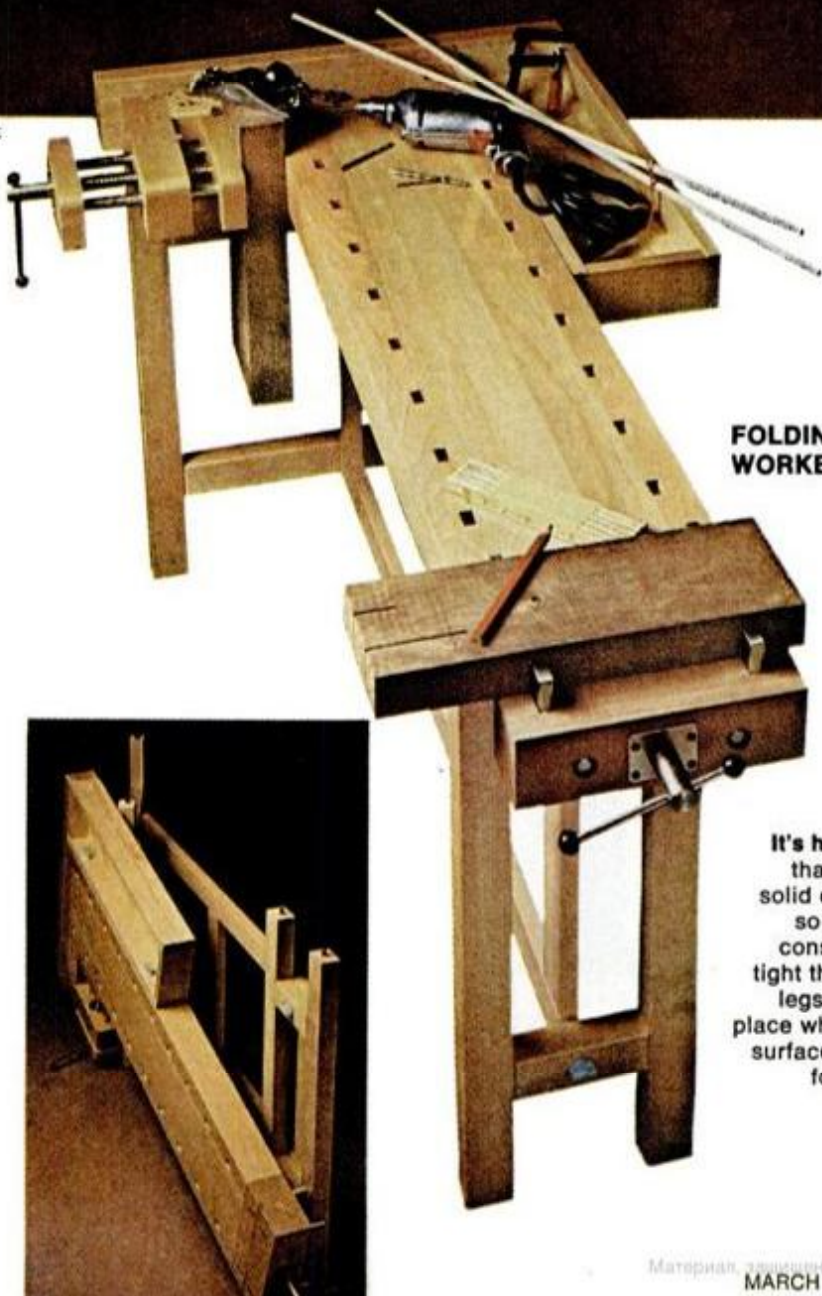
### Vise with a Superman grip

I was working on a claw-and-ball stool leg and had it clamped between two bench dogs. A quarter turn on the tail vise applied enough torque to lock it in place. The vise has so much strength that I was able to raise the whole end of the bench off the ground by lifting the clamped leg. Any piece of wood, even one requiring heavy mallet and chisel work, will stay locked in place. It will break in half before it slips out. Working with this bench is like having an extra pair of very strong hands.

The bench dogs can be fitted into holes along the full length of the table, including the tail vise. The bench shown at left can hold work up to 81 in. long. The combination of vises including the shoulder vise accessory (left inset) lets you set the work securely in the best and most comfortable position.

### A tradition of excellence

This kind of strength and versatility comes from a long heritage of

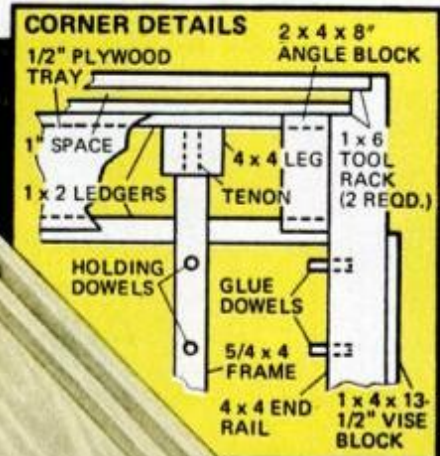


### FOLDING WORKBENCH

**It's hard to believe** that a bench this solid can fold down so flat (left). The construction is so tight that the hinged legs are locked in place when the bench surface is set on the four steel pins.

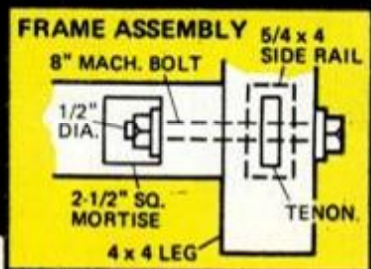
# PM's guide to workbench assembly

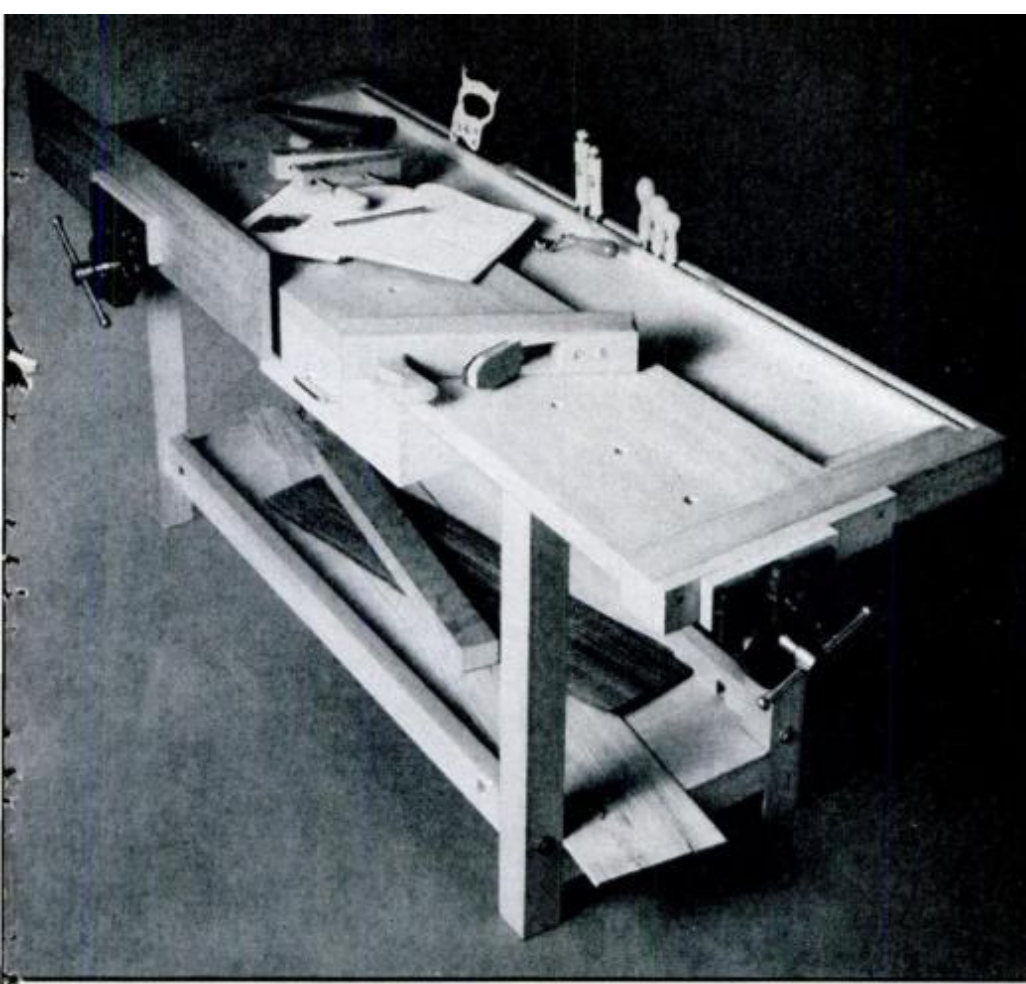
You can use this plan to make a strong, durable frame. Incorporate features from other benches shown to custom-build your own superbench.



**ASSEMBLY GUIDE**

<b>Framework</b>	
Legs	4x4x30"
Front stretchers	5/4x4x69"
Side stretchers	5/4x4/25"
<b>Tool platform</b>	
Ledgers	1x2 stock
Surface	1/2" plywood
<b>Work surface</b>	
Table	2 1/2 x 13 x 79"
Bench-stop holes	3/4" dia. 12" o.c.
End rails	4x4x28"
Vise block	1x4x12 1/2"
<b>Tool racks</b>	
Ledgers	1x2 stock
Tray	1/2" plywood
Holding boards	1x6 stock
Spacing	1" apart





**English model bench** (above) features Sheffield-made steel vises. There's a unique quick-release lever that lets the vise (left) slide in or out without your turning the handle. A full-length slot for hand tools and a recessed tray keep surface clear.

benches are available through Woodcraft Supply Corp., 313 Montvale Ave., Woburn, Mass. Leichtung Co. at 5187 Mayfield Rd., Cleveland, Ohio, offers a line of Danish benches. But I found the most complete selection, including all benches on these pages, at a relatively new company, Garrett Wade, based at 302 Fifth Ave., New York. The firm has done a thorough scouting job to come up with such variety and also offer a beautiful and extensive line of imported hand tools that complements the benches.

It's easy to get used to selecting tools from the stock at your local hardware store or lumber yard. But you'd be amazed at the variety of top quality hand tools that are available if you know where to look. We'll do a roundup soon.

#### Faster, more accurate work

Can a great piece of equipment make you a better craftsman? Absolutely. You can work faster and more accurately with these benches. It's easy to stay organized during a complicated project; clamp a glue joint in the tail vise, cut precision dovetails on a board in the front vise, and plane a shelf edge clamped between

the bench dogs. The amount of storage space built into the Swedish

#### Swedish craftsman bench

<b>Material</b>	Swedish silver birch
<b>Length</b>	62½ in.
<b>Width</b>	29½ in.
<b>Weight</b>	102 lbs.
<b>Work surface</b>	6½ sq. ft.
<b>Clamping capacity</b>	57 in.
<b>Approximate price</b>	\$300

craftsman bench will go a long way toward keeping tools clean, neat and within reach so you can get to them quickly when you need them.

If you're really cramped for space

#### Danish folding bench

<b>Material</b>	Danish beech
<b>Length</b>	54 in.
<b>Width</b>	29½ in.
<b>Weight</b>	83 lbs.
<b>Work surface</b>	3¾ sq. ft.
<b>Clamping capacity</b>	50½ in.
<b>Approximate price</b>	\$300

the folding bench is a perfect solution. But once it's up you may never want to take advantage of this unique feature and put it away.

#### Your superbench

We used the English bench (above) as a model for the assembly guide (opposite page). Even though it has steel vises instead of elaborate wooden ones, it is still a complicated project and a challenge to any woodworker. Before attempting a bench like this you should be aware that hardwood assembly requires incredibly sharp tools with experienced hands behind them. There is little margin for error, and joints, to seat properly, must be absolutely square.

Laminating a flat bench surface of this size might be a stumbling block unless you have a full array of pipe clamps and can fall back on a thickness planer for finishing. You can

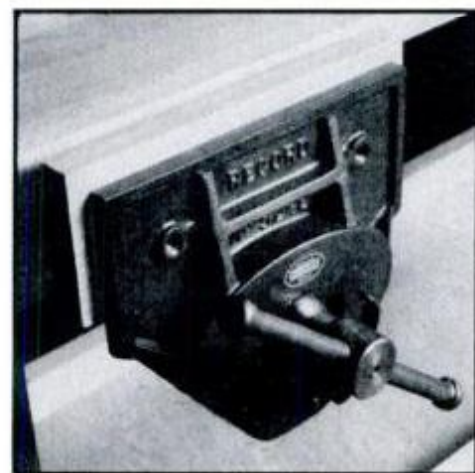
#### English model bench

<b>Material</b>	Beech, steel vises
<b>Length</b>	79 in.
<b>Width</b>	34½ in.
<b>Weight</b>	235 lbs.
<b>Work surface</b>	6¾ sq. ft.
<b>Clamping capacity</b>	78½ in.
<b>Approximate price</b>	\$400

overcome this by getting a maple (or other hardwood) countertop and cutting it to fit your bench. You should adjust the dimensions given to suit your shop space and your size.

Include in your plans the features from other benches that will give you the most service. For instance, you can add more drawers or enclosed storage beneath the bench

(Please turn to page 150)



European cabinetmaking. My Steiner bench is made of European red beech, a heavy, dense wood that is impregnated with linseed oil. It

#### Steiner classic bench

<b>Material</b>	European red beech
<b>Length</b>	87 in.
<b>Width</b>	33 in.
<b>Weight</b>	240 lbs.
<b>Work surface</b>	9½ sq. ft.
<b>Clamping capacity</b>	8 ft.
<b>Approximate price</b>	\$450

weighs 240 pounds and is so stable that you don't have to bolt it to the floor.

George Ott Inc., another West German firm, makes similar benches that are exported to firms around the world, including Steinway & Sons, the piano manufacturer. Ulmia

# Two clever add-ons for your shop

## King-size bandsaw table



Table can be made to fit any size saw. Here it's on a 14-in. Rockwell with its rip fence being used. Photo below shows how pivot point is used to saw a perfect disc. Spacing of cleats given at right is for 12-in. Craftsman saw. In each case, the cleats are placed to suit the saw's table.



There are times when even the largest bandsaw table is too small for the job. But the table on my 12-in. Craftsman saw was too small most of the time. By adding this auxiliary wood table, I increased its small table to a king-size 20x37-incher with a rip fence and circle-cutting attachment for sawing discs up to 60 in. in diameter.

This table is unique in that the rip fence and pivot point stay put in any set position by mere friction. No clamps, magnets or screws hold them; rubber in contact with emery cloth does the trick and grips tenaciously when side pressure is applied. To shift position of either fence or disc pivot, just pick it up and place it where you want it.

### Table drops into place

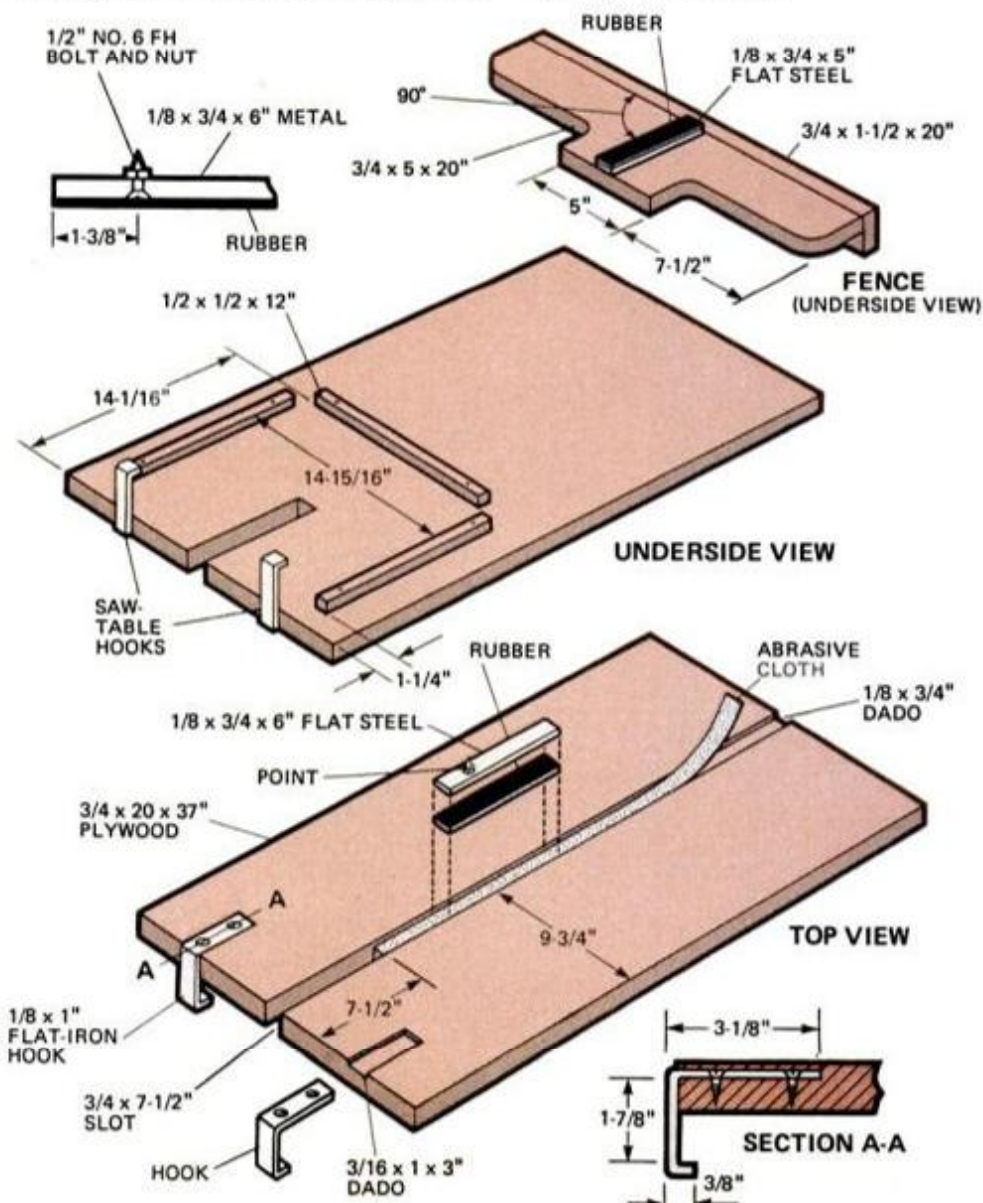
The plywood table is designed to lift on and off and hooks over the saw table. Three cleats, attached underneath, position and hold the plywood over the table. Rip fence and pivot point ride in a  $\frac{3}{4}$ -in.-wide dado having a strip of No. 120 emery cloth glued to the bottom. Make the

dado with your router or saw's dado cutter, and cut the  $\frac{3}{4}$ -in.-wide blade slot with parallel cuts on your table saw; your bandsaw size determines slot length. My 12-in. saw needed one  $7\frac{1}{2}$  in. long. Depth of the dado should equal the combined thickness of metal, rubber and emery cloth.

### Bend L-hooks by heating

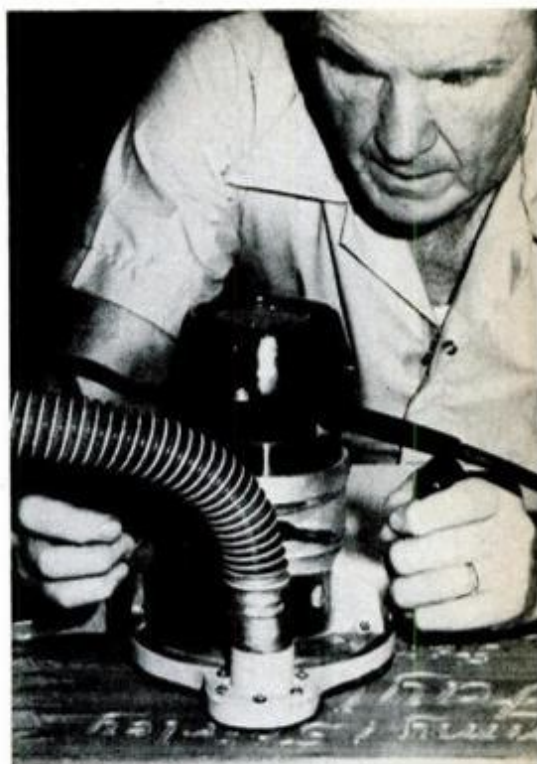
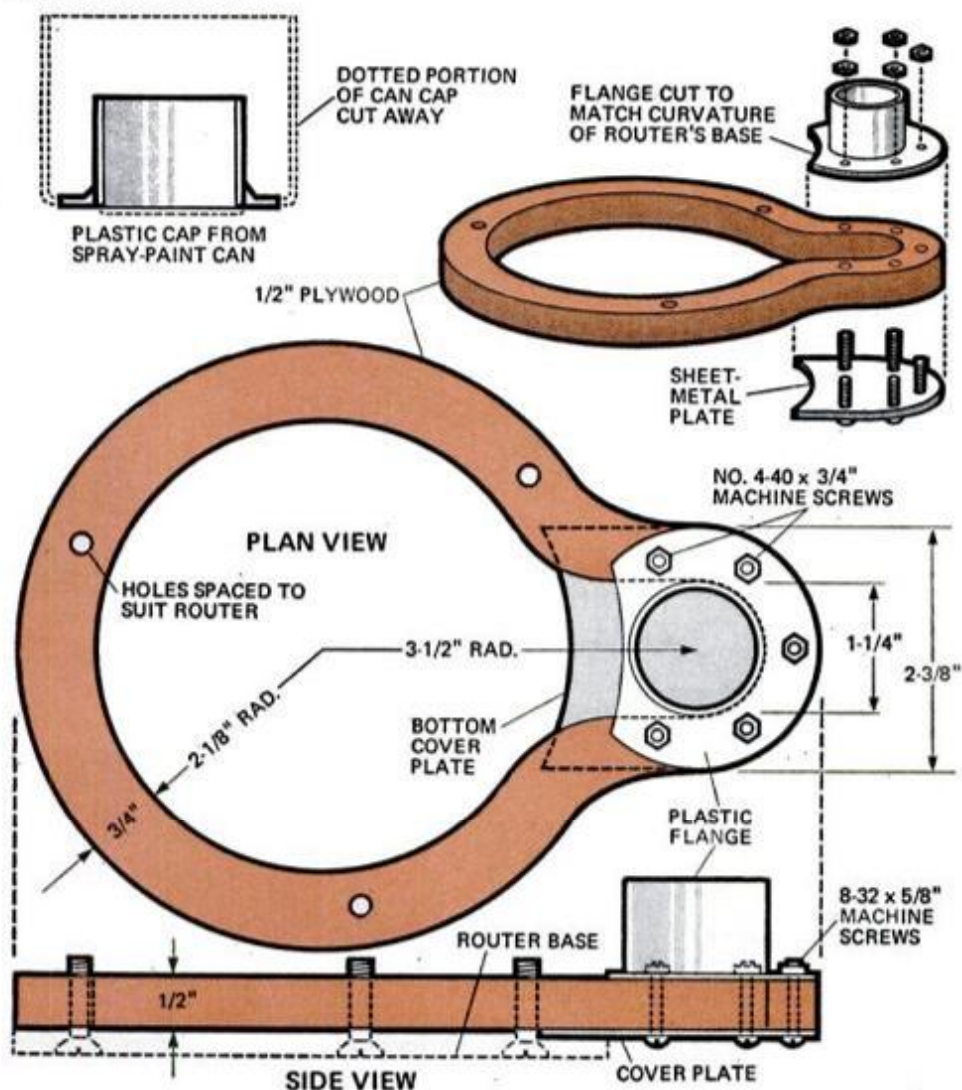
The two metal hooks rest in  $\frac{1}{8}$ -in.-deep dadoes and are bent to suit the saw's table. Make the short bends first, hook them over the edge and mark for the second bend. Sharp right-angle bends are easy to make when you heat the metal with a propane torch before clamping and bending in your vise.

I found bike inner tube better than car inner tube to cover the metal pieces; it's thinner and readily available at bike shops for the asking. It will adhere better if you wash the rubber in hot soapy water to remove the powdery residue before cementing it to the metal pieces with Skotch Super glue. Pivot pin is a No. 6 x  $\frac{1}{2}$ -in. FH stovebolt filed to a point. —George S. Watson





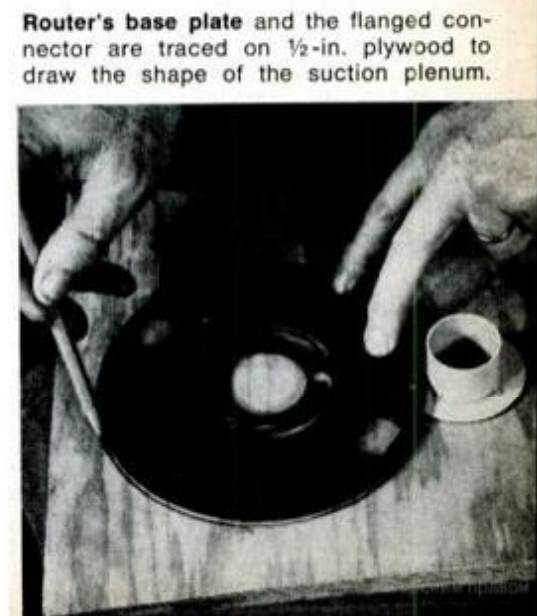
## Router dust-collecting attachment



Strong suction from shop vacuum pulls chips into hose to keep work clear of debris as router is moved over surface.



Flanged hose connector is made from plastic cap off spray-paint can. You cut away the outer shell and center of the top.



