

# POPULAR MECHANICS

OCT. 1967  
35 CENTS

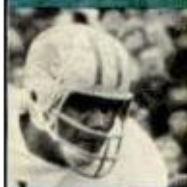


## 1968 CARS

Compare Them  
In Color

Plymouth's  
**ROADRUNNER**  
All Guts, No Gimmicks

The Year of the "Personals": Javelin Joins the Mustang Mob • Intermediates: Bye-Bye Bulk • Family Cars: Momma Wants a Back Seat • Luxury Jobs: You've Got to Spend It Somewhere



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How to Tell What's Happening and Why

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|         | Choose Masonry Paint    | Install a Luminous Ceiling | Make a Portable Double as a Bench Saw |
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You probably won't ever sail a small vessel through sub-antarctic waters to a treacherous, weather-blasted island and climb to the summit of a storm-swept volcano.

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 **Red Ball Oneida**

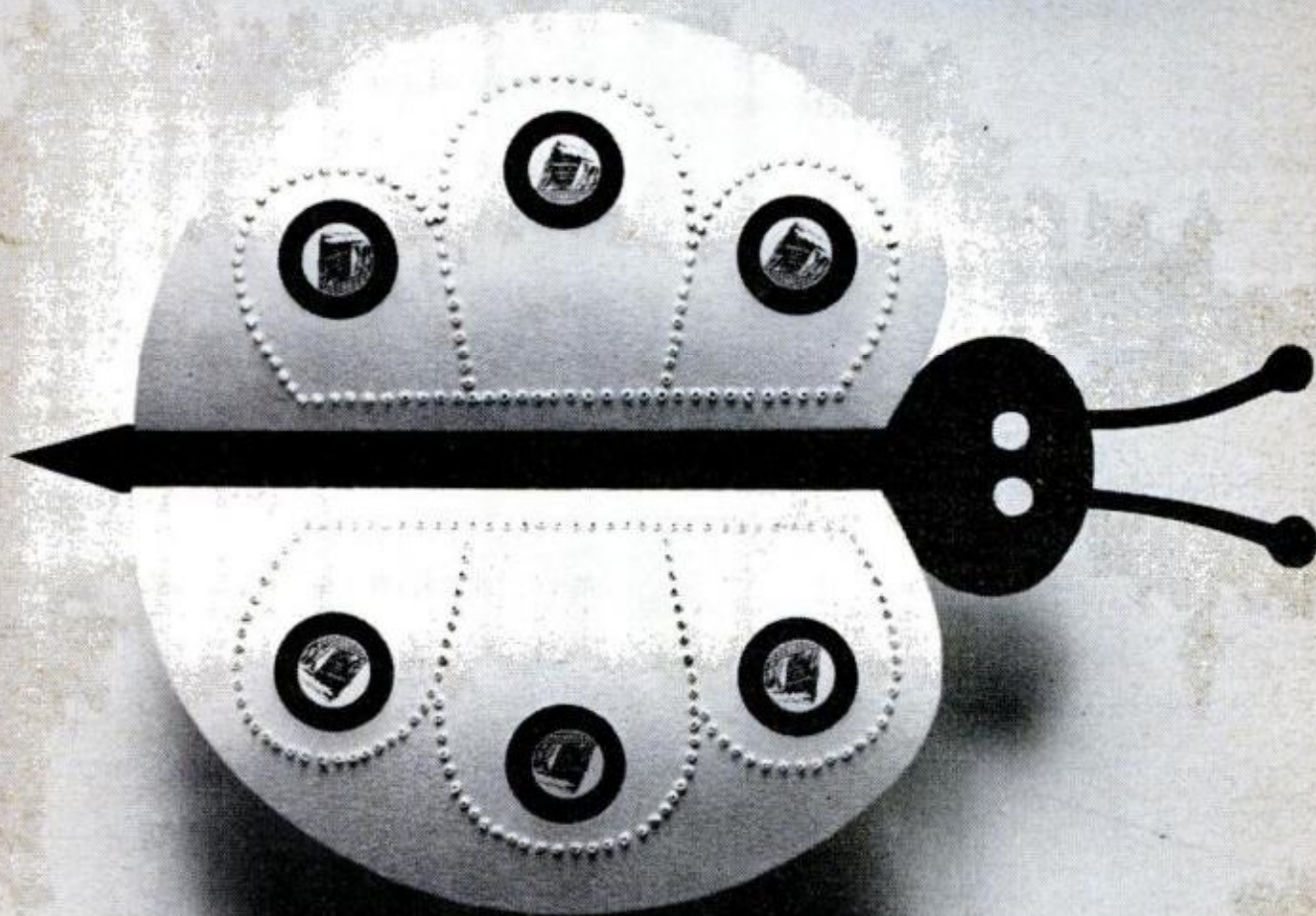
Look for the Red Ball by Ball-Band, Mishawaka, Indiana





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**The beginning of our 1968 Better Ideas story** starts at the end—the rear end of our wagons—where you'll find the famous Ford Magic Doorgate. Ingenious, special hinges permit the Doorgate to swing out just like a door or swing down like a tailgate.

**When you operate the handle** at the right side, the Doorgate opens as a door for safer, easier passenger entry to the third seat and easy "close-in" loading of heavy objects.

**Pressing the center latch** operates the Doorgate as a conventional tailgate, and swings it down to support long, bulky loads like lumber or ladders.

**Magic Doorgates** are available on all 12 wagons from Ford for 1968 (standard on Fords, Torino and Fairlanes, optional at moderate cost on Falcons).

**Dual-facing rear seats** are another Ford Better Idea. They enable you to seat additional passengers in the rear of Ford wagons.



**For those who really put their wagons to work**, we've made the load floor of Ford wagons long enough and wide enough to carry full 4 x 8-foot sheets of plywood.

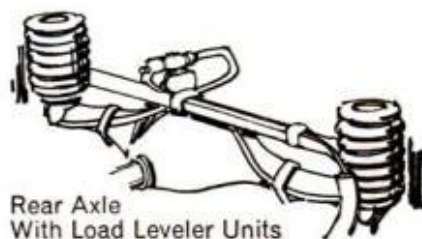


**Other Better Ideas**—a lockable stowage compartment concealed beneath the deck of the rear compartment is standard on Ford, Torino and Fairlane wagons. Also, for less than \$30 you can order Torino or Fairlane wagons with removable cushions that turn this compartment into a rear-facing seat that accommodates two additional passengers.

**Ford wagons tailor the power to the job**, too. Choose from as many as six different engines on Ford, Torino, Fairlane or Falcon wagons, ranging from lively 200- or 240-cu. in. Sixes through the efficient new 302-cu. in. regular gas V-8, to the mighty Thunderbird 390-cu. in. V-8. You can team any of them, with either SelectShift manual and

automatic, or Synchro-Smooth 3-speed manual transmission.

**Ford's optional load leveler** is especially useful on wagons where the load can quickly change from just a driver to an extra heavy load. The load leveler keeps your Ford on an even keel and gives you a comfortable ride regardless of the weight of the load. The load leveler is twice as helpful if you pull a heavy trailer. It compensates for the extra weight of the trailer



Rear Axle  
With Load Leveler Units

tongue—keeps your wagon steering true and pulling strong. The load leveler helps rear springs with additional support from heavy rubber air springs, automatically inflated by an engine vacuum-driven compressor.



Engine Vacuum-Driven Compressor

**It's Better Ideas like these**—plus many more—as well as the specialized know-how we've gained in 40 years of building almost 5 million wagons, that have won Ford the title of the Wagonmaster!



1968 Ford Country Squire With Dual-Facing Rear Seats



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This One



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## NEXT MONTH IN POPULAR MECHANICS

**Good Cars You Can't Buy Here.** Foreign manufacturers are producing some dandy cars. But you can't buy all of them in the United States.

**50 Great Ideas for Your Family Leisure Center.** A special 24-page, tear-out section that you'll want to save and use.



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# LETTERS

TO THE EDITOR

## Minnesota has one, too

Dan Fales wrote in the August *What's New Outdoors* (page 14) that only six states have adopted a state fish. There's a seventh: Minnesota has the walleye.

The walleye was adopted as the official state fish by the 1965 Minnesota legislature. The Department of Conservation has a brochure, *The Story of the Walleye*, which is sent upon request.

Willernie, Minn.

HUBERT IVES JR.

## No discount

I would like to point out an error in the article, *We'll Never Be No. 1!* (page 86, August PM).

On page 88 under item 10, you say: "If a travel agent reserves your car for you, he pockets 10 percent of the discount and you get the remainder."

This is not now, nor has it ever been, the policy of Hertz. In the *Hertz Ready Reference Guide*, one of the items appearing under the section heading, "Discounts Are Not Granted To," reads: "Customers placing reservations through travel agents, hotel reservation desks and other commissionable sources . . ."

Marjon, Inc.

JACK DOLL, Manager

Frederick, Md.

Hertz System Licensee

## Time stands still

I was reading *Shortwave—Have You Listened to It Lately?* (page 170, August PM) when I realized that the man in the first picture is listening to a shortwave radio that is unplugged. The picture will live forever; I framed it and have it hanging in my room!

Lowell, Mass.

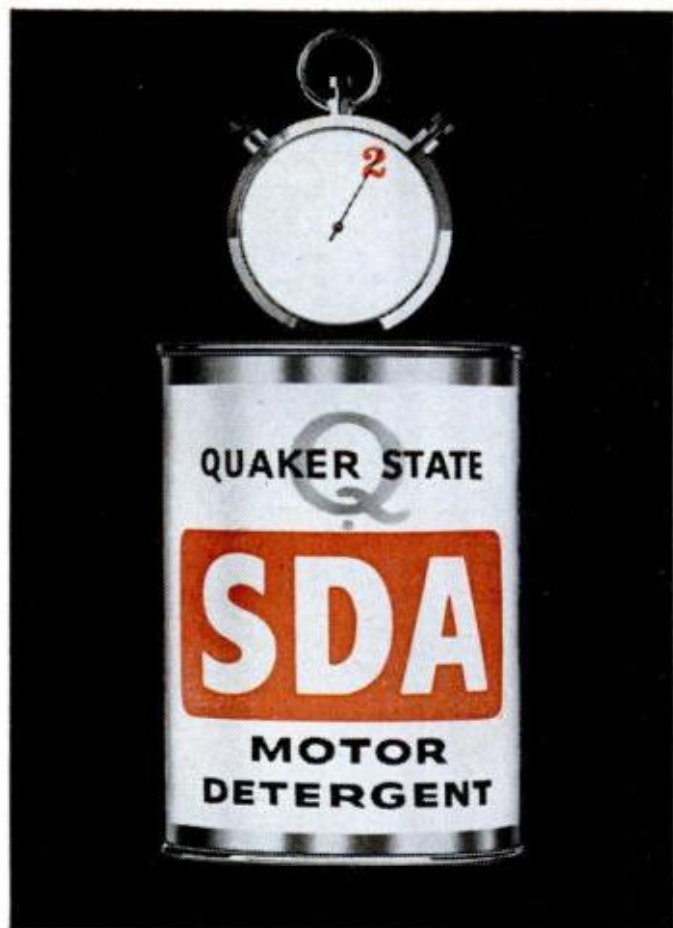
GEORGE J. ANASTAS

*That man is our electronics editor who'll probably be impossible when he learns that you've hung his picture on your wall. Next thing, he'll want to pose for our cover. And really, George, he was listening. That loose plug belongs to the electric clock on top of the radio. (If you sit and stare at it, you'll note that the clock isn't moving.)*

## Source for the Goose

In the News Brief, *Tin Goose Returns in a STOL Role* (page 91, July PM), you state that the designer of the Ford Tri-Motor airplane was the late William B.

*(Please turn to page 8)*



## Engine Sluggish? Get a 2-minute tune-up with Quaker State SDA.

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Occupation.....Working Hours.....A.M.....P.M.

322

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**"I now earn three and a half times my former pay"**

Robert Fisher,  
Holbrook, Ariz.



# LA SALLE EXTENSION UNIVERSITY

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## LETTERS

(Continued from page 6)

Stout. Not so! I designed the Ford Tri-Motor in the winter of 1926 in Mr. Ford's laboratory on his farm in Old Dearborn, Mich. William Stout, who designed the Stout Three-Engine Air Pullman, was the man who persuaded Mr. Ford to build airplanes.

Syracuse, N.Y.

TOM TOWLE

### Do watchers need watchers?

I wish to commend Marshall Lincoln on the excellent article he wrote about my newly patented speed-checking device, VASCAR. (*Watch It, Speeders!*, page 61, August PM.) His thorough understanding of this device was obvious and his ability to explain its operation was superb.

I would like to point out one significant error. On page 203 he wrote that the minimum clocking distance should be one-quarter of a mile; that should read one-tenth of a mile.

Blue Island, Ill.      ARTHUR N. MARSHALL

I will be the first to admit that a device can be designed to give either the peak speed or the average speed of a vehicle during any given time interval.

However, I must add that there isn't any device that cannot be improperly used to give a desired reading.

I know that the big objection to radar is the malpractice employed in its use. What is to prevent the same from happening with VASCAR?

Woodlyn, Pa.

BEN A. HOGENSEN

### Safe even without seat belts

In your story, *Lightning Is As Deadly As Ever* (page 64, August PM), you have stated under the heading "How to Protect Yourself During a Thunderstorm" (page 67) that a car is the safest shelter because it's grounded. How can this be when it is mounted on rubber (nonconductive) tires?

North Bend, Ohio

JOHN C. YOST

The safety is afforded due to the car's being insulated from ground by the tires. Right?

Lima, Ohio

DALE R. DAVIS

Right.

### Depends on how you slice it

In *Make Your Own Tiffany Shade* (page 166, August PM) you gave six steps for  
(Please turn to page 10)

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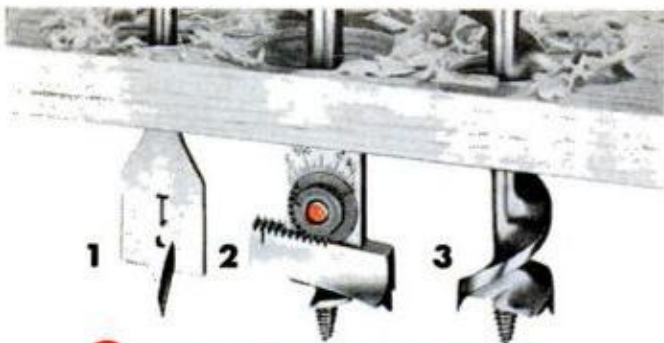
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## LETTERS

(Continued from page 8)

making a pattern. In step No. 5 you said, "Calculate each radius by dividing each circumference by 1.57."

By using  $\pi \times D$  to find the circumference of a circle with a one-inch diameter, for example, and then using your method, you wind up with a two-inch radius and a one-inch diameter.

All I can say is that it's a neat trick if you can get your formula to work.

Vienna, Mo.

JOHN PARKER

Missouri, eh? Well, you showed us. It should be 6.28 and not 1.57. But then again, half a pi is better than. . . .

## Reason for ratchet

A horse-drawn mower (item No. 7 in *New Home for Old Inventions*, page 102, August PM) had no use for brakes since it would not roll away—even on a 35° slope and untended.

There were ratchets in the hubs of the wheels so turns could be made while both wheels supplied power to the main shaft.

The unique feature of the mower you showed was the bulky revolving wheel with the zigzag path in it. At its bottom was a roller riding in the slot, attached to a shaft, which, pivoting near its middle, connected with the sickle at the forward end. This moved the sickle to and fro over the cutting plates.

Jasper, Mo.

DAVID O. GREEN  
(19th Century farmer)

## Happy rocketeer

I have just returned from a successful afternoon of model rocket flying—my first attempt at it—and the thanks goes to author Eugene Florida and his article, *Getting Started in Model Rocketry* (page 148, July PM).

I built the complete system, from control box to rocket, as illustrated, and enjoyed every minute of it. The illustrations and directions were concise and easy to follow, and their application resulted in an attractive and very successful beginning to model rocketry.

The design of your rocket received a high compliment from one of the expert "rocketeers" at the meet which I attended. He called it a "wind-cheating" design, and after launching it on its maiden flight, I must agree. It attained an altitude of over 300 feet with only a  $\frac{1}{4}$ A.8-4 engine.

Thank you again for getting me started with a hobby that will afford me many hours of pure pleasure.

Fort Lauderdale, Fla. ROBERT E. THUROW



# My Wife and I started our own Anti-poverty program with this beat-up davenport— picked up for \$5—sold for \$300! Now that MUI taught us the secret, we'll never be poor or dependent again!

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BY JOHN F. PEARSON  
**SCIENCE**  
WORLDWIDE

**NEW SYSTEM FOR STOPPING** enemy missiles is under study by the Navy. Called Seaborne Anti-Ballistic Missile Intercept System (SABMIS), this line of defense would use surface ships and submarines to launch interceptor missiles to pick off enemy ICBMs early in their trajectories. Because of its mobility, this system could also be used to defend friendly nations against missile attack. SABMIS would complement, not replace, our land-based Nike-X system.

**NUDISM BOOSTS MARITAL BLISS.** That conclusion might be drawn from the results of a two-year study of over 1300 nudists by a sociologist at California State College at Long Beach. Forty-five percent of the subjects said their marriages were happier as a result of their stays in nudist camps. About 30 percent said their avocation made no difference, and only 1.3 percent believed that it caused marital difficulties. The remaining 23.7 percent of the subjects didn't answer.

**FIGHT WATER WITH WATER.** That's the imaginative approach used by Japanese engineers in stopping dangerous floods. Instead of constructing the usual sandbag barriers, which require much slow and heavy work, Japanese flood-fighters rush to the scene with a supply of empty plastic bags. They quickly fill them with water and start building dikes.

**A SCIENTIFIC PUZZLE** surrounds a recent discovery by British researchers probing a fatal nerve disease in sheep called scrapie. The disease-causing agent may not be bacteria or a virus, but something much smaller and tougher than either. It slithers through filters fine enough to catch most viruses and can't be killed with high heat, chemicals or radiation. Some scientists think the "thing" may be a nonliving entity (even though it is capable of proliferating in its victim) and represents a new class of disease-causing agents.

**A NONHUMAN COMPLAINT DESK** is being tried out in a Swedish department store. The disgruntled customer enters a tape-recording booth and tells his grievances to a machine. Store officials respond by mail.

**PEP PILLS AND OTHER DRUGS** are out so far as athletes at the 1968 Olympics are concerned. The International Olympic Committee, which recently announced the drug ban, said medical spot checks will be made on athletes during the games.

**ELECTRIC HEAT WITHOUT WIRES** is provided by a new plastic material developed by an eastern electronics company. Its resistance to an electric current causes it to heat to temperatures as high as 160°F. It will be sold in the form of sheets, molded shapes and filaments that can be woven, according to the company. The plastic has been used experimentally to keep young vegetable plants from freezing.

**"PEOPLE SNIFFERS"**—gadgets used by our riflemen in Vietnam to detect enemy soldiers by smell—have proved so successful that new models are now being slung from VC-hunting helicopters. The sniffers are small enough to be carried on a soldier's back. Air samples are taken in through a hose-connected scoop on the soldier's rifle. If a whiff of air contains ammonia, a decomposition product of human perspiration, a series of photoelectric events causes a rise in pitch of beeping sounds going through earphones worn by the rifleman. The sniffer can detect a man at ranges up to 300 yards.

**INTERESTED IN MOON MAPS?** The U.S. Geological Survey has completed 10 in a series covering an area of 1.2 million square miles. Multicolored and scaled at about 16 miles to the inch, the maps incorporate details obtained from the Ranger, Surveyor and Lunar Orbiter projects. Cost is \$1 per map.

**GROWING EVIDENCE** indicates a link between gum diseases and psychological disorders, according to a researcher at the University of Houston. Studies show a "significant increase in periodontal (gum) disease in rats after a period of stress," explains the scientist. It also has been established that psychological stress changes the physical makeup of saliva in humans, permitting a greater buildup of calculus, a substance that forms on teeth. Calculus is thought to be a major factor in gum disease. ★★★

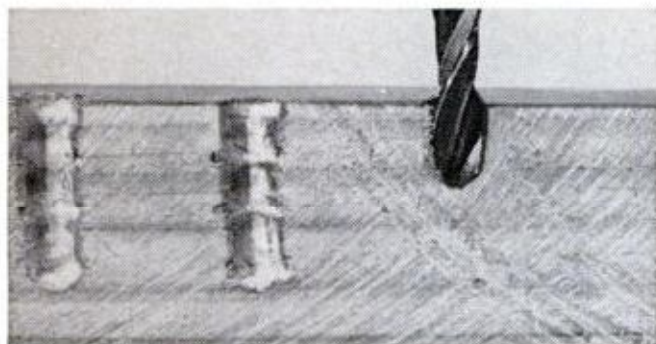


# Seven workshop headaches.

## Seven Mystik Tape Cures.

### 1. Drilling a Finished Surface:

When you're drilling a finished wood surface, the drill can skid out of the punch and scar the finish. You can avoid this by sticking a piece of Mystik Clear Plastic Tape over the spot you want drilled. This skidproofs the surface. So you won't have to worry about damaging the finish.



### 2. Removing a Tap Washer Without Scratching the Chrome:

When you're changing a faucet washer, wrap the chrome packing nut with Mystik Electrical Tape. You'll avoid scratching the nut with the wrench.

### 3. Keeping Wood From Splintering When Sawing:

A strip of Mystik Masking Tape placed on the underside of the wood, along the cutting line, will keep the edges from splintering while you saw. (This is especially helpful when you cut plywood.)

### 4. Losing Small Parts:

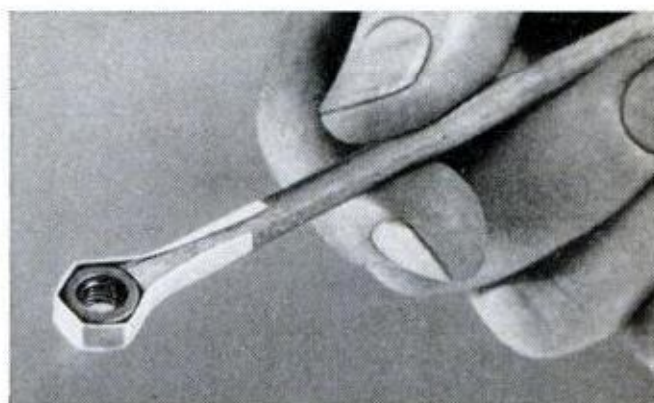
Mystik Double-Faced Tape makes a great no-spill parts rack when disassembling and reassembling a small motor. Stick a

strip of the tape on your bench and press the parts on it in the order of disassembly. This makes reassembly easy.

### 5. Tools Without Handles:

If you don't have handles for all your files or hacksaw blades, wrap Mystik Electrical Tape around the tangs, and you'll fashion a working handle.

### 6. Threading a Nut To An Inaccessible Bolt:



If you have to thread a nut and bolt in a place you can't reach with your fingers, cut a piece of Mystik Masking Tape (as wide as the nut is thick) and use it to mount the nut on the end of a pencil, butting the side of the nut to the pencil. This way, you can hold the nut in place while you turn the bolt into it.

### 7. Holding Tacks on Hand-Tool Heads:

If you're working with small tacks, place a piece of Mystik Double-Faced Tape over the hammer head. The tack will stick easily to the tape. You can then give the tack a firm, direct hit.

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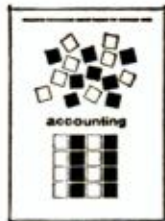
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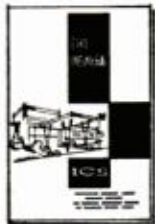


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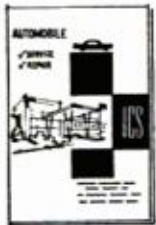
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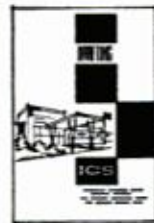
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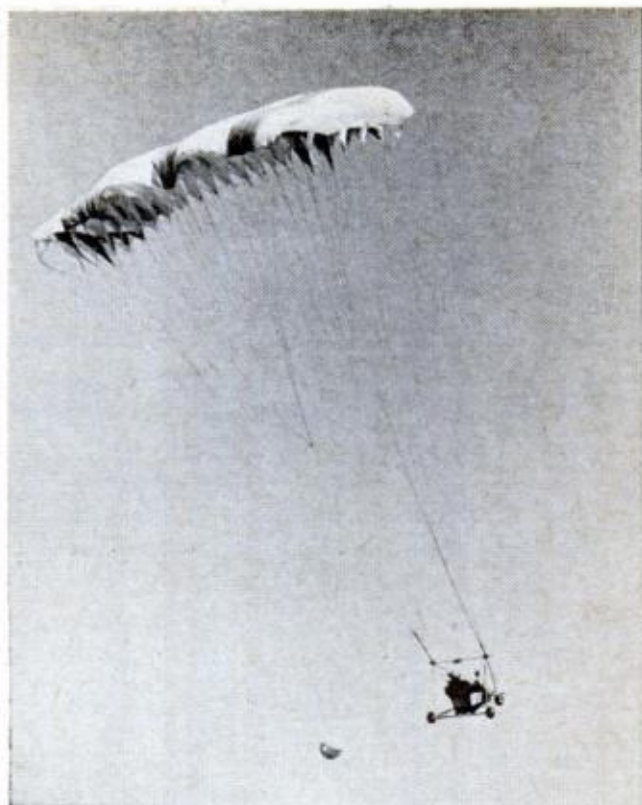


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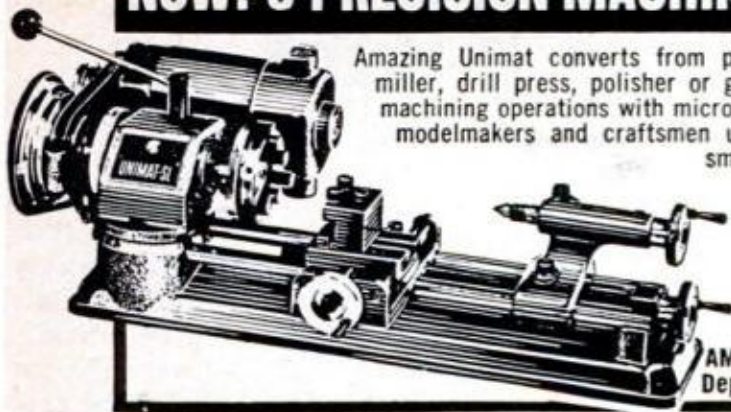


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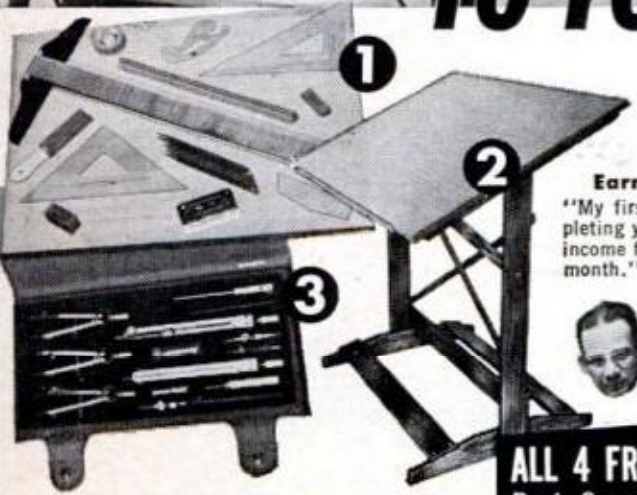
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DETROIT

# LISTENING POST

BY BOB IRVIN

**THE ELECTRIC-CAR RACE** now appears to show General Electric one step ahead of Ford. GE's experimental electric, called the Delta, has a top speed of 60 and a range of 120 miles—about triple the performance of Ford's experimental electric, the Comuta. Moreover, the GE car is about four feet longer than the six-foot, eight-inch Comuta, although both are designed to carry two adults and two children. The Delta has solid-state controls and pushbuttons for forward and reverse. Both cars are strictly for testing, but Ford is committed to marketing one by 1976.

**A PROTOTYPE CAR USING AIR POWER FOR ACCESSORIES** instead of electricity is arousing interest among the automakers. The prototype was developed by the Schrader Div. of the Scovill Manufacturing Co. Schrader is the world's largest producer of tire valves. Now it's trying to sell the industry on using an air system to operate power windows, power seats, windshield wipers and even an energy-absorbing steering column. The company says simple motors operating off a central supply of compressed air could operate this equipment better than the electric motors now being used.

**A SEMIAUTOMATIC TRANSMISSION FOR VOLKSWAGEN AND PORSCHE** is in the works for 1968. And, in order to conform with the 1968 U.S. safety standards, VW is also changing the bumpers, headlights and rear-view mirrors on the Beetle. A VW antismog system utilizes fuel injection to make the engine cleaner burning. Speaking of air pollution, California's chief antismog engineer says Volvo has "the auto industry's most advanced approach to the whole problem of exhaust emission control"—a preheating chamber inside the intake manifold. Federal officials predict all 35 U.S. and foreign manufacturers who have sought approval will have their antismog systems certified "okay" for use next year.

**SNOW-TIRE SHORTAGE** this winter is forecast by some rubber company officials because of the strike which paralyzed the industry for several weeks. When production resumed, manufacturers had to concentrate on rebuilding stockpiles of conventional tires for Detroit and the aftermarket, had to defer snow-tire production.

**FEDERAL SAFETY STANDARDS FOR TIRES**, as well as cars, will go in effect next January. The National Highway Safety Bureau had to scrap its first set of tire standards last January because they were impossible to meet. Final standards drawn up after consultation with rubber companies provide for a tire-wear indicator—already on most 1967 tires, anyway—as well as labels clearly stating the number of plies and the weight they're built to carry. No more labels saying "4-Ply Rating." From now on, that would have to read "2-Ply" tire. Meanwhile, it's not generally known, but there have been tire recalls, just like the car recalls—except they don't have to be reported to the federal government.

**AN AUTO PRIMER PAINT** that fights rust but attracts beetles is reported by the Agriculture Department. The insects are a type of sap beetle which ruined millions of dollars worth of strawberries in Michigan. Quite by accident, researchers discovered the beetles seemed to be attracted to nearby cars. Now, scientists have started a thorough investigation to determine whether these and other paints really can be used as a weapon against insects.

**A LAST ATTEMPT** to keep some small auto companies from going belly-up as a result

*(Please turn to page 24)*



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## DETROIT LISTENING POST

(Continued from page 22)

of the new U.S. safety standards is being made by Sen. Birch Bayh, of Indiana. Under Bayh's bill, companies building less than 500 cars yearly would be exempt from the standards. This would include firms like Avanti, S.S. Automobiles, and Classic Industries. It will come as no surprise to you that auto critic Ralph Nader opposes giving these companies an exemption.

**THE INDUSTRY** isn't going to put some safety features on its cars until it has to. Chrysler has decided it will wait until the Jan. 1 deadline before adding lap and shoulder belts—a \$45 item at this year's option prices.

**STATE HIGHWAY ENGINEERS** are going to come under increasing pressure to clean up some of the roadside hazards that may be costing 16,000 lives a year. That's the estimate of Michigan's Rep. Jack H. McDonald, who is pressing for legislation requiring off-the-road safety standards. He complains about guardrails that protect bridges instead of motorists, and ditches so steep that it's almost impossible to avoid overturning. The cost to repair these other hazards would be \$1 billion, according to the Bureau of Public Roads.

**RATHER SWITCH THAN FIGHT?** A recent market survey indicates about 25 percent of this year's new car customers have been undecided about the make of car they want, but do know the kind of car and the options. This is a switch and shows buyers are demonstrating less brand loyalty and doing more shopping around. (Watch our PM Owners Reports for the 1968 model year to see which owners stay loyal. In 1967 the Chevy Impala had the highest following: 47.8 percent of new owners bought from "past experience.")

**FRANCHISED OUTLETS**, a growing trend in the auto-accessory field, may be in the offing for a recently developed car-finish protection process called "Plexorizing." Made by Plasticon Chemicals of Long Island City, N.Y., the process material is said to provide a hard, shiny, protective coat of clear plastic that seals out dirt, stops corrosion, wears at least a year, and can't be washed away by soaps or detergents. Being tried in the New York area are a couple of pilot outlets. If they do well, look for another nationwide chain much like the Midas Muffler shops. ★★★



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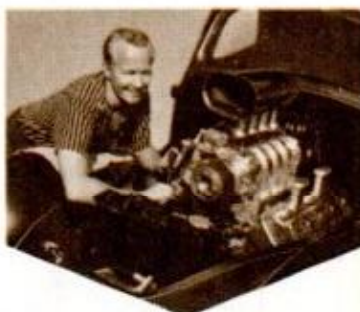
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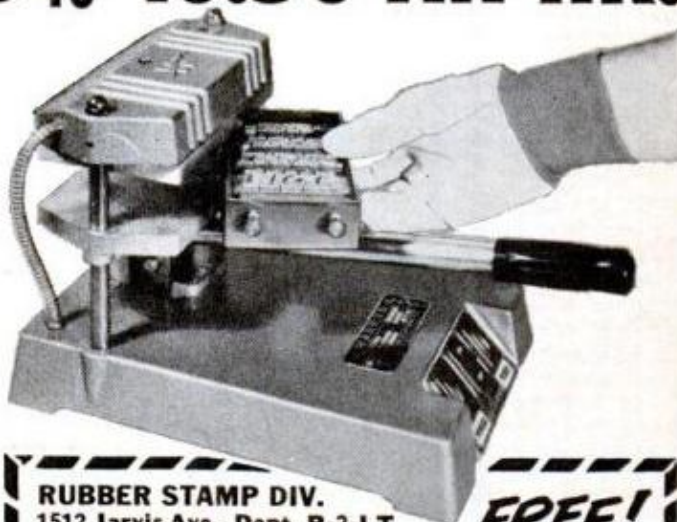
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AMERICA'S NO. 1 CLASSIFIED SECTION  
CAN BE FOUND ON PAGE 71  
IN THIS ISSUE

# Going nowhere



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Computers are machines too. Just machines. It takes a programmer to make them work. It takes a programmer to unleash the computer's fantastic power for use in business, science, electronics. You name it.

75,000 programmers are needed right now. Starting salaries are around \$7,000. Experienced programmers get \$10,000-\$15,000 - and more. And there are lots of part-time programmers needed.

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# How to get rich

How can you get rich some day? Make a hit record . . . a killing on the stock market . . . or invent a gadget like the hula hoop?

For most of us, these are just dreams. But have you ever stopped to think that there is a way to get rich—possibly only one sure way? Most fortunes, as you know, are made by people who own their own business.

Perhaps you've thought of starting a small business of your own . . . a franchised drive-in, or maybe a service business. Trouble is, you need \$10,000 to \$15,000 to get started and even then it's a gamble—with slim chances of ever making really big money.

But there is *one* business which could make you rich—almost overnight; And the beauty of it is, you can start on a shoestring during your spare time, even while holding your regular job.

## Cash by Mail

The business is Mail Order—and it's fabulous! Come up with a 'hot' new item . . . and WHAM!

It strikes like a bolt of lightning! Suddenly, you are deluged with cash orders from all over the country . . . MORE MONEY than you could ever make in a lifetime!

Like the Vermont dealer who ran one ad in Sports Afield Magazine. His ad pulled 22,000 orders—over A HALF MILLION DOLLARS IN CASH!

There is no other business where you can make a fortune so quickly!

● A beginner from Newark, N.J., ran his first small ad in House Beautiful—offering an auto clothes rack. Business Week reported that his ad brought in \$5,000 in orders. By the end of his first year in Mail Order, he had grossed over \$100,000!

● Another beginner—a lawyer from the midwest, sold an idea by mail to fishermen. Specialty Salesman Magazine reveals, "he made \$70,000 the first three months!"

## Proof

It's a fascinating business! Running ads in newspapers and magazines . . . mailing gift catalogs . . . getting cash orders in your daily mail—steady as clockwork.

There is no other business where you can start on a shoestring and pyramid your profits—without investing in merchandise! One husband and wife mail order team took in \$40,000 selling one item. They obtained FREE ads in national magazines . . . didn't invest a cent in merchandise, and even got the supplier to ship all orders for them!

These exceptional cases are absolute proof that you can get rich in your own Mail Order business. Very rich. Even a U.S. Gov. Report stated: "A number of

one-man Mail Order enterprises make up to \$50,000!"

Pick up any magazine. Notice how the same mail order ads are repeated . . . month after month? That's concrete proof! You know those ads wouldn't be repeated over and over again—unless they were bringing in big cash profits to their owners.

## The Secret

The secret of getting rich in Mail Order lies in *financial leverage*. It's a little-known, almost secret method—using other people's capital to make money for you!

You can get thousands of dollars worth of advertising in big national magazines—without investing your own money! And you don't have to write a single ad. Tested and proven ads are prepared for you by experts. Reinvest the profits from your first successful ad—to get more, larger ads, and the profits begin to snowball! It's like building a chain of stores . . . each new store puts more money in your pocket.

You mail out beautiful catalogs which offer hundreds of dollars worth of fine, quality gifts—yet you don't invest one



The thrill of receiving money in your mail is one you'll never tire of!

cent of your own money in merchandise! Your catalogs are printed with your name and address, so all orders come to you. Everything is "drop-shipped" for you, and there's up to 100% mark-up! You pocket the cash profits immediately—even before the orders are shipped to your customers!

Repeat orders alone, just from mailing catalogs, could bring you a steady income for the rest of your life!

Yes, Mail Order is the fastest-growing, most profitable business in America! And now, with more people moving to the suburbs . . . the population explosion . . . and the expanding teenage market . . . we are on the verge of the BIGGEST BOOM in Mail Order history!

Now, with the help and backing of Mail Order Associates, Inc., of Montvale, N.J., you can follow the same proven steps to Mail Order success—using the 'secret' of financial leverage!

## Start Now

We supply you with beautiful gift catalogs throughout the year. All products are dropshipped for you, with up to 100% mark-up! You get free samples of top-selling mail order items, plus monthly trade reports on 'hot' new products . . . tested, successful ads are sent to you monthly. You get advertising directories, postal laws, complete courses, expert guidance—EVERYTHING you need to practically guarantee YOUR SUCCESS. Why? Because *our* business depends upon your success. It's mutually profitable!

A recent feature article in Income Opportunities Magazine stated, "Mail Order Associates Inc., offers the most comprehensive Mail Order program ever offered to beginners." They go on to say, "This could be the opportunity you've been looking for. A chance to get in on the ground floor in a little-known business which we believe is on the verge of a new boom."

## Free

We are now accepting a limited number of charter members in our new Mail Order Program. No previous experience is required but you must be over 21.

If you are sincerely interested in starting a profitable business of your own . . . if you can see the tremendous advantages which Mail Order offers . . . then ACT NOW!

Mail the coupon today, or simply send your name and address on a postcard. No salesman will call. We will send you a free book—gift catalog, reprints of feature articles, plus complete facts about our program. Write to:

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Name .....

Address .....

City ..... State ..... Zip .....



# WHAT'S NEW OUTDOORS

BY DAN FALES

**NEW PLASTIC SHOTGUN SHELLS** are giving reloaders a field day. Wanda Cartridge Co. of Houston, Tex., has developed a shotgun shell that's been hoped-for for years. Made of metal-like thermal plastic, the shell is tough enough to hold up under successive reloading operations. Until now, most plastics couldn't withstand the rugged extraction and ejection system used in automatic shotguns. But Wanda is using Lexan, a heavy-duty poly-carbon developed by General Electric. The buckshot and prime cap are the only metal in these shells. There's a plastic overshot wad designed to plane out of the shot line shortly after leaving the barrel. This wad can be reused, too. The cartridge company is marketing only 12-gauge shells, and only in the southwest, now. But it hopes to increase production shortly. A



box of 25 shells costs between \$2.70 and \$3, depending on shot size.

**YOU MAY BE FISHING** with heavier tackle next year. The tackle makers said so at the annual show of the American Manufacturers of Fishing Tackle Assn. held in Chicago a few weeks ago. The big names in tackle announced 1968 production increases of heavy-duty tackle for saltwater and large fresh-water game fish. Mostly, the makers feel that increased mobility is letting you get where the big fish are. I attended the show and saw another trend. Along with ultralight gear, the manufacturers are going hog wild over compact rod kits that fit easily into suitcases. I'll have a detailed report later.

**THE WORLD'S FIRST AIR GUN** dates back more than 200 years. In 1750, according to museum experts, this rifle was the first to operate on a compressed-air principle. A smith's bellows was used to pressurize air in the large copper ball. The gun fired a .351-cal. lead bullet accurately for 25 meters (about 80 feet). The maker is



unknown. The gun is on view at the Museum of Historical Weapons in Wurzburg, West Germany. To see how far we've come with use of compressed air in rifles turn to page 120 for an explanation of an entirely new firearm principle.

**BUILT-IN HEATING PADS** in socks promise to keep your feet warm this winter. I find that my feet almost freeze while I'm snowmobiling or sitting idly in [\(Please turn to page 36\)](#)







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

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

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

By Victor B. Mason

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

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

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

## I Have All The Money I Need

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

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

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

## A Fascinating and Peculiar Business

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

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

## Are You Mechanically Inclined?

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

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

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

## Does Happiness Hang on Your Decision?

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

**VICTOR B. MASON**  
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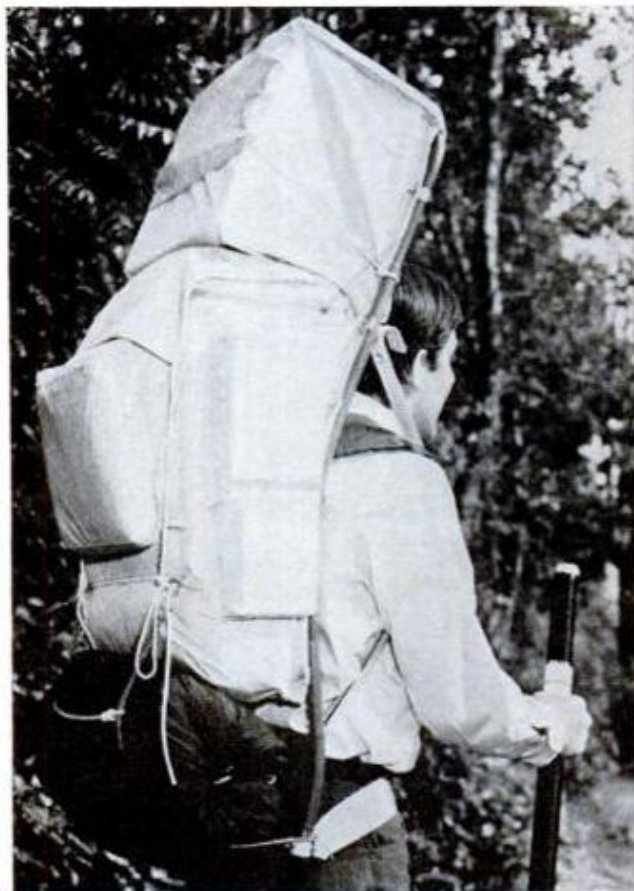
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## WHAT'S NEW OUTDOORS

(Continued from page 34)

a cold duck blind. This is true, too, of ice fishermen and skiers. Well, Lectra-Sox Div. of Timely Products Corp. has just started marketing nationally "hot" socks that are electrically heated by flashlight batteries. A concealed wire runs from the battery pouch on the sock band to a heating pad in the toe. When the pouch is snapped closed, the pad warms—when unsnapped, the heat is cut off. A garter holds pouch and sock up. Low voltage, D-cell alkaline batteries are completely safe in all kinds of wet-feet situations. Made of a new wool and acrylic fibers, the socks can be hand-washed. Suggested price: \$9.95 a pair without batteries.