Router's base plate and the flanged connector are traced on 1/2-in. plywood to draw the shape of the suction plenum.

**F**ew tools create such a clean-up problem as a router. If you do a lot of routing at your bench—as I do carving redwood signs—you'll appreciate an attachment that sucks up the chips as fast as they are made. Such a sucker-upper can be made to fit any make router and used with any shop vacuum having a 1-1/4-in. hose and adapter. The attachment will not interfere with normal router use; you simply unplug the hose to use the machine away from your bench.

### Spray can provides connector

To add this vacuum attachment to your router unscrew its bottom plate and remove it from the upper part. Next make a flanged hose connector from the inner part of a plastic spray-can cover by cutting away the outer shell and the center of the top with a sharp knife. This, plus the router's bottom plate, is used to draw the plenum outline. Lap the edge of the flange 3/8 in. with the bottom plate, trace around the two on 1/2-in. plywood and cut out traced area. Saw the inside to get enough rim for

screws that hold the bottom plate.

Now place the router sleeve with the two knobs on the plywood cutout and lap the hose-connector flange as before. Mark holes for base-mounting screws, trace where the sleeve laps the plastic flange and trim the latter so it butts the circular shape of the sleeve. Drill holes through the flange, plywood and a sheet-tin bottom plate and attach with five 8-32 x 5/8-in. RH machine screws.

### Spacer makes suction plenum

Sandwich the plywood cutout between router top and bottom base and bolt together with slightly longer screws than originally used to fit the tapped holes. The 1/2-in. plywood spacer creates a suction plenum and tunnel for the chips to collect and be sucked up the connecting hose.

Your attachment is now ready for use. If you sand it carefully and paint it black, it will look like an accessory that came with the machine. Spray-paint can caps come in many colors; a red or yellow one will make the attachment look like a store-bought item.—*Jack S. Hoke, Jr.*

## RUSH HOUR ON MAIN STREET

(Continued from page 81)

used the city streets in spite of a diminishing number of protests from citizens. Englishman Brian Redman pocketed \$30,000 for winning the hour-long race, and the track worked. Not a citizen was bruised despite 150-mph speeds down old Ocean Blvd.

Formula 1 is faster and trickier than Formula 5000. Formula 1 engines put out over 400-hp with a displacement limit of only three liters (or 183 cu. in.), and the cars weigh as little as 1200 pounds! Even though Grand Prix racing has been deadly to both drivers and fans over the past few years, the race is firmly on the schedule for March 28. It would take a major upset to change that date now.

### Travel agent's dream idea

Chris Pook, a 35-year-old graduate of the Sorbonne and the University of London, is the owner of a travel agency in Long Beach. He is also said to have the ability to sell a radiator to a Beetle owner. In May, 1973, he met with three members of the Long Beach Convention Bureau.

Paul Bessler, Bob Lichtenhan and Dan Swanson liked the "international" flavor of Pook's idea, though they thought Pook, himself, was out of his mind.

Pook, who once raced Formula Juniors against such drivers as Mike Spence and Jackie Stewart, forged ahead. He talked the former Grand Prix star and local Long Beach folk hero, Dan Gurney, into serving on his "steering committee."

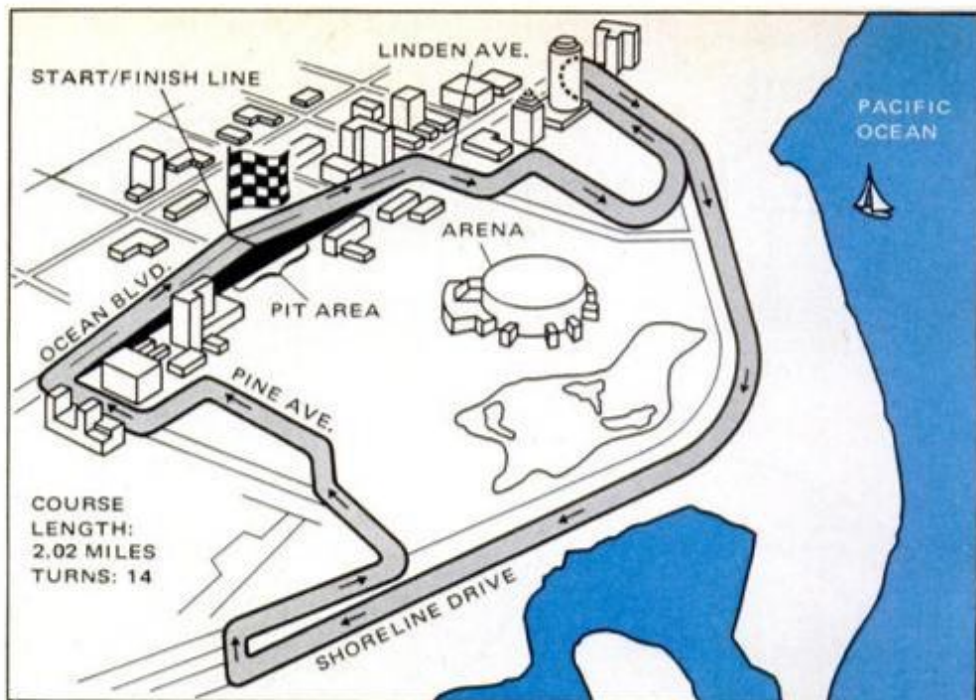
With the Gurney name in the fold, Pook added Long Beach attorney Don Dyer and Riverside Raceway president Les Richter, both revered names in Southern California.

"I thought he was touched in the head," said Gurney of Pook when they first met. "I thought they were both crazy," said Richter.

Meanwhile, Pook briefed City Manager John Mansell and the city council on the scope of the event (and its financial impact on the city) and these officials gave their unanimous approval on Nov. 19, 1974.

### Others have tried street racing

But just because a city feels that an international race should be held doesn't mean that such a race is available or even possible. Pook is not the first fan to envision a motor race similar to the exciting Monaco Grand Prix on the streets of Monte Carlo in his own home town. For years certain enthusiasts have talked of such a race in New York's Central Park. One of the brothers of



**The Long Beach Grand Prix**, like the famous Grand Prix of Monaco, will wind its way through the streets of the California city. As a warmup to the big Formula 1 race, the circuit was laid out last year and tested with a Formula 5000 race.

Monaco's Princess Grace is one of the backers of such a street race in Philadelphia's Fairmount Park.

Pontiac, Mich., is a city which actually staged street racing (with tragic results) and so did Trois Rivières, Que., but neither on the scale of Monte Carlo.

Chris Pook is not a man to allow details to stand in the way of the master plan. If formal approval of a Grand Prix was also needed from the Commission Sportive Internationale (CSI), the competition wing of the Federation Internationale de L'Automobile (FIA) in Paris, France, Pook would go to Paris, France and get it.

### Off to the CSI in Paris

He went, using his own money, and a little extra chipped in by Gurney and Richter; while the city approved the race there was a stipulation that no tax money be spent.

There followed a series of negotiating meetings which resulted in a visit Long Beach by Guiseppe Baccagaluppi, director of the famous Monza circuit in Milan, Italy, and chief safety consultant to the CSI Safety and Circuits Board.

The course, originally planned and laid out by Pook, Gurney and a Long Beach city engineer, Jack McGinnis, was to Baccagaluppi's liking. He paced the course for three full days (with only 10 hours' sleep during his entire visit). With some minor changes, Baccagaluppi approved.

So the course was formally endorsed by the CSI and the FIA on March 19, 1974. There could be a United States Grand Prix West on

March 28, 1976, if all else could be worked out. Credit should go to FIA for this decision in view of the fact that twice before, once at Ontario Motor Speedway and once at Riverside International Raceway, approved races died from lack of money.

The only problem remaining for Pook, in fact, was to come up with enough money to change the face of downtown Long Beach from a retirement community to a racetrack. Confident that he could dream up the necessary \$600,000 to make this drastic change, Pook obtained a sanction for a "test" race from the Automobile Competition Committee of the United States. He planned a F/5000 race over the racetrack.

### Money came from stock issue

The money came from a private stock issue. Although the Securities and Exchange Commission handed down some tight rules covering the issue (only to California citizens, only to those with some connection to motor racing, tight income stipulations, and the like) the funds began to come in. The ultimate goal was \$600,000, but the figure in the bank has now climbed to over \$700,000 according to the Long Beach Grand Prix Assn. headed by Pook.

From this money, aside from the royalties for the use of the streets, the city will also be reimbursed for "out of pocket" expenses including such items as extra police and road work by city crews.

The profit for stockholders, if

(Please turn to page 132)

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## RUSH HOUR ON MAIN STREET (Continued from page 130)

there is any, will come from seat sales for nearly 70,000 grandstand seats, general admission, and a fat \$250,000 from CBS television over the next four years. The F/1 race is being shown live.

There were and are, however, problems to solve—many of them.

What do you do, for example, with people who live inside or alongside the circuit of a downtown race and who do not wish to become involved? After all, you are using their front yard, and many people are simply not impressed with motor racing even if they can watch world-famous racing drivers by hanging out their own front windows.

### Free day for the neighbors

Pook has the answer. If they do not wish to see the great race for nothing, even though they can have passes to allow their friends through police lines, they can accept a free day at either Catalina or San Diego, away from the noise, the smell and the parking headaches. Arrangements have been made for buses to haul them out.

However, if the F/5000 race is any example, many will request the day off but few will take advantage of it. Pook found that while a majority of the downtown area is senior citizens and *did* opt for the day away, few actually went on race day. Most decided to stay home and watch the action.

Officials estimated that upwards of 20,000 people saw the F/5000 for nothing simply because they live in the area or have friends who live there. This will probably be true for the F/1 event.

It was one of Pook's recurring nightmares before the F/5000 race that thousands of people would arrive from all over the country anxious to see the race on city streets, but not realizing that tickets were being sold. He saw this as the public relations problem of all times, yet at the trial race, this did not happen.

But ticket prices and the location of some blocks of seats were a major complaint of many hundreds of fans at the shakedown event. With prices ranging from \$12 to \$25 for premium locations and general admission costing \$8, many felt that the LBGPA was trying to get it all back in one day.

Worse, some of the \$12 seats were in locations where it was almost impossible to see the cars as they roared by. The problem was that the seats were built too low, and too far removed from the track. Some were actually behind trees. With the

slope of the track on the backstretch down toward the inside, the fans in the lower seats on the outside could see little more than an air scoop blasting past. Most of these fans drifted away from their seats soon after the first heat of the first race started and found better places higher up in the grandstand or elsewhere. This problem will be solved for the Formula 1 race.

A problem that cannot be solved quite so easily for the Formula 1 race is still outstanding. In concept, the city streets of Long Beach belong to the taxpaying citizens. While most of them either welcome or at least tolerate the several days' invasion of racers, some do *not*.

### Some businessmen aren't happy

You might imagine that the closer to the course your business is located, the more you would welcome an influx of thousands of extra money-spending fans. This is not the case, and is a thorn in Pook's side. The businesses on Ocean Blvd., for example, are literally cut off from the money-spenders by retaining walls and catch fences. The only people with access to these restaurants and theaters are reporters and officials, and they often have their meals and entertainment provided free of charge by the promoters. Or the racers themselves, who would have such access but are in too big a hurry to stop for a snack.

Whether or not this problem is resolved by Grand Prix time remains to be seen, but in any case it doesn't have much to do with the fans. Nor does every businessman along the main stretch hate the idea. Some simply close their doors and enjoy the race from the best seat in the house. One at the F/5000 race went so far as to change his big outdoor sign into a greeting to local favorite Mario Andretti.

Letters are printed in all the local papers about the racing. One Long Beach couple admitted in a letter in the *Los Angeles Times* that Long Beach was indeed known as "the Iowa of the west," but that the appellation was certainly preferable to the "Monte Carlo of the west" in their opinion. Then the letter huffily asked "How many of these are necessary before our city administrators realize that there is nothing wrong with remaining the nice, quiet city we have always been?"

### Parking problem averted

Parking was considered one of the major potential problems, but it was (Please turn to page 136)

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**RUSH HOUR ON MAIN STREET**

*(Continued from page 132)*

handled in a unique way. Since there are only somewhat less than 10,000 parking places near the course (and most of these are assigned to officials, participants, press), outlying parking lots were designated according to grandstand seats. As the fan arrives on the outskirts of Long Beach, he begins to see signs with "Assigned Parking, KK, Next Right" or the like. What this means is that if you hold a ticket to Grandstand KK, you turn off and park even though you are still miles from the action.

Then (for a \$2 fee which many considered to be an unpleasant little rip-off) you are bused directly to your stand. The reverse occurs after the race is over and you are on your way without having to fight heavy traffic.

Prices for lodging and food will be somewhat inflated but not shamefully (with certain notable exceptions). One hotel along the course sold single rooms for three days for \$1000, and had all the takers it needed. And the hotel is almost fully reserved at the same prices for the Grand Prix. But unlike cities such as Indianapolis before the 500, where tripling the price for anything is considered a modest act, Long Beach has held the line. You will pay somewhat higher prices (a \$25 motel room a block away from the race route will be more like \$35 or \$40) but we hope that the rates will stay reasonable.

**Red-coated 'governors' will help**

Borrowing a plan from Pasadena, its cousin to the north, Long Beach formed a "Committee of 300" for the Grand Prix. These red-coated "Governors" and "Associate Governors" (depending on how much they were willing to pay to join) circulate all over the area and help where they are needed. If you have a problem at the Long Beach Grand Prix, talk to a red-coated Governor. These men and women are local business people, courteous, friendly and anxious to maintain a good image for their hometown.

The Grand Prix course in Long Beach begins with a start-finish line on Ocean Blvd., a main street running east and west. The racers will go the wrong way on the boulevard (the other side is pit lane) to a sharp right-hand, downhill turn on Linden Ave. Some leave the ground at this point. At the bottom of the hill there is a sharp left turn and almost immediately another sharp

*(Please turn to page 138)*

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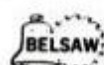
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## RUSH HOUR ON MAIN STREET *(Continued from page 136)*

right turn leading into a sweeping 180° left turn on the only part of the track specially built for the race.

### Hairpin 180° turns

After the broad 180 comes a hairpin 180 to the right, one of the two slowest points on the course. From this point drivers accelerate on Shoreline Drive (built on landfill dredged from Long Beach Harbor) to the fastest point on the course. Shoreline sweeps gently to the right for .79 miles of high-speed driving into a difficult braking and shifting situation in preparation for a hairpin 180 to the right and then a sharp turn to the left on Pine Ave.

Right and left through a parking lot and up Pine Ave. hill brings the cars to a sharp right turn onto the main straightway, Ocean Blvd. (or a sharper right into the pits).

### Difficult course, but good

This is a difficult road course according to the drivers, but the 2.02-mile track is "What road racing is all about," according to Mario Andretti, who will be driving the Parnelli F/1.

More than three quarters of the money in the LBGPA is allocated for track modification and the erection of safety systems. The safety devices along the course include a concrete wall 34 inches high, 12 inches thick at the top and 24 inches thick at the base, all the way around. These barriers are similar to those used to divide freeways and turnpikes, except that they have a vertical face on the traffic side to keep cars from becoming airborne if they strike them.

### Barriers are 'wheel catchers'

The barriers are precast in 12-foot lengths and weigh 8000 pounds each. They are set in place by cranes and held together by interlocking steel pins.

Along the top of the barriers runs a 10-foot chain-link fence anchored by steel posts. The top curves inward at a 45° angle to become a "wheel catcher".

Behind the barriers and debris fence is a 50-foot-wide "no-man's land", then another fence, then the spectator area. With insurance one of the major problems (the city wanted to be protected from every possible lawsuit, since a city is so easy to sue) these stringent safety measures are considered necessary.

### Tires, drums guard corners

Intersections and corners are guarded by stacks of tires (more

than 25,000 of them in all) and 1500 sand-filled oil drums, each weighing 650 pounds.

"Many deaths of racing drivers can be attributed to cars wedging underneath, or between, Armco-like barriers and either decapitating or crushing the driver in the car," said Dr. Peter Talbot, safety director of the race.

"By using tires and drums, we eliminate the hazard. We consider this to be the most modern, up-to-date safety system in the world today," Talbot concludes.

Jack McGinnis, assistant city engineer of Long Beach, explains, "The drums and tires all give a little when they are hit. The whole thing slides and much of the energy from the original impact is absorbed and dissipated."

### Over 100 spins in shakedown race

There were over 100 spins and slides and wall-kissings up to and including the F/5000 shakedown race, and not a driver was injured (except for rookie Dick Workman of San Francisco, who was seriously injured in a crash on an access road off the course).

Course modifications were not completed until two days prior to the September F/5000 practice laps, but now that everybody knows exactly what they are doing the task should be easier and quicker for the Formula 1 Grand Prix.

The F/5000 was a rip-snorter, offering everything a road-racing fan could ask for and with none of the promoter's worries realized. Not one elderly person was struck, nor was one heart attack suffered due to the witnessing of a wildly spinning car in a front yard. The race did have its share of spins and slides because of the difficult course and the lack of familiarity of the drivers (with Jackie Oliver demolishing his UOP Shadow on a wall). But the fans loved it all, and the promoters claim to have nearly broken even.

This is a sign of stupendous success in modern motor racing.

The attendance was nearly 75,000, including a whopping 45,000 paid, which indicates a record attendance will be on hand when the international stars arrive in force for the F/1 race this month. Little stands in the way now of Emerson Fittipaldi battling Niki Lauda and all the other Grand Prix drivers up Pine Hill and down the main street of Long Beach. The concept has been proven.

Even Christopher Robin Pook probably couldn't stop the circus on March 28. ★★★

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## FLUORESCENT LAMPS

(Continued from page 120)

is coated with a fluorescent chemical.

In addition to the tube, the circuit contains a switch, ballast (transformer) and starter. A pull-chain, toggle or pushbutton switch turns the circuit on and off. The ballast provides the high voltage necessary to start the mercury-vapor arc inside the tube and stabilizes the circuit by keeping the operating current at a steady value, as shown in the two-lamp circuit diagram on page 142.

### The job of switches

The starting switch closes the circuit between the two filaments when the lamp circuit is energized. It also opens the circuit between the two filaments after sufficient time has passed to heat the filaments to the

#### LAMP WATT/LENGTH RATIO

Watts	Length (in.)
15	18
20	24
30	36
40	48
100	60

proper temperature. There are four different starter circuits available: manual, automatic glow-switch, automatic watch-dog and automatic thermal-switch (see page 121).

### How the lamp works

A circuit for a fluorescent tube is illustrated in the upper detail below. Here a ballast is connected in series with the lamp. The automatic starter switch is in closed position when no current is flowing through the circuit, though the starter element is heating (diagram A, see below). When the circuit is closed (dia-

gram B), the two lamp filaments are connected in series through the starter to supply voltage. Since the automatic starter short-circuits the path, no current will flow in the lamp. Thus, the filaments are cold, and argon gas cannot conduct.

As the current begins to heat the lamp filaments to a certain temperature, the mercury in the lamp begins to vaporize. A few seconds later, the automatic starter opens (diagram C), breaks the circuit and causes the ballast to produce high voltage between the filaments. This voltage

strikes an arc through the argon gas and mercury vapor. The mercury-vapor arc then causes the fluorescent chemicals inside the tube to fluoresce, emitting a brilliant light which illuminates the lamp.

### Colors vs. 'whites'

Fluorescent lamps are available in many colors and "whites." Colors are used for decorative purposes; whites for general lighting. These whites offer the most efficiency per dollar of cost, the best color-render-

(Please turn to page 142)

### Ends of lamp remain lighted

POSSIBLE CAUSES	WHAT TO TRY
1. Shorted starter.	Replace starter.
2. Lamp failure.	Replace lamp.
3. Incorrect wiring.	Check wiring against manufacturer's schematic.

### Lamp does not start

POSSIBLE CAUSES	WHAT TO TRY
1. Lamp not seated in sockets.	Reseat lamps firmly in sockets.
2. Defective starter.	Replace starter.
3. Defective lamp.	Replace lamp.
4. Defective switch.	Disconnect power. Place a continuity tester across switch. Turn switch on. A reading should exist. If not, replace switch.
5. Defective ballast.	If all of the above check good, then replace the ballast.

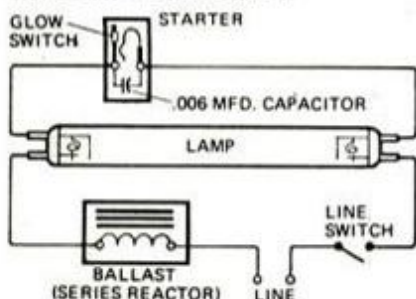
### Lamp slow in starting

POSSIBLE CAUSES	WHAT TO TRY
1. Defective starter.	Replace starter.
2. Wrong-size ballast.	Check fluorescent specifications.
3. Low line voltage.	Check voltage. It must be $\pm 10$ percent of 120 v. If not, check with power company.

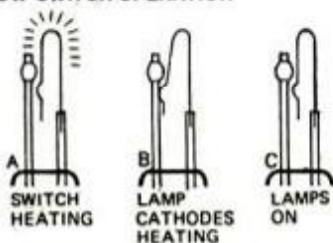
### Lamp blinks on and off

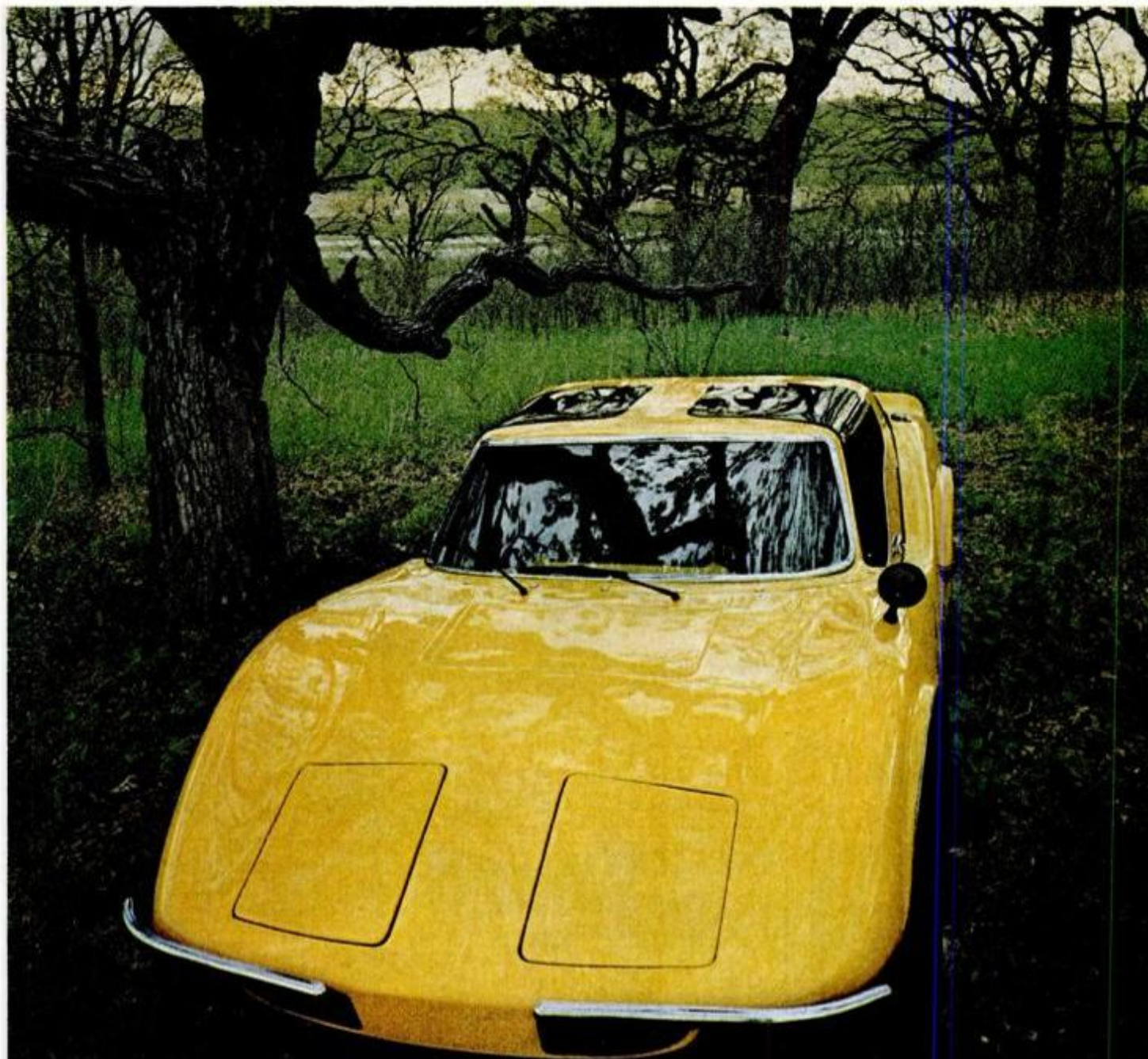
POSSIBLE CAUSES	WHAT TO TRY
1. Lamp failure.	Replace lamp.
2. Defective starter.	Replace starter.
3. Cold drafts or low temperature.	Block drafts or heat room up to above 50°F.
4. Wrong-size ballast.	Refer to previous section.
5. Low line voltage.	Refer to previous section.

#### BASIC SINGLE-LAMP CIRCUIT



#### GLOW-SWITCH OPERATION





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## FLUORESCENT LAMPS

(Continued from page 140)

dollar of cost, the best color-rendering properties and the most natural whiteness (their appearance versus true outdoor light).