**A TREMENDOUS AMOUNT OF STUDY** paid off for Murray Pletz at the University of Washington. Murray is this year's winner of Alcoa's Student Design Merit Award. He developed this four-stage aluminum pack frame after extensive study of back and shoulder muscles. If most of your hiking will be in flat,



treeless country, or on clear mountain trails you can use this pack fully extended—a foot over your head. But if you're planning a hike on overgrown trails or through hilly country you can alter the pack frame so the center of gravity isn't too high. Murray hopes this three-pound pack will be marketed some day. ★ ★ ★



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# SOLUTIONS FOR MECHANICAL HEADACHES

# AUTOMOBILE CLINIC

BY MORT SCHULTZ

## Not so innocent

*My 1966 Pontiac engine rumbles when accelerating from 20-45 mph with dwell and timing set to spec. The noise disappears if I retard timing, but that produces an acceleration lag. Where's the problem?—Rush Taylor, Elkhart, Ind.*

Probably in the vacuum advance with a bad diaphragm or a restricted vacuum line being the specific trouble. It may look innocent propped on the distributor, but in a situation of this type, the unit should top your troubleshooting list.

## Less wear on tires and pocketbook

*Can you alert Buick and Pontiac owners to a situation that may be costing them money? A kink in the front-end suspension of my 1965 Buick Special was found to be causing extreme tire wear.*

*The front-end specialist found caster, camber and toe-in to be correct until he placed a weight on the front of the car. Toe-out was radically changed, and this change was occurring during operation whenever the front of the car bore down. Based on past experience with late model Buicks and Pontiacs, the mechanic went directly to the source of the problem. The radii of the steering arm and the steering wheel arm were not the same as they must be. He adjusted the steering arm, and I now have close to 10,000 miles on a new set of tires without a trace of tread wear.—Dr. E. S. Stine, East Stroudsburg, Pa.*

Thank you, Dr. Stine, and our hats-off compliments to a really sharp mechanic.

## Tea is served

*Three minutes after starting my 1964 Chevrolet Bel Air in the morning, I get a teakettle whistle from the engine compartment. The noise starts low, but gets gradually louder and steady. It stops only when I accelerate in Drive. I don't particularly mind the whistle, but I do resent my neighbors running from their houses*

*for a free cup. Help!—Nat Rosenblatt, Brooklyn.*

Either charge 10 cents per cup or check for a plugged filter screen in the transmission or a whining alternator. And there's another possibility, not as apparent. There is a neoprene seal beneath the front timing cover over the area where the front harmonic balancer is located. It could be bone dry and need lubrication.

## Full-time starting

*My 1961 Plymouth with automatic transmission starts in Neutral, Drive or Reverse, making this safety-minded driver awfully unhappy. What's wrong?—Carl Fitzgerald, Asbury Park, N.J.*

Smile, Carl. Your trouble is a neutral switch which is stuck in a closed position, or the insulation on the wire leading to the neutral switch is worn and the wire is completing the circuit by contacting some part of the car. To find out which, disconnect the wire from the neutral switch at the transmission. If the starter operates, the wire is at fault—if it doesn't operate, replace the neutral switch.

## Short-term trouble

*I can't keep clutches and pressure plates in my 1963 Oldsmobile station wagon with stick shift and 394-cu.-in. engine. The first time, clutch, plate and throwout bearing had to be replaced after only 11,000 miles. Then they went bad again after another 11,000 miles. Now 3000 miles later, the car shakes like mad when starting out in low. Shall I dump the vehicle?—John Beareys, Flint, Mich.*

That, of course, is up to you. But before you do, maybe you'll want to check on these possible causes. First, the clutch linkage could be binding or misaligned, preventing the clutch from releasing fully. Secondly, the first time the clutch went bad it may have caused the flywheel

*(Please turn to page 42)*



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## AUTOMOBILE CLINIC

*(Continued from page 40)*

to warp, which explains subsequent events. Finally, the cover may have become distorted, resulting in uneven contact with flywheel.

### Too many calories

*Despite many tune-ups and carburetor adjustments, my 1963 Mercury Comet stalls when the engine is hot. I'm about ready to replace the carburetor, but wanted to check with you to make sure there is no less drastic measure.—Ken Bright, Elizabeth, N.J.*

There certainly is. Usually, the difficulty is an over-rich fuel-air mix. I would replace the fuel inlet seat fiber gasket with the rubber-coated aluminum gasket (part No. C3AZ-9569-B) Mercury issued to solve this problem with Comets and Meteors. After installing this new gasket, adjust the carburetor float assembly to a dry setting of 1 inch.

### A pregnant Ford?

*Adjustment of the transmission bands and changing of fluid have failed to clear a condition with my 1964 Ford Galaxie*

*with Cruise-o-Matic transmission. It just doesn't want to go first thing in the morning. I have no trouble the rest of the day. Why does my transmission have morning sickness?—Ben C. Eyerly, Macksburg, Iowa*

I'd say you have trouble with your transmission valve body assembly. The pressure valve is probably sticking. Try a can of transmission lubricant. If that doesn't free it, you will have to dig into your transmission.

### Fencing with a dipstick

*The oil dipstick in my 1965 Chevy is like a foil—too flexible. I have trouble getting it in the tube, and you ought to see some of the strange readings I've gotten. Is there a substitute?—Carl Krause, Seattle, Wash.*

Not that I know of. But there is a modification that will clear up the trouble. It applies to '65 Chevelles and Corvettes with 283 and 327 V8 engines, too. The dipstick has to be straightened and then twisted 90°. It's best to have a Chevy shop do the job according to the diagram on page 6 of Chevrolet Service News No. 1 (Jan. 1965).

## Service Tips

● **Dodge has issued a statement** about brakes due to the careless driving habits of some owners. Important parts of the statement are as follows:

"Chrysler Corp. equips all of its vehicles with braking systems that are entirely adequate under normal use and service. However, the brake system can be abused through incorrect driving habits. The brake system is designed to start braking with only a light force applied to the pedal. Because of this characteristic responsiveness, it is important that the owner avoid, as much as possible, driving with his foot resting on the brake pedal with sufficient force to cause the brakes to be even lightly applied. Continuous "riding" of the pedal can result in excessive lining wear, abnormally high brake system temperatures and possible damage to brake system components."

In short, men, keep you're cotton-pickin' foot off that pedal unless you're braking.

● **Oldsmobile Toronados** may be receiving damage to the front bumper at the carwash.

Olds reports that damage is the "apparent result of attaching the chain hook directly through the lower flange of the bumper." A longer chain is required on the Toronado because of the greater distance between the cross member and the front of the car. Make sure the chain is hooked up properly. Otherwise, have your car washed by hand instead of machine.

● **Owners of 1967 Camaros** with 327-cu.-in. engines will be interested in this typographical error. Although the manual says to use AC 45 sparkplugs, don't. The right plug is the AC 44.

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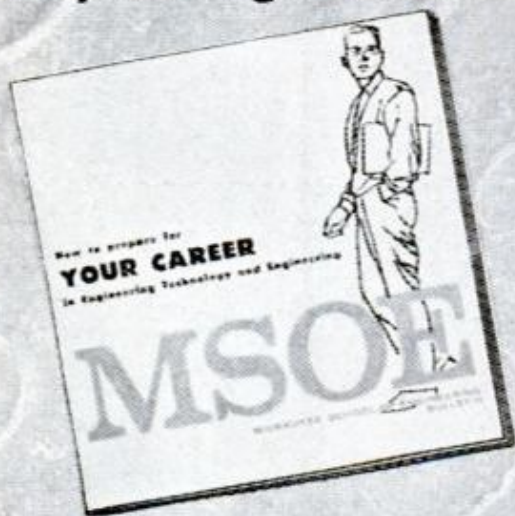
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BY KEVIN V. BROWN  
**AVIATION**  
JETSTREAM

**MILITARY TIME**, for those who lived by it, is 24 hours long. For those who haven't, this may sound strange. Like, doesn't every day have 24 hours?

Not really. Civilian time is divided into two 12-hour half days, with a 1:00 a.m. and a 1:00 p.m. Military time, when it gets to 12 noon, doesn't start over again with 1:00 p.m., but goes right on to 1300 hours, 1400 hours—all the way to 2400 hours.

Draftees, bless 'em, had—and still do have—some trouble adjusting to this.



**24-HOUR WATCH** has standard 1-thru-12 dial (left) for morning hours, then when it reaches 1:00 p.m. its dial flips automatically to 13-through-24 for afternoon and evening. Maker predicts air travelers may switch to 24-hour day which is less confusing than a.m. and p.m. Air schedules could then be based on 24-hour clock



Now, claim some, the civilian populace may have to go along. With the great rush of air travel and the new jumbo jets and SSTs expected to create an even greater rush, more and more people will be crossing more time zones, and the constant time changes may be more of a nuisance than military time.

So, they say, everyone may soon be on a 24-hour day.

One watchmaker is anticipating the trend. Gruen has a watch with a special dial that gives the standard 1 through 12 in the morning, then jumps to 13 through 24 during the afternoon and evening hours.

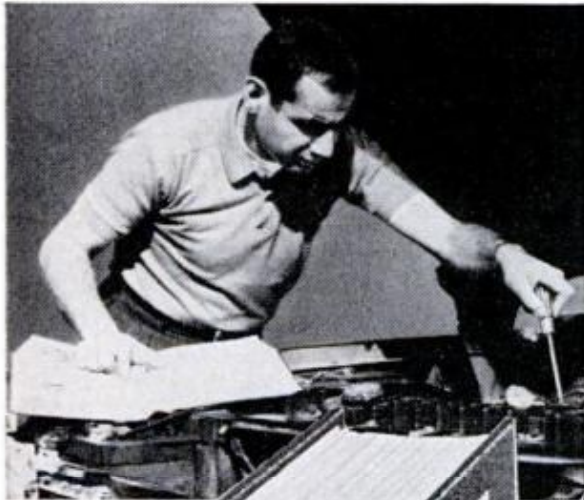
Time? Why it's 17:45, friend! ★★★



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# Drivin' with Dan

What can I do about freeway drivers who crowd in ahead of me? Has your size been a disadvantage in race-car driving? Do all cars need side mirrors? Dan Gurney answers these and other provocative questions

**Q.** My dad keeps telling me that following too closely is the most dangerous driving habit one can have. But here in California I have to drive a lot of freeways. If I drop back to what looks like a safe distance, other cars just keep getting in front of me into the open space. Would you put up with that?—Bill Lee Donar, Newport Beach.

**A.** Your dad's advice is basically very sound. The frustration you experience probably results from the way you are attempting to apply it. There are other lanes on the freeway besides the "fast one" on the far left. You might try driving in the slightly slower lane on the right, where there isn't as much pressure from traffic behind you to keep up a certain pace. Still, the rule remains—never follow so closely that you can't safely cope with a sudden stop or unexpected maneuver by the driver ahead of you. Keep aware of the complete traffic picture around you by constantly checking your mirrors and your freeway driving will be easier and safer.

**Q.** I've read every article I could find about you,

but none of them say you were interested in racing cars until after you got out of the Army. Is that true? Most professional drivers seem to start earlier than that.—M. J. Neely, New Orleans.

**A.** I didn't get into organized road racing until after the service, but I was interested in racing and cars—anything on wheels, really—for a long time before that. I broke my arm when I was about nine or ten, and one of my recuperative exercises was a sort of "row cart" that was propelled by arm power. I can still remember how great I thought that was. I also tried drag racing and a bike or two as a youngster and used to go to watch every race I could find. I guess you could call it love at first sight.

**Q.** I would like to know your weight and whether or not you think your height has caused any disadvantages in being selected for driving racing cars.—Paul Berardi, Milford, Mass.

**A.** Right now I'm about 190, although I'd like to be a little lighter than that. As a rule, *(Please turn to page 48)*



**BEFORE TESTING** one of his All-American Eagles, Dan Gurney swaps a few words with the recently retired Richie Ginther. Before stepping down, Ginther was Dan's mate on the All-American Formula 1 racing team














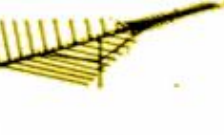







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## DRIVIN' WITH DAN

*(Continued from page 46)*

the larger the driver the more difficult it is for him to be properly "fitted" to a racing car, particularly the smaller cars. In stock cars, on the other hand, this is almost an advantage since some of the smaller guys have to spend quite a bit of time having control pedals built up, and so on. I have gone through some unusual adjustment to make myself comfortable in certain cars, including having a special "bubble" for my head built into the top of our Ford Mark IV Le Mans car, but I don't believe that over the years my height has been much of a problem.

**Q.** *I never realized until I looked at PM's Racing Car Chart how similar Formula 1 cars are to Indy racers. The latter are just a little bigger and more powerful. My question is: Why doesn't USAC reduce its size and power so that Formula 1 cars can compete at Indy?—Joe Parker, Jr., Flint, Mich.*

**A.** Word is that in the near future a universal formula, or set of rules, will be adopted for both Indy and Grand Prix cars—probably by 1970. Both types of cars have been moving in that direction recently. Indy engines are getting smaller; they are down to a 4.2-liter maximum now, whereas F-1 engines are getting bigger (up from 1.5 to a 3-liter maximum now). I think a common formula would be a terrific thing in promoting international competition to the fullest extent in both car and driver exchange.

**Q.** *Do you feel that the field of professional racing mechanic is promising? Do they make a reasonably good income? I have been thinking seriously of this as a career, but I'd like to investigate it first.—Doug Lawson, Birmingham, Ala.*

**A.** I think it's a field of almost unlimited opportunity and satisfaction, but one that is very demanding. A good racing mechanic will probably never know regular 9-to-5 hours and in many cases he may not make as much money as an ordinary mechanic because the good jobs usually go only to the proven people. But first-class racing mechanics are as rare as, or rarer than, first-class drivers and the rewards, both financial and personal, can be considerable. Frequently, in addition to salary, top racing mechanics, depending on the race, participate in any purse won by the cars they work on.

**Q.** *Do you think a side-view mirror is important on the average car if you have a good rear-view mirror and know how to use it?—Betty McKinney, Oakland, Calif.*

**A.** Definitely. In fact, I feel that side-view mirrors—on the driver's side, at least—should be standard equipment (if they aren't already). There are blind spots on both sides of your car that a rear-view mirror simply won't cover. The side view can protect you on the left, and I would advise a glance over your right shoulder—even if it looks clear on the right in your rear-view mirror—before you make any move.

**Q.** *Are you going to get another American driver for your Eagle Grand Prix team? Will it be A. J. Foyt?—Tommy Matthis, Kansas City.*

**A.** We hope to have a second American driver on the Eagle F-1 team, although there are money factors to be considered. After Richie Ginther's retirement, we used Bruce McLaren, of New Zealand, because Bruce's own car was temporarily out of action and because he's a fine, experienced Grand Prix hand who is also a good student of machinery. We talked with Foyt about the possibilities and both of us are interested in giving it a try. A. J. has his USAC commitments, of course, and the same sort of thing is true of almost all other top American drivers. Also, running a two-car team is expensive and we have been on a very tight budget this year. The Eagle Club response has been a big help and now we are beginning to receive more assistance from American industries as well.

**Q.** *I understand some states don't allow you to run with your parking lights on—headlights or none at all. That seems wasteful and a little silly to me.—Roy Simson, Dallas.*

**A.** The idea, I'm told, is simply for safety insurance. The theory seems to be that lots of people forget to switch from parking lights to headlights at the right time. If your car will run at all, the headlights won't affect it any more than the parking lights.

---

*If you have questions on racing, high-performance and everyday driving techniques, send them to "Drivin' with Dan," c/o Popular Mechanics, 575 Lexington Ave., New York, N.Y. 10022. Questions cannot be answered by individual letters. Questions on maintenance and repair should be addressed to the Auto Clinic (see page 40).*



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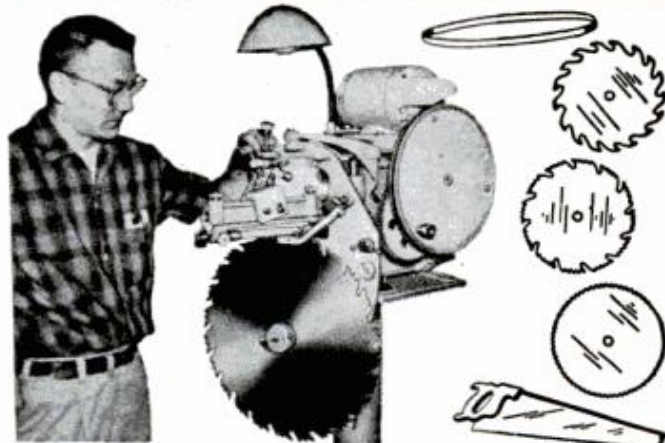
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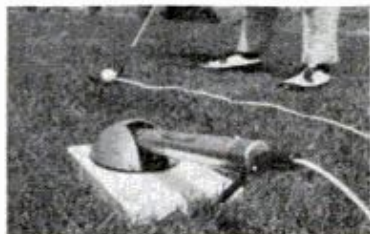
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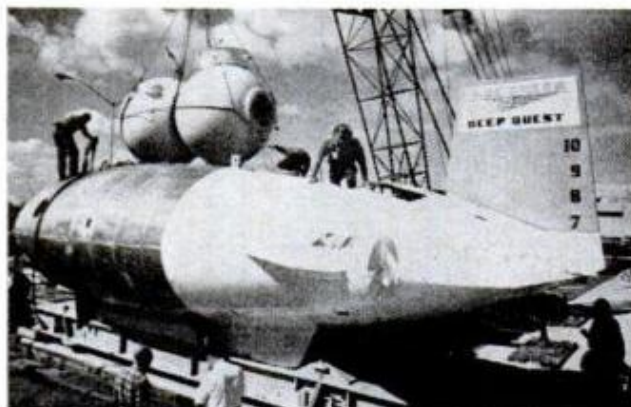
### Army's new Cheyenne

The Army's new AH56A Cheyenne takes off straight upward and flies forward at a speed of 250 mph. The Lockheed craft, with a 27-foot fixed wing and turbojet pusher propeller on the tail, is designed to provide fire support and to escort troop-carrying helicopters.



### To Vietnam, Civil War style

Looking like its Civil War namesake, the Monitor is a new armored gunship designed to operate in the shallow waterways of Vietnam. An entire fleet of the vessels, built from the 60-foot hulls of Navy landing craft, is being readied for use against the Vietcong.



### Deep research

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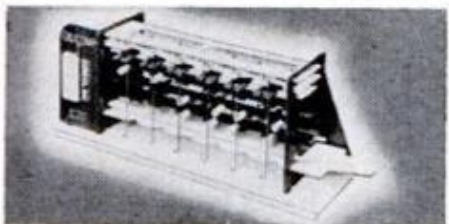




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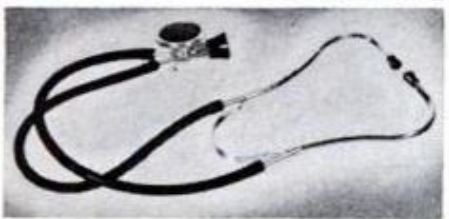
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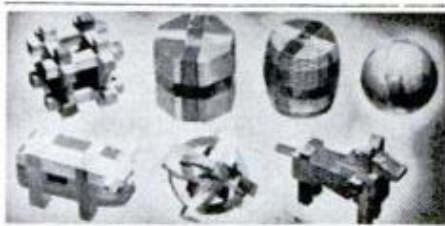
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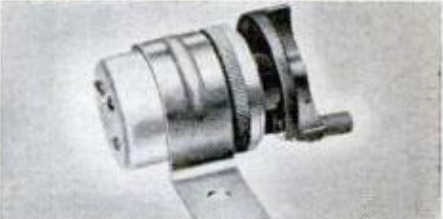
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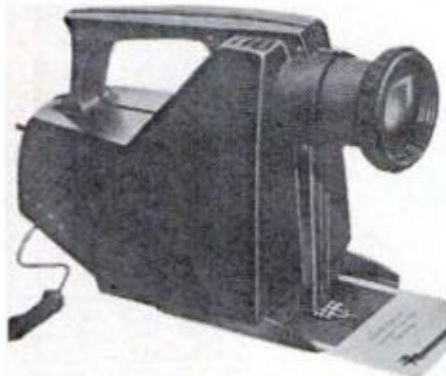
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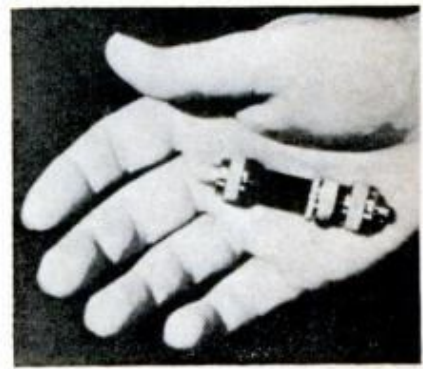
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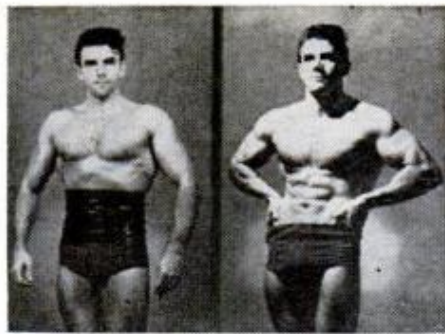
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Built-in Shock Absorbers to eliminate**

**vibration** **STIHL 041 AV**



# WHY A CHAIN SAW THAT ELIMINATES VIBRATION?

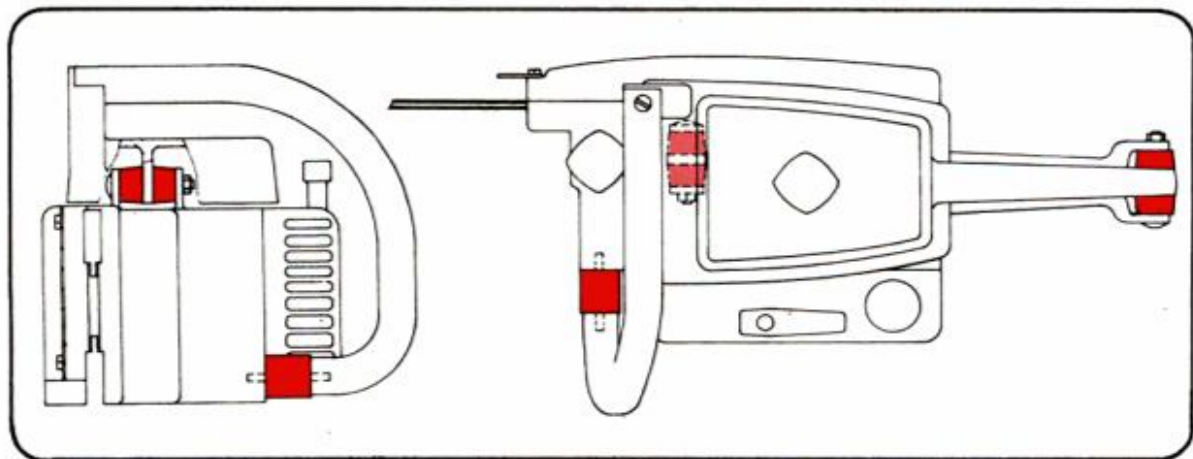
As world leader in the manufacture of fine chain saws, and with more than 40 years of experience in design and operation, STIHL has systematically tackled and solved many of the problems related to chain saw use. Of these, none has been more vexing and elusive than ever present vibration. A natural irritation seemed to accompany every chain saw operation.

In the interim, many studies were made about the negative influence of vibration upon the user, including the physical fatigue, mental reaction and indirect influences upon behavior and production. It offered a real challenge to STIHL

and other chain saw manufacturers and obviously needed solving, and so . . . solve it, STIHL did!

In developing the system, our engineers gave it the code letters "AV" for "anti-vibration". This is how the STIHL 041 AV was born.

*As you can see in the diagram, as illustrated in red, a system of five strategically located shock absorbers intercept vibration and practically eliminate it. These in turn serve as buffers between the operator and the saw and help to eliminate fatigue and physical wear. Now, you can cut more with less effort!*







# WORLDS FIRST AND ONLY CHAIN SAW WITH BUILT-IN SHOCK ABSORBERS

## TO ELIMINATE VIBRATION

STIHL is first again — in all the World!  
This time, with a chain saw that has  
shock absorbers built right into the crank case.



# 041AV

### CHECK THESE OTHER SUPERB FEATURES:

- ✓ Fully automatic chain oiler with quantity control.
- ✓ Lifetime cylinder.
- ✓ Super-size muffler cuts noise as you're cutting wood.
- ✓ "All-position" Tillotson carburetor; completely protected from engine heat.
- ✓ Larger air filter for longer working time between changes.
- ✓ Special Bosch "immediate" ignition system.
- ✓ "Long-life" friction clutch.
- ✓ Product of more than 40 years of experience by the world's first chain saw manufacturer.

As shown by the arrows —

The shock absorbers are strategically positioned at five suspension points to absorb and reduce engine and chain vibration. They practically eliminate muscle fatigue and give you the smoothest working saw ever!

This advanced 5½ h.p. lightweight also gives you more horsepower per pound than any other make of saw. Makes even bigger cutting jobs seem shorter and easier.



TODAY'S MOST ADVANCED CHAIN SAW . . . WITH EXCLUSIVE STIHL PATENTS!  
YOU'LL HAVE TO TRY IT TO BELIEVE IT!



# NOW! BECAUSE YOU ASKED FOR IT!!!



World's First and Finest  
CHAIN SAWS - Bring You

**STIHL'S QUALITY & WORKMANSHIP**  
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## A NEW ECONOMY MODEL THE **S-10**

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**NOW YOU GET ALL THESE  
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*Formerly Only Found In Higher Priced Quality Saws.*

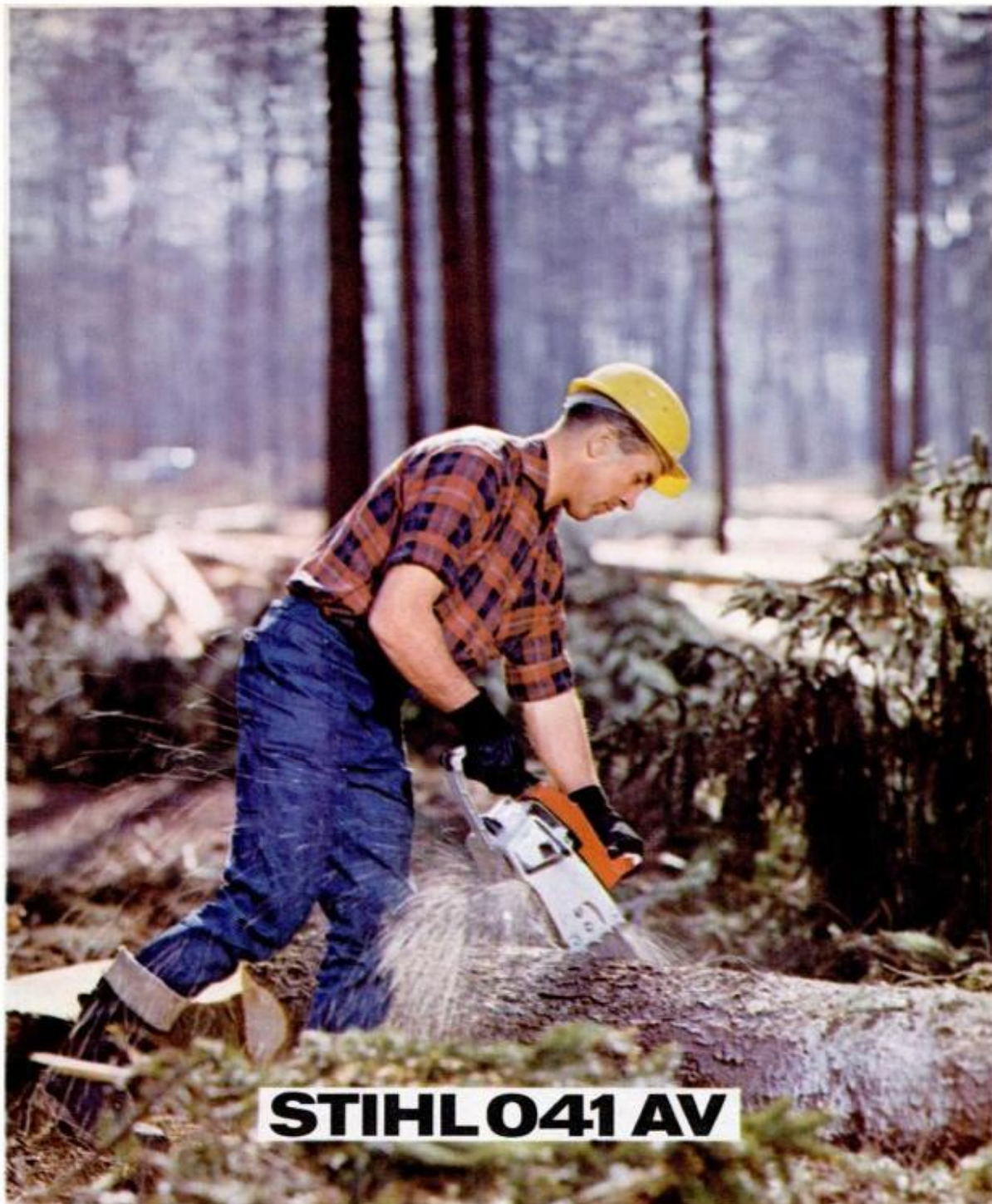
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- Weighs only 15 lb. (complete with bar and chain)



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**STIHL AMERICAN, INC.**

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**WORLD'S MOST POWERFUL CHAIN SAW!**

with **15** GIANT  
HORSEPOWER!



**WHETHER YOU MEASURE IT AT THE CRANKSHAFT OR AT THE CHAIN, NO PORTABLE CHAIN SAW IN ALL THE WORLD CAN BEAT THE POWER AND THE CUTTING PERFORMANCE OF THE STIHL 090!**

This is *the* BIG ONE! The saw made for the real BIG timbermen in the real BIG timber! Its mighty 15 horsepower, 8.5 cu. in. displacement engine has made it the champion and favorite performer, not only in our own Northwest, but also in the great forests of Europe, South America and the Orient. Power-wise and performance-wise this STIHL chain saw

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**NEVER SETTLE FOR LESS THAN THE BEST! INSIST ON STIHL!**



# A NEW, POWERFUL LIGHTWEIGHT ELECTRIC



110-220 Volt, Single-Phase Chain Saw

## CHAIN SAW

# E-15



When you use a STIHL E-15 lightweight electric (2.6 h.p.) chain saw your cutting is not limited to boards and small construction timber.

This saw incorporates sufficient power, durable performance and constant cutting speed to handle larger cutting jobs. Thus, it has proven itself perfect for both the "do-it-yourself-er" and the production cutter.

The 110-220 volt motor of the STIHL E-15 with a 1900 watt output provides much more power than you would expect from conventional saws of this type. To meet local electrical engineering regulations, it has been designed to eliminate radio interference

and has the protection of double insulation.

The E-15 has an automatic chain oiler, oil level inspection window and uses  $\frac{3}{8}$ " chipper chain. The bevel gear reduction ratio is 1:3.4 and the chain speed is 33 ft. per second.

These features compare closely to those of a gasoline powered saw and guarantee smooth cutting capacity. It is available with 13" and 16" bars and each new saw comes complete with a set of service tools.

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FINEST Quality Stamps, three lines, \$1.50. Dee's, Box 14004, Phoenix, Arizona 85031.

### PRINTING, MULTIGRAPHING, MIMEOGRAPHING, GUMMED LABELS

OFFSET Printing 100 copies \$3.49. Parks, 1879 Dover, Wantagh, New York 11793.

1000 ZIP Code, gummed address labels \$1.00. Coy's, 2005 North Ninth, Springfield, Ill. 62702.

AMAZING Business printing values. Samples. Print Shop, Box 576, Greenville R.I. 02828.

OFFSET PRINTING—8 HOUR SERVICE—25 to 5,000 copies. Free booklet "Secrets of Cutting Printing Cost." 305 S. 4th, Springfield, Illinois 62701.

FREE Literature: 1000 address labels \$1.00. 1000 business cards \$4.95. Printing, rubber stamps, Jordan's, 552 West O'Connor, Lima, Ohio 45801.

THERMOGRAPHED Business cards \$2.99—1000, free samples. Gables, 405 Clifton, Glenshaw, Pa. 15116.

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FREE Discount printing catalog. Wagner Company, 6200PM Whitewood, Library, Penna. 15129.

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1000 EMBOSSED Business cards, and three line rubber stamp \$6 up. National, Wells, Milwaukee 53208.

1000 GUMMED Address labels, \$1.00. Walt's, Box 966-A, South Bend, Indiana 46624.

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PRINTING Presses, type, supplies. Lists. 5¢. Turnbaugh Service, Mechanicsburg, Pennsylvania 17055.

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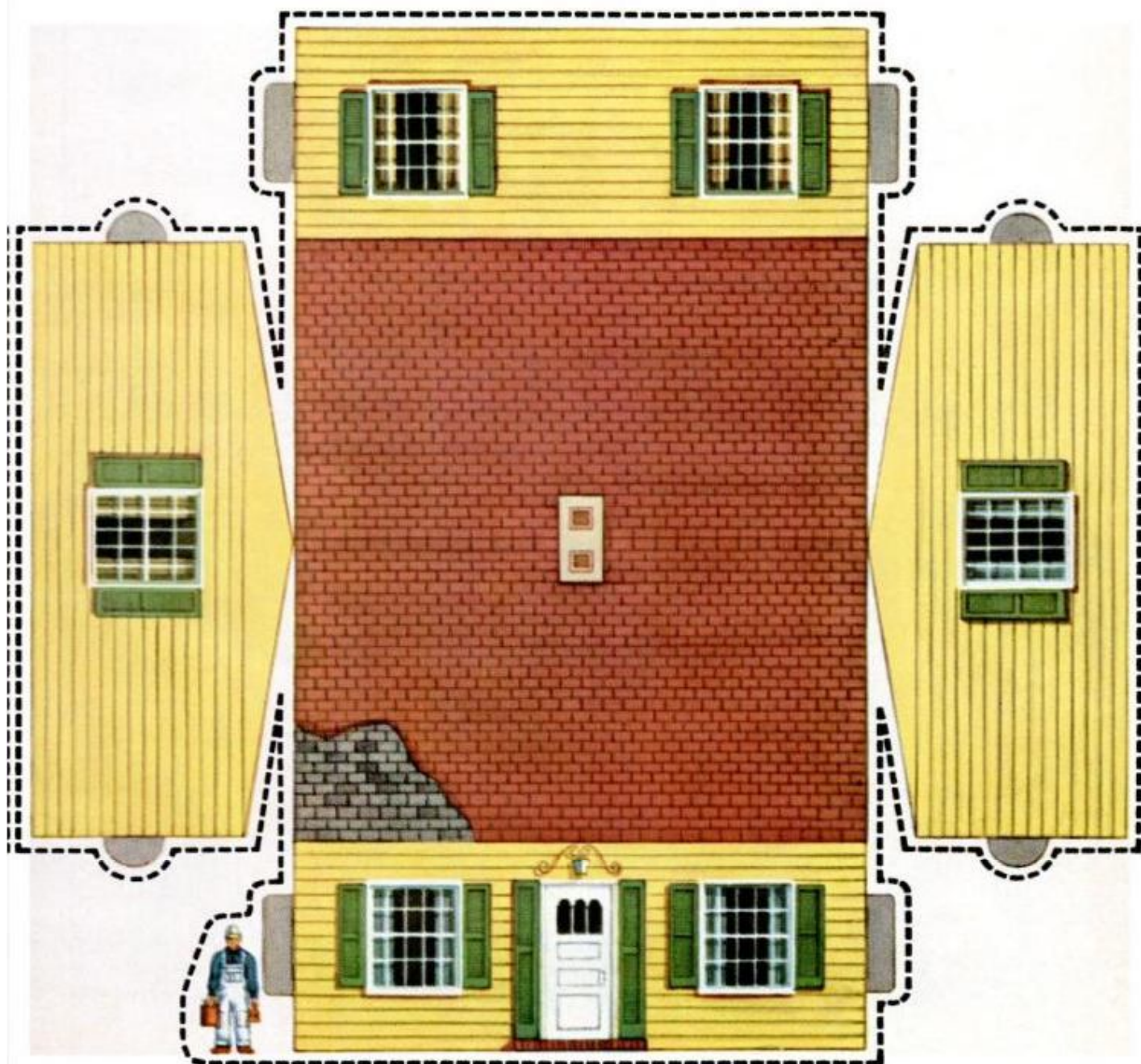
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outboards or stern drives ever built.  
**Mercury / MerCruiser '68...**



**The Payoff  
is Performance!**





# '68 Mercury

## The Payoff

**New Merc 1250SS—world's most advanced outboard.** The *Thunderbolt*-fired 125-hp Merc 1250SS is the new performance champion from the company that has made performance a specialty. It's brand new from powerhead to propeller shaft—truly revolutionary in design! This powerhouse has new piston design, rugged new power train, new carburetion for breathtaking acceleration, new fuel linkage for surprising economy. Yet there's all the quiet dependability you expect from Mercury engineering and exclusive 6-cylinder design. If you like go, this is it. Sheer power for the fun of it. This is the new Merc 1250SS for 1968!

**Thunderbolt—world's first, world's finest electronic marine ignition system.** *Thunderbolt*—designed and built by Kiekhaefer to the highest standards in the marine industry—for Mercury only; proved in the world's toughest competition, offshore powerboat racing. *Thunderbolt*—only electronic ignition designed specifically for marine use—was pioneered by Mercury. And *Thunderbolt* is still ahead. It delivers twice the electrical energy twice as fast as any other system. Result: *Thunderbolt*-charged engines run smoother, quieter, more efficiently at all speeds from slowest idle to full bore. Spark plugs last years. And with no breaker points to wear out or replace, *Thunderbolt* eliminates ignition tuneups. Best of all, you can take your pick: *Thunderbolt* is standard on every new Merc of 50 hp or more.



**Quiet, new 100-hp Merc leaves other motors in its wake.** This new, 6 in-line 100-hp powerhouse delivers more power through a wider RPM range than anything else in its class. Tremendous power to get a whole gang of skiers up and on plane fast. Enough thrust to push a king-size family cruiser with all the trimmings. The new, 100-horse Merc sets a new standard for quiet, smooth performance, thanks to Mercury's System of Silence and *Thunderbolt* ignition without breaker points. The new Merc 1000SS: nothing in its class can keep up with it (or look as good doing it).

**The toughest test program makes the toughest outboards and stern drives.** At Lake X and Sarasota, Florida—at Oshkosh and Fond du Lac, Wisconsin—MerCs and MerCruisers are put through their paces day and night. In impact tests, experienced drivers slam into logs and across sandbars. In exposure tests, Merc and MerCruiser paints and finishes are exposed to the ravages of salt water and salt atmosphere. Here's where Mercury's million-dollar finish baked on in our new paint lines proves that it's the best answer yet to saltwater corrosion. The equivalent of years of customer use is crammed into months of intensive tests. In the marine industry, there's no stronger recommendation than the words, "Tested and Proved at Lake X."



# peak is Performance!

**MerCruiser—more features, more accessories than any other stern drive.** New MerCruiser Power Trim. Obsoletes competitors' power "lift" systems which simply raise and lower the unit for beaching, maintenance, etc. With Power Trim you adjust the angle of your stern drive for optimum performance as load and water conditions vary. Press a button to trim your boat, to get on plane faster, for a smoother ride. Operate Power Trim even while you're running at top speed! Makes launching, trailering, shallow-water operation a breeze. Improved Power Trim is standard equipment on the '68 MerCruiser 120 and 160.

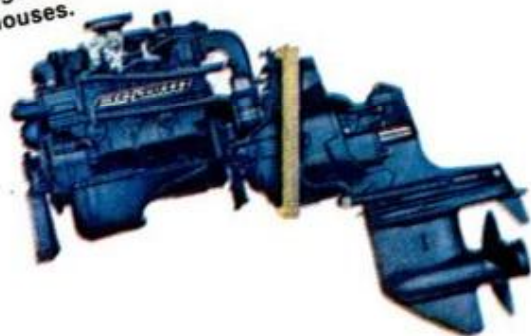
**Systems-designed.** MerCruiser is not just an engine and a stern drive—it's a marine propulsion System. Steering, remote controls, propellers, instruments—every component is Kiekhaefer-engineered and Lake X-tested. They go together to make you go better. Look for MerCruiser Systems in your favorite boat at leading marine dealers.