### Tips for selecting whites

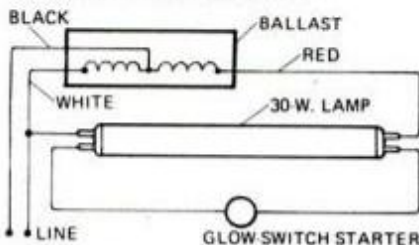
The most popular whites are cool white, warm white and daylight. Cool white has high efficiency and good color rendition. Used widely in schools, offices and factories, it blends well with natural light. Warm white has the highest efficiency, but highlights orange, yellow and yellow-green at the expense of other colors. This makes tones warmer and more pleasant—why warm white is the choice of many homeowners installing fluorescent lamps. Daylight is used primarily for display lighting, particularly in store windows, since it shows up well at a distance.

### Prolonging lamp life

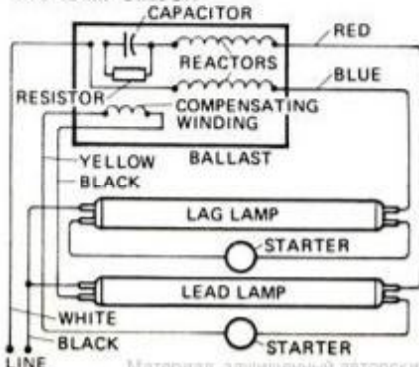
The life of fluorescent lamps is not only affected by voltage and current, but also by the number of times they are started. Homeowners can prolong this life by following these suggestions:

- Operate lamps continuously for a three to four-hour period for maximum life. Turning the lamp on and off cuts its life considerably.
- Room temperature should be at least 50° F. For colder rooms, special fluorescent lamps and starters can be used.
- The right starter should be used with fluorescents. Check replacement starter numbers against numbers stamped on the original starter.
- Be sure the ballast has the catalog or type number specified for the fluorescent lamp unit. ★ ★ ★

#### SINGLE-LAMP CIRCUIT WITH AUTOTRANSFORMER BALLAST



#### TWO-LAMP CIRCUIT



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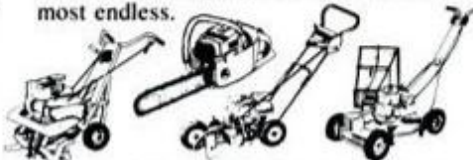
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all blind spots. With this technique, the fire was put out in less than 10 seconds, drum and all.

"Most of our students find it pretty satisfying," Tom Slater told me later. "You face this frightening thing. You're alone with an extinguisher. And you beat it; you almost always win."

Almost. I got my first big scare when we were fighting a "pan" fire—a container filled with flammable liquid. Only in this case the pan was the size of a swimming pool and blazing fuel floated on top of water. The tactic was theoretically simple: Make a single cut across the front of the pool to drive flames back, then sweep rapidly side to side until the entire surface is extinguished. But it didn't turn out that way. I was working with a partner, starting with our extinguishers wide open from about 10 feet away. We made the initial cut, then continued sweeping as we walked closer to the pool in matching cadence. The fire was dying; it looked as if we had it made.

The first hint of trouble was a sputtering sound from my partner's extinguisher—his stream was breaking up and about to run out. I made the mistake of going on, concentrating on patches of fire in the far right corner of the pool, and didn't see the rush of fire approaching from my left.

Anderla hit me on the shoulder. "Your partner's out," he shouted. "Back away!" The angry orange-yellow flames leapt across the pool, came right over the edge and rolled up into a waist-high ball a foot in front of me. I bowed my head to shield my face and backed away fast. I wasn't burned, but my nose looked as if I had sat out in the sun too long. Suddenly, the training didn't seem like football practice any more. I had learned a new respect for fire and how it can surprise you. Nor were my nerves calmed any by a statement made casually by one Ansul instructor as we broke for lunch: "We'll set up some really big fires for you this afternoon," he said.

#### Five types of fires

According to Ansul, there are only five basic kinds of fires, of which the simple spill type is one. The other four are:

■ **Three-dimensional liquid:** If a container of gasoline or other flammable liquid hung on a wall springs a leak and catches fire, there are two fires to put out—the spill fire on the floor and the flaming liquid dripping from the container. Tactic: Put out the spill fire first, then follow the

stream up and extinguish the container.

■ **Flammable liquid under pressure:** A fuel line breaks open and burning gasoline spurts out under pressure. Plumes of fire stab from the pipe. If the break is big, the ground shakes and the air may be hot many feet away. Usual tactic: Aim for the break in the pipe first, then hit the spill fire on the ground or the fire balls burning above the pipe.

■ **Flammable gas under pressure:** A propane or other gas line bursts, the gas ignites and the resulting fire looks like the exhaust from a rocket. Tactic: Inject the extinguishing agent into the flow of gas, trying to cut off the fire at its source.

■ **Flammable liquid in depth:** This is your familiar deep-fat fire in a kitchen. It is like a spill fire in a container, but it may be more difficult to put out than it seems. The sides of the pan interfere with the flow from the extinguisher, and you have to be very careful not to blast the stream directly into the burning fat at close range or you'll just blow flaming grease all over the kitchen. The technique here is to stand well back and let the stream "fall" into the pot as gently as possible.

#### 12,000 deaths a year

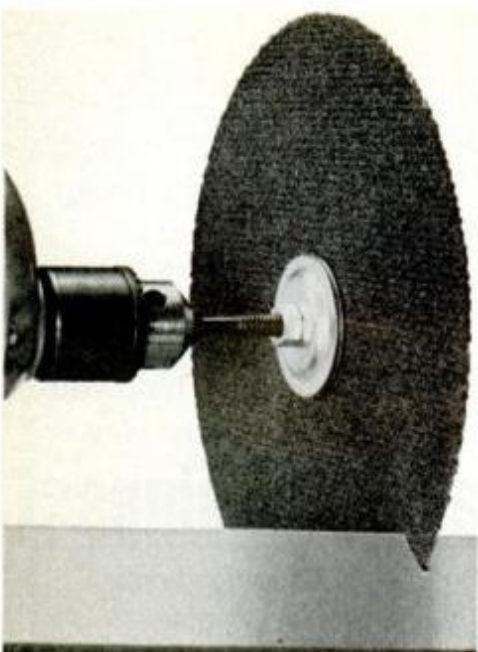
Every year in this country fire takes an average of 12,000 lives—half in private homes or apartments—seriously injures hundreds of thousands more, destroys more than \$3 billion in property and costs an additional \$8 billion in insurance premiums, lost production time and other related expenses. Hedging against these terrible losses, U.S. industry spends many millions on fire-warning and extinguishing equipment, and homeowners spend millions more on smaller, portable devices.

But what good is all this equipment if its owners don't know how to use it? I had fought eight fires with some of the best coaching in the country—and put out five. A good record for the first time out? Not if the three fires that survived my attack happened to be in my kitchen. That's why professional firefighters go to school—and homeowners should if they could. A few local fire departments offer fire-safety courses as part of adult-education programs, but these are few and far between.

Just having a fire extinguisher around the house is not always the best thing. In the hands of an untrained or panicky person, it could be dangerous—such as blasting burning grease around a kitchen. An ex-

(Please turn to page 146)

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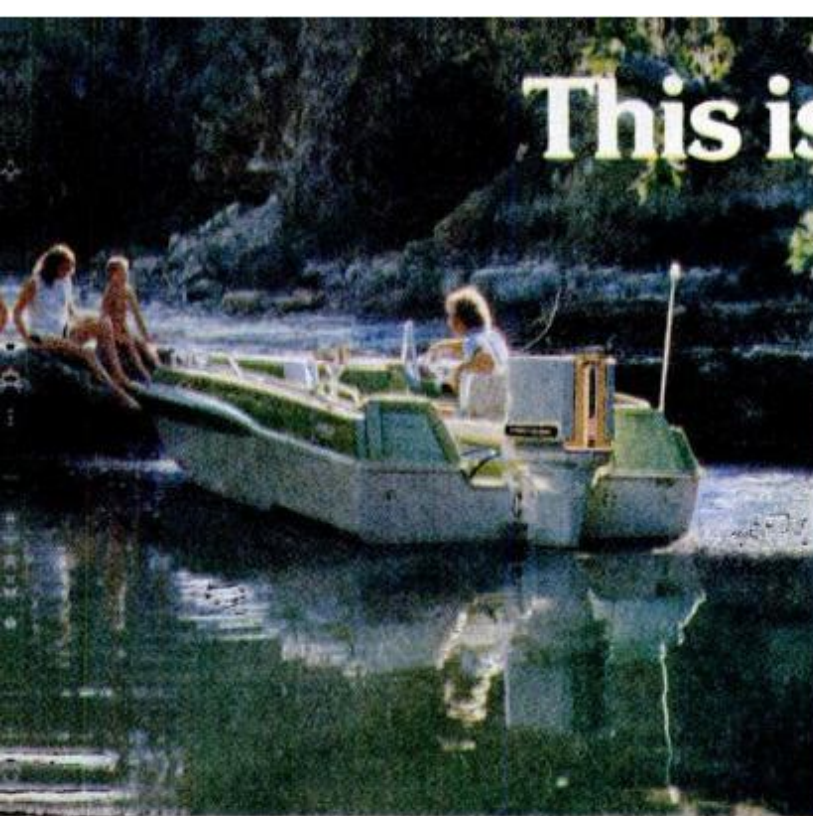
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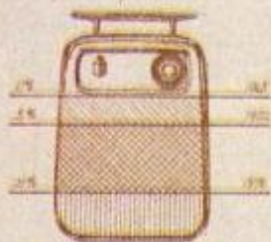


# This is living.



## This is Chrysler's 105: Spare the fuel, not the horses!

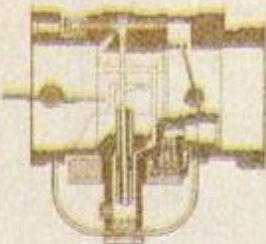
*Amount of fuel you consume per dollar of fuel. Shows*



*Shows fuel in a gallon (1 gallon = 128 fluid ounces)*

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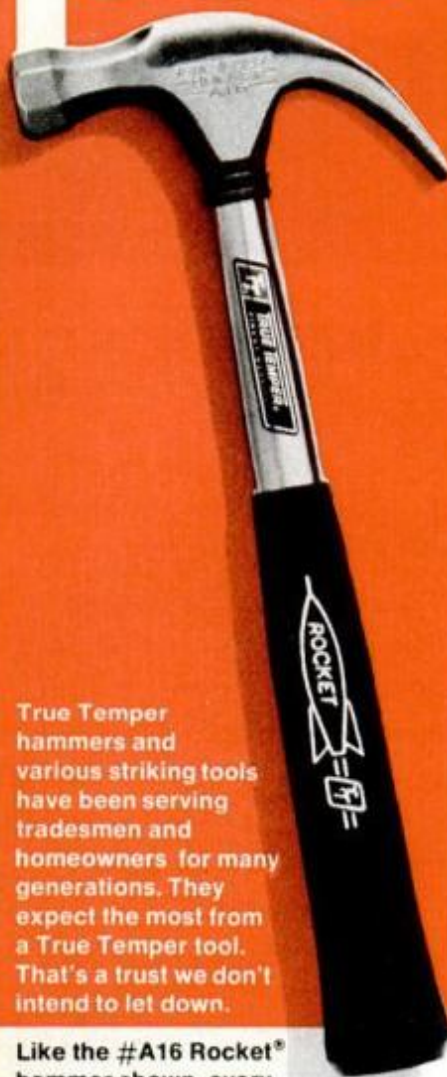
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## THEY GO TO SCHOOL TO FIGHT FIRES (Continued from page 144)

tinguisher also tends to give a false feeling of confidence that could be deadly in an emergency. That's why every member of the family should know not only how to use an extinguisher properly, but when, where—and even *whether* to. In some cases, especially in serious fires, it's often best to get out of a burning house as fast as possible instead of staying and attempting to fight a fire yourself. (See checklist on page 84 for more on helpful fire-safety pointers.)

### Know your extinguisher

It's also important to know the different classes of fires and the correct extinguishing agent to use on each. Using the wrong extinguisher can not only be ineffective but also hazardous. Water on a magnesium fire, for instance, can cause an explosion. Water on burning grease can spread the fire. And water on an electrical fire can result in a deadly shock. Use an extinguisher made for fuel fires on your wood-frame house and you risk repeated flareups as hidden embers continue to burn.

As I learned at the Ansul school, there are four basic classes of fires. These refer to the *substance* involved in a fire, not the *type* of fire, as discussed earlier. Each extinguisher will be labeled according to the class of fire it is designed to handle. Be sure to check this label before buying or using an extinguisher.

■ **Class A:** Extinguishers labeled with an "A" in a triangle will put out fires that burn with an ember—wood, paper, cloth, rubber. Water can be used to fight such fires, but dry chemical works faster and is safer to use if you're not sure just what the cause of the fire is.

■ **Class B:** Extinguishers labeled with a "B" in a box are effective against hydrocarbon fires—fuel oil, benzene, solvents, gasoline and other petroleum products. Carbon dioxide, a smothering agent, is frequently used to fight such fires, but again dry chemical works well and is becoming increasingly more common. One problem with carbon dioxide is that, if used in quantity, it can smother not only the fire but you, too, since it removes oxygen from the atmosphere.

■ **Class C:** Extinguishers labeled with a "C" are designed especially to fight electrical fires. The C rating guarantees that the extinguishing agent won't conduct electricity back to the operator.

■ **Class D:** Extinguishers labeled "D" are special-purpose units for fighting metal fires, such as highly flammable magnesium. Made primar-

ily for industrial and military use, they are rarely needed in the home.

### Which type for the home?

Home fire extinguishers should be rated to handle Class A, B and C fires. Rather than getting three different types—and trying to figure out which to use on what—your best bet is the so-called multipurpose dry chemical household extinguisher that will handle all common types of home fires. A typical 2¾-pound unit costs less than \$15, but lasts only about eight seconds. Bigger extinguishers do run up in price, but are worth the investment—when you need them.

There's no question about the value of training in firefighting. Underwriters Laboratories, for instance, rates industrially used extinguishers on the basis of what an amateur firefighter could be expected to do with one. A 350-pound wheeled dry chemical extinguisher, for example, carries a rating of 320-B:C. The "B" means it works on flammable liquid or gas fires, the "C" that it doesn't conduct electricity. The 320 means it can put out 320 square feet of burning liquid—when handled by a novice. An expert using the same extinguisher can put out 800 square feet of fire—more than double the rated amount.

### Training pays off

It didn't take me long to learn the value of training. One of our exercises at the Ansul school was to put out a propane gas fire spurting up from one of those innocent-looking little pipes sticking out of the ground. What I didn't know was how intense and hot the fire could get when they opened up the pressure control on the pipe. I was handed a hose with a valve handle on top that looked like a stirrup. "This has a pretty good kick," the Ansul man said nonchalantly.

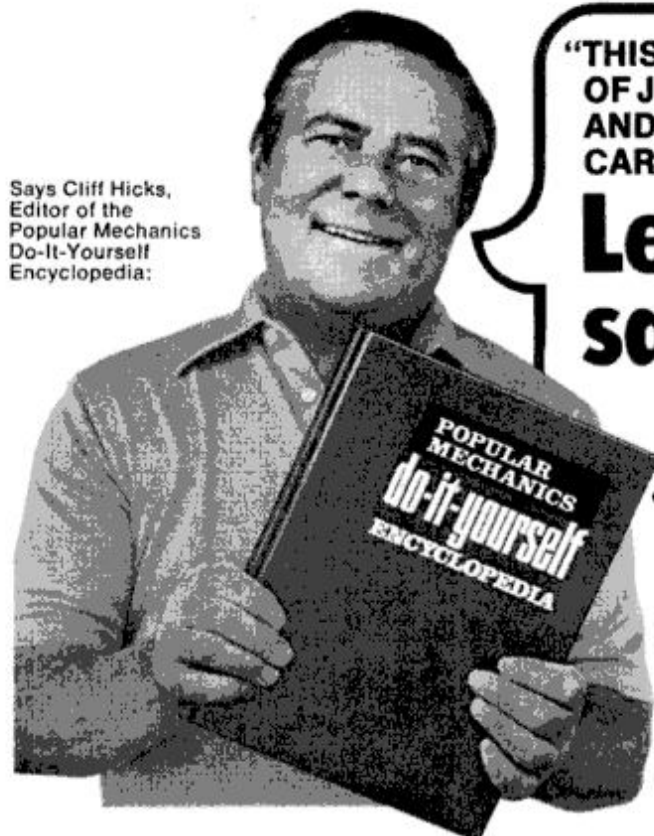
As I approached the fire, flames shot up 30 or 40 feet, making booming sounds like a continuous explosion. The temperature a few feet from me rose to more than 800° F. Suddenly that stirrup took on all the importance of a parachute rip cord. I pulled it back hard. The force of the stream—between 80 and 100 pounds—almost knocked me over backward. Shoot into the fire at its base first, I remembered being told, then follow the fireball up. To my surprise, the fire went out in seconds—I had the right equipment and just enough training to know what to do. I felt a little zinged but very happy as I headed for the showers. I was becoming a real firefighter. ★★★

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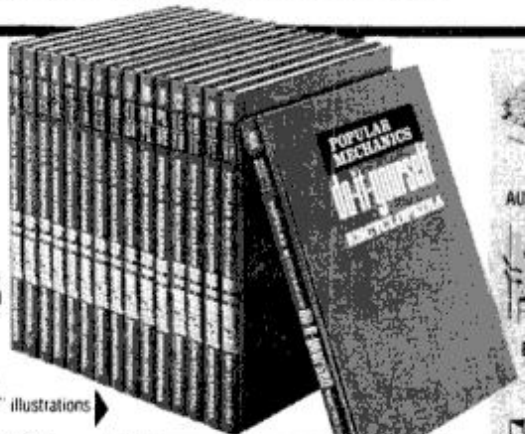
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## 20 TIPS FOR HOME FIRE SAFETY

(Continued from page 84)

and await help there than to race down a stairway and risk falling or being trapped at the bottom. If you do go out a window, don't jump. Climb out carefully, hang by the sill to put you as low as possible, bend your knees, then drop straight down and roll as you hit.

**4. Portable, fold-up escape ladders** are commercially available that hook over a windowsill or lock across a window opening. These can be stored in rooms where escape would be impossible by any other means if the doorway were blocked. They are not suitable, however, for very young children and elderly persons.

**5. Agree on a way** every member of the family can sound an alarm to alert others if fire should prevent you from reaching each other. Hallways and stairways are among the first areas to fill with smoke in a fire and may become blind alleys. Keeping a police whistle in each room is a good idea. Lacking this, try pounding on walls and shouting. Everyone should have a flashlight—most killer fires occur at night and electric power may be knocked out.

### Close all doors

**6. Be sure all doors are closed** between different areas of the house when you go to bed at night. Doors delay the spread of fire and may give you the few extra minutes that you'll need to escape.

**7. Get out fast.** Don't take time to dress or collect valuables—nothing is worth more than your life. In one tragic Maryland case, a man was found overcome inches from safety—trying to put his pants on. Senseless modesty had cost him his life. Grab a coat if one is handy, but wait until you're *outside* to put it on. (A coat is also useful for smothering burning clothing or covering an injured person.)

### Every man for himself

**8. In escaping a fire,** everyone should be trained to act for himself—not run around helter-skelter looking for others. This just creates chaos and panic and wastes precious time. Except for young children and the elderly or infirm, who will need help, every member of the family should get out by himself, on his own, through the nearest, safest escape route for *him*. This may sound selfish and heartless, but experts know it to be the fastest, most efficient way of evacuating a house. Plan to meet at a prearranged place outside to count heads. Return only if someone is known to be missing.

**9. Don't open a door** that feels excessively hot to the touch—fire and fumes behind it may blast out at you the second you open it, overcoming you before you can retreat. Superheated air can wither your lungs in a single breathful.

If you must open a door, do so very carefully. Brace the weight of your body against it (to hold back possible high-pressure gases) and open it only a crack at first. If there's any evidence of fire, smoke or heated air, close it instantly. If you feel no heat or rush of air, it's probably safe to use the doorway.

**10. Never go in** or near a smoke-filled room unless absolutely necessary to rescue someone. If you must go in, or are caught in a smoke-filled room, crawl on the floor as low as possible. Smoke and heated fumes tend to rise, and the air is clearer and cooler at floor level. If feasible, hold a water-soaked cloth over your nose and mouth. If no water is available, a pillow or dry cloth is better than nothing. This will help protect you from smoke inhalation, but will *not* stop carbon monoxide—your worst enemy—so it is a limited aid at best.

### Keep windows closed

**11. To open windows or not** is a matter of question. Some experts believe that fresh air can help to dissipate smoke and lethal fumes. However, drafts may fan a fire, making it worse. In general, it's best not to open windows unless you're trapped in a smoke-filled room and need air to breathe or are using a window as a means of escape. For the same reason, make sure all doors are shut after you're certain everyone is out.

**12. Be especially careful** in the kitchen—65 percent of all household fires occur here, many from burning grease, some from faulty appliances. Be sure all appliances are properly grounded and in good working order. Don't let grease overheat, and *never* leave the kitchen while cooking with a deep-fat fryer or the like. Don't wear loose-fitting clothing that may dangle over stove burners and catch fire as you reach for something in an overhead cabinet—curiously enough, a frequent cause of housewife injuries.

### Kitchen fires are tricky

**13. When fighting a kitchen fire,** be extremely cautious here, too. Blasting a stream of extinguisher chemical directly into a pot of burning fat at close range will just splatter flaming grease all over the

kitchen, spreading the fire. Stand well back and "lob" the stream into the fire as gently as possible. If an extinguisher is not at hand, small grease fires can usually be put out by quickly covering the pot with a lid, tray or other nonflammable object to smother the fire.

**14. Don't smoke in bed** or while dozing in a chair, especially if you've been drinking or are on sleep-inducing drugs and are likely to be drowsy. Ironically, after all the years this familiar warning has been repeatedly made, burning bedding or other upholstery is still a major cause of home fires—and deaths. Burning material produces particularly noxious smoke and fumes, and many victims are overcome without even awaking.

**15. Be sure cigaret butts** are out, especially after a party where there may be heavy smoking. Many butts that appear to be out really aren't and can continue to smolder for hours. If you then toss them in the trash before going to bed, as many people do, they can start a fire later in the night—and you may never smoke again. The best practice is to deposit each day's butts in a tin can and place the can outdoors overnight. Not until the next day should they go into the garbage.

#### Children and matches don't mix

**16. Children start** a high percentage of fires, usually by playing with matches, cigaret lighters, candles, lanterns and other fire-producing objects. Obviously, all such articles should be kept out of their reach, and young children should never be left unattended. The problem is made doubly serious by the fact that most children, having started a fire, are afraid of punishment and run off without telling anyone what they've done. The fire rages on until, often, it's too late to do anything about it. Even more tragically, a child may hide in a closet, under a bed or in some other remote place and himself become a victim.

**17. How many fire extinguishers** should you have? The more the better, within reason. There should be several placed at various locations around the house. They should be near areas where fires are most likely to occur—kitchen, basement, garage—but not so near that you can't reach them if a fire does break out. Don't put one right next to the furnace, for example, or alongside the kitchen range.

Extinguishers should be checked periodically for proper pressure. Some come with pressure-indicating gauges. Those that don't should be tested every year or so by an ex-

tinguisher service shop. Once an extinguisher has been used, even if only partially, it should be refilled immediately—an empty one won't do you any good. There's a tendency to put off or forget this chore—and that could be fatal.

#### Consider a fire alarm

**18. While home fire alarms** are still fairly rare, more and more fire prevention experts are recommending their installation. If you decide on one, be sure it's of the latest, most advanced type designed to detect a fire at its earliest stage. The old heat-sensor type allows a fire to build up too much intensity before it's activated—you could be dead before it sounds off. The electric-eye type detects smoke but not invisible carbon monoxide. The best type, recommended by most safety experts, is the so-called "ionization" detector. This senses both smoke and carbon monoxide and can sound a warning before a smoldering fire breaks into flame or builds up heat.

Ionization detectors come in two models—one operating on batteries, the other on house current. Both should have some kind of fail-safe or emergency backup system. The 117-volt type has the disadvantage of not operating in a power failure or if a fire knocks out power. It should have backup batteries or at least a warning indicator to signal when it is not functioning. The battery-powered type works in a blackout, but you must remember to check and renew its batteries regularly. It should have an indicator warning when battery power is low. Like fire extinguishers, there should be several such units located in different parts of the house.

#### Get rid of flammable trash

**19. Keep your house as clean** as possible, especially basement, attic and garage areas that tend to become cluttered. Get rid of unneeded papers, empty cardboard cartons, old paint cans, scrap wood, shop sawdust—anything that can cause or feed a fire. Keep flammable liquids—paint thinner, kerosene, cleaning fluids and the like—away from heat sources and out of children's reach.

**20. Finally,** remember that superheated air and carbon monoxide gas are the real killers in a fire—and that most people who die in fires are never touched by flames. In the last analysis, the name of the game is get out. Immediately! Don't wait until you actually see fire, and don't try to fight a fire that's out of control—there's no glory in being a dead hero. ★ ★ ★

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## OLD-WORLD WORKBENCHES

(Continued from page 127)

without altering the basic frame construction. This same construction can be applied to a scaled-down version for a child's bench about 48 in. long. If you haven't attempted complicated cabinetwork before, you could try making this smaller bench out of kiln-dried fir which is easy to work with. If you stick to the layout for mortise and tenon joints with bolted stretchers you'll wind up with an extremely strong bench.

### Dry-assemble all joints first

Don't rely on white glue. Each wood surface to be glued should be scored with a rough file and you should coat all surfaces and edges in the joint. Use an epoxy resin or liquid-hide glue. These are long-setting and will give you time to complete a series of joints for the end frame and get them completely clamped. Check instructions on the glue bottle for clamping times and don't glue below the temperature limit listed. If you get a good bond in an epoxy resin joint, you'll have to break the wood to get it apart. So dry-assemble all joints first to check your measurements.