**Mercury and MerCruiser have won more races than all other outboards and stern drives combined.** In the world's longest, toughest ocean marathon, the "Bahamas 500," MerCruiser finished first and Mercurys and MerCruisers took 7 of the first 11 places, winding up 1, 2, 3, 7, 8, 9, 11. (The stock MerCs were running against big racing inboards with 3 times the horsepower!) It's the same story in all the important races—Miami-Nassau, Sam Griffith Memorial, Orange Bowl Regatta, Lake Havasu, Salton Sea, 6 Hours of Paris, England's 24-hour International Speedboat Race—with MerCs and MerCruisers winning handily against any and all competition. To win such races, you need more than speed. You've got to be tough—really tough. And you've got to be proved before you get to the race—not during it. Whether winning races or providing truly trouble-free family boating, Mercury and MerCruiser have what it takes to do the job.

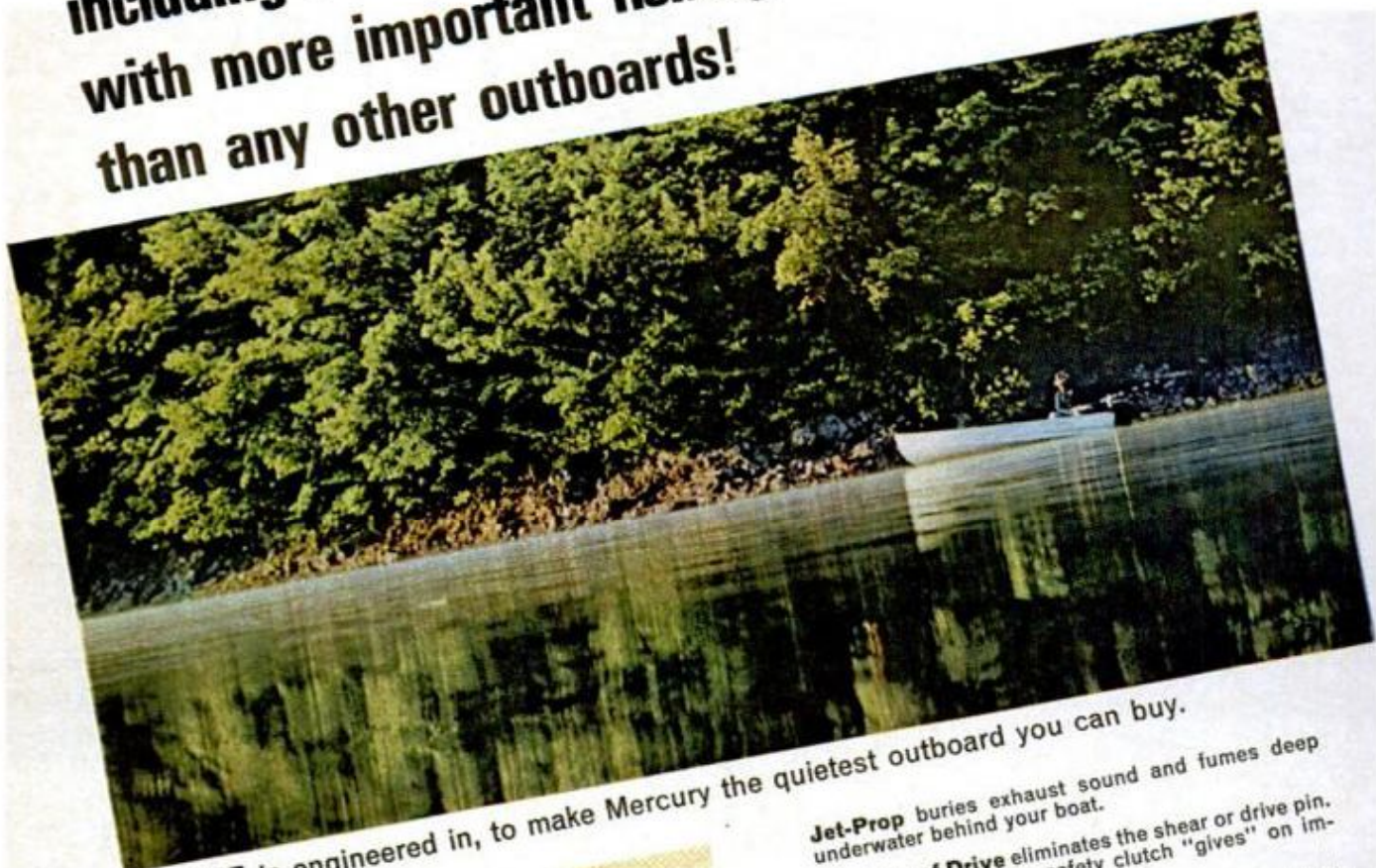
**MerCruiser '68 offers the widest range of stern drive power: 6 models—from an extra-economical 60 hp up to a blazing 325 hp.** MerCruiser—choice of more boatbuilders and boat buyers than all other stern drives combined—offers more performance, reliability, features, economy—and more choice of power and accessories than any other stern drives. MerCruiser's worldwide network of service dealers permits go-anywhere boating—free from care. '68 MerCruiser power: extra-economical 60s and 80s—the popular 120 (best-selling stern drive ever built)—the 160 that outperforms competitive 200 hps—and 8-cylinder 225- and 325-hp powerhouses.

## '68 MerCruiser





**World's 4 best fishing motors...  
including a new electric-starting 20...  
with more important fishing features  
than any other outboards!**



**SILENCE** is engineered in, to make Mercury the quietest outboard you can buy.



**New Electric-Starting 20.** Optional electric starting brings new versatility to the feature-packed Merc 200.

**Tilted Powerhead** keeps the engine firing smoothly from slowest idle to top speed.

**Smooth, Angled Leading Edge** glides over submerged obstructions and through weeds.



**Jet-Prop** buries exhaust sound and fumes deep underwater behind your boat.

**Shearproof Drive** eliminates the shear or drive pin. Mercury's live-rubber safety clutch "gives" on impact, protects against damage.

**Twist-Grip Throttle** gives one-hand control of both speed and direction. Or if you prefer, fit Quicksilver remote controls to any model.

**Full Forward-Neutral-Reverse Gearshift** for maximum maneuverability in the tightest spot.

## **The Payoff is Performance!**

**See your Mercury/MerCruiser dealer!**

**'68 MERCURY OUTBOARDS: 3.9, 6, 9.8, 20, 35, 50, 65, 100, 125 hp.**  
**'68 MERCUISER STERN DRIVES: 60, 80, 120, 160, 225, 325 hp.**

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## 68 Pontiac GTO





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**New Integral SelectAir Conditioner**—quiet, dust-free travel with year-round comfort: cools, dehumidifies, warms, defrosts.

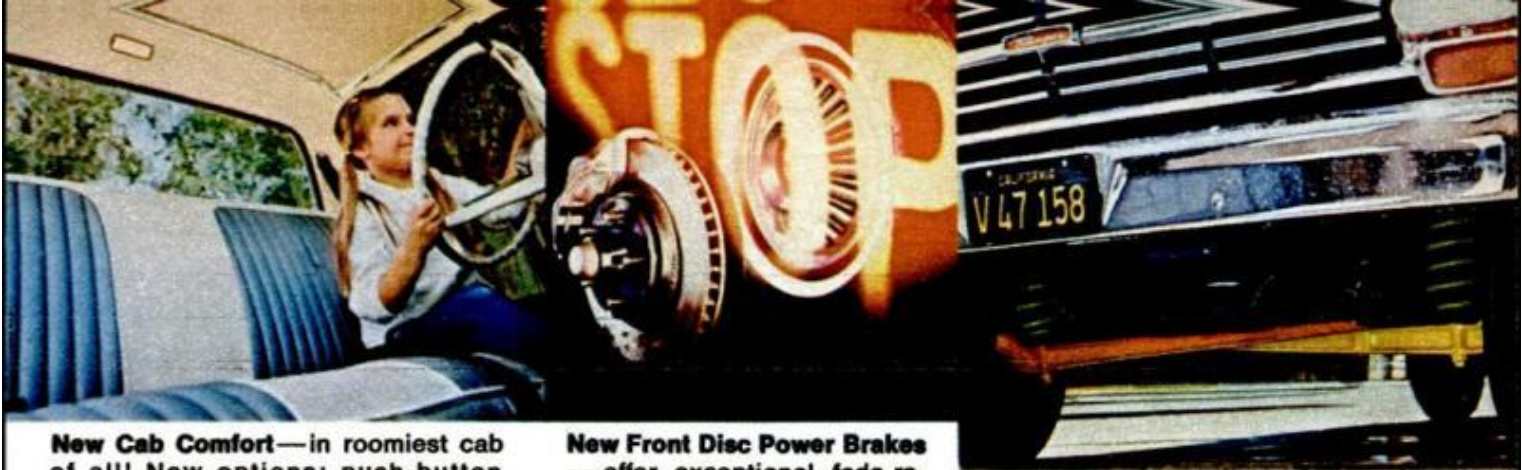


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# Look at the better ideas







**New Cab Comfort**—in roomiest cab of all! New options: push-button radio, tinted glass, courtesy lights!

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**Exclusive Twin-I-Beam Suspension**—the famous Ford front end that combines unmatched durability and riding smoothness.

# in '68 Ford Pickups

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*Ford* ...has a better idea.



OCTOBER 1967

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All Buicks have the full line of General Motors safety features as standard equipment. For example, seat back latches and padded windshield corner posts.

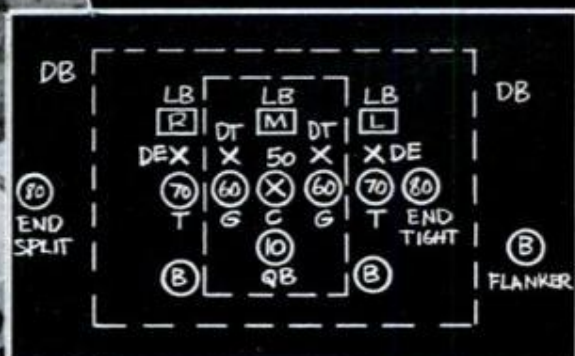
We thought you'd like to have a little easier time parking. So we shortened the wheelbase of the two-door Skylark down to 112 inches. Wouldn't you really rather have a Buick?



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Illustrations by Gerald McCann

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"When you first look at a map, all you see is a maze of lines and colors. But when you concentrate, you can see how everything is put together very methodically. And if you focus your attention, you can see the smallest detail which helps you understand the map better."

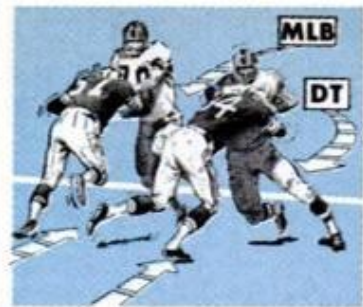
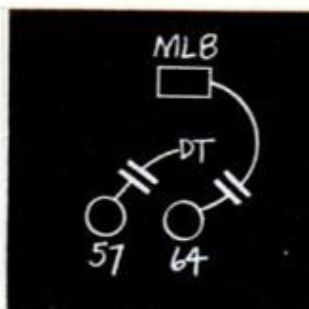
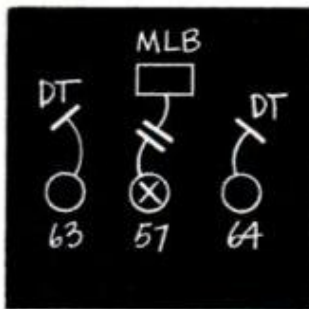
That's the pro scouts' secret of watching football: They know how to focus their attention.

Their technique is ideally suited to watching a game on TV. Although you are at the mercy of the TV cameraman, you will get close-ups of many things that you couldn't see from any single point in the stands.

You might want to focus on:

- A particular position. "I'll frequently watch the offensive guards. They'll show you which way the play is going, and they'll always take you to the ball," says Gene Cronin, long a scout in the National Football League and now director of player personnel for the Atlanta Falcons. "If it's a run, they'll pull out of the line to lead the blocking. If

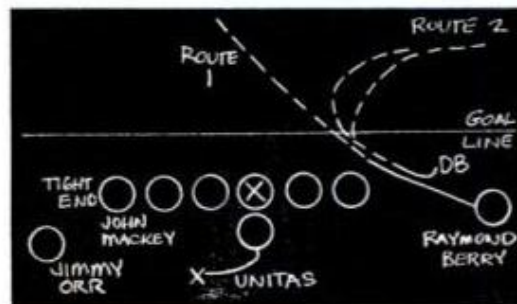
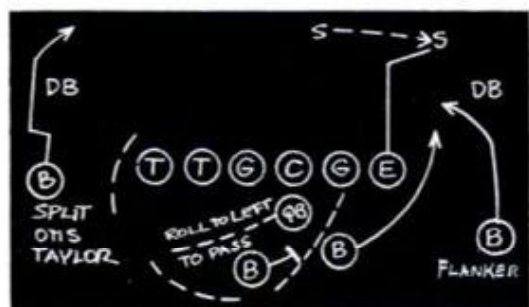




**DO-DAD BLOCKING OF GREEN BAY.** Assume the defense is a normal 4-3 (four rush men and three linebackers) and Green Bay chooses an off-tackle plunge. If the middle linebacker is over the center, the blocking is as in the left-hand diagram. However, if the middle linebacker shifts behind the defensive left tackle, the offense must shift their blocking from "man-to-man" to an "area" concept. The center (Ken Bowman,

57) always takes the man coming inside (in center diagram the middle linebacker, in right-hand diagram the defensive tackle) and right guard (Jerry Kramer, 64) takes the man going to the outside (in center the defensive tackle, at right the middle linebacker). The offensive linemen might run into each other if they held rigidly to blocking "their men," so instead of blocking specific men, they block an area

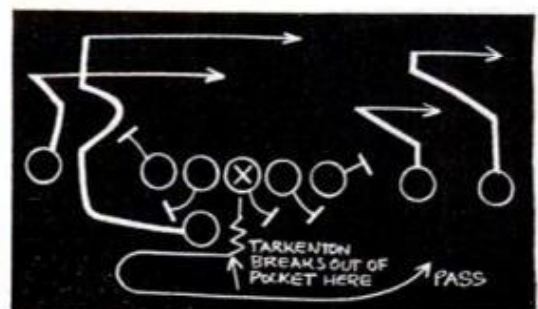
**KANSAS CITY UNBALANCED LINE.** Len Dawson, Kansas City quarterback, needs a lot of time to unload pass. To protect him, KC puts its heaviest men—two tackles and a guard—on left in unbalanced line, which is quite rare in pro football. Dawson moves to his left as he gets snap of ball and the line moves with him in a "moving pocket." The reason: Most teams put strongest rushmen on the offensive right; thus Dawson will be fading away from them into a strong pocket. Also, right setback can go downfield right on pass pattern, flooding right side with receivers and leaving lone defender to guard against KC split end



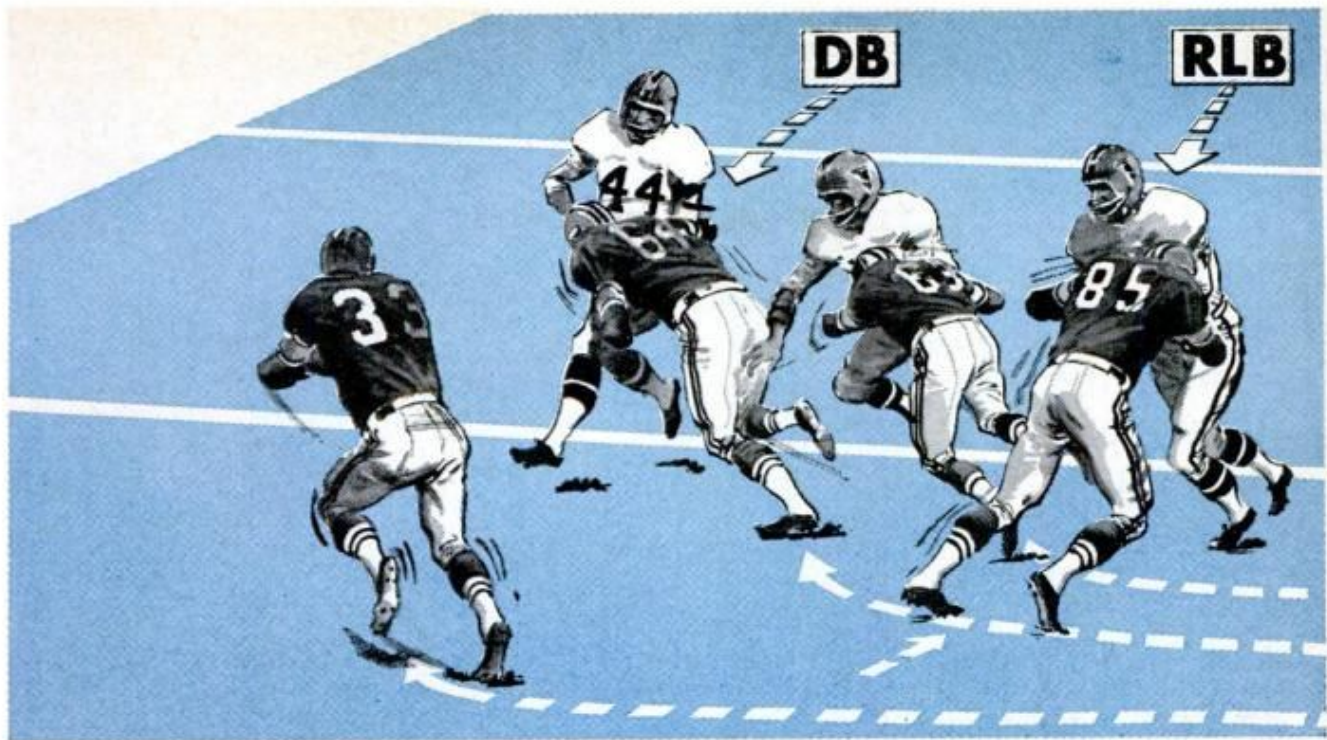
**BALTIMORE GOAL-LINE OFFENSIVE.** Within opponent's 10-yard line Raymond Berry slants over center, forcing defensive back to come up fast behind him. Berry has two choices: If DB is playing him loose, he continues slant-route over goal to take pass from Unitas; if DB is playing tight, Unitas fakes pass once as a signal to cut. Berry wheels toward right far-corner of end zone to take over-shoulder pass, leaving defender two steps behind on cut. Unitas's decision is vital because he can see where the defender is behind Berry—though Berry can't—and thus he must offer signal to Berry on which way he's to move

**TARKENTON SCRAMBLING.** While with the Vikings at Minnesota, Fran Tarkenton scrambled out of the pocket only two or three times a game. The other 20 or 25 times, he stayed firmly in the pocket. When he broke out to his left, though, all his receivers knew that this was a signal for them to cut to their right. Fran would run 10 or 12 steps to his left, then peel off and arc back to the right. Thus it was much easier for him to spot potential receivers than most fans realized. Instead of trying to pick out one man in the downfield

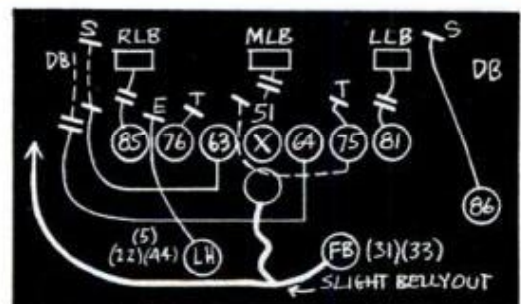
chaos, he was looking at a precalculated pattern. When he threw the ball, he had the momentum and clear line of vision that he might not have had if he simply moved backward in the pocket. Of course, defense men tried to force him back to the left to prevent him from getting loose on right and turning upfield for a pass or run







**GREEN BAY POWER SWEEP.** This Green Bay "bread-and-butter" play places three blockers in front of ball carrier and can be stopped only by hot pursuit of opposing linebackers. In past, one setback blocked corner linebacker until defense began "hiding" linebacker behind defensive end. Now setback blocks defensive end while offensive end blocks corner linebacker. Both offensive guards, Fred Thurston, 63, and Jerry Kramer, 64, pull out to lead interference. Watch Green Bay use it when ball is near hash mark so ball carrier can run down a "corridor" between the blockers on one side and the sideline on the other



it's a pass, they'll hold in place to block for the passer."

● A particular individual, such as your favorite quarterback. "You'll find that Joe Namath of the New York Jets has a very quick release—he gets the ball away very fast once he decides to unload," says one scout. Another points out that Randy Johnson of the Atlanta Falcons tends to hold the ball a half-count too long and then figures to make up for it with the speed of the pass "because he has such a strong arm." You may also see the tendency of Fran Tarkenton of the New York Giants to break out of the passing pocket by go-

ing to his left. When he was with the Minnesota Vikings, that was the signal for all his receivers downfield to break to the right (see illustration, page 88). Or you may look for George Mira of the San Francisco 49ers to break out of the pocket to his left and then loop to try to run up the middle.

● The tipoffs that betray what a player will do next. "Paul Hornung had a tendency to line up a little closer to the line of scrimmage when he was going down and out for a pass than when he was going to block or carry the ball," says one scout. Halas points out that

(Please turn to page 252)



**PACKER "BUZZ" DEFENSE.** Green Bay emphasizes linebackers protection against pass with its "buzz" defense. Linebackers watch offensive setbacks to see if they swing out to become potential pass receivers. At that moment, linebackers retreat to protect zones behind them. Middle linebacker Ray Nitschke retreats so suddenly that he's been known to turn back on play to get into pass-defense position. Often setback will "check-and-swing"—raise his arms as if to block in order to freeze linebackers for a moment, then swing out to pass pattern. Nevertheless, the Green Bay linebackers set record with 11 interceptions last year



It's an engineering year with lots of innovations and solid improvements.



# '68

## OUTBOARDS:

THINGS ARE REALLY PERCOLATING in the outboard pot this year. You'll see a flood of new models, new convenience features, new engineering—in fact, so many new developments that it's impossible to pick out any single trend-setter. There are trends all over the place.

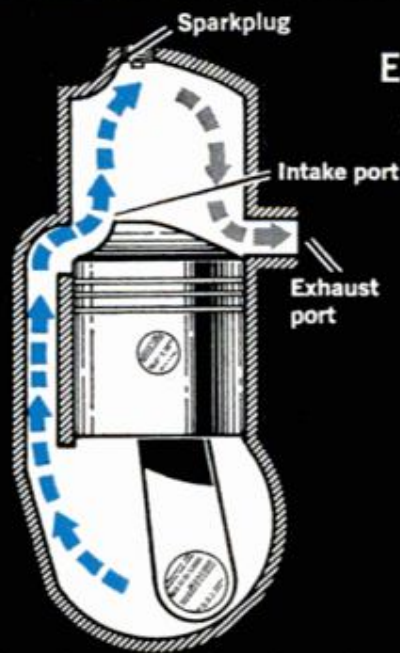
If you're interested in more horsepower, Merc's all-new 125-hp 1250 is the most powerful stock outboard in history. At the opposite end of the scale, both Johnson and Evinrude are introducing tiny 1½-hp fishing motors. These little shrimps weigh in at 19 lbs., fully fueled, making them just about the lightest conventional outboards ever to hit the market.

In between, almost every company is offering either completely new models or new features to dress up carry-over models. One of the most interesting of the former is a three-cylinder 55-hp model which Johnson and Evinrude will both be selling. Under development for more than five years, it features a new cylinder design and "loop charging," a new approach to scavenging for U. S. marine engines. According to Tom Kalbfus of Johnson, it permits smoother gas flow, less exposed piston area, lighter pistons, reduced bearing loads, higher compression and a higher pow-



◀ **EVINRUDE'S MIDGET**, the 1½-hp Mate, is portable power in tiny package for skiffs, canoes and sailboats

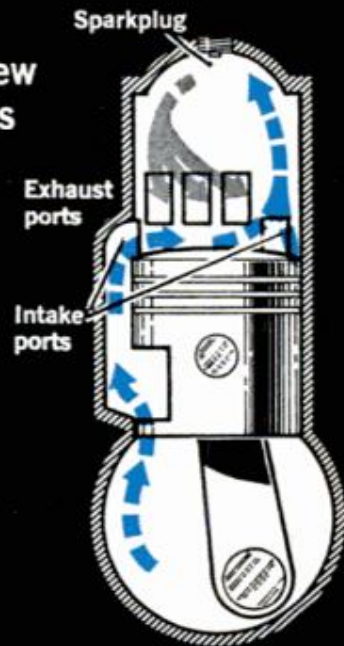




CROSS-SCAVENGED

## Easy breathing for OMC's new 55-hp three-cylinder models

BOTH JOHNSON AND EVINRUDE will offer "loop charging" on their new 55-hp models. In conventional cross-flow scavenging, left, gas is directed up toward plug by shape of cylinder face. Exhaust port is on the opposite side. With loop charging, right, two slanted intake ports make fuel charges converge and flow upward to the plug. Exhaust exits through three ports on opposite side. Flat piston used is lighter, runs cooler. Vibration is cut and engine life increased. Shape of cylinder head produces smoother, more efficient combustion.



LOOP-CHARGED

# From 19-pound minipack to a 125-hp powerhorse

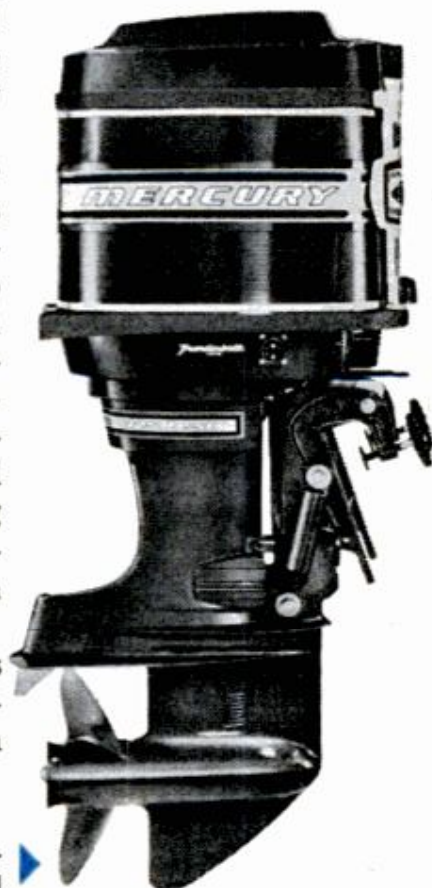
By ART MIKESSELL  
Boating Editor

Technical Art by  
ZIK Associates, Ltd.

er-per-cubic-inch ratio. They're even using a different manufacturing technique to produce the 55. The block is secured to a pallet and mechanically moves down a 100-ft. transfer line where a series of close-tolerance machining operations are performed. By the time the block reaches the end of the line, it has been totally machined. Sounds just like the big boys in Detroit.

The one predictable development this year is the wider availability of electronic ignition. Chrysler's version, introduced in the '68 models, is called Magna-power. It will be offered on the 105-hp and 75-hp motors. Johnson and Evinrude will have CD ignition on their new 55-hp, 65-hp and 85-hp motors, in addition to the 100 and 115 models. Kiekhaefer, who started the whole thing two years ago, will offer Thunderbolt ignition as standard equipment on every model from 50 hp up, including manual and electric starting models not equipped with alternators. (A Kiekhaefer-designed energizer replaces the magneto on such models.)

Like electronic ignition, the deluge of changes this year is aimed at lower maintenance, greater convenience, increased versatility and top efficiency. Turn the page for a company-by-company review.

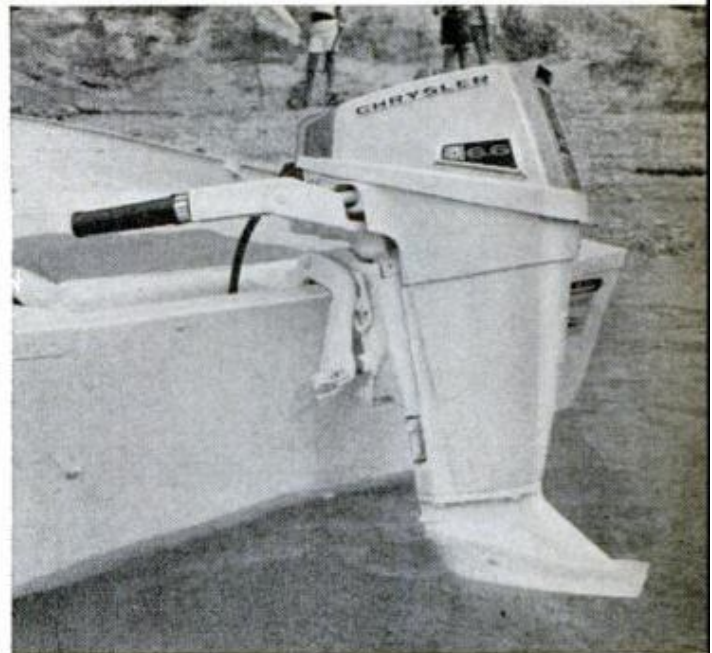
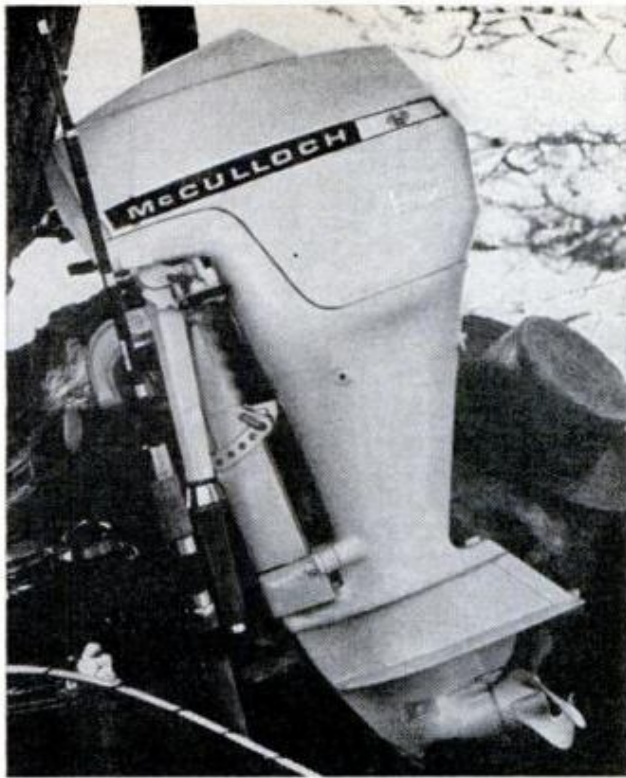


MIGHTY MERC 1250 with 125 hp is the '68 horsepower record holder. It's all new, from prop to powerhead



Hp.	No. of Cylinders	Weight	Bore & Stroke	Displacement	Starting
<b>CHRYSLER</b>					
105	4	243 lbs.	3.312" x 2.800"	96.55 cu. in.	electric
75	3	221 lbs.	3.312" x 2.800"	72.39 cu. in.	electric
55	2	145 lbs.	3.187" x 2.800"	44.7 cu. in.	electric*
45	2	127 lbs.	3.125" x 2.750"	42.18 cu. in.	manual**
35	2	127 lbs.	3.000" x 2.540"	35.9 cu. in.	manual***
20	2	79 lbs.	2.437" x 2.140"	19.96 cu. in.	manual****
9.9	2	56 lbs.	2.187" x 1.750"	13.15 cu. in.	manual*****
6.6	2	48 lbs.	2.000" x 1.625"	10.2 cu. in.	manual
4.4	2	48 lbs.	1.875" x 1.625"	8.99 cu. in.	manual
3.5	1	29 lbs.	2.062" x 1.562"	5.18 cu. in.	manual
*Alternator model available      **Electric and alternator models available ***Electric model available      ****Autoelectric model available					
<b>EVINRUDE</b>					
115	4	261 lbs.	3 3/8" x 2 1/2"	89.5 cu. in.	electric
100	4	265 lbs.	3 3/8" x 2 1/2"	89.5 cu. in.	electric
85*	4	240 1/2 lbs.	3 3/8" x 2 1/2"	89.5 cu. in.	electric
65*****	4	225 lbs.	3" x 2 1/2"	70.7 cu. in.	electric
55	3	190 lbs.	3" x 2 1/16"	49.7 cu. in.	electric
40*	2	154 lbs.	3 1/16" x 2 3/4"	43.9 cu. in.	electric**
33	2	140 lbs.	3 1/16" x 2 3/4"	40.5 cu. in.	electric**
18	2	79 lbs.	2 1/2" x 2 1/4"	22.0 cu. in.	manual***
9 1/2	2	60 lbs.	2 5/16" x 1 13/16"	15.2 cu. in.	manual
6	2	51 lbs.	1 5/16" x 1 1/2"	8.84 cu. in.	manual
5	2	41 lbs.	1 13/16" x 1 1/2"	8.84 cu. in.	manual
3****	2	33 lbs.	1 9/16" x 1 3/8"	5.28 cu. in.	manual
1 1/2	1	19 lbs.	1 9/16" x 1 3/8"	2.64 cu. in.	manual
*Available with pushbutton Selectric Shift or standard gearshift      **Also available with manual starting ***Also available with electric starting      ****Folding model also available with optional carrying case *****Heavy-duty model with lower gear ratio also available					
<b>HOMELITE</b>					
55*	4	239 lbs.	2.75" x 2.50"	59.4 cu. in.	electric
*Four-cycle engine, the only such outboard available in the U.S. today					
<b>JOHNSON</b>					
115	4	261 lbs.	3 3/8" x 2 1/2"	89.5 cu. in.	electric
100	4	265 lbs.	3 3/8" x 2 1/2"	89.5 cu. in.	electric
85*	4	240 1/2 lbs.	3 3/8" x 2 1/2"	89.5 cu. in.	electric
65**	4	225 lbs.	3" x 2 1/2"	70.7 cu. in.	electric
55	3	190 lbs.	3" x 2 1/16"	49.7 cu. in.	electric
40*	2	154 lbs.	3 1/16" x 2 3/4"	43.9 cu. in.	electric***
33	2	140 lbs.	3 1/16" x 2 3/4"	40.5 cu. in.	electric***
20	2	79 lbs.	2 1/2" x 2 1/4"	22.0 cu. in.	manual****
9 1/2	2	60 lbs.	2 5/16" x 1 13/16"	15.2 cu. in.	manual
6	2	51 lbs.	1 5/16" x 1 1/2"	8.84 cu. in.	manual
5	2	41 lbs.	1 13/16" x 1 1/2"	8.84 cu. in.	manual
3*****	2	33 lbs.	1 9/16" x 1 3/8"	5.28 cu. in.	manual
1 1/2	1	19 lbs.	1 9/16" x 1 3/8"	2.64 cu. in.	manual
*Available with either mechanical or electric shift      **Heavy-duty model with lower gear ratio also available ***Manual starting also available      ****Electric starting also available *****Available with right-angle or Anglematic lower unit in both rigid and folding models					
<b>McCULLOCH</b>					
75	3	196 lbs.	3 1/8" x 2 3/4"	63.3 cu. in.	electric
45	2	145 lbs.	3 1/8" x 2 3/4"	42.2 cu. in.	electric
9	2	48 lbs.	1 13/16" x 1 45/64"	10 cu. in.	manual*
7 1/2	2	39 lbs.	1 5/16" x 1 45/64"	10 cu. in.	manual*
4	1	37 lbs.	2 1/8" x 1 1/2"	5.3 cu. in.	manual
*Electric model also available					
<b>MERCURY</b>					
125	6	—	2 7/8" x 2 7/16"	99.812 cu. in.	electric
100	6	—	2 7/8" x 2 3/10"	89.587 cu. in.	electric
65	4	—	2 15/16" x 2 3/10"	62.35 cu. in.	electric*
50	4	—	2 7/16" x 2 1/8"	43.837 cu. in.	electric*
35	2	—	3" x 2 3/10"	32.516 cu. in.	manual**
20	2	—	2 7/16" x 2 1/8"	21.918 cu. in.	manual**
9.8	2	—	2" x 1 3/4"	10.996 cu. in.	manual
6	2	—	1 3/4" x 1 1/2"	7.216 cu. in.	manual
3.9	1	—	2" x 1 3/4"	5.5 cu. in.	manual
*Manual-starting model also available      **Electric starting also available					
<b>MONTGOMERY WARD</b>					
80	4	242 lbs.	3 1/8" x 2 3/4"	84.36 cu. in.	electric
55	2	153 lbs.	3 3/16" x 2 5/16"	44.7 cu. in.	electric
35	2	145 lbs.	3" x 2.54"	35.9 cu. in.	electric
20	2	73 lbs.	2.44" x 2.14"	19.9 cu. in.	manual
9.2	2	56 lbs.	2 1/8" x 1 11/16"	11.97 cu. in.	manual
6	2	55 lbs.	2" x 1 11/16"	10.6 cu. in.	manual
3 1/2	1	29 lbs.	2 1/16" x 1 9/16"	5.18 cu. in.	manual
<b>SEAGULL</b>					
5	1	37 lbs.	2.244" x 1.575"	6.1 cu. in.	manual
4	1	34 lbs.	2.244" x 1.575"	6.1 cu. in.	manual
3	1	28 lbs.	1.772" x 1.575"	3.8 cu. in.	manual
2	1	26 lbs.	1.772" x 1.575"	3.8 cu. in.	manual
<b>SEARS</b>					
75	3	196 lbs.	3 1/8" x 2 3/4"	63.27 cu. in.	electric
45	2	145 lbs.	3 1/8" x 2 3/4"	42.18 cu. in.	electric
28	2	102 lbs.	2 5/16" x 2 1/16"	29.97 cu. in.	electric
14	2	82 lbs.	2 1/4" x 2 1/8"	16.4 cu. in.	manual
9	2	49 lbs.	1 5/16" x 1 45/64"	10 cu. in.	manual*
7.5	2	42 lbs.	1 5/16" x 1 45/64"	10 cu. in.	manual*
4	1	37 lbs.	2.125" x 1.5"	5.3 cu. in.	manual
*Electric model also available					





**DELUXE FISHING POWER** such as the McCulloch 7.5-hp model, left, and Chrysler's 6.6, above, seems to be one of the '68 trends. Companies have finally gotten around to dressing them with a little style

### **Chrysler**

For 1968, Chrysler has concentrated its development efforts on the under-10-hp fishing models. The company's four new fishing motors (3.5, 4.4, 6.6 and 9.9.) are "the most deluxe outboards ever offered in this horsepower range," according to Don Milton, general manager of Chrysler's Marine Products Operations. Showing off the new engines, he makes a pretty good case for this statement.

All are compact, low-profile designs with one-piece lower units. Styling is less Spartan than on most fishing motors—they look like little versions of the high-horsepower models. Available in either standard or long shaft, they all have "depth-minder drive" which allows the engine to be locked in a tilted drive position with the propeller running five inches above the normal level. A low water intake provides sufficient cooling. The 9.9 Autoelectric (and also the 20 Autoelectric) offers such luxuries as key-switch starting and a generator which not only keeps the battery fully charged but provides up to 10 amps of power for lights and accessories. It even has a built-in 360° dome light for night operation.

At the high-performance end, the big news is Magnapower CD ignition which provides easier starting, prolonged no-miss idling and improved acceleration. It's on the 105 and 75. A racing version of the 105 with a high-speed lower unit will also be offered in '68.

All models except the 3.5 feature rubber-cushioned spline drive which eliminates shear pins. The splined shaft drives the propeller through a rubber bushing which permits slippage if the prop happens to strike an underwater object.

### **Evinrude**

With a line stretching from 1½ hp to 115 hp, Evinrude's big news is the three-in-line 55-hp Triumph and that pint-sized 1½ called the Mate.

The 19-lb. Mate is engineered for high thrust (for its size) and very slow trolling. It uses 2 to 1 gear reduction to swing a "big" 7¼-in. prop. The motor pivots 360° and the steering handle flips completely over to give easy control when backing. It's an ultra-simple motor with adjustable high and low-speed needle valves. You can take off the motor cover by loosening four

*(Please turn to page 222)*



# 1968: The Year of the Big IF

**Threatened by strikes, needed by bureaucrats, squeezed by taxes and driven to higher prices, can Detroit still come up with a 9-million car year?**

By **BILL KILPATRICK**  
*Auto Editor*

**T**HAT SNAKE PIT on the opposite page symbolizes the situation in which U.S. automakers find themselves as the 1968 model year gets under way—somewhat of a mess.

Even so, things aren't messier than they were a year ago when the industry offered three new cars (Camaro, Cougar, Eldorado), a healthy spate of safety and engineering changes . . . and faced a sales market that threatened to drop out of sight.

This year the industry has five all-new (or almost so) cars, a sprinkling of styling, safety and engineering refinements most buyers are going to like, a sales curve on the upgrade . . . and enough potential problems to sink a ship.

Messiest of the messy is the good possibility (as this is being written, in early August) of a strike by Walter Reuther's United Auto Workers. UAW demands are hard-nosed, industry-resistance stiff. A long and costly battle could be in the offing.

(In fact, as early as mid-July—before UAW demands were made public—the rank-and-file living along Detroit's often-dreary side streets were laying in caches of food, seemingly in preparation for a prolonged pull over industry negotiating tables.)

Manufacturers can hold their own in the labor management struggle per se, but idle plants eat money and lost sales are just plain gone, period.

Yet the labor situation—bad as it may or may not prove to be—is just one of several problems that must be resolved if the industry is to continue the buoyant upswing that finally relieved last winter's sales doldrums.

Facing the industry are:

- Possible resistance to increased prices.
- More cooks—mostly federal and state bureaucrats—having a hand in the automotive broth, particularly regarding safety, probably pricing.
- The possibility of higher federal and local taxes reducing buying power.
- Stepped-up U.S. military commitments overseas, possibly reducing the



**Buckle up for safety—if you can figure out which goes with which!**



number of potential new buyers, increasing defense production, diverting buyer interest.

- The possibility that widespread reports the '69s will be *really* different will result in a "wait 'till next year" attitude on the part of customers.

- A labor force deeply and personally scarred in the wake of Detroit's terrible riots.

- Mounting complaints about poor workmanship.

These are just a few of the more obvious ogres looming on industry hori-

zons in the coming model year. How auto executives will grapple with them, and myriad others, is—from this viewpoint—pure conjecture. The one thing certain to this observer is that the year of the '68s will boil down to the year of the big *if*.