To be honest, these benches are the best available and will require a sizeable investment of money (over \$400 for the large Steiner bench) or time for construction. But using a great bench makes woodworking tremendously satisfying and the improved quality it can bring to your projects will encourage you to undertake more and more complex cabinetwork in the future. ★★★

## HIGH FLIERS

(Continued from page 98)

of the vertical dowels and through the hole at the tip of the wing. We recommend that you use a 30-lb.-test line for flying.

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Both kites proved able fliers in our tests. The box kite flew even in a very slight breeze—although not for long—but is easier to launch and keep climbing in a breeze of about 10 mph. Ours proved very sturdy, surviving a couple of hard crash landings to the frozen ground without a tear.

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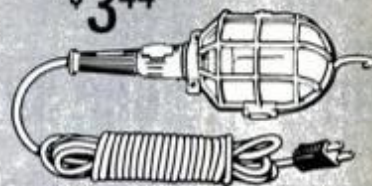


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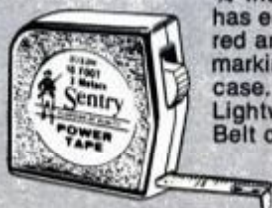
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## WAR WATCH IN THE SINAI (Continued from page 78)

ternational Development, National Security Council and NASA.

The character of a given terrain dictates the choice of sensor. The Sinai's Et Tih plateau, for example, is an oven-hot area of sandstone, limestone and chalk that supports only scrub vegetation. This hard terrain lends itself to the use of seismic sensors or MINISID (miniature seismic intrusion detector) devices, which can detect a walking man up to 90 feet away or a moving vehicle from a distance as far away as 900 feet.

A small geophone in the sensor converts small earth disturbances into electric signals that activate a transmitter. The transmitter broadcasts a VHF signal on any one of 640 separate channels to a nearby watch station, where technicians analyze the signal. In the Sinai set-up, detected intrusions will be reported to the United States base camp, whose director will relay the information to the United Nations Emergency Force, the Israelis and the Egyptians.

### Types of intrusion programmed

The watch station or SRP (sensor reporting post) utilizes a minicomputer that can ingest thousands of bits of information from the ground-emplaced sensors. The computer is programmed to produce a "signature" which will identify the type of intrusion, whether troops or vehicles. In the event of a detected intrusion, American technicians must then verify the discovery by sending one of their men forward to actually observe and identify the nature of the intrusion.

"Occasionally a sensor goes haywire and somebody has to go forward and shoot the bastard," explains a State Department contracting officer who was with the U.S. team that surveyed the Sinai last December.

There are many different types of sensors but all have at least three basic components: a detector (an electronic circuit for discriminating targets from nontargets), a radio transmitter and a battery power pack or other power source. They are sophisticated devices. The MAGID T-4, for example, can sense changes in electromagnetic fields when a Jeep, truck, or armed foot soldier approaches. MAGID (magnetic intrusion detector) also can count closely spaced vehicles and detect distinctive magnetic signals from different types of vehicles. Present MAGID models can discriminate an M-60 tank from an M-48 tank and a

two-and-a-half-ton truck from a five-ton vehicle.

### Even a 'twig' may be a sensor

Perhaps the simplest sensor, developed for use in Indochina, is the NBB (noiseless button bomblet). It is camouflaged to look like a twig or stone. When the NBB is stepped on or disturbed, even by being moved 1/32 of an inch, it activates a low-power radio transmitter with a range of 1000 to 1500 feet. Transmissions are picked up by a special device called ARFBUOY (automatic radio frequency buoy), which relays the signals to either a ground or airborne sensor reporting post (SRP).

All of the sensors developed by the JASON group and other military R&D labs can be linked to one another in what is called a phased array. MINISID III—125 of which have been provided for use in the passes—is emplaced by hand. It has a 90-day mission duration before a battery change is required and operates in temperatures ranging from minus 65°F. to 155°F.

### Monitoring troop movements

MINISID III is typically deployed along trails or roads to monitor troop and vehicle movements. This sensor can be patched into a network with a DIRID (directional infrared intrusion detector) and an ACOUSID (acoustic intrusion detector), both of which will also be used in the Sinai.

In the basic MINISID deployment, a buried geophone detects seismic waves, which are processed to determine characteristic signal features that uniquely identify the type of intrusion into a sensor-seeded area. When used in a dual mode, as are today's sensors, MINISID III geophones will pick up seismic signals but will not transmit an alarm until the second sensor confirms that an intrusion has been detected.

The American technicians will wear orange-colored uniforms, live in porta-camps similar to mobile homes, carry small arms for personal protection and a U.S. Sinai Field Mission ID card with inscriptions in English and phonetic Arabic and Hebrew. Since some of the soldiers in the Israeli and Egyptian armies are illiterate, the following key sentences are included: "We don't fight—Peacekeepers." "May I use my radio?" "May I take my belongings?" "May I speak to your commander?"

United Nations peacekeeping troops will escort the American technicians

(Please turn to page 154)

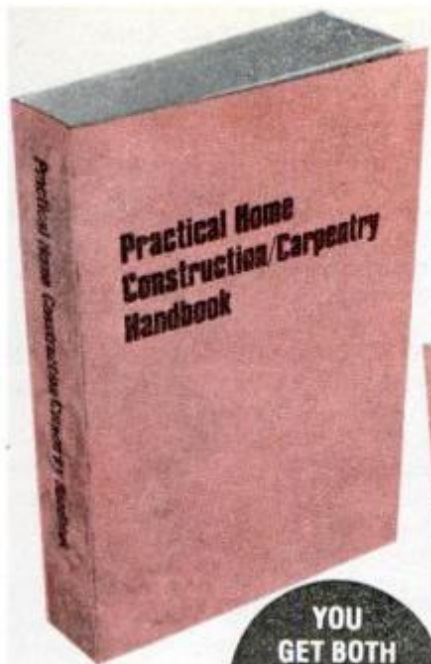


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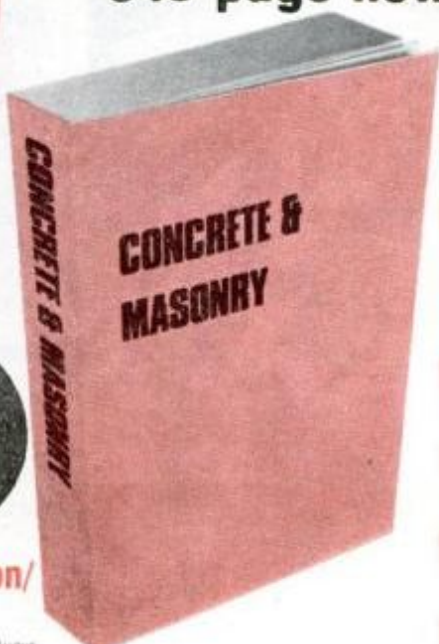
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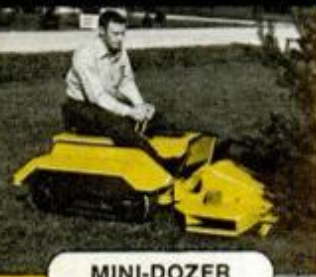
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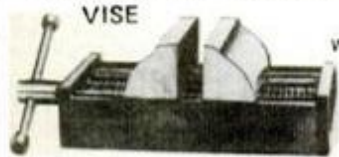
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## WAR WATCH IN THE SINAI

(Continued from page 152)

into "no-man's-land" and also guard approaches to the Sinai Field Mission base camp and forward watch stations or sensor reporting posts.

Under terms of the withdrawal agreement, both sides are permitted a limited number of troops within their own lines but not inside the buffer zone. Assuming that the Israelis have seeded their own zone, portable ground readout equipment can be used by a patrol or mounted in a vehicle. The basic sensor receiver provides a visual display and audio signals, both of which can be transmitted to a nearby SRP for analysis.

### Sensor management complex

The electronic surveillance system that has been developed by the United States could break down without a complex process known as sensor management. As experience was gained in Vietnam, a form of sensor management was developed that today includes frequency management, selection of areas for sensor emplacement, selection of the types of sensors to be employed, delivery methods to be used, readout equipment and personnel required.

Sensor management is a continuous process. After emplacement, sensor fields must be evaluated for proper operation. As time passes, some sensors may no longer be needed; they must be deactivated to conserve allocated frequencies. Other sensors may have to be replaced to maintain the required capability.

### Guard against saboteurs

Since the nerve center of any such operation is the SRP, this installation must have its own security systems to keep out possible saboteurs. Any group bent on touching off renewed fighting between Israel and Egypt would first have to knock out the early warning system. The American watch stations, although guarded by UN soldiers, will be fenced in and probably further secured by buried strain-sensitive cable sensors that give warning at the slightest pressure.

In the event of an emergency, it's probable that the first aggressive signs would be picked up by one of the high-flying monitors. It's no secret that U.S. spy-in-the-sky satellites pass over Egypt, Israel and the Sinai every few hours and, on signal, photograph military activity on the ground. Also, under the terms of the agreement, high and low-altitude recon aircraft like the Mach-3 SR-71 and the slower propeller-driven Mo-

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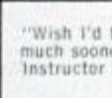
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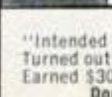
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## WAR WATCH IN THE SINAI

*(Continued from page 154)*

hawk OV-1, will be provided by the United States to fly one mission every 7 to 10 days. More frequent flights will be made if requested by the UN Emergency Force, Israel or Egypt. The results of such recon missions will be made immediately available to all parties.

Let's assume that relations between Egypt and Israel take a turn for the worse. Satellite and high-level reconnaissance indicate a war footing in each country, with armed forces in a state of readiness.

### Risky part of the job

The early warning system is working perfectly, but the 200 Americans are in danger of being caught in the middle. That's the big risk of their assignment. They are volunteers—and they have a job to do: to let the aggressor know that he is being watched and that the nation in danger of attack has been warned.

Now it's up to the State Department, and possibly the United Nations, to intervene diplomatically.

### Electronic countermeasures

But the basic situation may not develop in such a straightforward way. Let's say the surveillance system is working at top speed in what is a near-war emergency. Signals are passing through air and ground relays. Watch stations receive signals, which are relayed to the Sinai Mission base camp for assessment and analysis. Real-time tactical intelligence is flashed to the UN force and the country about to be attacked. Now the Americans must be especially alert to the possibility of the aggressor using electronic countermeasures to "spoof"—fool and jam—the sensor system.

Of course, this possibility was taken into consideration from the start. The American sensors will be sited carefully to take every advantage of terrain features, and the use of redundant relays and receivers will provide multiple readouts. Authentication procedures will be employed to prevent unwanted activation of the command and response systems. Sensors will be programmed to respond only when a certain code is transmitted.

It all adds up to a big undertaking—and a delicate one. But our 200 technicians know as much about their specialty as any group in the world. They learned their business in Vietnam, a tough training ground, and they're working with some of the most sophisticated electronics gear available. ★★★

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You just can't make mistakes with the "2-step" method in the new 1976 MOTOR AUTO REPAIR MANUAL. First the special "Trouble Shooter" section helps pinpoint in a flash the cause of trouble. Next, over 3,000 "How-To-Fix-It" close-up pictures (and plain-talk directions) show how to lick repair problems—fast and right! Even green beginner mechanics find the MANUAL so clear and easy to follow, they speed through jobs almost as fast as experienced pros!

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Every job, from installing distributor points to front end jobs, is covered in minute detail for 2,300 U.S. car models, 1969-1976. MANUAL contains 55,000 specifications, thousands of illustrations, diagrams and charts—the "meat" of 300 official shop manuals in 1,520 oversize pages.

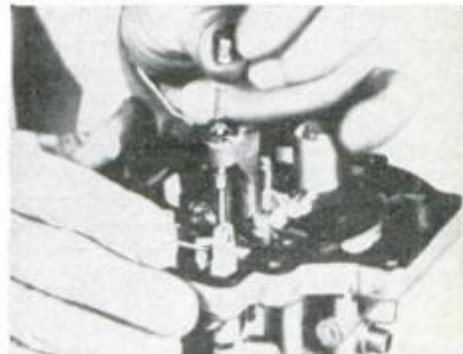
You get service data on Transmissions, Steering, Brakes, Universals, Alternators, Fuel Pumps, Ignition Systems, much more! It's no wonder this illustrated MOTOR MANUAL is called the auto repairman's indispensable "Bible." It's no wonder that 7,500,000 copies have been purchased by repairmen, service station operators, the U.S. Armed Forces, schools and students all over the world. Here is the help every beginner or "pro" needs to fix almost any part of any car right the very first time. And save time, work, money!

Learn all about the 1976 cars and in addition see if Detroit's new specs and procedures affect your older car. Auto makers continually update and improve past model adjustment specs on older cars as new road test data comes in. That's why you'll need this new 1976 MOTOR MANUAL to get the best performance out of your car—even if you already own an earlier edition.

## 1. Spot trouble fast



## 2. Fix it fast



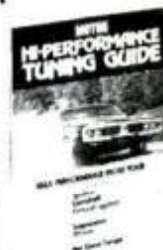
### 1976 edition covers all these makes

Toronado	Ford Fairlane	Lemans
Mustang	Tempest	Barracuda
Mustang II	Corvette	Buick Apollo
Mark III	Valiant	Olds Omega
Pontiac	Mercury Cougar	Chevy Monza
Thunderbird	Camaro	Buick Skyhawk
Buick	Front-drive	Olds Starfire
Imperial	Cadillac	Ford Elite
Cadillac	Javelin	Mercury
Lincoln	Montego	Monarch
Dart	Torino	Pontiac Astre
Continental	Mark IV	Ford Granada
Mercury	AMX	Cadillac Seville
Ford	Hornet	AMC Pacer
Chevelle	Challenger	Dodge Aspen
Chevrolet	Pinto	Mercury Bobcat
Chrysler	Maverick	Plymouth
Plymouth	Vega	Volare
Dodge	Nova	Cosworth Vega
Oldsmobile	Gremlin	Cordoba
Buick Special	Buick Century	Charger
Comet	Cutlass	Grand Am
Ventura	Monte Carlo	Firebird
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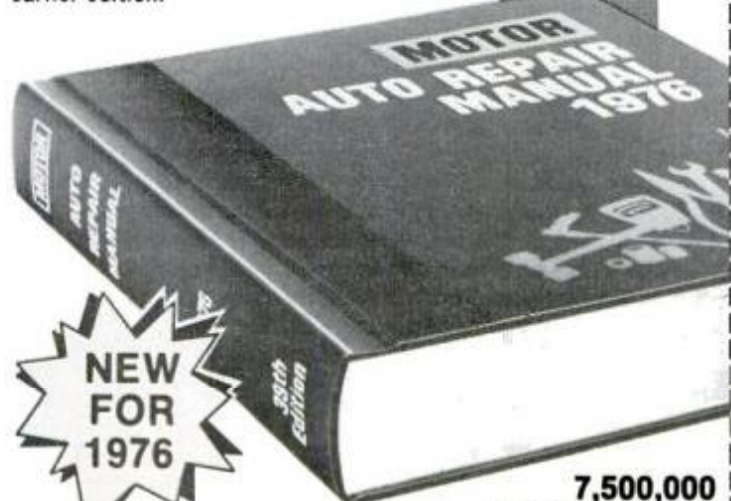
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## CAMPING THE EASY WAY—BY CAR

(Continued from page 103)

are among your tools, and then add a small board, gunnysack, box of flares, jumper cables and towline to help you get out of sand or a soft shoulder off the road. Tire chains, tire pump and spotlight also belong in this basic kit. Carry spare oil, sparkplugs, fan belt and water if you expect to be far from service stations. An ax and block and tackle are also stowed next to a small bag of sand by many campers. Matches, candle and tinder can be taped up in a small box, and a spray can of bug repellent, blankets and windshield ice scraper are stashed away in the cars of many campers in northern states.

For glove compartment rather than trunk, a jackknife, tire-pressure gauge, emergency plastic blanket, nylon cord, first-aid kit and small radio to get weather reports are worthwhile. A trouble lamp with a 12-foot cord and a lighter-plug terminal will also fit here, next to a pair of pliers and a coil of wire. You can camp for years without needing any of these and then suddenly be sorry that one or more of them wasn't along.

### Bathroom privileges

Your car, unlike a self-contained recreational vehicle, does not have a built-in hot-water system, sink, shower, toilet or holding tanks. Instead you use the bathroom facilities of filling stations and those that every campground provides. For under \$15 each, however, you can get a plastic portable sink with built-in water supply and a camp toilet. Or for under \$100, there are toilet units like the Thetford Porta Potti that are self-contained and particularly convenient for a family with children.

### Extras just for fun

Within reason, there's little limit to the sports gear you can stow in the back or trunk, tie on the top, or tow behind your camper car. Surf board, inflatable boat, outboard motor, hunting gear, bicycles, skin diving tanks, tennis rackets and archery equipment all can fit in. If relaxation means beach chairs, surf-casting tackle, ice chest of beverages, barbecue, and even a mini TV to watch the play-offs, bring them along. Most campsites offer extra-charge electric outlets which, with your extension cord, can power a handy electric frying pan and hotplate, lights and dual-current refrigerator.

Today's family car can carry the comforts of home. ★★

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Now,  
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## Mixture No. 79

The most famous number in pipe smoking.

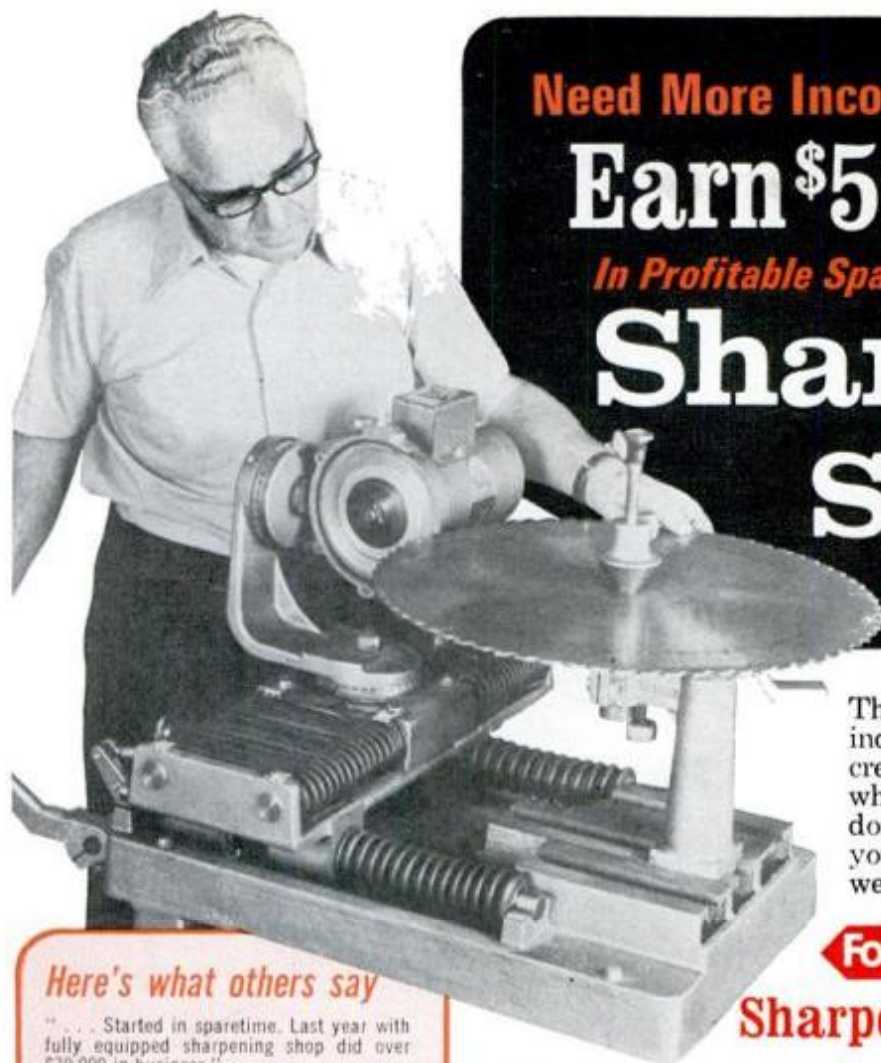
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"An accident almost crippled me for life but thanks to Foley equipment and the training I received at your school I now have a profitable business which proves 'You can't keep a good man down'."

J.H. North Dakota

"The Foley Filer handles all my needs. For what customers were demanding of me I thought I'd need extra machines and equipment. Not so, the Foley Filer takes care of everything I need."

H.F. Pennsylvania

"Your equipment is built to last. It'll outlive me (and outwork me)"

C.W. Iowa

"I'm a 'retired farmer' at 68 but my Foley equipment keeps me busier than ever—and it's profitable too!"

L.J. Minnesota

"I started a small sharpening operation in my garage. I now have 2 other branches and several people working for me. My gross income is in the five figure bracket."

L.G. Chicago

"Who says a woman can't succeed in supposedly a man's business. I did and today I'm doing business with many industries. I just finished sharpening 55 ten food band saws."

A.A. Wisconsin

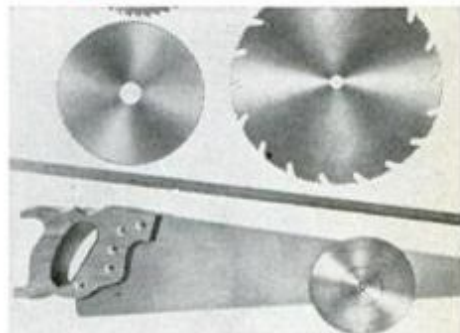
"Looking for a snow plow. I stopped in at a rental outlet. Browsing around, I noticed a power chain saw and it dawned on me that rental shops could mean extra profits for my sharpening business. Now I have extra business all of the time from rental outlets."

M.S. Vermont

"The Quality of Foley equipment has guaranteed me repeat business because I can turn out quality jobs every time. You might say, I've built my reputation on Foley's."

C.D. Colorado

You can sharpen combination (rip and crosscut) circular saws, band saws, hand saws, crosscut circular saws as well as Carbide-tipped saw blades—and do a perfect job every time without experience or special training. The precision Foley sharpening equipment does it for you automatically! Set up in basement or garage, work your own hours in your own way and earn big sparetime profits.



use our truck to pick up saws in five nearby towns. With a family to support and plans for building to our house we had to pick up business fast and already sharpen an average of 15 to 20 saws a day. Business for the future looks even better as good machine filing is our best advertising."

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Do-It-Yourself Kit contains everything you need to install. Complete, illustrated instructions for installing with standard tools.



Look for Gold Mark quality products in the automotive department of your favorite store.

## PICKING PACKS

(Continued from page 111)

material and construction, excellent—superior in design and comfort. Alpine Designs in Boulder also reports that its new mini Flexpack is so adjustable that it can perform as an adult ski touring pack during the winter and a child's frame pack during the summer. To would-be customers for the full-sized Flexpack, Alpine Designs says, "Lift the frame over your head and crash it to the floor as hard as you can." That's confidence.

### Picking the perfect one

With something like 35 United States manufacturers offering better than 300 kinds of backpacks this spring, selecting a pack for your own use can be mystifying. At least it can be said that the frames of reliable manufacturers are all reasonably well made. The weight range of the frame is not too important unless you are the kind of backpacker who will even saw off the handle of your toothbrush to cut down on weight you carry. Heliarc welding is considered the strongest, but eutectic welding holds up just about as well. Aluminum fittings are satisfactory, too.

Frame contour has been found to be important. Let the frame bend forward at the top and it moves the center of gravity forward. The hold-open-bar carries much of the weight of the load and should be attached to the frame and not, as in some of the inexpensive models, used in a fabric pocket.

The belt is another key feature of a pack that should be checked before determining if the model meets your needs. A good hip-suspension system distributes the weight evenly over as much of the hips as possible and keeps the load in close to your body. It should, at the same time, allow the back to adjust to the pack when making a steep climb or descent. This will reduce back and leg fatigue as well, while providing better balance and a feeling that the pack is secure. Some hikers claim that only the single piece belt permits the frame to ride smoothly on their hips. Others favor the two-piece belt which is more commonly available this year.

### Choose quality

Select a soft or frame pack made by the manufacturer that originated the design or one of the imitators. What you get depends on how well the unit is made. Examine not only the frame but the shoulder straps to see how well padded they are and

whether they are wide enough so they won't bite into your muscles. Cheap ones skimp on pad material and sometimes use easily frayed nylon belting that can slip through buckle fasteners.

Stitching should be of durable nylon or cotton-wrap nylon, with stitches small, straight and even. Several companies provide do-it-yourself backpack kits at lower prices. Double stitching is required over pockets, and stress points must be reinforced. Zippers should be made of materials that will not jam

## BACKPACK SOURCES

Among major companies in this field are the following. Some can supply names of dealers while others offer mail-order catalogs, services.

Adventure Pack 656 Front St., El Cajon, Calif. 92020	Denver, Colo. 80216
Alpenlite 115 S. Spring St., Claremont, Calif. 91711	High Touring 1251 E. 2100 S., Salt Lake City, Utah 84106
Alpine Designs 6165 East Arapahoe, Boulder, Colo. 80303	Holubar Mountaineering Box 7, Boulder, Colo. 80302
Camp Trails Box 14500, Phoenix, Ariz. 85063	JanSport Paine Field Park, Everett, Wash. 98204
Cannondale 37 Pulaski St., Stamford, Conn. 06902	Kelty 1801 Victory Blvd., Glendale, Calif. 91201
Coleman 250 N. St. Francis, Wichita, Kans. 67201	Lowe Alpine Systems 1752 N. 55th St., Boulder, Colo. 80301
Frostline Kits 452 Burbank, Broomfield, Colo. 80020	Recreational Equip. Box 22090, Seattle, Wash. 98122
Gerry 5450 N. Valley Hwy.,	Revendell Mountain Works Box 198, Victor, Idaho 83455

in cold or damp weather, and should be operable with mittened fingers if you plan any cold season hiking or cross-country skiing.

This year there is a bewildering variety of pack compartments available. Most lines include a single-compartment model plus various dividers. In some you can unzip the floor of the upper section to make one big bag for large items. Others unzip around the outside for access to individual pockets. Somewhere there's a pack to best suit your purpose. ★ ★ ★



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## ACTION



### PL-1407 Surf Sailer

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An 80 MPH flying Volkswagen! This VW powered biplane is sensationally inexpensive and flies like a dream. 150 mile range. Proven design. Kits and parts readily available and The Scamp is a handsome piece of work. **\$49.98**



### PL-1270 Teenie Two

Daughter of Jeanies Teenie and slicker than Mom, Teenie Two is the second generation of PM's most successful VW powered monoplane. The rage of the homebuilts, if you listen real hard you'll hear her say "Come on and fly me." **\$35.00**



### PL-1406 Boonie Bug

Starting with a junked VW bus chassis, you add some work and love and presto! A smooth riding enclosed van with ATV capabilities plus sleeping and camping facilities. Show-stopping looks too! Truly a child of the 70's. **\$14.95**



### PL-1405 Scuba-Tow

A motorcycle battery powers this streamlined fresh or salt water dream. Pulls you on or under the water for hours of effortless snorkeling or scuba diving. Rugged and dependable. Big, full scale plans and detailed instruction manual. **\$7.95**



## MODELS

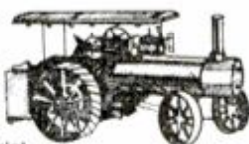
### PL-1276 Quiet as a U-2!

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### PL-1200 SS United States

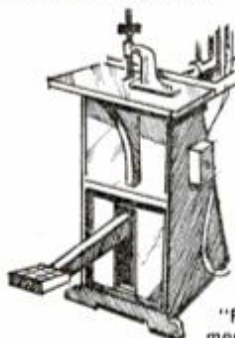
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## POWER TOOLS

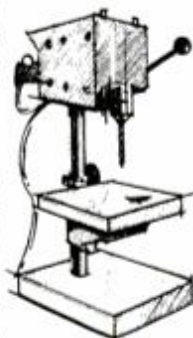
### PL-1400 Boring Machine

Charles Kastl has designed a magnificent home-built boring machine. Horizontal, pedal operated, this tool can become the pride of your workshop and at great economy. **\$6.95**



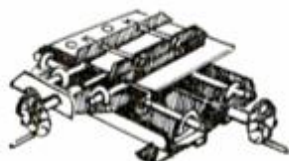
### PL-1401 Drill Press

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### PL-1402 Milling Table

An ideal machine for model builders, electronic hobbyists and camera buffs. Built entirely of parts found in hardware, hobby and plumbing supply stores, this precision tool costs about \$30 to build from scratch. Another Cutler design. **\$6.95**



## BACKYARD STORAGE

### PL-1277 Carriage House

Eye appeal, storage space and two stories! Equip it as a workshop or an office. Build the second floor as a bunkhouse that sleeps two kids. 8x12, the covered walkway widens the second floor over 2 ft. Two sets of plans (one for your building permit). **\$5.49**



### PL-1301 The Southern

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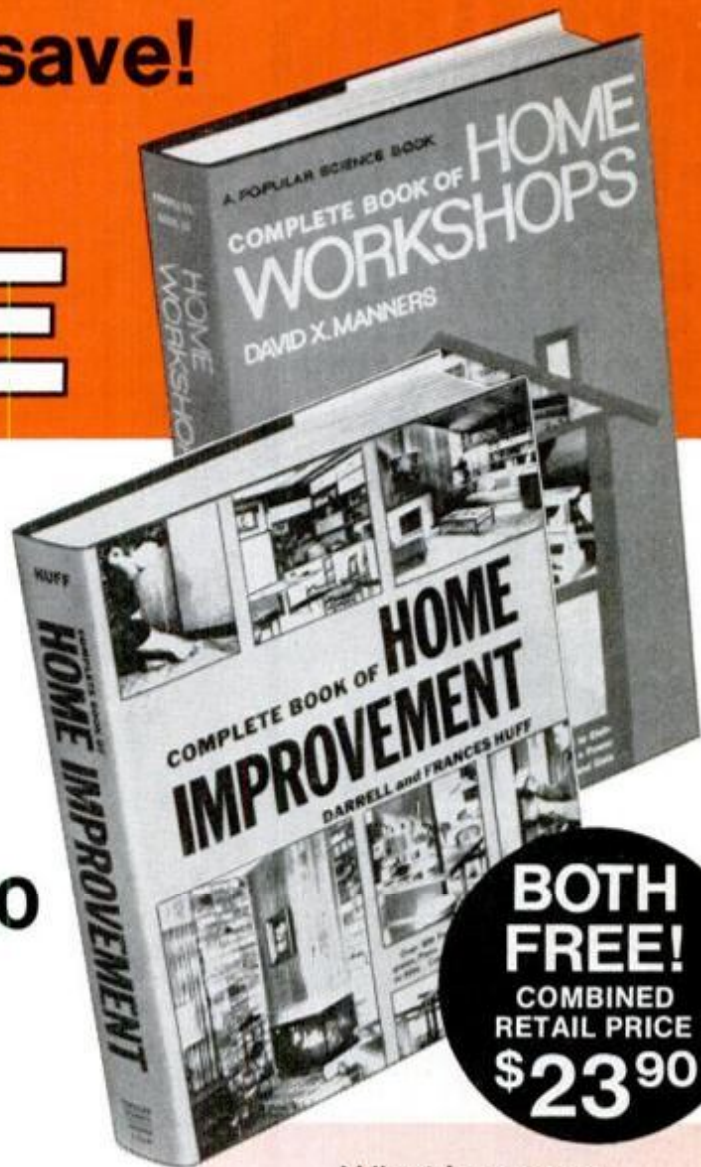
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## DRIVING THE 1976 VOLVOS

(Continued from page 89)

same species, obviously, with the same lion-cage construction, but primitive and truck-like next to the latest cars from the Swedish automaker.

This would normally be the year—in view of eight to nine-year model runs for European cars—that the series would give way to an all-new body style. But annual changes of the last years have resulted in a vehicle more successful than perhaps even Volvo anticipated.

### Pegging the price

A record number of cars were sold in the U.S. in 1975 and Volvo expects even greater sales in 1976 (about 70,000 cars). And to keep up the momentum in 1977 (Volvo's 50th anniversary), they'll start shipping cars from the now-under-construction Chesapeake, Va., plant—the first assembly plant to be built here by a foreign automaker.

The material, labor (and confidence) Volvo has in its cars is reflected in the price. You can't ignore it because it's so high. To my mind, you used to get *more* than you paid for when you bought a new Volvo, but that hasn't been the case for some years. It's true that '76 cars offer more in the way of performance, ride, safety, comfort and quality of construction than ever before, but now the price is more in line with what they're worth. A Volvo to go will blow the doors off your budget: The 242 starts close to \$7000 and the price can hit \$11,000 for the top-of-the-line 264GL.

### The 260 Series

The Volvo 164 was introduced in 1968. The obvious changes that distinguish the 4-door, '76 luxury sedan from the '75 counterpart are the new badge—264 instead of 164—and the new front end, which was designed for running into walls, literally. The energy absorbing nose is an application of the Volvo Experimental Safety Vehicle, and is similar to that integrated into the 240 Series last year.

When you get on the road, the car's improved performance becomes obvious—a clear result of the all-new, aluminum, V6 engine. The 164's in-line Six was an indefatigable workhorse, but, all cast iron, it weighed a ton. The better power-to-weight ratio of the V6 makes the 264GL incredibly nimble for a luxury sedan. (The 262GL and less-posh 264DL won't be available until about April 1st).

The V6 is a joint development of Volvo and the two French automakers, Renault and Peugeot, and it debuts here in the Volvo. Its smoothness and torque characteristics (and, I expect, its reliability) are outstanding—fuel consumption not withstanding. EPA says you can expect 15 city and 23 highway from the 265 automatic, which I'm sure is close (since I got 14.1 mpg in really red-hot, cab-dragging driving when I drove the 265 in New York City recently). This fuel economy is clearly better than you can expect of other cars of comparable luxury and performance, especially driven hard, but still, I would have expected more of Volvo.

### Tweedledum and Tweedledee

The 260 Series and the 240 Series are more alike than you might suspect. Looking behind the grillework and engine, the differences are mainly a matter of creature comfort: Standard on the 260GL sedans is airconditioning, sunroof, leather-faced (or velour) seats, heated driver's seat and so forth. Amusingly, there are also power *front* windows; in the rear, you crank.

The two series share, to an almost identical degree, all the features that really count: four-wheel, power-assisted disc brakes; dual hydraulic brake system; self-adjusting, three-point lap/shoulder belts; corrosion resistance; roll-cage construction; tinted glass, and front and rear towing points.

What this means is that you can flaunt it, if you've got it, with a 260 but a 240 is a better value.

### The 240 Series

The new 2.1-liter, overhead-cam, in-line Four is just what the 240s needed. The '76 power train also includes a new manual four-speed, with or without electric overdrive, and an improved three-speed automatic that shifts quicker and kicks down into low at speeds up to 40 mph.

The B-21 engine uses a belt-driven, overhead camshaft, and aluminum alloy cylinder head of cross-flow design. Ignition is electronic and fuel injection is by Bosch's simple continuous-injection system (CIS).

What makes the B-21 a joy compared to last year's cast iron, ohv B-20 is the redesign for maximum torque at 2500 rpm instead of 3500. This does pleasant things for performance in the lower rev range where you need it most—assuming you don't plan to race.

## 1976 VOLVO SPECIFICATIONS

### Models and base price

242 2-dr. sedan: \$6295  
 244 4-dr. sedan: \$6595  
 245 5-dr. sta. wagon: \$7495  
 262GL 2-dr. sedan: \$9595  
 264DL 4-dr. sedan: \$8450  
 264GL 4-dr. sedan: \$9895  
 265 5-dr. sta. wagon: \$9495

### Dimensions (all models)

Wheelbase: 104.0 in.  
 Length: 192.6 in.  
 Width: 67.1 in.  
 Height: 56.5 in.; wagons: 57.5 in.  
 Track front and rear: 55.9/53.1 in.  
 Ground clearance: 7.1 in.  
 Turning circle: 32'2"

### Specifications (common to all models)

Configuration: Front engine, rear-wheel drive  
 Chassis: unitized  
 Seating positions: 5

Suspension f/r: Independent-spring strut type  
 with coil springs and stabilizer bar/Live  
 rear axle with coil springs and stabilizer bar

Brakes f/r: Power-assisted disc/disc

Tires: CR78x14 steel-belted radial, white sidewall

Steering: Rack and pinion

Steering turns, lock to lock: 3.5

Fuel tank capacity: 15.8 gallons

Catalytic converter: California cars only

Fuel type: Regular (unleaded, Calif.)

Fuel injection: Bosch CIS

Electrical and ignition: 12-v, transistorized

Transmissions: 4-speed synchromesh; 4-speed  
 synchromesh with electric overdrive; 3-speed  
 automatic

### 260 Series specifications

Engine type: Aluminum V6, overhead cam

Displacement: 2673 cc (162 cu. in.)

Compression ratio: 8.2:1

Power: 125 hp @ 5500 rpm

121 hp @ 5500 rpm (Calif.)

Torque: 150 ft. lbs. at 2750 rpm

148 ft. lbs. at 2750 rpm (Calif.)

Battery: 70 amp./hr.

Vehicle weight: 3200 pounds (3300 wagon)

### 240 Series specifications

Engine type: Inline four-cylinder, sohc

Displacement: 2127 cc (130 cu. in.)

Compression ratio: 8.7:1

Power: 102 hp @ 5200 rpm (99 hp @ 5200

California)

Torque: 114 ft. lbs. @ 2500 rpm

Battery: 60 amp. hr.

Vehicle weight: 3000 pounds (3200 wagon)

EPA fuel economy ratings (manual transmission,  
 U.S. cars)

Model	City	Highway
242/244	17	27
245	16	28
262/264/265	15	27

Also new for '76 are changes under the skin like larger disc brake pads, more corrosion-resistant copper-alloy brake lines and other "minor" improvements.

### \$8000 dream car

It was the B-21-powered 245 wagon I most enjoyed on a test drive from Volvo's test track to the company's new plant in Kalmar, on the east coast of Sweden. The take-home for the station wagon is about \$8000 after taxes but it's worth it. Just look around. For \$6000 plus, for example, you could own a well-appointed Dodge Aspen wagon—a compact that's very impressive, especially in its big-car ride, and a good value—but I think the 245 is worth the difference. Of course, it'll take some years just to stash away the down payment. Meantime, I'm lucky: My 145 has only 100,050 miles on the six-digit odometer. ★ ★ ★

# HENRY MORGAN SAYS: "Good appliance repairmen are scarcer than doctors who make house calls."



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 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 for you!

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 electronics 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 appliance 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.

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 repair 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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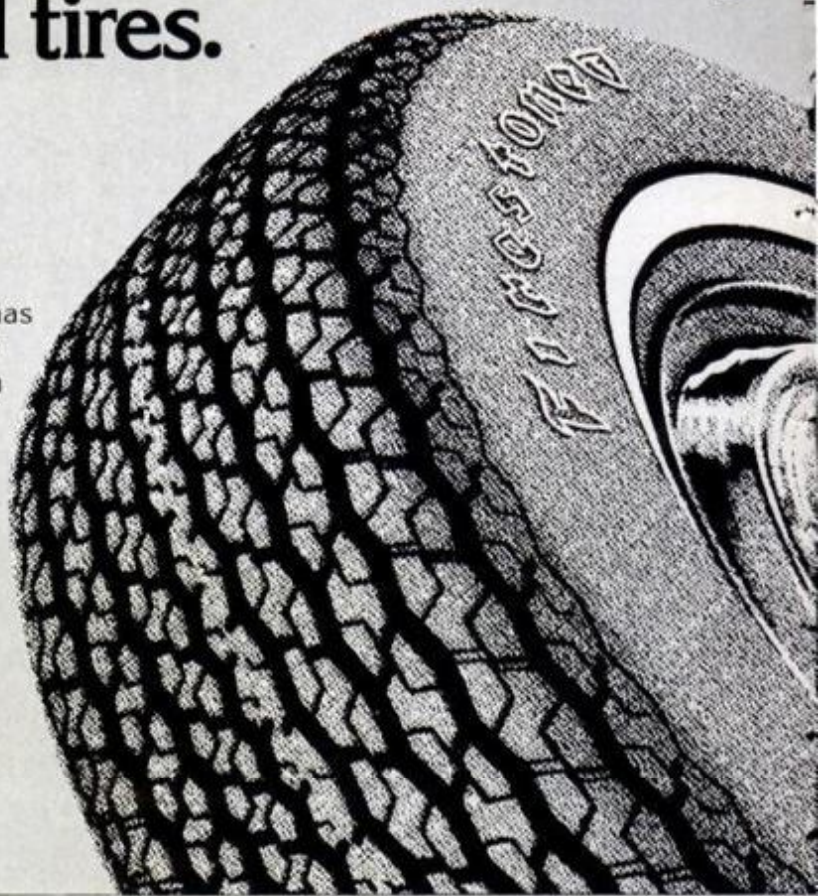
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# Who and what to ask before you buy steel belted radial tires.

## 1. Ask your tire dealer to tell you all this:

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If he can tell you all this, he's talking about one tire: The Firestone Steel Belted Radial 500™.



Don't forget—the safety of your tires is also affected by air pressure, wear, load, and operating conditions.

## COPY PHOTOGRAPHY

(Continued from page 91)

or painting. But printed texts, drawings, and the like, are *line* originals which carry all their information in one tone against a background of a contrasting tone or color. These require special techniques to give you black-on-white results instead of gray-on-gray.

### Adjusting exposure for tone

For tone originals, I use Kodak Panatomic-X film, for its sharpness and fine grain, but "push" it to 80 ASA to get more contrast. For best results, take your meter reading from a white card or paper that matches the white background of the original you're copying and use two-and-a-half stops more exposure than the meter indicates. If you can't find such a card, or the original's background isn't white, meter off a standard, 18 percent gray card or use an incident meter; with either gray-card or incident metering, use the meter's recommended exposure. For maximum sharpness, close down two or three stops from your lens's maximum aperture, and adjust exposure by changing shutter speeds.

If you're using a filter (never use

more than one at once), hold it over the meter when you take your reading. Then, if the original is similar in color to the filter, give the film one half stop less exposure than indicated; if the original and filter are opposite in color, give it one half stop more.

### Test roll

Now you're ready for a test roll. Pick a normal-looking original, and shoot it, bracketing your exposures at half-stop intervals from two stops less than the calculated exposure to two stops more. Process 10 minutes in straight Microdol-X at 75° F. If you have the film done by a custom lab, ask for a one-stop push. Test-print on smooth-surfaced, grade 3 paper, to find which exposure gives the best copy. From there on, use this as the basis for future exposures.

Low-contrast tone originals, like faded photographs or pencil sketches need extra contrast to reproduce well, so treat them not as continuous tone, but as line originals.

Line originals don't require the subtle separation between grays that you need for tone originals. Here there should be just two, unobviously differentiated tones: pure black and pure white.

For line work, I use either Kodak Panatomic-X or High Contrast Copy films. Of the two, Panatomic-X is the easier to get and use. Rate it at 125 ASA, meter by either the gray-card or incident methods, and use that reading as the basis for your exposure tests. To develop, try Kodak HC-110, in dilution A, for six-and-a-half minutes at 68°, for a two-stop push. This is my choice for low-contrast tone originals, too.

Kodak High Contrast Copy film is made for use in copying line originals and gives a very good high-contrast negative with ultrafine grain and very high resolution. But it's harder to find than Panatomic-X, and it's trickier: Any slight variation in lighting, processing or printing will show up as a marked defect in the final print. If you do use it, rate it at ASA 32, meter the corners as well as the center of your field to make sure the light varies no more than a one-third stop, and develop in Kodak D-19, as recommended in the film's data sheet. But other developers will also work: Experiment.

### Copying away from home or studio

Sometimes you have to copy something without access to a good set-

(Please turn to page 171)

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## COPY PHOTOGRAPHY

(Continued from page 170)

up. When I was a private investigator, I had to copy medical files that couldn't be taken from the hospital's reading room. So I set up on a table-top, with the camera on a tripod with its column inverted, and light from a small strobe bounced off an adjacent white wall.

If the place you're shooting in won't let you use a tripod or a strobe, try to work at a sunlit window, use a faster film, and (if you can), copy a smaller portion of the original, so you'll have to blow it up less to read it afterwards.

Pictures and diagrams in books and magazines are usually under copyright—the right to reproduce them is someone's property. It's probably all right in practice to make single copies for your own use or to show to friends. But if you want to make up 30 copies to distribute to a class, you're not only violating copyright, you're stealing bread from the mouth's of the copyright-owner's children.

The fees for small-scale reproduction rights are very low, and payment makes the copier feel like a very moral person indeed. ★★★

## CB ANTENNAS

(Continued from page 88)

though they're also available for use with matched pairs of whatever antenna you choose.

If you want to keep your car's CB a secret, you might consider an antenna that mounts on the cowl, where one would expect a regular car-radio receiving aerial. Cowl mounts, however, pick up ignition noise, and their pattern of coverage, as shown on page 88, is not the most useful. Besides, a decent CB antenna will still have a loading coil to show what it is. But straight masts that look like (and double as) regular car-radio antennas will severely compromise CB performance; regular car-radio aeriels used for CB will be even worse.

### Meter-checking and tuning

For any antenna to operate at its best, its impedance and that of its cables must match that of the CB set. But since half of the antenna system—your car and the antenna's location on it—is beyond the manufacturer's control, he can't guarantee a perfect match.

But you can. Most antennas can be tuned for best results, by adjusting either the position of the antenna

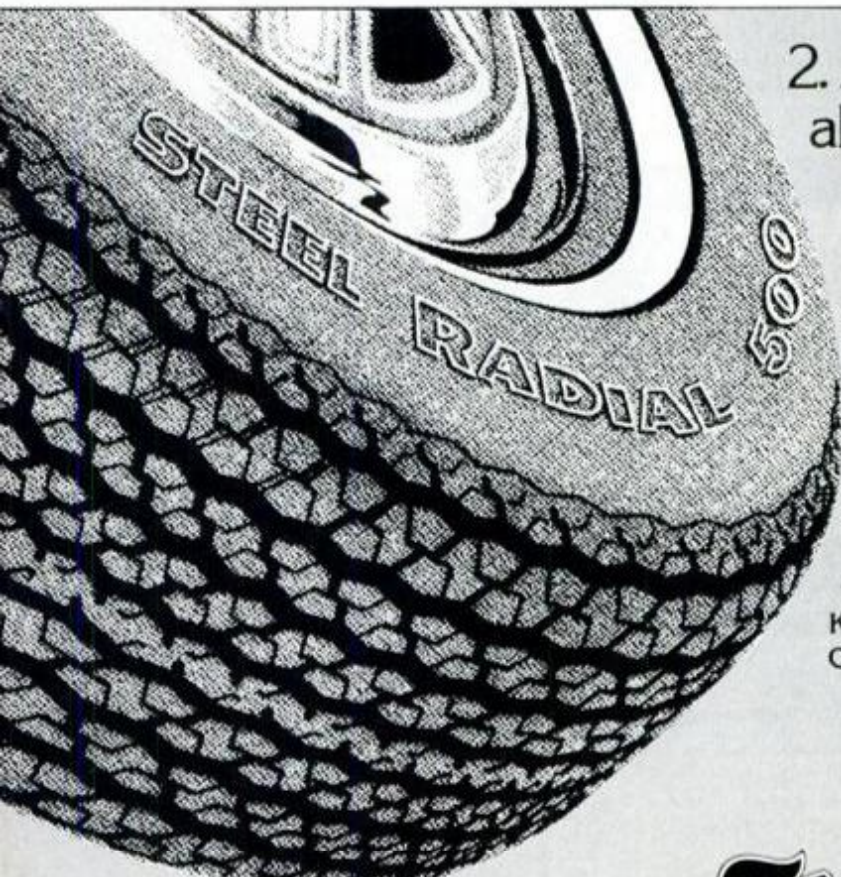
shaft, or a piece of it, within a set-screw collar, or by moving an element near the tip.

To make sure your adjustments are improvements, you can use readily available, inexpensive meters to measure standing-wave ratio (SWR), output signal field strength, or both. For best results, tune the antenna for the lowest possible standing-wave ratio, (anything lower than 1.5:1 is good, anything higher than 2:1 is pretty bad), double checking with field-strength meter as you go, to make sure you're increasing, not decreasing your output. Try to borrow, rent or share such meters if you can, rather than buying them outright; you won't need them often. In fact, you may not need one at all, save for reassurance: When I checked out my own hatchback installation (the one at the bottom of the second column on page 86), the needle of the SWR meter barely twitched, indicating that I'd done better by luck than I could have done on purpose.

### Center-load or bottom-load?

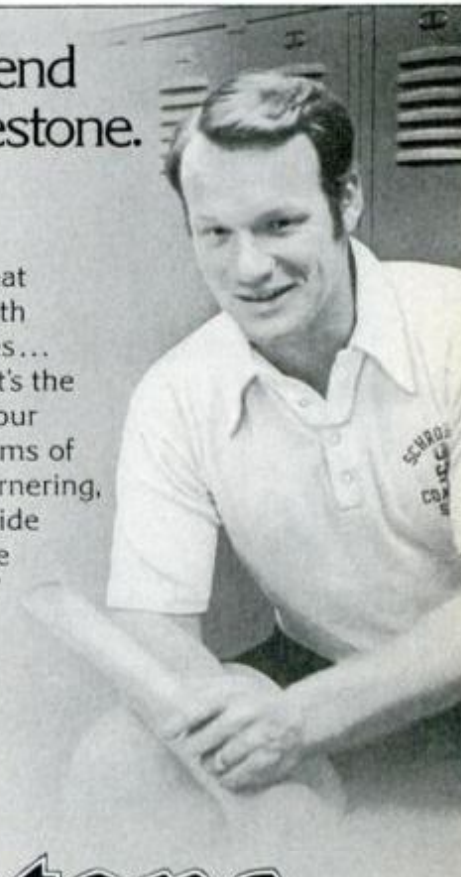
Coil-loading, the antenna-shortening technique mentioned earlier, takes several forms. Antennas can be loaded by coils concentrated at their

(Continued on page 172)



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### CB ANTENNAS

(Continued from page 171)

center, top or bottom, or distributed along their entire length.

Continuously loaded antennas are less critically tuned than others; this makes them easier to install, though they're not as efficient as some other types.

Top-loaded antennas are most efficient, but harder to match, and their characteristics change as they move in relation to the car—a problem worsened by the tendency of top-weighted masts to sway. This design also puts the most fragile part of the antenna, its coil, where it's most likely to hit something.

Center-loaded antennas are one of the two most popular coil-loaded designs, because they radiate efficiently—up to 2 dB better than base-loaded types. But the coil bulge halfway up the mast increases wind resistance and, possibly, sway; and it makes any damage from overhead obstructions costlier than replacement of a simple, replaceable shaft.