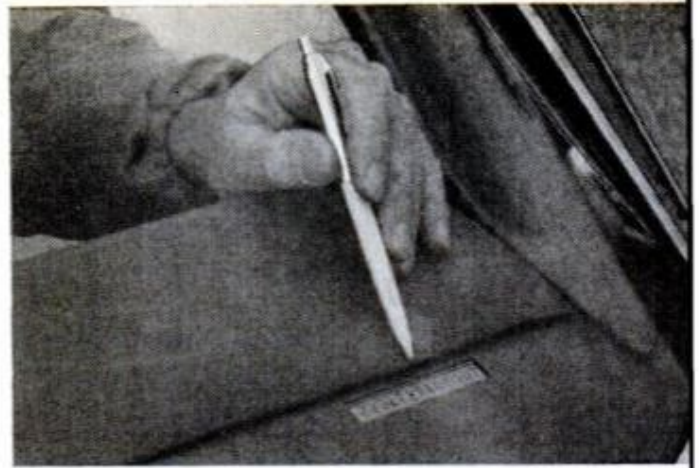
#### **Prices a key**

*If* a strike is averted, and *if* terms of the new contract aren't deemed too costly, automakers may be able to hold price increases to less than \$100, most of which is to cover government-re-





**PEEK-A-BOO HEATER-CONTROL MARKINGS** on new Mercurys are rough to see around corner on dash



**ANTITHEFT VEHICLE IDENTIFICATION PLATE** on General Motors cars is on the drivers' side of dash

quired safety provisions, antismog lashups, antitheft devices and—probably—the planned-on industry sweetener for the UAW pot. But if things get out of hand, you can be certain the rate of return on investment isn't going to be downgraded; extra costs will be passed along to buyers, some of whom may choose to sit things out with their old cars.

So if buyers don't balk at price increases, what will they get for their money? Not enough, I think, to cause a real stampede. Detroit's 1968 offerings are about par for the course—a wrinkle here, a bend there, a few gimmicks, some "Tiffany-touch" (to quote a Ford executive) trifles, the kind launched each year in a sea of superla-

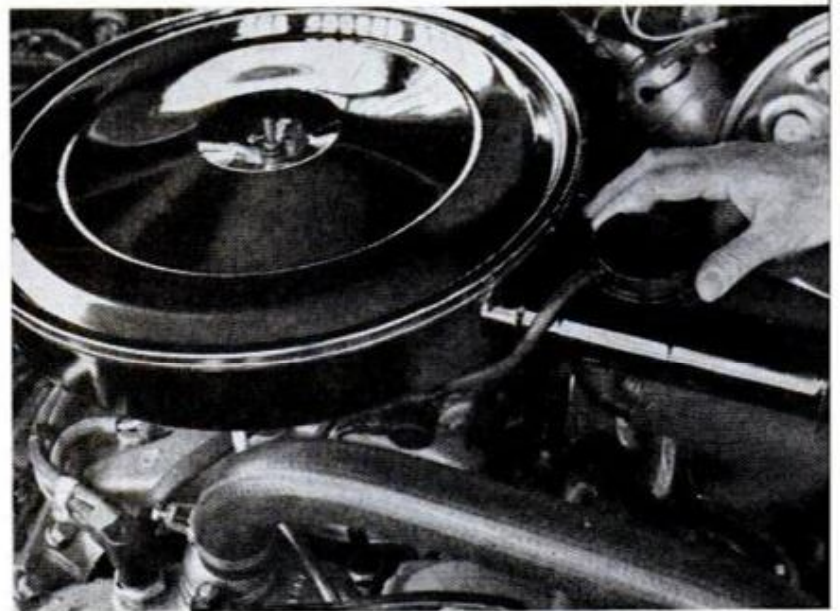
tives. The cars aren't bad, and there's no reason not to buy one if you need a new car, but, despite Detroit's infatuation with the term "breakthrough," there just aren't many exciting innovations and important changes.

There *are* some new cars, however. American Motors, struggling to get back in the black, is making a strong bid in the so-called "personal" car market with its sporty, peppy, neatly-done Javelin. Dodge has completely revamped (handsomely, I think) its Charger. Ford has added a fastback called the Torino to its intermediate Fairlane line. Mercury has a comparable new fastback called the Montego Cyclone, "Montego" being a new name for what had been the intermediate

**BOOT AT BOTTOM** of Pontiac gear shift lever forms a debris-collecting hole



**EXHAUST EMISSION CONTROL SYSTEM** on all Pontiacs is identified by the air preheater integrated into carburetor air cleaner







**SLICK RECESSED DOOR HANDLE** is American Motors' design. Fingertips go between lock and the catch



**TAG-ALONG TACHOMETER** squats on top of American Motors dash in same eyesore spot as last year

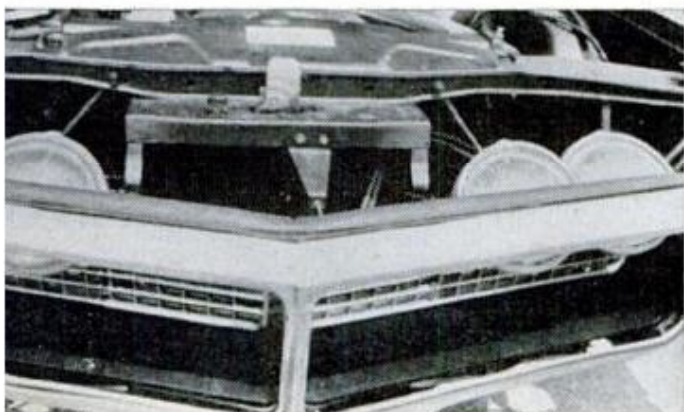
Comet line. And there's a spanking new successor to Corvette's Sting Ray, a production version of Chevrolet's Mako Shark II show car.

Most of these cars stay close to the beaten path in styling and engineering. Yet, oddly enough, just when AMC and Dodge have given up on fastbacks (the Marlin has been discontinued), Ford and Mercury have chosen to jump in even deeper (both the Torino and Montego Cyclone being blown-up versions of Ford's Mustang 2+2 fastback). It will be interesting to see who guessed right.

### The Corvette outstanding

The most spectacular car of the bunch—and the one offering the most advanced engineering and design is, of course, the Corvette. It's an outstanding automobile; many of its features (e.g., the built-in roll bar) will appear on other cars in future years.

**TUCKAWAY HEADLAMPS** are styling feature even more in vogue this year than last. These are Riviera's



**SPEED CONTROL** on Chrysler cars is set using the actuator located on the end of the directionals lever



New on all cars this year, thanks to Big Brother, are antismog devices. Based on standards established by the State of California, the devices are designed to reduce auto-exhaust pollutants. There are two types: one a pump system that recirculates and reburns exhaust gases, the other an arrangement whereby initial combustion of the carburetor fuel-air mixture is more complete.

Which of the two systems will be on your new car depends upon the number of engine cylinders and type of transmission the car has. The recirculating type will be on most manual V8s, the improved-combustion type on most automatics and just about all Sixes. Both systems require periodic checking, mostly for cleaning. Both are said to be virtually foolproof. But despite manufacturer assurances to the contrary, I can't help thinking tune-up shops are

*(Please turn to page 242)*



# Safety: Is it for real?

**T**HE PLAY ON WORDS is obvious, but Detroit's nadir these days (at least in part) is a young man named Ralph Nader, a Washington attorney whose book *Unsafe at Any Speed* focused attention on the issue of auto safety.

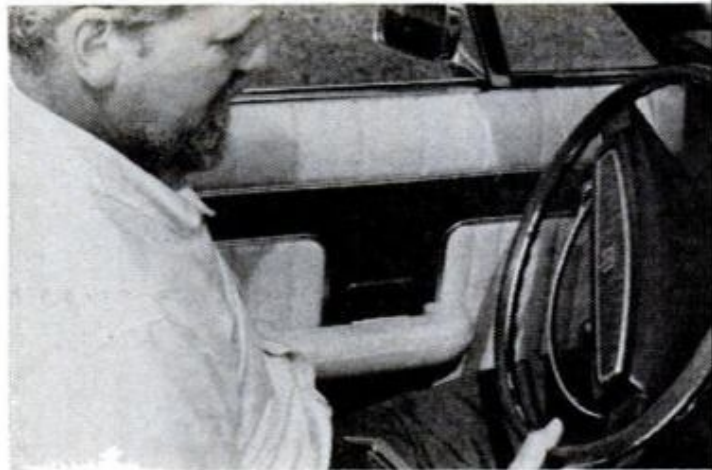
Nader had the gall to point out that automakers could do a better job on safety than they had been doing.

Detroit's initial reaction was, "Wait and see. Maybe it'll blow over." This attitude changed, however, when the top brass saw the ground swell of public concern the book stirred up. When Nader and an aroused Congress refused to play dead, the design and engineering wizards hit their drawing boards.

"I'll tell you one thing," a Pontiac engineer told me. "Regardless of what they say about Nader, he sure changed a lot of thinking around here."

Bud did he—or anybody—change it

**DOOR RELEASES** on some Pontiac front doors are placed well aft and low enough to be hard to reach



**ALL FORDS AND MERCURYS** have a collapsible steering column and breakaway steering-wheel design

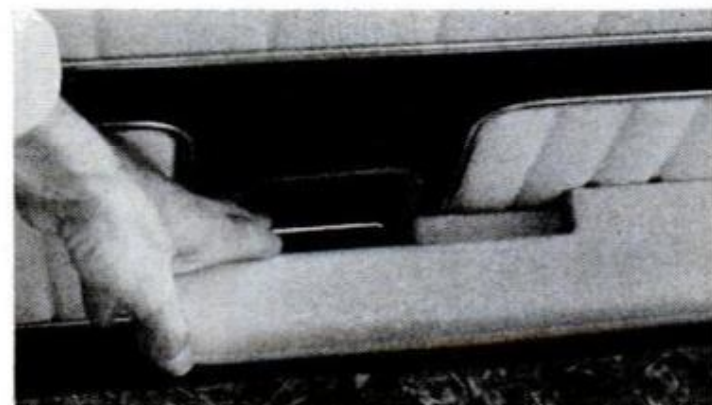
enough? Studying the industry's '68 offerings, one would be forced to conclude, "No, not enough." The safety items on '68 cars are either padded-out carry-overs from last year, or are compromises between cost accountancy, public pressure and sales.

For example, what sort of doublethink does it take to proudly proclaim safety features on a car that any peabrain who can afford it can drive at speeds of over 100 mph? If an accident occurs at such speeds, it makes little difference whether or not the window cranks have plastic knobs.

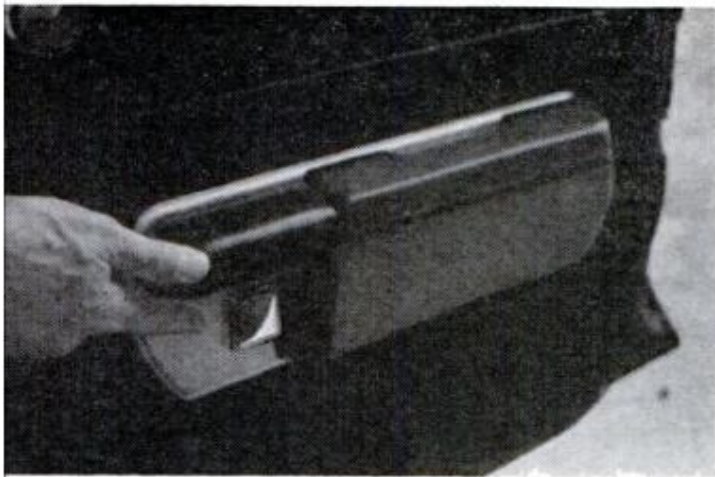
## Not just Detroit

The idea here isn't to belabor Detroit or downgrade so-called "performance" cars. But called for in this whole safety bag is a growing up on the part of all parties to the issue—drivers, manufacturers, highway engineers, lawmakers.

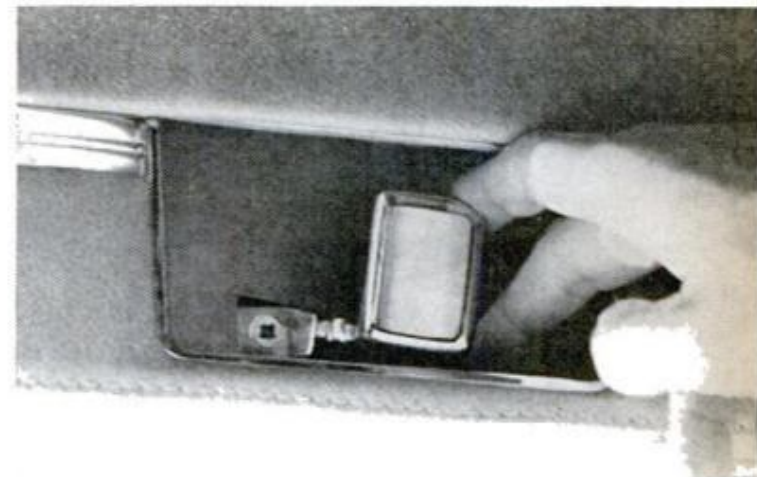
**SQUEEZE-TYPE DOOR RELEASES** are standard on all Mercurys and Fords. Safe design but hard to squeeze







**NOTCHED ARMREST** on some Buicks wraps around lever-type door release. You pull outward to open



**BUICK ELECTRA** has a recessed door release that is comparatively small but still is very easy to use

Perhaps nothing will be resolved until people stop seeking psychic fulfillment from their automobiles and until Detroit stops pandering to this mild (or, if one studies the mounting annual auto accident statistics, fatal) sickness.

#### **Armies of marginal drivers**

Sure, driving a zippy car is a joy. But it's also a responsibility. Unfortunately, too few people are willing to accept it. Like Detroit, they would rather have their cake and eat it. But—plainly—this sort of doublethink has got to go by the boards. It isn't enough that armrests "give," steering columns telescope, control knobs and handles are recessed and everything in sight is "padded." Not when power-train engineers are adding more soup to the mix, politically motivated "pour and patch" thinking dominates highway planning, and state agencies continue to license

**AMERICAN MOTORS DOOR RELEASE** is on forward end of armrest. Locking lever is also in the armrest



veritable armies of marginally skilled and unstable drivers.

The entire auto industry is pointing with pride to the fact that this year's backs and front seats have extra padding to protect the knees of rear-seat passengers in the event of impact. That at least half the potential rear-seat passengers—particularly in the smaller, sporty-type cars—are cramped and forced to sit with their knees splayed east and west apparently doesn't enter the picture.

#### **Tangle of belts**

Another thing you're going to notice (Oh, boy! Are you going to notice 'em!) is a wild tangle of seat belts. Cars with bench seats have six sets of belts, with shoulder harnesses for driver and right-front passenger still being evaluated as a standard, come Jan. 1, 1968. A salesman is going to point

**"OLD-FASHIONED" DOOR HANDLE** is placed forward of and partly enclosed by armrest on GTO Pontiac





to this undeniable mess and say, "See, Sir? Your 1968 Black Widow is completely Nader-ized." What he's trying to say is that if pushy young Mr. Nader hadn't raised such a big fuss, you wouldn't have all those ugly straps littering your "luxurious, color-harmonized upholstery."

Actually, the makers could have done a better job of seat-belt installation (inertia roll-up reels, for example), but this would have upped car prices and been a tacit admission that safety provisions don't really have to louse up a car.

Last year, for example, self-locking seat backs were introduced on several two-door models. I thought this might be a prelude to a roll-up shoulder harness located so that it unreels from

the seat top—a neat and surely not too radical idea. But this year, once again, the shoulder harness is nailed down someplace aft, and this year, again, it's an awkward mess, so much so that few drivers will bother with it. Hence the built-in cop-out for Detroit: "Look, Mr. Nader, we gave you what you wanted. If people don't use 'em, that's not our fault."

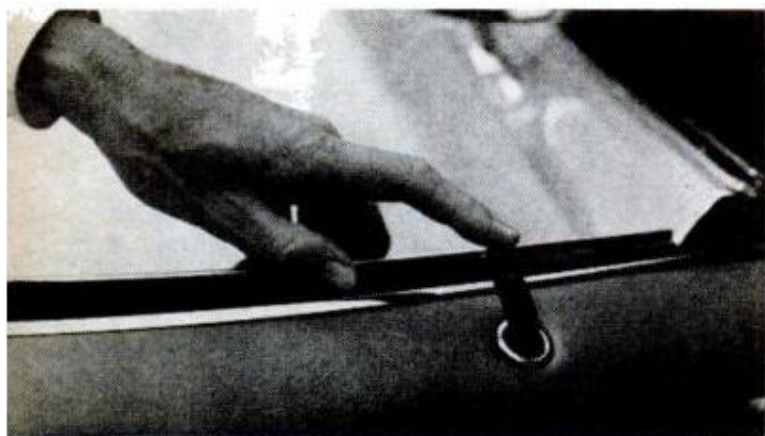
One real safety feature of the new cars are side lights and marker reflectors that enable drivers approaching from the side to see you at night. Surely this will add considerably to night driving safety.

### What else?

But what else is there? Not much. Rear-view mirrors break away and are of the day night type. Door locks have been beefed up, Ford now has a telescoping steering column (others had it last year), padding abounds. Last year's dual-braking systems carry over, of course. Tires are better.

Suspensions in general are still too soft, brakes too often indifferent, engines too powerful for most peoples' needs.

Is safety for real? Well, you're not as apt to get impaled on a steering column, thrown out the door, or bashed against the dash. That's progress—but not enough. ★★★



**DOOR LOCK BUTTONS** on Buicks are located where they've been for years, but now they're flexible

**PADDING ON REAR OF FRONT SEAT** of Cougar protects knees and heads. All cars have it this year



**COUGAR'S FRONT-SEAT BACKREST LOCK** is easily accessible. All 1968 two-door models have them





# The really new ones

**D**ESPITE BALLOONS, drums, fanfares, pretty girls, orchids for the ladies and free lollipops for the kiddies, what really brings traffic to dealer showrooms at new-model time each year is the advent of an all-new car.

This year, once word gets around, much of this "curiosity" action will be at the local American Motors dealer's (you know, Harry, that place off the beaten track, the guy who used to sell the Nash), the Dodge store, the Chevy agency, and at local Ford and Lincoln-Mercury dealerships. Each will have something really (or quite) new to show the faithful. And the faithful won't be disappointed, either.

Newest of the new is American Motors' sporty Javelin, a by-now-traditional long-hood, short-rear-deck entry in the "personal" car market. Also new is the '68 Corvette, a handsome marcher for out-and-out gung-ho enthusiasts. Dodge's new Charger is a stylish and tasteful departure from the previous fastback design. Finally, Ford and Lincoln-Mercury are offering sleek and slick fastbacks called the Torino GT and Montego Cyclone, respectively, in their intermediate lines.

As these things go in the auto trade, five new and or at least different cars may send 1968 into the record as a vintage year.

With the exception of the Torino, which was on the West Coast when I was elsewhere, I've driven (albeit briefly) all of them. One or two I liked better than the others, but I doubt you're going to find any of them a bitter pill to swallow. Each has its own thing

(or things) it is trying to do, and if you appreciate what that is and don't expect a mass-produced, relatively low-priced car to be on a par with, say, the limousine of a desert oil sheik, or the custom sports job of an international playboy, then you're going to like what you see and drive. Even though the hand of the cost accountant can be seen here and there, the cars are still pretty nifty. **CHARGER:** Borrowing from teen-age vernacular, Dodge calls its new Charger a "tough" car—a car that's supposed to get the adrenalin going full blast the moment you set eyes on it. Oddly enough, it does; it is "tough."

Completely restyled from the pre-

**REAR MARKS** of the all-new Charger for '68 are a chopped-short body line and portholed taillights



**REAR ROOF LINE** of AMC's new Javelin sweeps down and into quarter panel in short rear-deck styling





'REALLY NEW' CARS—HOW THEY COMPARE					
Car	Wheel-base (in.)	Track (f/r, in.)	Overall Length (in.)	Overall Width (in.)	Engines in Model(s) Series* (Displacement, cu. in.—V8 except as noted—carburetion)
American Motors (Javelin)	109.0	58.36/57.00 (V8) 57.92/57.00 (6)	189.22	71.89	232-6-1bbl., 290-2&4bbl., 343-4bbl.
Chevrolet (Corvette)	98.0	58.3/59.0	182.1	69.2	327-4bbl., 427-(1)4bbl., or (3)2bbl.
Dodge (Charger, R/T)	117.0	59.5/59.2	208.0	76.6	318-2bbl., 383-2&4bbl., 426-4bbl., 440-4bbl.
Ford (Torino GT)	116.0	58.8/58.5	201.0	74.6	302-2bbl., 390-2&4bbl., 427-4bbl.
Mercury (Cyclone, GT)	116.0	58.8/58.5	203.1	76.0	302-2&4bbl., 390-2&4bbl., 427-4bbl.

\*Not all engines available in all models.

vious Charger, the '68 version features a crouched, poised-for-action look. The car is very much aerodynamic (although Dodge stylists say the design was never tested in a wind tunnel), including a rear deck "spoiler." The basic theme is a wedge, high over the rear wheels and tapering to a point forward. From a bird's-eye view, the car bulges out around the rear wheels, giving it a pronounced muscular appearance. The tail has been chopped off *a la* European GT style. The car is available as a basic Charger, or in a high-performance R/T version, complete with bumblebee stripes. Plainly, Dodge has one eye on the so-called "youth" market, the other on NASCAR victory lanes.