Base-loaded types, which seem to be most popular on the roads, have their coils at the bottom. This does reduce efficiency a bit, but it also presents only an inexpensive rod to bend or break, and offers a slender profile to the wind. Base-loaded types are also a bit less susceptible to noise pick-up from the ignitions of passing cars. And base-loaders are more tolerant of low capacitances between the car and the ground—which makes them better for small cars. With cars shrinking, it's likely that the market for base-loaders will expand. ★★★

### PM OWNERS REPORT: CHEVETTE

(Continued from page 114)

a fine car, but what annoys me is that you can't use the sun visors without knocking the rear-view mirror out of adjustment."

From Texas, a teacher's view: "Handling for parking is great, but handling on wet pavement leaves something to be desired. It skids badly. Good body fit, good comfort up front but scrunched in the rear."

And finally, from a Colorado machine operator: "Overall, I'm pretty happy with the Chevette. It seems well built, and except for one seat-belt rattle, it's soundly put together. I've found that replacing the original tires with radials has helped in both handling and gas mileage. The car provides good, reliable transportation, is an excellent second vehicle (especially in a family that doesn't need rear-seat legroom), and feels stable even in high crosswinds." ★★★



## New Polaroid 'Pronto!' takes SX-70 film

Polaroid's new "Pronto!" camera for SX-70 film doesn't fold flat like other SX-70 models. But at \$66, its price is a lot thinner.

And it has a few features even the more sophisticated SX-70s lack: The flash circuitry keeps the camera from shooting (and wasting a film) if you should try to use flash with a used-up Flashbar. It also lets



you use flash outdoors, to illuminate the shadows with back-lighted subjects.

Though the camera doesn't fold, it is quite compact (3-5/8 inches high, 4-1/8 wide and 5-9/16 long) and, at 16 ounces, the lightest Polaroid ever. For \$22 more, you can get an accessory kit with a tripod adapter, cable release and selftimer.—*Ivan Berger*

## AUTOMATIC DOOR OPERATOR

(Continued from page 60)

over two hours, following five easy steps shown. But first, you should check the condition of your door's coil springs; an operator will not open a door with weak or broken springs.

The Door-Valet comes in a 32-in.-long box you can bring home under your arm, and is one of three FCC-approved models.

Standard and Deluxe models, with self-lubricated roller-chain drive, will operate one-piece or sectional-type doors (wood, steel, fiberglass) to 7 feet high and 18 feet wide. Added Deluxe features include a 1/3-hp motor (Standard has 1/4 hp), dual courtesy lights, two-minute light time delay after door opens and closes and a key-switch control for manually opening and closing the door from the outside. The Supreme model has a positive screw-drive mechanism instead of roller chain.

All three models have the instant reverse safety required by U.L. Should the door's path be obstructed during the closing cycle, the door will reverse automatically to full open position. The Standard model sells for about \$140.—*Wayne C. Leckey, Home and Shop Editor*

# At Last, The Secret But Legal Way To Get Money

"MOST PEOPLE ARE TOO BUSY DREAMING TO REALLY DO ANYTHING ABOUT GETTING THE MONEY THEY WANT" REPORTS A NOTED FINANCIAL WIZARD.

I have tried many things in my long, rewarding life. In my youth, I tried direct selling of items at so-called wholesale discount prices. Forget it! I could not make a profit let alone use distributors.

A little older, but not so much wiser, I tried drop-ship selling using catalogs. Alas, the only people sure of making money were those selling the catalogs.

Just to give you a better idea, in the last twenty-three years alone I tried importing items from Hong Kong, Japan and others. I looked into mail-order schemes and deals. I tried the stock market, commodities, options and even horse race and crap systems. Believe me, I tried everything. Nothing worked for me. I must have bought every "GET RICH" book on the market.

As you can well imagine, I was going broke. Sure, I held steady jobs. But each business venture dipped deeper into my pockets. I was sinking fast.

Little could I know then how lucky I was for this to have happened to me. Something grew inside me. I could not rest until I found the answer I desperately needed — The Secret. I knew there must be an answer. I dedicated my life to finding it.

And now, after two years of research, after communicating with the richest, most powerful, as well as the wisest men of my time, I have put the puzzle together. What was unobtainable before suddenly became easy to get. I had an undefined power that gave me an advantage over everything I did.

### \$10,000 GUARANTEE

Your Purchase Price BACK in 24 hours if you, for any reason whatsoever, fail to obtain at least \$10,000 within 6 months using the method I describe on page 7 of AGVCF. You keep everything I sent you. You are the sole judge. Keep this for your records.

JACOB ALBRIGHT  
c/o Jacob Albright Memorial Foundation  
Mailing Address:  
P.O.B. 167, Dept. 1103-6  
Colmar, Pa. 18915

Dear Jake: You may be a rich old crackpot, but I have nothing to lose with your \$10,000 Guarantee. Here is the \$3.00 for AGVCF. But don't forget, I must obtain at least \$10,000 within 6 months using the method you describe on page 7, or I keep everything you sent and you send me my money back in 24 hours. I am the sole judge. My order is on that basis only.

I now live with more wealth than I dreamed possible. But unfortunately, now I am old. It took most of my adult life, over 34 years, to find the answer. I must leave something for my fellow man to save him time, a most precious commodity.

I realize that if I don't share what I have uncovered, I will only take it to the grave. And I will not benefit from the only thing that really matters to me now — helping my fellow man.

Now, don't get me wrong. What I have discovered is not a lot of mumbo-jumbo or a positive thinking method. Positive attitude is important but I can't give you that.

What I can give you is a 10 Chapter, step by step, presentation of "The Secret But Legal Way To Get Money." The code initials of the book title are AGVCF.

The most difficult part of this message is to place a value on it for you. I know that using it twice, I obtained \$100,000 in just 6 months. A friend of mine, who I told, had no money in his pocket at the time, picked up \$15,000 in three months. He later went on to get over \$150,000 in a year. So you can see my dilemma. To many of you, it will be worth an immediate fortune. And I want to get the AGVCF into the hands of as many as I can. I would give it away, but I know people place no value on "Freebies" and these are just cast aside. So read my SPECIAL OFFER below.

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Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_

Orders For Cash or Money Order processed in 24 Hours . . . Allow 15 Days if you send a check.

All Orders Shipped Book Rate.  
Add 50¢ For First Class.

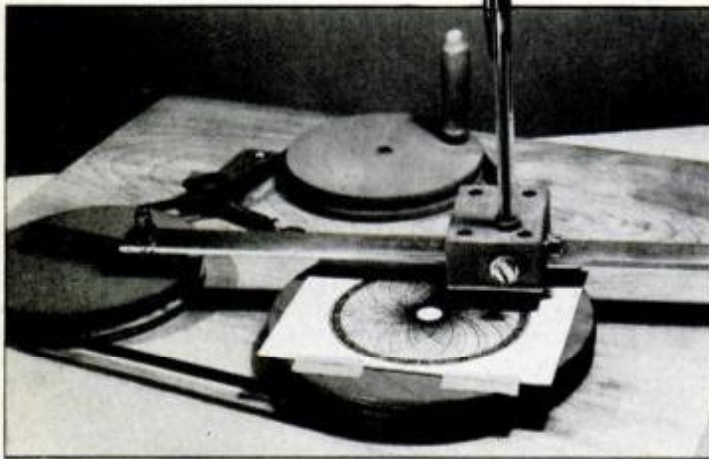
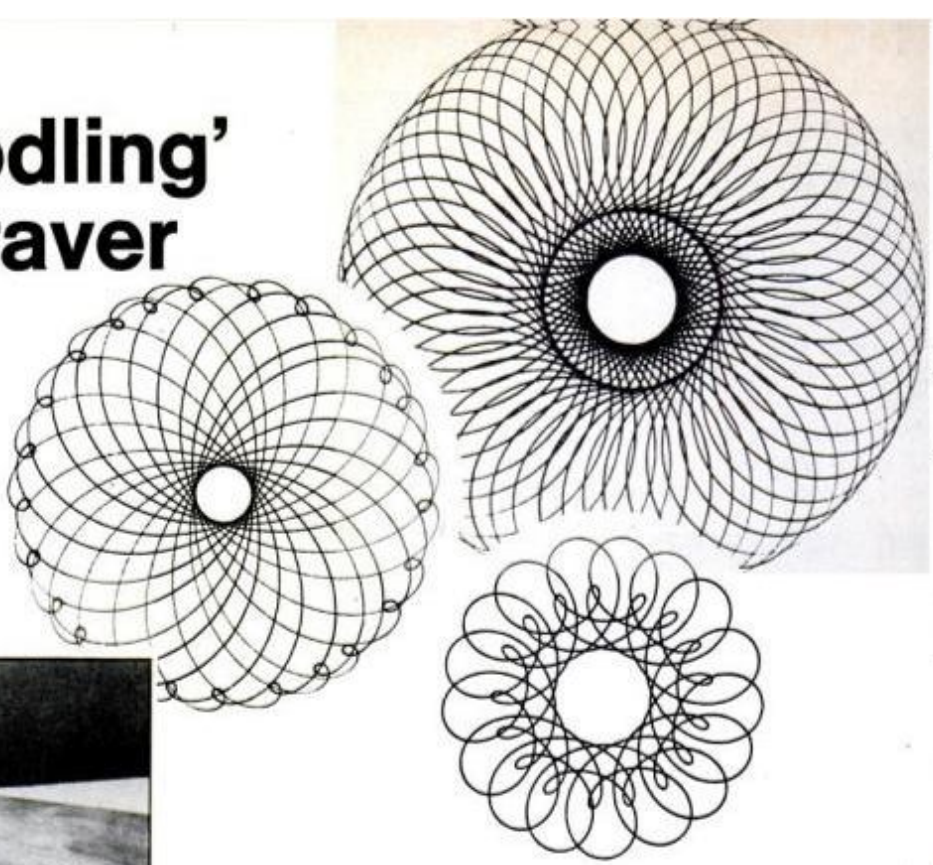
Copyright 1975. All Rights Reserved.

# Have fun 'doodling' with this engraver

You can crank out dozens of decorative designs in aluminum and brass by just spinning a disc.

by Walter E. Burton

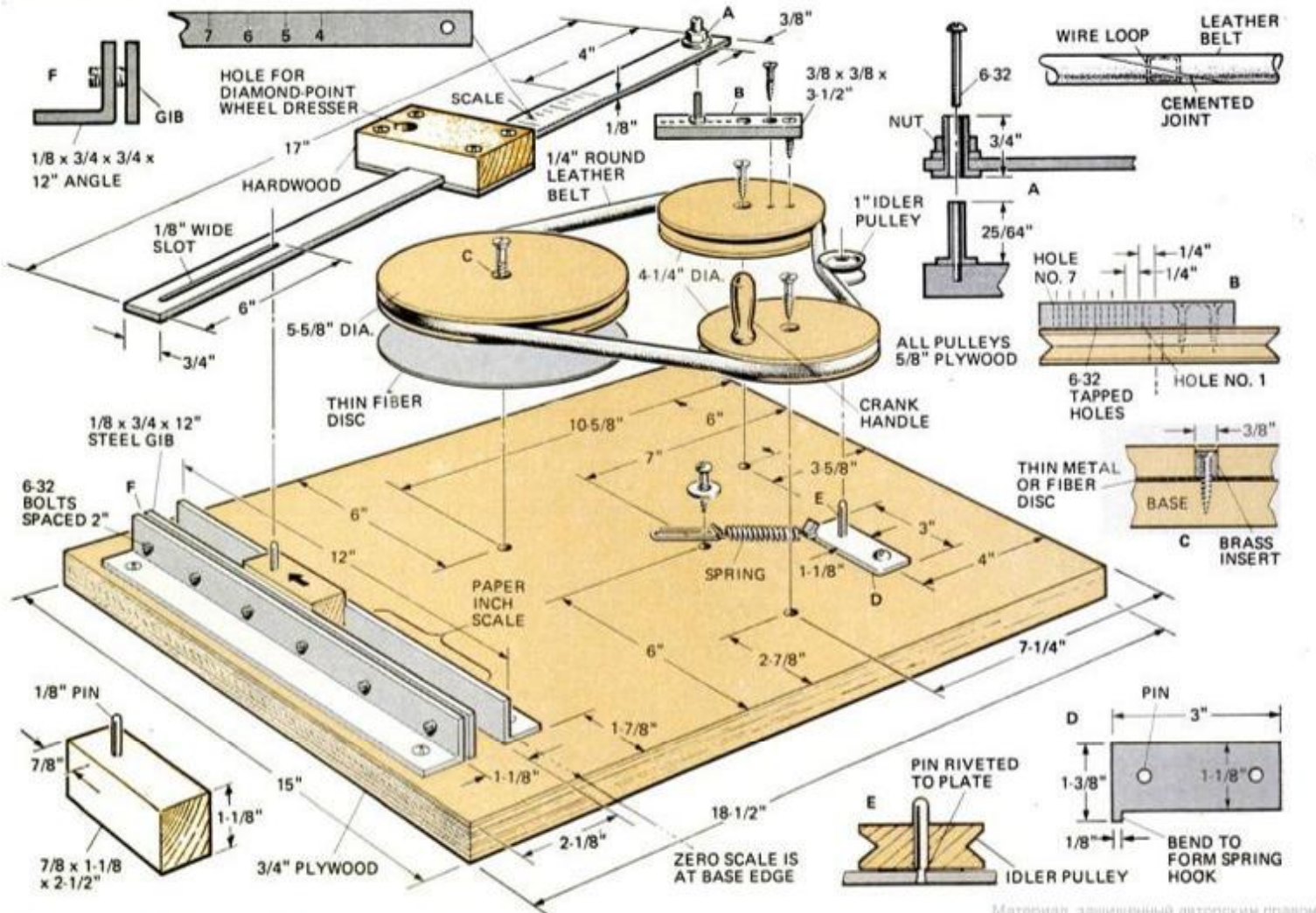
Fine ballpoint pen is used to form design on cardboard taped to wood wheel. For scribing metal, use diamond stylus.



If you like to doodle, you'll love the way you can do it with this updated version of an old-time polygraph machine. It uses a ballpoint pen for paper or a diamond-point, abrasive-wheel dresser for metal. All you do is turn a crank and watch the design appear like magic. The examples above give you an idea of the many intricate designs you can get by varying the setting of the

*(Please turn to page 176)*

Art: Fred L. Wolff



NOW...an Olympic Champion introduces the **SPEED SHAPER™** based on his amazing **SYNOMETRICS™** concept, a combination of **ISOMETRICS + ISOTONICS** to help you...

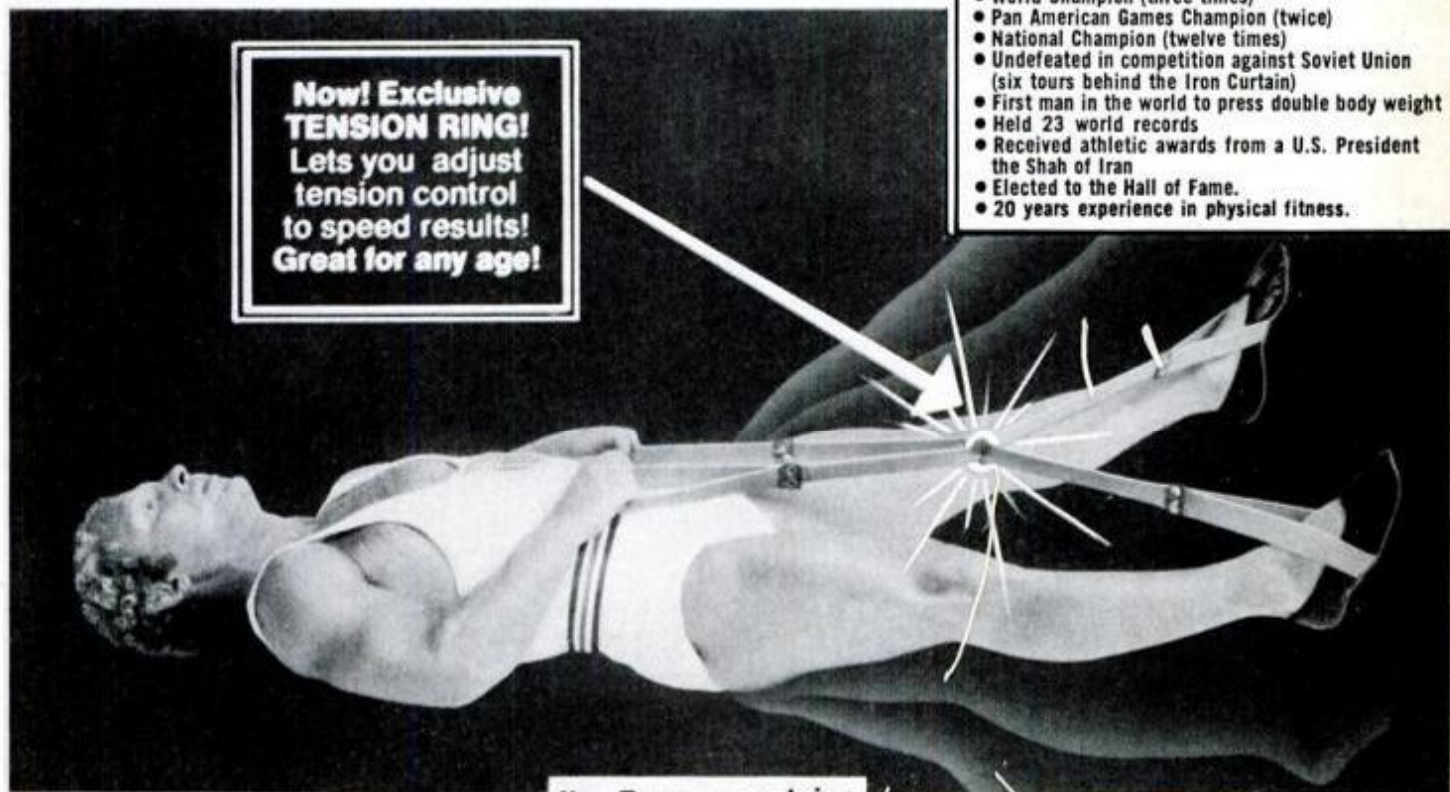
# Turn Belly Fat into a Rock-Hard Lean Stomach

...in 7 short minutes a day with the "miracle" of **SYNOMETRICS**...the fantastic new discovery for **speed shaping** away ugly, embarrassing fat and flab...to reveal a brand new rock-hard, lean, trim, handsome body!



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Olympic Champion and truly one of the world's outstanding athletes.
- Olympic Gold medal winner (U.S. Team)
  - World Champion (three times)
  - Pan American Games Champion (twice)
  - National Champion (twelve times)
  - Undefeated in competition against Soviet Union (six tours behind the Iron Curtain)
  - First man in the world to press double body weight
  - Held 23 world records
  - Received athletic awards from a U.S. President the Shah of Iran
  - Elected to the Hall of Fame.
  - 20 years experience in physical fitness.

**Now! Exclusive TENSION RING!**  
Lets you adjust tension control to speed results!  
Great for any age!



## Ike Berger explains What is Synometrics?

You already know about the Isotonic and Isometric principle of body dynamics. Millions of people use one or the other in their daily exercises. I used BOTH methods in my daily Olympic training for years in different separate exercises. One day I accidentally discovered that if I used BOTH methods **together in one single exercise**, I automatically speeded up the results tremendously and I reduced my daily exercise hour down to only 7 short minutes..

## The Science of SYNOMETRICS

I later learned the scientific reason for this amazing result. It's called **SYNERGISM**—meaning that when you combine two methods the result is greater than the both of them separately. I now called my new discovery **SYNOMETRICS** and developed a special exercise unit I call the **SPEED SHAPER**. And that's just what it is...a speed method to give you results in minutes, NOT hours! Now...build yourself a "fantastic looking body" with the incredible **SYNOMETRICS**—the invention that works on the exciting new scientific concept of **ISOTONIC + ISOMETRIC**.

## What Is The SPEED SHAPER?

An ingeniously designed amazingly compact slimming and shaping discovery that has no ropes or pulleys.

- Contains no metal, springs, gears or other dangerous or exhausting parts or complicated apparatus.

**"I'M OVER 50, YET IN JUST 7 DAYS SPEED SHAPER™ 'BURNED' OFF THE FAT AND FLAB I'VE LIVED WITH FOR THIRTY YEARS."**



"I'm over 50 and I thought my fat and flab was with me for life...**SYNOMETRICS** "burned" it off in only 7 days. In fact results came so fast I had to cut my daily 7 minute workout to 5 minutes to slow down the slimming process. It's the most amazing method I've ever tried...and I've tried just about every gadget and gimmick I've seen in magazines and TV."

HY HARRIS, New York, N.Y.

- It is NOT worn around your waist but its power: it effect can be selectively applied to ALL problem areas: stomach, waist, chest, arms and legs, safely, easily and FAST.
- It is so amazingly compact that it slips easily into your pocket to be with you whenever needed. Weighs 5 ounces.

## IRON CLAD MONEY BACK GUARANTEE

In just a few days you must actually begin to see measurable, real results...or your money back promptly and without any question.

\*No diet needed if daily caloric intake does not add to your present body weight.

Send Today for Speed Shaper Kit, only \$9.95

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509 Fifth Ave., New York, N.Y. 10017

If the **SYNOMETRIC** Unit can really start shaping me up in just days, and I mean **ALL OVER** (stomach, waist, chest, arms and legs), I will keep it and use it...otherwise, I will want a full refund. Rush **SYNOMETRIC** to me.

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I enclose \$9.95 (plus \$1.00 postage & hdg.).

NY res. add sales tax: NYC 8%, NY State 5%.

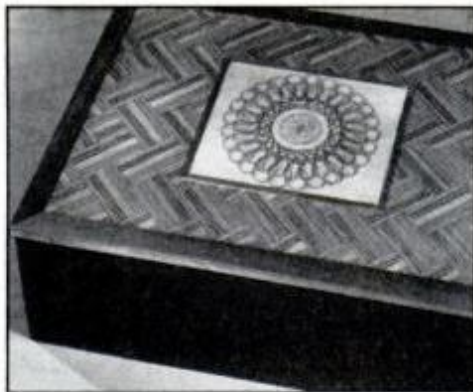
Save \$1.00! Order 2 and send \$18.90.



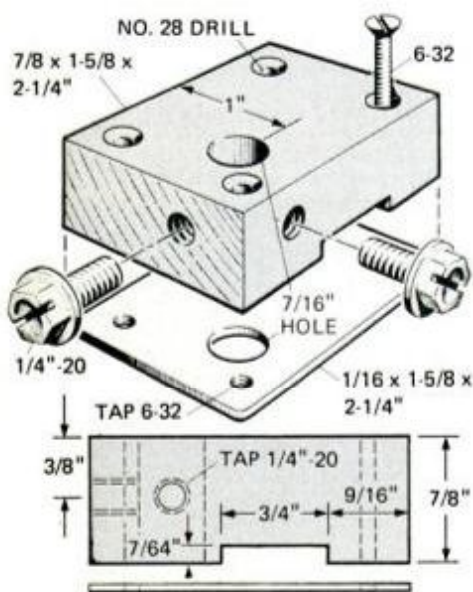
**Decorative coasters** are made by cementing the metal to 3/4-in. squares of 1/4-in.-thick rigid plastic foam.



**Handsome clock dial**, another example of the use of metal designs, was engraved in wire-brushed aluminum.



**Circular design** on this trinket-box lid was given a ground finish with abrasive grains and then inset in lid.



### DOODLING

*(Continued from page 174)*

pivot points. The "engravings" can be used to decorate box tops, coasters, knob escutcheons, clock dials and the like.

Basically, the machine consists of three plywood wheels connected by a leather belt. Bits of adhesive tape attach the item to be decorated to the wheel, which acts as a rotating "drawing board." As this wheel turns, a block carrying the stylus (diamond tool or pen) moves over it, guided by the stylus arm.

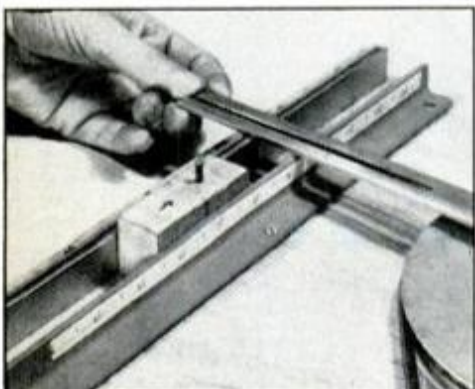
The rotating wheel draws circles; the stylus arm draws oval figures. The combination of these two kinds of curves forms a decorative, usually symmetrical, pattern. Patterns are

easily varied by changing the position of the pin that guides the stylus arm, the position of the stylus block along the arm, or the distance of the pivot point from the center of the wheel that operates the stylus arm.

The relative sizes of pivot wheel and pattern-holding wheel, as well as distance of stylus from centerline of arm and effective arm length, also determine the pattern.

The machine's base is a piece of 3/4-in. plywood. (Locations of the various parts are given in relation to bottom and right-hand edges when the crank wheel faces the operator).

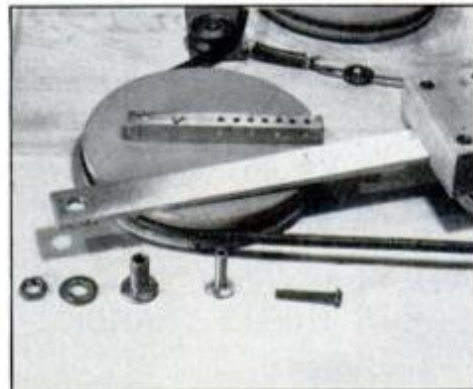
I turned the wheels from 5/8-in. fir plywood and grooved the edges for 1/4-in. round leather belts. Each wheel bearing consists of a brass insert drilled to rotate snugly around a No.



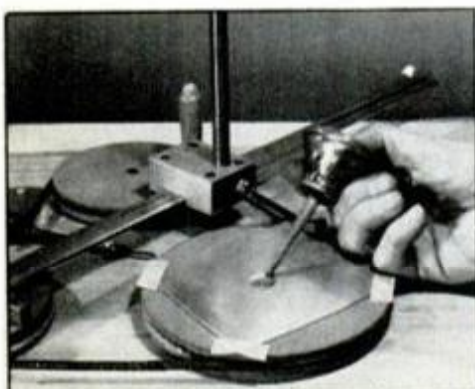
**Index mark on guide block** is set by inch scale. Slot in stylus arm fits over pin.



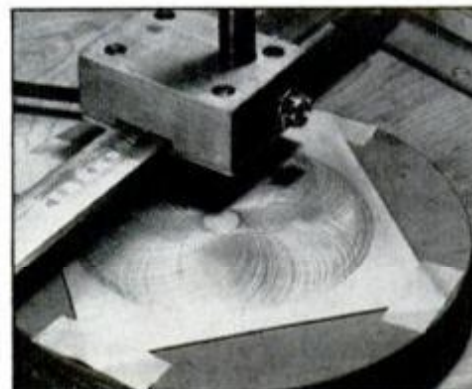
**Spring-loaded idler pulley** keeps belt taut, slip free. Belt dressing also helps.



**Parts of pivot assembly** which links stylus arm and the wood wheel that cranks it.



**Light oil applied** to metal surface beforehand reduces stylus friction.



**Tabs of masking tape** at corners hold metal plate flat on wheel surface for engraving.



**Added weight** (milling cutters) on stylus arm lets diamond cut brass deeper.

6 wood screw. You can improve the wheel action by placing a thin washer of cardboard-like fiber between the wheel and the base.

I used a round leather sewing-machine belt, spliced the ends as shown and used Duco household cement and a wire-loop reinforcement to hold them in place. A coating of stick-type belt dressing will help to reduce the slipping.

A 1-in. idler pulley turns on a pin riveted to a thin steel plate, and a coil tension spring holds the pulley against the belt. An elongated wire loop clamped by a wood screw and washer anchors the spring.

The stylus has a  $\frac{1}{8}$  x 6-in. slot extending almost to one end. A  $\frac{3}{8}$ -in. hole at the opposite end accepts the pivot assembly, which operates the stylus arm.

The steel crank bar has a series of 6-32 tapped holes on  $\frac{1}{4}$ -in. centers and is mounted so that hole No. 1 is  $\frac{1}{4}$  in. from the wheel center. For small designs, an additional hole nearer the center is useful.

### Maple block holds stylus

A maple block grooved on the bottom holds the stylus. Depth of the groove is slightly less than arm thickness, so when the four 6-32 bolts are tightened, the block is locked securely on the arm.

Bore a  $\frac{1}{16}$ -in. hole almost tangent to the groove to accept a diamond-tipped, abrasive-wheel dresser. The block can hold other tools, such as a ballpoint pen if built up with a piece of rubber tubing.

The weight of the stylus arm and block is sufficient for holding a ballpoint pen in contact with paper. For engraving metal, additional weight is required. Milling cutters (which weigh about 1- $\frac{1}{2}$  lbs.) slipped over the diamond-tipped rod will do the trick although any similar weight may be used.

The maple arm-guide block rests in a channel formed by two pieces of metal angle. A gib positioned between the block and left-hand angle is used to lock the block in a fixed position. One bolt enters a hole drilled about halfway through the gib to prevent endwise slippage.

The block's pin engages the slot in the stylus arm and is positioned somewhat nearer one end of the block than the other. Reverse the block and a greater range of pin position can be obtained in one direction. At the block's midpoint, on each side, is an index mark for positioning the block relative to a scale. An arrow on top of the block points normally to the rear edge of the base.

Three scales enable setting for re-  
*(Please turn to page 193)*

## ACCIDENT TRAPS

*(Continued from page 97)*

### 9 Architectural glass

- Accidents per yr.: 177,600
- Severity index No. 9

#### PROTECTION:

- Specify safety glass for sliding doors
- Light areas on both sides of glass
- Don't obstruct access to door
- Use guard rails for glass on stairwells

One of the biggest problems with sliding glass doors is that people who are unfamiliar with your house may try to walk right through them. If you're going to have a party, try putting a strip of color tape across the door in line with the handle. Another tip is to insert a small rubber bumper at the end of the floor track. This will prevent the door from cracking or breaking if it is opened too far, too fast.

### 10 Tubs, showers

- Accidents per year: 51,700
- Severity index No. 10

#### PROTECTION:

- Put down nonslip standing surfaces
- Provide handrails
- Install antiscald devices on faucets
- Don't install protruding hooks

A CPSC study on this subject led to the development of nonslip panels that cement to the bottom of the tub. They're available at most hardware stores and home centers and come in a variety of colors and patterns. As you shift your weight to step out of the tub, you should have a secure handhold and sure footing underneath.

### 11 Stoves, ovens

- Accidents per year: 23,600
- Severity index No. 11

#### PROTECTION:

- Use push-turn knobs for child safety
- Don't try to relight a hot oven by hand
- Install a kitchen fire extinguisher
- Keep gas cutoff valve working freely

Don't try to relight a range if you smell gas. Wait a few minutes until it dissipates before striking another match. An ABC-rated fire extinguisher is best for around the house since it will work on all types of home fires,  
*(Please turn to page 178)*

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**A NEW** ★ ★ ★ ★  
**ALL-AMERICAN ANSWER**  
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**Mini-Beep Tractor Kit**  
 Extra Comfort, Extra Rugged

**Turf-Rider Tractor Kit**  
 Extra Traction, Extra Utility

Make no mistake — these are tough and true lawn and garden tractors. Designed to quickly conquer almost any outdoor job. Buy in kit form direct from the factory! Stable Mini-Beep has extra leg and seat room for increased driving pleasure. Turf-Rider simplifies big jobs with big wheel traction. Both offer all-gear drive, 12 or 16 hp., over 30 attachments incl. mower, garden tools, snowblower, blade, loader, etc. Send now, to:

**STRUCK KIT**, Dept. PM36B, Cedarburg, Wis. 53012

Catalog showing Struck Tractor Kit construction & uses (specify Mini-Beep or Turf-Rider) — 50¢. Both catalogs — 75¢.

Plans for fabricating both Mini-Beep and Turf-Rider Tractors from local materials — \$6.00 (refunded on any purchase).

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a waterproof general-purpose construction adhesive for

- paneling
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Available in cartridges, quarts and gallons.

**ACCIDENT TRAPS** (Continued from page 177)

Consumer Product Safety Commission Hazard Index—1975 Report		Consumer Product Safety Commission Hazard Index—1975 Report	
Most severe accidents (Age frequency severity index)		Greatest number of accidents (Emergency room reports)	
Stairs, steps, landings	21.02	Stairs, steps, landings	465,000
Lawnmowers	11.98	Nails, tacks, screws	280,000
Swings, slides, play equip.	10.46	Architectural glass	177,600
Tables (nonglass) and chairs	9.46	Table (nonglass) and chairs	151,500
Nails, tacks, screws	7.15	Doors (nonglass)	148,900
Liquid fuels	5.45	Knives, cutlery	147,600
Flooring	5.42	Swings, slides, play equip.	143,300
Bleaches, dyes	5.38	Glass bottles and jars	102,700
Architectural glass	5.32	Flooring	84,800
Tubs, showers	3.55	Toys (nonriding)	76,700
Stoves, ovens	3.39	Drinking cups and glasses	73,800
Ladders, stools	3.09	Ladders, stools	73,300
Power saws	2.87	Cans, reclosable seals	69,500
Glass bottles, jars	2.76	Fencing	16,100
Money (paper and coins)	2.64	Power saws	57,800
Fencing	2.50	Tubs, showers	51,700
Porches, balconies	2.14	Doors (nonglass)	47,700
Paints, solvents	2.01	Flatware	42,300
Knives, cutlery	1.99	Wire (nonelectric)	40,200
Electrical fixtures	1.89	Lawnmowers	39,900

including a grease fire in the broiler. It's better to ruin a flaming steak than to take a chance on losing your kitchen—or home.

**12 Ladders, stools**

- Accidents per year: 73,300
- Severity index No. 12

**PROTECTION:**

- Replace steps that are worn or split
- Don't lean them against walls
- Stand them on a level surface
- Don't work from the top step

Don't get attached to that old rickety step stool. It will literally let you down when you need it.

**13 Power saws**

- Accidents per year: 57,800
- Severity index No. 13

**PROTECTION:**

- Keep blade guards working freely
- Wear safety goggles
- Make power switches inaccessible to children
- Cut on flat surface so saw won't bind

You know that a sharp blade gives a smooth, easy cut, but it also makes a safe cut. A dull blade will bind faster by running off the line and may kick back from the work. Touch up the blade points with a mill bastard file before your next job.

**14 Glass bottles, jars**

- Accidents per yr.: 102,700
- Severity index No. 14

**PROTECTION:**

- Store out of reach of children
- Use plastic containers for food storage

**15 Money (paper and coins)**

- Accidents per year: 9400
- Severity index No. 15

**PROTECTION:**

The problem here is that young children, especially infants, often test out new objects by trying to eat them. Don't let children use play money that can be small enough to swallow.

**16 Fencing**

- Accidents per year: 16,100
- Severity index No. 16

**PROTECTION:**

- Keep in good repair
- Don't leave protruding staples or nails
- Don't use barbed wire in the more populated areas

**17 Porches, balconies**

- Accidents per year: 32,600
- Severity index No. 17

**PROTECTION:**

- Replace rotted rails
- Replace split or rotted uprights
- Sand to avoid wood splinters

You should be able to take a hard fall into a railing and bounce off. You can push and pull on a railing to test it. If it's wobbling around, now's the time to replace it.

## 18 Paints, solvents

- Accidents per year: 15,200  
 Severity index No. 18

### PROTECTION:

Follow guidelines for No. 6, liquid fuels.

## 19 Knives, cutlery

- Accidents per yr.: 147,600  
 Severity index No. 19

### PROTECTION:

Store up and out of the way  
 Don't store among other utensils  
 Don't submerge in sink water

This is a case where the accidents are generally not dangerously severe although there are a great many of them. With the help of a few stitches the body can heal most cuts well. Be sure to instruct children carefully in the basic rules for handling any sharp objects; don't use them against your other hand, direct the working action away from the body. Don't store knives in a slot where the points and edges will be exposed. If you want to use a magnetic knife holder, be sure that the magnet is strong enough for all the knives you'll hang on it.

## 20 Electrical fixtures

- Accidents per year: 21,600  
 Severity index No. 20

### PROTECTION:

Don't overload circuits  
 Replace frayed wires and cracked plugs

Most outlets are well within the reach of children who may not be old enough to understand the implications of electrical shock. There are plastic insulators available through most hardware stores that are made to clip into the outlets when they're not being used. They do not conduct current and will prevent a child from trying to fit anything into the receptacle. ★★★



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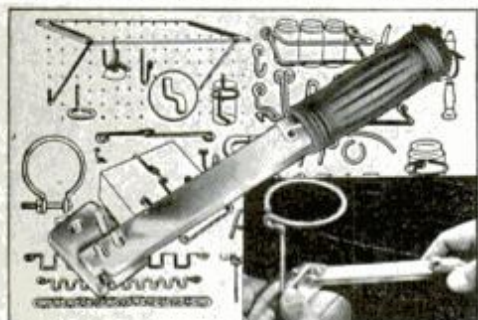


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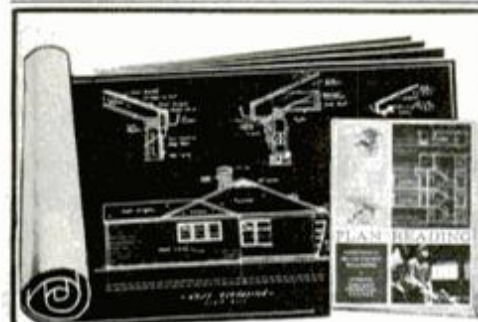
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## YOUR STARTING SYSTEM

(Continued from page 118)

hour rating should be stamped on the battery.) For example, a battery rated at 60 amp./hours should have a load imposed on it of 180 amps.

■ **Determine the voltage reading,** but don't prolong the test. It should be completed in 15 seconds to prevent draining the battery excessively.

A minimum of 9.6 volts should be attained for a 12-volt battery. If you get a reading that's less, replace the battery.

3. **Test the starter relay.** If your fail-to-start difficulties fall into the "majority" category, you have found and corrected the trouble before reaching this step. But if not, let's turn our attention to the starting relay, which some call the starting switch and others the starting solenoid.

I like starting relay, because one task this part does is to connect the battery to the starter motor, relaying current from the former to the latter.

Another purpose of the starting relay is to break the circuit between starter motor and battery. When the starter motor has started the engine, and there is no further need for it, a solenoid in the starter relay breaks the circuit, and the starter motor deactivates itself. If it didn't—if it stayed engaged with the engine's flywheel—the starter motor, flywheel or both of them would be chewed to pieces.

Don't be misled by what I said before—that most cars have starting relays, but in some the battery is connected directly to the starter motor. All cars have some means of making and breaking the circuit between battery and starter motor. In the case of those which have battery and starter motor connected directly, that means is the starter motor itself.

### Using a battery-jumper cable

Anyway, the starter relay is a separate component that is mounted somewhere in the engine compartment, either on a fender well, the firewall or some such. Testing the relay is a snap.

Arm yourself with a battery-jumper cable. Find the relay (trace the battery's positive cable until you come to it if you can't find it) and listen to what's happening as someone in the car activates the ignition.

If the relay clicks but the engine doesn't crank, connect the jumper cable across the relay's two large terminals.

Try starting the engine. If it now starts, the relay is bad. Replace it.

4. **Check neutral-start switch.** Before turning to the starter motor,

eliminate the neutral start switch as a cause of starting failure.

If the engine doesn't start with the transmission in NEUTRAL or PARK, move the transmission shift lever through all ranges, ending up with it in either DRIVE or REVERSE. Place your foot firmly on the brake and attempt to start the engine.

If the engine starts, the neutral-start switch is either out of adjustment or defective. Adjustment is done differently for different models. Take the car to a dealer who has a service manual and let him make the adjustment, or replace the switch and adjust the new one properly. This is not an expensive repair.

Of course, if you have a service manual you can do this job yourself. It's not difficult. In most cars, the neutral-start switch is mounted on the transmission.

5. **A final check.** If you've gotten this far without getting the engine started, you may have a big job on your hands. The starter motor probably has to come off the car for disassembly, bench testing and overhaul. This puts you into a whole new ball game.

### Test for cable resistance

However, maybe excessive resistance in the battery-to-starter motor cables, which wasn't uncovered before, is causing the problem. It's worth a shot to find out.

If cables have not been replaced in many months, you might want to replace them indiscriminately on the chance that one or more is causing the problem. New battery cables are a lot less expensive than overhauling an old starter or buying a new one.

You could, if you want, test for cable resistance yourself if you have a voltmeter calibrated in tenths of a volt.

Tests are done by cranking the engine. To keep the engine from starting accidentally, disconnect the coil-to-distributor lead.

Connections are made between the battery's positive post and the battery side of the starting relay, and then between the battery's positive post and the starter-switch terminal to check cables leading from the battery's positive post to the starter. A reading of 0.1 volt or more for either test warrants your replacing the cables.

To check for high resistance on the grounded side of the circuit, connect the voltmeter between the battery's negative post and the starter-motor frame.

Crank the engine. A reading of 0.1 volt or more indicates excessive resistance. Replace the battery's ground cable and retest. ★★



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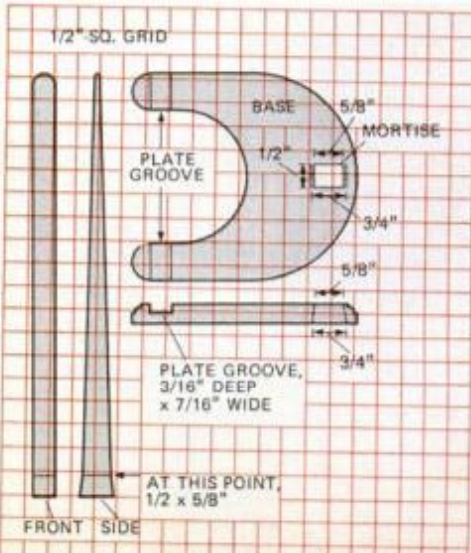
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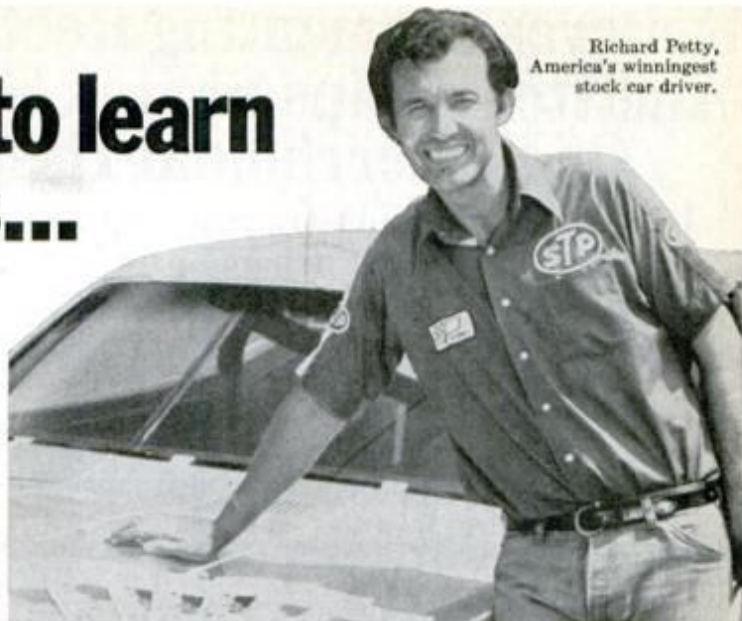
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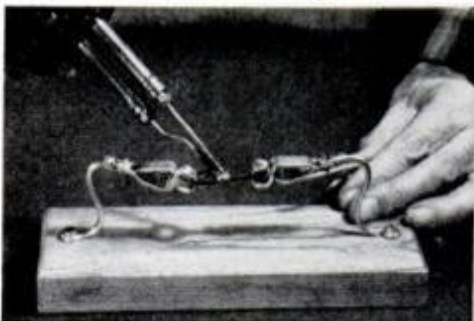
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#16

## HINTS

FROM READERS

### Third hand for soldering



When two test clips are attached to lengths of solid-core wire solder and fastened to a board, you can position them to hold the joint just where you want it for soldering by bending the soft wire.—*W. E. Burton*

### Sawdust removes remover



A handful of sawdust sprinkled over wet paint-and-varnish remover does a great job of soaking up the sludge as you scrape the surface with a putty knife. It makes it a less messy job.

### Steam raises dent



Steaming a dent is a trick the pros use to raise the crushed wood fibers flush with the surface. Place a wet cloth pad over the dent and hold a hot pressing iron on it a few minutes. Let dry and sand.—*Charlie McNitt*

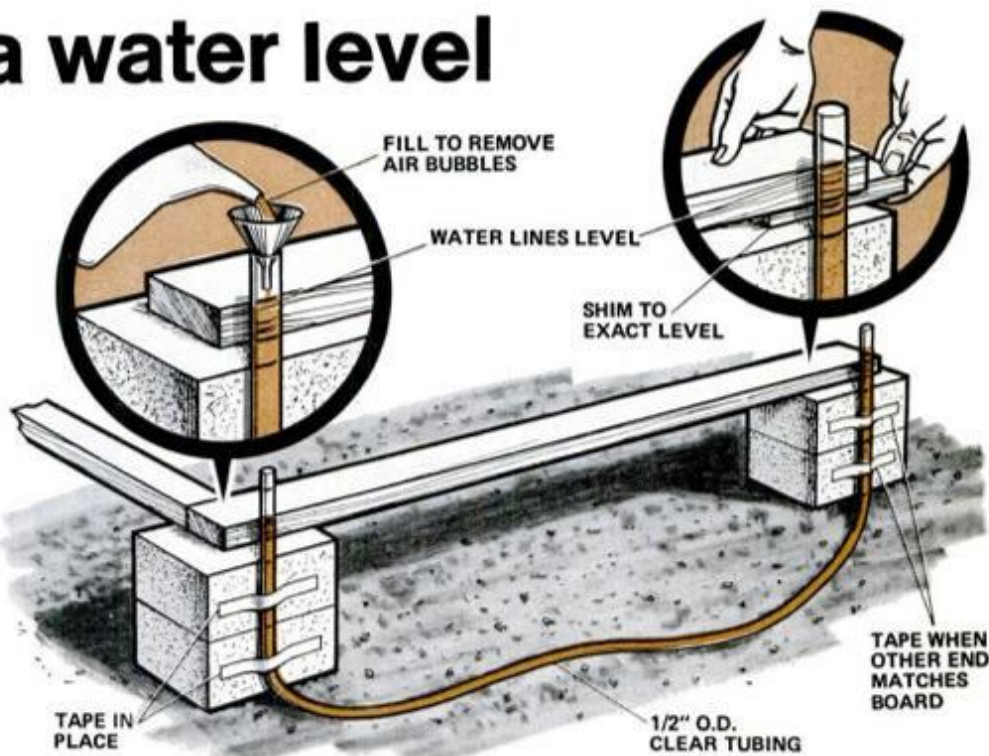
# How to use a water level

**T** rue level is a must condition for all types of construction from tables to foundations. Most home workshops have a level that works only for small jobs. How would you level a 16-foot deck or a 30-foot slab? There are levels made for industrial use 10 feet and longer, but these are specialized and very expensive.

There is a perfect tool for the oversize job, and it only costs a few dollars. It's inexpensive because it has no level bubble or transit optics. It's not heavy, stores easily, and won't break if it drops. It relies for accuracy on a most basic law of nature—water will seek its own level.

Just get a length of 1/2-inch clear tubing as long as you need to level one end of the job to the other. Filling the tube with water makes it as operational as a dead accurate level. This means that if you take, say 40 feet, of clear, flexible tubing and fill it with water, the water at the last inch of tubing will be dead level with the water line at the other end.

For example, to level a long girder, adjust the tubing up and down until one end is level with the top of the



beam. Then match the other end of the beam to its own water line. If you had 300 feet of tubing you could level a slab as long as a football field. Because the tubing is flexible, it has the unique capability to level around corners. This is extremely handy in

getting similar elevations on window sills from one side of the house to another. You can't go wrong on such a small investment and you'll find this tool is really invaluable on large scale jobs.—Mike McClintock, Associate Home and Shop Editor

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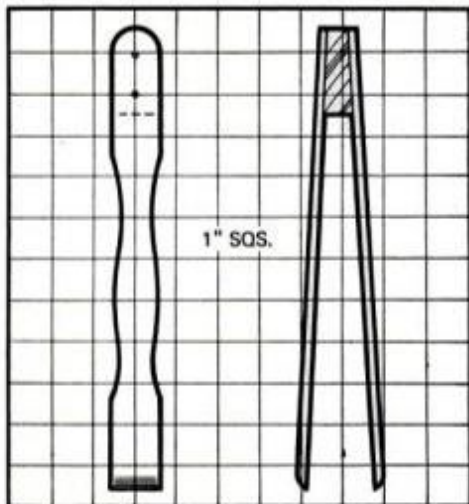
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# Wood food tongs



Wood tongs at a buffet salad bowl let your guests help themselves in grand style.



**G**reat for salads, sliced sandwich meats and olives, these handy wooden food tongs are ideal at a buffet table. They are simple enough to mass-produce in your workshop, make dandy gifts for friends and neighbors and can be made for little or nothing from scrap pieces of hardwood. Splinter-free birch or maple is best and will take the bending without breaking.

Scroll-cut legs can be produced in quantity by ganging the 1/8-in.-thick strips together and sawing and sanding them as one. The 1-in.-wide strips are cut overlong so they can be glued together near the ends in packs of 8 or 10. The tapered blocks to which the legs are attached with waterproof glue and brass escutcheon nails are shaped to spread the leg ends 1 1/2 in. apart.

When smoothly sanded, the tongs are dipped in salad oil and the excess wiped off. After drying, buff with a soft cloth.

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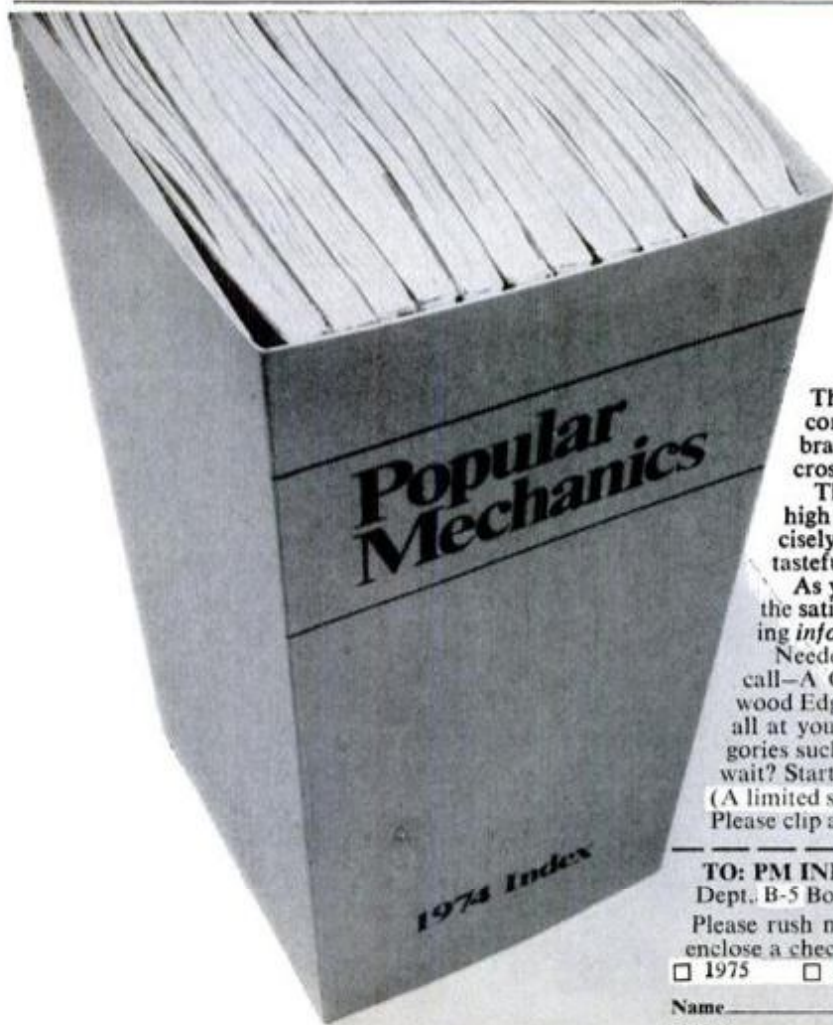
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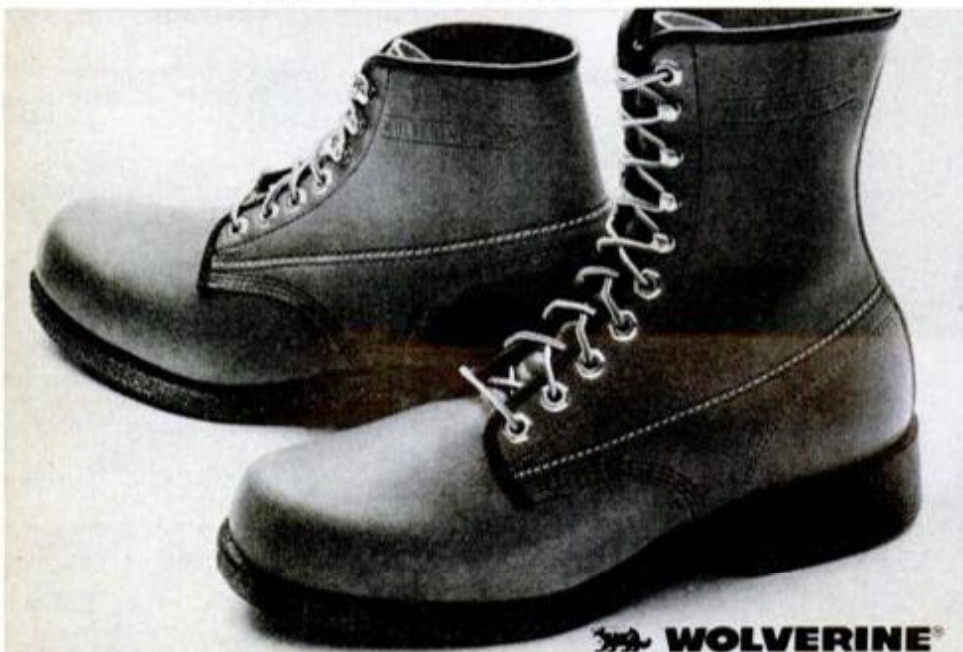
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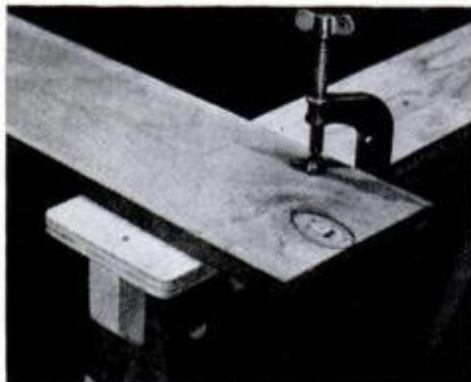
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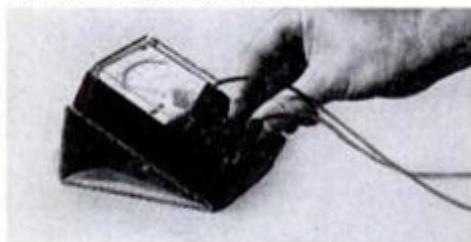
### FROM READERS

#### Flat-top sawhorse



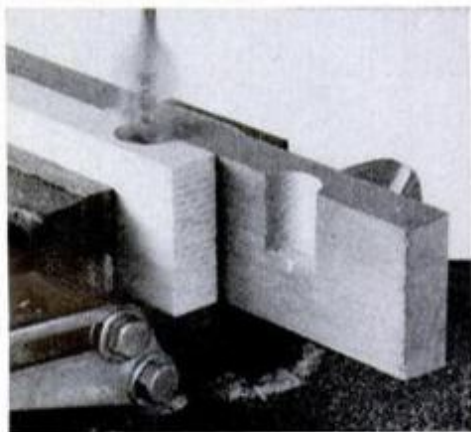
You'll find your sawhorse a lot more useful if you nail a wide board to the top. The overhang provides room for attaching a clamp when the job requires it.—*Harvey Plunksetter*

#### Quick meter stand



A multimeter is easier to read when tipped up slightly. To hold it, make a wedge of corrugated cardboard. Mount the multimeter on the wedge with rubber bands.—*Ken Patterson*

#### Pockets for screws



A quick way to form neat shouldered screw pockets on the inside of table aprons is to face the work with a same-size scrap, clamp together and center spur of flat bit over the joint. Second hole is made at angle for screw.—*Rosario Capotosto*

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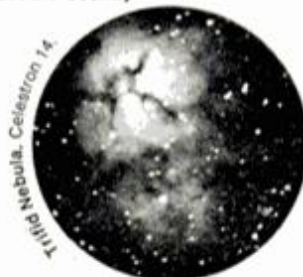
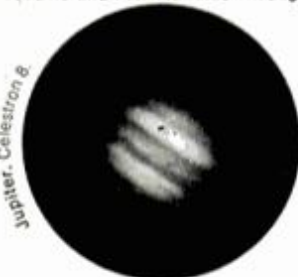
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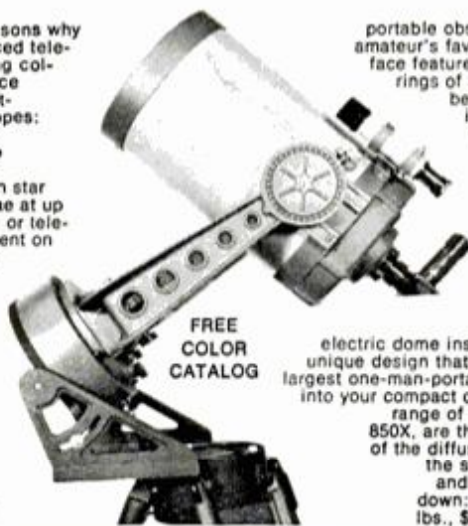
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## DOODLING

(Continued from page 177)

peat drawing of a particular design.  
 ■ An inch scale 13-in. long is glued to the outer vertical surface of the right-hand metal angle 3 in. from the end for gauging the position of sliding block.

■ An inch scale, with ¼-in. divisions, is stamped along the top of the stylus arm, with the "0" position coinciding with the center of the pivot hole over the pulley. Only the portion from 4 to 8 in. is needed. The right-hand edge of the block is used as an index line in setting the position of the stylus.

■ A series of numbers—1, 3, 5 and 7—identify the tapped holes along the top of the steel bar. These numbers, with No. 1 hole near pulley center, indicate different positions of the stylus-arm pivot with respect to the axis of the pulley. Stamping numbers on both the top and one side of the bar is an added convenience.

### Record design's 'formula'

Once a design has been worked out by trial, record its "formula" by writing down the three scale readings in left-to-right sequence. For example, 7, 5¾, 6 indicates that the guide block is at 7 in., the stylus-holding block is at 5¾ in. and the arm pivot is at hole No. 6. If desired, an arrow pointing upward for the "normal" position of the block, or downward for the reversed position, can be added to the formula.

Aluminum is easy to engrave; brass requires more pressure. Best pressure for various metals can be found by trial. Actually, when using a rounded diamond or other point, the "engraving" is more of a rubbing than a cutting action.

The metal blank should be flat. Its surface can be prepared in various ways, ranging from polishing to dulling by chemical etching or rubbing with a mixture of abrasive grit and water. For a ground-glass effect on aluminum, rub 180-grit aluminum-oxide grains mixed with water over the surface with a small metal block.

Fasten the blank with self-adhering tape and spread a thin layer of oil over the surface to reduce stylus friction. Bring the stylus against the blank with the arm elevated slightly above the guide block. Put additional weights in place, then turn the guide pulley slowly. Count the number of revolutions the wheel requires to create a pattern and record it along with the "formula." Best starting and stopping points for the stylus tip are on the smallest diameter of a pattern. Finished designs can be protected with clear lacquer. ★★



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

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

by Victor B. Mason

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

Out of the thousands who read this message perhaps only you and a few others will have the vision and the intuition to realize that it may be intended that you read this page at this time—that the coincidence of holding this magazine in your hands may shape your destiny, may guide you to lots of independence beyond the dreams of avarice.

Don't misunderstand me, I am not speaking of mysterious laws of nature that will sweep you to success without effort on your part. That sort of talk is rubbish. If this message is intended for you, you are the kind of man who knows that anything worthwhile must be earned. If the earlier development of your karma has revealed to you that there is no reward without effort, you may now be ready to learn and use the secret I have to impart.

Please don't misunderstand this statement. I am not a philanthropist. Frankly, I am going to charge you something for the secret I give you. Not a lot—but enough to convince me that you are a little above the fellows who merely "wish" for success.

I have two businesses that now pay me all the money I need.

One of them is unusual in two respects: 1) It is needed in every little community throughout this country; 2) It is a business that will never be invaded by the big fellows. It is essentially a one man business and can be operated without outside help. It is good summer and winter. It is growing each year. It can be started in spare time on an investment so small that it is within the reach of anyone.

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There is not enough space here to tell you the full story, but if you are interested in becoming independent in a business of your own, in knowing the sweet fruits of success as I know them, send me your name. That's all. Just your name.

I will send you the facts that will enable you to check up on the opportunities in your own community and then if you decide to take the next step, I will allow you to invest \$15.00. Even then if you decide that your \$15.00 has been badly invested, I will return it to you.

There's no coupon on this announcement. If you don't think enough of your future to write your name on a postcard and mail it to me, forget the whole thing, but if you think that having this message come to your attention may be a coincidence that is more deeply connected to your destiny than either of us can say, then send your name. No salesman will call on you. I will write you fully and you can then make your decision in the privacy of your own home.

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# What it costs to insure your family RV

by M. Jay Wanamaker

**T**here are a lot of conveyances which can be considered to be recreational vehicles—dune buggies, trail bikes, antique cars, boats, and the like. But for now, let's consider just the road machines that your family can use to get away from it all—campers, trailers, pick-up campers and motor homes. The use of camping vehicles, towed or powered, has mushroomed since World War II and the inflationary cost spiral of luxury vacations has added impetus to their popularity.

## Planning your motor trip

In preparation for a vacation, the average motorist will have his vehicle tuned and checked for defects. He will get maps and check routes to his destination. But he all too often forgets to check a very important aspect—insurance on his recreational vehicle.

All states require drivers to demonstrate financial responsibility for accidents in which they are involved and may have caused. The most common method of proof is through liability insurance. For the vacationer, it is important to know that requirements vary from state to state. The driver who carries the minimum for his home state may find himself below the required limits of state in which he has an accident.

But there's a new development in RV insurance. Now companies will consider a driver to be insured in any state if his policy meets the minimum requirements of his home state.

The quickest way to find out if you meet the minimum standards or, more important, if your coverage is adequate for your recreational vehicle, is to check with an independent agent. He considers the value of your RV and takes into account its age (an important consideration in the light of replacement costs). More important, he can tell you where you have gaps in your insurance. For instance, your insurance is not in effect if you rent



Insurance protection for a pop-up or fold-down tent trailer could run about \$73 a year.



Insurance for a pick-up camper is generally a part of regular vehicular policy.



For insurance purposes, motor homes are treated as though they were second cars.

your recreational vehicle to someone while you are not using it. If, for fun, you tow someone on a bicycle or skis with your RV, you're in trouble if he falls. Your insurance won't cover his injuries, so don't tow him. You'll be the loser if you do.

A more important consideration is not whether you meet the minimum limits, but whether or not you are protected fully against a possible

judgment arising from an accident. Jury awards arising from accident cases run high.

If you own your own home or have other financial assets, you might consider carrying a minimum of 100/300/25. What this means is that your insurance company will cover up to \$100,000 for one person injured in an accident, \$300,000 for all injured and \$25,000 for property damage. The difference in premium between a 20/40/10 policy and one with 100/300/25 would be about \$15 a year on the average. Your agent can write an endorsement raising the limits of your policy.

If your vacation takes you to Canada or Mexico, you have special insurance considerations. In Canada, as in the United States, proof of financial responsibility is required. Here again, your agent can be of help. He can obtain the so-called "Yellow Card" which is recognized by Canadian authorities as a guarantee that you meet the minimum requirements for the various provinces. The provinces, incidentally, have steep liability limits—typically \$35,000 or \$50,000. There are a few provinces (among them, Ontario, British Columbia, Manitoba and Alberta, where if you meet the minimum requirements, you don't need the Yellow Card).

Mexico does not recognize insurance written by anyone other than a Mexican company. What is more, Mexican authorities don't fool around in the event of an accident. Without proper coverage, you can wind up in jail and have your vehicle impounded. Mexican insurance can be obtained from agents in nearly any border town in the United States. It costs about \$20 for a car, somewhat more for expensive motor homes or motor campers. You can eliminate the stop at the border by asking your agent to obtain coverage from member companies of either the American Foreign Insurance Assn. or American International Underwriters before you leave.

But wherever you tour, the type of insurance you need and its costs depend on the type of recreational

vehicle you own. Today, Americans go camping with everything from towed folding campers and trailers, through pickup-truck campers to self-propelled motor homes.

### Towed campers and trailers

Generally, your homeowners and auto policies will cover you for liabilities on small, fold-down camping trailers when they are hooked to your car. For larger towed vehicles, you had better check; they may be covered.

When it comes to physical damage to your trailer or camper, you will have to pay more for comprehensive and collision insurance.

Often, a rider to your existing policy is enough for a low-cost fold-down camper. Where you require more extensive coverage, a "floater" can be added to your existing auto policy. Another possibility is one of the new policies, developed by the Insurance Service Organization,



Full protection for a new travel trailer that cost \$4000 new could run you about \$120 a year with \$100 deductible on collision coverage or about \$78 without the collision.

tailored specifically for recreational vehicles. Which is best for your needs? Your best bet is usually to have an agent go through the options to match your requirements.

### Fold-up camper

To give you a rough cost idea for recreational vehicles insurance, let's take some examples. The first is for a new, folding camper which costs about \$1800, to take a typical model. Right away, you must remember one thing. Liability, medical payments and uninsured vehicle insurance are not available for the towed vehicle. That is usually part of the coverage you can obtain on the vehicle doing the towing. So for the towed folding camper, you can get the following:

■ **Comprehensive.** Assuming \$100 deductible for this case, your cost would be about \$13. With \$50 deductible, it would run about \$16; \$250 deductible would cost about \$9.

■ **Collision.** If you want this option, it would be about \$29 with a \$100 deductible. It goes up to about \$34 for \$50 deductible and down to about \$19 for \$250 deductible.

■ **Miscellaneous personal property coverage** is available to protect your personal possessions in much the same way as they would be protected with a homeowner's policy. Before you actually pick up this option, check with your agent first. You may already have this coverage. Surprised? Homeowner's insurance protects personal possessions away from home. For this case, though, let's assume that you take \$1000 worth, with \$100 deductible. This would come to about \$11.20.

■ **Additional living expense coverage** comes to about an additional \$8. What this amounts to is protection in the event your recreational vehicle becomes uninhabitable. So, if your RV has a breakdown or is

damaged by fire, you can check into a local hotel until it is repaired or made livable again. The insurance company will pick up the tab.

■ **Transportation expenses and towing and labor costs coverage** would add about \$12 to the cost of this insurance. If you have a loss covered by your comprehensive insurance or a collision, you can get some reimbursement for the expense of getting back to where you garage the RV provided that it is inoperable. You have to be 50 or more miles from home and the limit under this coverage is \$100. In addition, you are provided with towing and labor costs up to \$25. This coverage is available for motor homes and recreational camping vehicles only.

Everything I've named above adds up to \$73.20 with collision and \$44.20 without collision. This is for a new \$1800 camper as covered by

(Please turn to page 196)

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## RV INSURANCE

(Continued from page 195)

a recreational vehicle policy. If your camper is older, the rates are less. If the camper is more expensive, it can go up slightly. But anyway, these are ballpark figures.

### Travel trailer

Suppose we run through the same exercise with a new trailer which costs \$4000. The policy would be essentially the same, but would reflect the higher costs of the more expensive RV.

- **Comprehensive**, with \$100 deductible, would be about \$30.
  - **Collision**, also \$100 deductible, would be about \$42.
  - **Miscellaneous personal property**. Because this is a bigger RV, let's assume \$2000 with \$50 deductible. The cost would amount to about \$28. It would go down to \$22.40 with \$100 deductible.
  - **Additional living expense coverage**—still about \$8.
  - **Transportation**, towing and labor would remain the same—about \$12.
- The total this time around would be about \$120, or \$78 without collision.

### Truck campers

These bolt-on bodies are proving more popular each year. They can usually be covered by the vehicle policy if the camper is identified in the policy. A simple endorsement may be enough, in many cases.

### Motor homes

Motor homes are the most luxurious of the recreational camping vehicles. Self-propelled, they are treated as though they are a second car for insurance purposes. It is important to remember that, for the purpose of physical damage coverage, motor homes are rated at their cost new. This is a key consideration when you realize that many models cost in excess of \$10,000. What is more, they often have their spacious interiors filled with valuable personal possessions. You would be ill advised to skimp on collision and comprehensive coverage for a motor home because of your considerable investment.

If you live in a no-fault state, your motor home will very likely fall under the no-fault rules. Although the interior of the motor home is probably covered by the comprehensive coverage clause, your personal belongings may not be. What's more, your homeowner's policy, which probably covers your personal property when it is in the motor home, is only in force when

there are signs of forced entry. Consider paying a few dollars more for the coverage of an unlocked vehicle. Also, be sure that special equipment not ordinarily covered in full under a homeowner's policy is protected by a rider.

Just what does it cost to insure a motor home properly? That depends on a number of things, such as the part of the country you live in, the original cost of the vehicle and the type and amount of protection you carry.

As a typical example, let's take a motor home of the current model year with a new cost of \$24,000 (motor homes are available which cost more and some which are a bit cheaper).

- **Liability coverage** of \$100,000 would cost about \$55.
- **Medical payments** of up to \$5000 would be an additional \$12.
- **Uninsured motorist coverage** (with a \$20,000 single limit) would be about \$3.
- **Comprehensive**, with a \$100 deductible would cost about \$207. With \$50 deductible it would up this cost to \$255, while \$250 deductible would bring it down to \$140.
- **If you take collision coverage** with a \$100 deductible, add about \$245. Cost would be about \$289 or \$157 for \$50 or \$250 deductible, respectively.
- **Miscellaneous personal property coverage** (\$100 deductible) is about \$22.40 for \$2000 worth of coverage.
- **Additional living expense**. Tack on about \$8.
- **Last, and almost least in cost**, adding transportation expense and towing and labor-cost coverage (described earlier) would be about \$12.

Adding up these eight items amounts to a pretty sound protection package for about \$564.40. Not bad for a \$24,000 pleasure palace.

You have all sorts of built-in options with all of the policies described. You can insure your vehicle with a \$50 deductible, but it would cost you. As an example, by going from the \$100 deductible option to \$50, the cost of full protection on the motor home goes up from about \$564.40 to about \$656.40. On the other hand, backing off to \$250 deductible on just comprehensive and collision reduces your premium to about \$409.40.

What you are doing with deductible is hedging your bets. If you have a major accident, you're still protected for the most part with a large deductible. But if you have a relatively minor accident, you will pick up the tab. The choice is yours. Some motorists prefer to pocket the difference in premiums by in-

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creasing their deductible, while others opt for fuller protection—at a price. While the choice is up to you, remember one thing. Never risk more than you're prepared to lose when deciding deductible amounts.

With the prospect of higher insurance rates in 1976 and 1977, accepting larger deductibles will help keep down premiums. Insurance is designed to protect you against major losses, not the fender-benders which up insurance rates.

Although I've given you ballpark figures as to what your recreational vehicle insurance should cost today, inflation (cost of vehicles, repairs, labor, medical costs, and the like) will probably result in increases of at least 20 percent more in insurance costs.

### What you aren't insured for

While your recreational vehicle coverage is wide-ranging, there are

isn't considered to be a recreational vehicle. It's the use you put it to, not the type of beast it is, that qualifies your wheels as an RV.

■ As I mentioned earlier, if you tow someone on a bicycle, skis or skates, you're responsible for any injuries he or she suffers. Your RV policy won't back you up on this. Besides, it's poor practice anyway.

■ Although I can't imagine your using a trailer or motor home for this purpose, if you race it, use it for stunts, speed contests or demolition derbies, you're on your own.

■ If your RV is damaged or destroyed while it is actually being worked on—repaired or serviced—the RV policy doesn't cover you. The only exception is if your mechanic somehow sets fire accidentally to the RV. Then, the policy will cover the fire damage.

■ You are not covered against intentional damage by you or any re-

### RECREATIONAL VEHICLE INSURANCE CHECKLIST

	MOTOR HOMES	OTHER RVs
	Registered	Nonregistered
RV-1: Liability coverage part for licensed (i.e., registered) recreational vehicles	Available	Not available
RV-2: Coverage part for off-the-road (i.e. nonregistered recreational vehicles	Not available	Not available
RV-3: Medical payments coverage part	Available	Not available
RV-4: Uninsured motorists insurance coverage part	Available	Not available
RV-5: Comprehensive coverage part	Available	Available
RV-6: Collision coverage part	Available	Available
RV-7: Miscellaneous personal property coverage	Available	Available
RV-8: Additional living expense insurance coverage (if the recreational vehicle is rendered uninhabitable)	Available	Available
RV-9: Transportation expenses and towing insurance (50 or more miles from home)	Available	Available

Consumer's Insurance Information Bureau of Independent Insurance Agents of America, Inc.

a few exclusions. It's a lot better to find out about them beforehand than to be upset afterward about "fine print" in policies. The few things that aren't covered are pretty straightforward.

■ To begin with, if your recreational vehicle (trailer, camper, motor home) is rented to someone or you use it yourself as a vehicle for hire, you're not covered. Should you rent the RV to someone, make sure that he carries adequate insurance. If not, no matter how good a policy you have, you aren't covered.

■ By the same token, you can't use an RV for business and expect your recreation vehicle policy to cover you. When you insure your RV, business and pleasure don't mix.

■ You're not covered if your recreational vehicle damages your own property, no matter whether you crash into your own garage (fixed property) or drop a bridge table out the back door (transportable stuff).

■ If you use your recreational vehicle as a year-round home, it doesn't qualify for RV insurance. A permanent residence, even though it's a trailer or motor home, just

relative of yours. Neither does an RV policy cover costs resulting from normal wear and tear, gradual deterioration, built-in defects (see your dealer on that), structural, mechanical or electrical breakdown or failure or freezing. Tires aren't covered, unless they're damaged by fire, vandalized or stolen.

■ Only permanently installed radios, tape decks and such are covered. The removable types, while not covered, probably are protected by your homeowner's insurance. Just to make sure, though, check with your agent.

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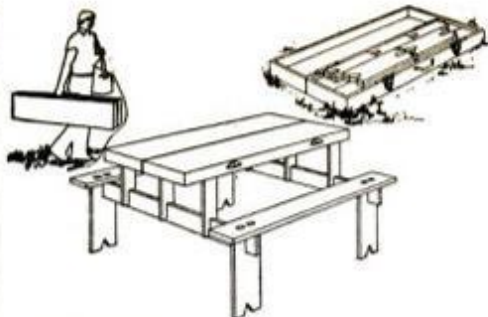
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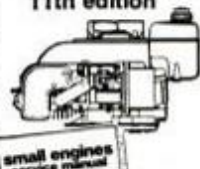
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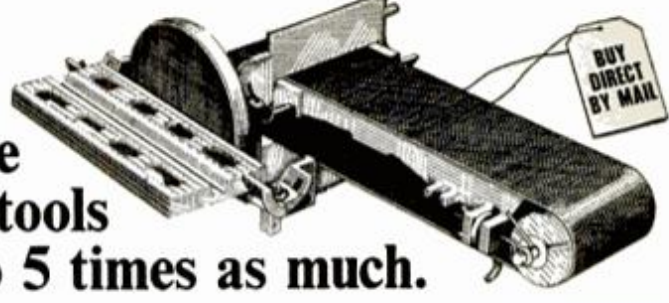


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(Continued on next page)

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In short, **Moneysworth** is a live wire sparking off hot information on the current money scene. It galvanizes readers all over the country into sending ardent letters like these:

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• "Your article on the 15% interest paid by Mexican banks has made it possible for me to retire in style."—*Eric T. Svenson; Fallbrook, Calif.*

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