Inside, genuine gauges (there are no warning lights) are canted toward the driver, a reasonable thought. Controls are actuated by rocker-type switches or thumb wheels. Bucket seats are optional. Up front, there's a fold-down "mother-in-law" seat/arm rest on the standard, split-back bench seat. The glove compartment is hinged at the top, an idea that may or may not prevent "fallout." Rear seats are of the bench type.

Under the hood, the 318-cu.-in. engine, featuring new heads and modified combustion chambers, is standard on the basic Charger, the 440 "Magnum" on the R/T. Two and four-bbl. versions of the 383-cu.-in. engine, also with new heads, are options for the basic Charger, the high-performance 426 Hemi, featuring a new camshaft and a special oil pan windage tray, for the R/T.

Transmissions throughout the line include a column-mounted three-speed manual, a four-on-the-floor manual, and a three-speed automatic, either column-mounted or in a console.

Like they say, it's a "tough" car. **CORVETTE:** "Dramatically new and different" is how Chevy bills the '68 Corvette, a production version of the Mako Shark II show car. I can't argue; it's quite a car, from pleasing appearance to dazzling performance.

A fellow named Karl Ludvigsen, a former (and highly successful) competition driver, took me around GM's Proving Grounds track at Milford, Mich., for my first ride in the car and never in my life have I gone faster with less fuss, a tribute to both Ludvigsen's driving skill and the car itself. Throughout the ride, during which we hit speeds approaching 140 mph on the straights and about 110 through the banked bends, he kept saying (and, wonder of wonder, I could *hear* him!), "Lovely, lovely, just plain lovely."

Later, I drove the car myself, albeit considerably less heroically I found it to be a forgiving and pleasurable package. It's reasonably comfortable for the type, responsive, stoppable (disc brakes all 'round), goes where you steer it, and scoots almost beyond belief.

Here, again, the styling is very much aerodynamic, the car being seven inches longer overall than the Sting Ray it succeeds and nearly two inches lower. The roof of the coupe (there's also a convertible) has removable, stowable

*(Please turn to page 250)*





**AMC JAVELIN** features crisp, flowing lines, overall sporty look. Car will be campaigned on racing circuit



**FORD TORINO GT** is an all-new fastback star of the '68 Fairlane line. Body style is also available as Fairlane 500. Standard on Torino GT are F70-14 Wide Oval whitewalls

**MERCURY CYCLONE**, like Torino, is an outgrowth of last year's Mustang fastback, is also available in GT version



**DODGE CHARGER** has been completely restyled, last year's fastback discontinued. Result is crisp, sporty

**CHEVROLET CORVETTE** is all new, features a built-in roll bar and removable roof panels







**DODGE GTS**, classified a compact, may be "small" but, with its optional 383-cu.-in. V8, it doesn't act small

# Compacts: Good things, little packages

**V**ERY MUCH ALIVE and kicking for '68 are compacts, a type of car more than one industry observer has said would soon be a thing of the past, their place being taken by sportier, "personal" cars or imports.

'Tain't so. While far from being industry sales leaders, compacts have a loyal following. And with good reason; they're a lot of car for the money and would, if given a tumble, more than

serve the requirements of many people. **CHEVY II:** Newsmaker in the '68 Chevy compact line is the Chevy II, which may turn out to be a real sleeper. It's a smart-looking car featuring more than a dash of sporty flavor. Available as the Nova coupe, a four-door and the Nova SS, the car is six inches longer than the '67s, boasts many styling features reminiscent of far more expensive cars.

**CHEVROLET CHEVY II** is a sporty one, especially this SS model. It's a full six inches longer this year **FORD FALCON**, below, is easily recognizable since it has only changed slightly from last year's models





## COMPACT CARS—HOW THEY COMPARE

Car	Wheel-base (in.)	Track (f/r, in.)	Overall Length (in.)	Overall Width (in.)	Engines in Model(s) Series* (Displacement, cu. in.—V8 except as noted—carburetion)
American Motors (American, Rogue)	106	56.4/55.0	181.0	70.84	199-6-1bbl., 232-6-1bbl., 290-2&4bbl.
Chevrolet (Chevy II, Nova)	111.0	59.0/58.9	187.7	70.5	153-4-1bbl., 230-6-1bbl., 307-2bbl., 327-4bbl., 350-4bbl.
(Corvair 500, Monza)	108.0	55.0/56.6	183.3	69.7	164-6-(2 or 4) 1bbl.
Dodge (Dart, 270, GT, GTS)	111.0	57.4/55.6	195.4	69.7	170-6-1bbl., 225-6-1bbl., 273-2bbl., 318-2bbl., 340-4bbl., 383-4bbl.
Ford (Falcon, Futura)	111.0	58.8/58.5	184.3	73.2	170-6-1bbl., 200-6-1bbl., 289-2bbl., 302-4bbl.,
Plymouth (Valiant, Signet)	108.0	57.4/55.6	188.4	71.0	170-6-1bbl., 225-6-1bbl., 273-2bbl., 318-2bbl.

\*Not all engines available in all models



**CHEVROLET CORVAIR** is still with us. It's a neat package and still in demand despite the cool Camaro



**PLYMOUTH VALIANT** line includes Signet model shown here. This year you can get a 318-cu.-in. V8.

Power choices are many (see chart) and transmissions include fully synchronized three and four-speed manuals and an automatic. The Nova SS, with the 350-cu.-in., 295-hp V8, is a dazzling performer. This model, by the way, comes with a lot of special performance-oriented trim. Bucket seats are available in the coupe only.

**CORVAIR:** In spite of a lot of gloomy talk that its number was up, the Cor-

**AMERICAN 440** retains last year's sheet metal and will for several years to come, according to AMC

vair is on hand for '68. With the exception of a slightly altered instrument panel, some new interior trim, and a special multi-carb engine option, things are pretty much of a carryover. The car remains a nice, tidy package.

**DART:** Dart's the name and "muscle" is the game. New this year and topping the line is a GT Sport (GTS) powered by a new 340-cu.-in. V8. It's a head-snapper, both in performance and looks. Lower-line Darts, including the carried-over GT, aren't punks, either.

Most noticeable exterior styling changes in the line are a new grille and new taillights. If the buyer wishes, these changes can be supplemented with a special decor package. The GTS has its own look, especially on the hood, and can be ordered with either wide side or bumblebee stripes.

Underneath the GTS hood there's the above-noted new engine. The all-out performance enthusiast can order his

*(Please turn to page 249)*





# 'Personal'-ity plus

**I** WISH there existed a better term for cars in this category than the word "personal." With millions of them on the road, the word loses meaning. They can't be called sports cars, either (despite what the ads say); they definitely are not. Nor are they compacts. Even to refer to them as four-seaters is stretching a point. So what are they?

A big, smash success, that's what; a type of car whose impact on the entire automotive industry has been enormous. If nothing else, you can credit today's generally better handling and vastly improved tires on (to pinpoint the leader) what Ford proudly refers to as "history's most successful car," the Mustang.

Yet this highly successful type of car



**PLYMOUTH BARRACUDA** features a fastback, convertible, hardtop coupe; a new, optional 340-cu.-in. engine



**CHEVROLET CAMARO** is little changed from last year, features new instrument panel, many dress-up options



# sportiness, scoot spell success



MERCURY COUGAR for '68 adds a 7.0 Litre GT-E, distinguished by bar splitting front grille and taillights



PONTIAC FIREBIRD continues as hardtop coupe, convertible. New styling has eliminated door vent windows





**FORD MUSTANG** has added flair of new side body panel for '68, outlined with second tone paint striping

is—when you think of it—a shrewdly calculated mix consisting of practicality, snob appeal, self-aggrandizement, snappy performance, good-to-mediocre handling, two-passenger comfort and a whale of a lot of fun. So who can knock it? Not me.

Here's this year's lineup (see "Really New" Section beginning on page 101 for American Motors' Javelin.):

**CHEVROLET:** (Camaro) Ventless windows are what you'll notice about the '68 Camaro. There's also a restyled instrument panel and console, the latter (in certain models) featuring a "stirrup-type" shift control (as in some other GM cars, by the way). Otherwise, the car is pretty much as it was presented last year, albeit "refined" here and there.

Bucket seats are standard, and quite tasty and comfy they are, too. Seat material is vinyl, but you can order fabric in the Sport Coupe version, if that is your preference.

Camaro's rear suspension features bias-mounted shocks—the right shock being forward of the axle, while the left one is aft. The rear wheels of the early Camaros—at least according to many owners who took part in *PM's* recent *Camaro Owners Report*—had a tendency to hop when charging off the mark. Presumably this new arrangement of the shocks is designed to cure the problem.

**FORD:** (Mustang) You'd have to be a

real Mustang buff to detect this year's styling changes. The grille has been modified somewhat, and there are a few sheet-metal changes. Newly-designed bucket seats are standard. A full-width bench-type seat with folding-center armrest is optional equipment on the 2+2 fastback.

A new option for Mustang this year is what Ford calls a "collapsible" spare tire. It's the same sort of tire that appeared on last year's Pontiac Firebird. Stowed in the luggage compartment, it adds to available space. Another option you can get is a tilt-swing steering wheel.

The car is available as a hardtop, a convertible and the fastback. In any version, but particularly with the beefed-up suspension, the Mustang is a ball to drive.

**MERCURY:** (Cougar) New to the highly-successful Cougar line this year is a special high-performance model called the 7.0 Litre GT-E.

The car features a "power dome" hood, special steel wheels, two-tone paint and quad exhaust pipes. Also in the package is a dazzling 427-cu.-in. engine linked to an automatic transmission, special suspension, heavy-duty shocks, power brakes and steering. The car is, however most readily identifiable by a horizontal bar that splits the grille. The new model is in addition to the already-potent XR-7, which remains as the show-case car in the line.



Elsewhere, changes on the Cougar are minor. You'll notice there are some new things added inside (e.g., a map pocket on the door of certain models), but that's about all. The car was a good thing when it was introduced last year and Mercury, apparently, sees no reason to fuss with it. I agree: It's a fine car.

**PLYMOUTH:** (Barracuda) This car was completely restyled last year, so don't look for too much in the '68s. Most notable changes are in lower sill treatment, one a narrow molding running under the doors from wheel-to-wheel, the other a special quarter panel casting. Also new are three narrow stripes along the side between the wheels.

Inside, there's a new "decor group," which will enable you to plush the car up as you see fit. At no extra cost, you can select either bench or bucket seats in the hardtops and fastback. These are available in eight colors. Buckets are now offered as standard in convertibles.

New to the Barracuda power picture this year is a 340-cu.-in. V8 that pours out 275 hp. The engine features a high-performance cam, extra-large valves and ports, 10.5-to-1 compression, and a four-bbl. carburetor. To say the car thus equipped is a goer is to put it mildly.

The biggest engine available (only on the Formula "S" models) is still the Super Commando 383. It has been refined, however, in the way of new cylinder heads with larger valves and ports, new manifolds and hotter cam-

shaft, all of which raise its horsepower to 300 at 4200 rpm.

The razzle-dazzle "groups" and "packages," which include hardware that used to be known as "optional at extra cost," keep growing in number and naturally are big on the "personal" cars. The Barracuda Formula "S" package lists heavy-duty front and rear springs, sway eliminator bar, special shocks, wide ovals and special ornamentation—you might call it a six-pack.

**PONTIAC:** (Firebird) This was a "mid-year" car in '67, meaning it hit a market on the downgrade. Industry sales have since rallied, sweeping the Firebird right along at a merry clip.

New this time around are ventless front windows, a larger instrument panel, side markers, some additional interior modifications, and—like the Camaro—bias-mounted shocks. Bucket seats are standard, the bench seat with folding arm rest being optional.

Available as a hardtop coupe and a convertible, Firebird offers a custom option that includes special wheel covers, wheel-well moldings, deluxe steering wheel and something called an "instrument panel assist group."

Standard engine is the overhead-cam Six, upped from 230 to 250 cu. in. It's rated at 175 hp. Transmissions include a three-speed manual, a four-speed manual and a two-speed automatic. On all models powered by the 400-cu.-in. engine, the optional automatic transmission is a three-speed.

—Bill Kilpatrick

"PERSONAL" CARS—HOW THEY COMPARE

Car	Wheel-base (in.)	Track (f/r, in.)	Overall Length (in.)	Overall Width (in.)	Engines in Model(s) Series* (Displacement, cu. in.—V8 except as noted—carburetion)
Chevrolet (Camaro)	108	59.0/58.9	184.7	72.6	230-6-1bbl., 250-6-1bbl., 327-2bbl., 350-4bbl., 396-4bbl.
Ford (Mustang)	108	58.0/58.0	183.6	70.9	200-6-1bbl., 289-2bbl., 302-4bbl., 390-4bbl., 427-4bbl.
Mercury (Cougar)	111.1	58.1/58.2	190.3	71.3	302-2&4bbl., 390-2&4bbl., 427-4bbl.
Plymouth (Barracuda)	108.0	57.4/55.6	192.8	71.6	225-6-1bbl., 318-2bbl., 340-4bbl., 383-4bbl.
Pontiac (Firebird)	108.1	60.0/60.0	188.8	72.8	250-OHC6-1&4bbl., 350-2&4bbl., 400-4bbl.

\*Not all engines available in all models



# Intermediates: right, ready and rarin' to go



**CHEVROLET CHEVELLE SS** tops newly styled line. Coupes, convertibles have 112-in. wheelbase; others 116



**AMC REBEL SST** tops series, has new hood lines, new injection-molded plastic grille



**DODGE CORONET** is termed "big enough for comfort, small enough to park." Series two-door sedan has been discontinued

**PONTIAC GTO** tops Tempest line, features new nonmetal, impact-absorbing bumper as part of hood styling







**MERCURY MONTEGO** is new name for Comet. Models number 13 in 5 series, resemble standard-size Mercs  
**OLDS 4-4-2** features optional ram-air performance kit, tops F-85 line. Note intake scoops under bumper





**T**HE MOST DRAMATIC industry changes for '68 are to be found in this category, the "in between-ers" that are—according to sales figures—growing in popularity. A few wheelbases have been shortened, a lot of sheet metal restyled, some engines modified and power and "comfort and convenience" options increased.

Whether or not these changes are a prelude to what we can expect industry-wide in '69 is anybody's guess. But it would seem reasonable to assume that the prevalent "sporty" theme expressed by these flexible middleweights is a hint of things to come.

Anyway, here's how they stack up this year:

**AMERICAN MOTORS:** (Rebel) The name "Rambler" appended to the Rebel has been dropped (it continues on the compact American series), but the omission doesn't mask the fact that this AMC intermediate is pretty much of a holdover from last year. The Rebel was then and is now, particularly in the SST version, a lot more car than many people realize.

For '68 there are new headlight housings and a new grille, a new hood featuring recessed molded sections, new flush door handles, a new taillight arrangement, and new lines and trim themes.

The Rebel comes as a 550, a 770, and an SST. You can get the 550 as a four-door sedan, a four-door wagon, a two-door hardtop, a two-door convertible. The 770 is the same, except there's no

convertible. The SST comes only as a hardtop and convertible.

Inside, things look the same, including that overwrought brocade for which certain AMC cars are infamous. Some company genius must have cornered the market for this stuff at one time, and my personal hope is that the supply is about exhausted. The cars would be far more handsome without it.

The engine offerings are a carryover from last year as are transmissions—a column three-speed, an overdrive thereon, a column or console automatic and four-on-the-floor.

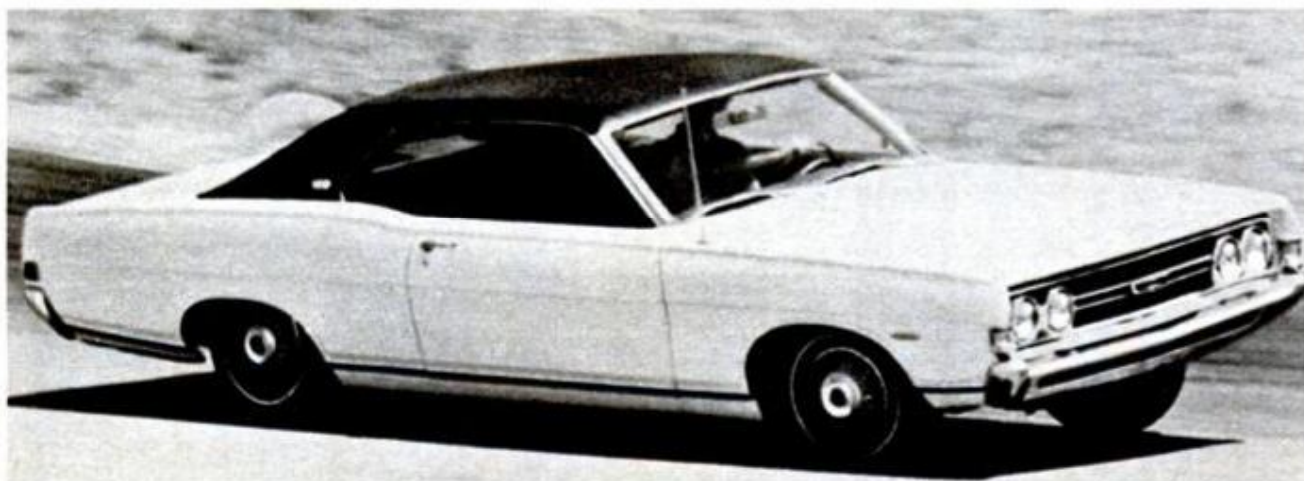
**BUICK:** (Special Deluxe, GS 350, GS 400, Skylark and Custom) Pay attention, 'cause this gets complicated. The Special of the past is now called the Special Deluxe, last year's Special Deluxe is now the Skylark, the '67 Skylark is now the Skylark Custom, the GS 400 remains as is, and the '67 GS 340 is now the 350. Got it? So what's new? Not much.

Throughout the line the coupes, two-door hardtops and convertibles have had wheelbases shortened to 112 inches. Other models, with the exception of the 121-inch wagon, have wheelbases of 116 inches. Obviously, this difference is reflected in overall length.

Styling changes are minor. The sculptured side theme is held over. There's a new grille, a new bumper, new headlight housing, a new roof configuration. Ornamentation is new here and there, and (to me, anyway) confusing.

The V6 has been dropped, replaced

**FORD FAIRLANE** line is topped off by the Torino. All two-door Torinos are hardtops with ventless side windows





## INTERMEDIATES—HOW THEY COMPARE

Car	Wheel- base (in.)	Track (f/r, in.)	Overall Length (in.)	Overall Width (in.)	Engines in Model(s) Series* (Displacement, cu. in.—V8 except as noted—carburetion)
American Motors (Rebel)	114	58.58/58.50	197.0	77.24	232-6-1&2bbl., 290-2bbl., 343-2&4bbl.
Buick (Special Deluxe, GS 350, Skylark, GS 400)	112- 116	59.0/59.0	200.6 (350, 400) 204.6 (Spec., Sky.)	75.5	250-6-1bbl., 350-2&4bbl., 400-4bbl.
Chevrolet (Chevelle series— 300, Malibu, SS 396)	112- 116	59.0/59.0	196.8 200.8 (4 dr.)	76.0	230-6-1bbl., 250-6-1bbl., 307-2bbl., 327-4bbl., 396-4bbl. (plus HiPf option on 327 & 396)
Dodge (Coronet series— Deluxe, 440, 500, R/T)	117	59.5/59.0	206.6	76.7	225-6-1bbl., 273-2bbl., 318-2bbl., 383-2& 4bbl., 440-4bbl., 426-4bbl.(2)
Ford (Fairlane, 500, Torino, GT)	116	58.8/58.5	201.0	74.6	200-6-1bbl., 289-2bbl., 302-2bbl., 390-2&4bbl., 427-4bbl.
Mercury (Montego, Comet Coupe, MX, Brougham)	116	58.8/58.5	206.1	76.0	200-6-1bbl., 302-2&4bbl., 390-2&4bbl., 427-4bbl.
Oldsmobile (F-85, Cutlass, Supreme) (4-4-2)	116 112	59.0/59.0	205.6 201.6	75.9 76.6	250-6-1bbl., 350-2&4bbl., 400-2&4bbl.
Plymouth (Road Runner, Belvedere, Satellite, GTX)	116	59.5/59.2	202.7	76.2	225-6-1bbl., 273-2bbl., 318-2bbl., 383-2&4bbl., 440-4bbl., 426-4bbl.(2)
Pontiac (Tempest, Custom, LeMans) (GTO)	116 112	60.0/60.0	204.7 200.7	74.8	250-0HC6-1&4bbl., 350-2&4bbl., 400-2&4bbl., (plus HiPf option) *Not all engines available in all models

by a 250-cu.-in. Six. A new 350-cu.-in. V8 replaces last year's 300 and 340-cu.-in. engines. Transmissions are three and four-speed manuals, two and three-speed automatics.

I can remember when the Buick used to be a doctor's car, period. Now it seems they're all things to all people. Or trying, anyway.

**CHEVROLET:** (Chevelle—300 and Deluxe, Malibu, SS 396) New front end styling features new grilles, bumpers. Bodies are wider and stress a long hood look. Roof lines are new, as is lower body treatment. Coupes and convertibles are on a 112-inch wheelbase. De-

pending upon the car you order and what you want, you can dress your Chevelle fancy enough for a coronation ball.

Interiors feature new fabrics and styling and a new instrument panel. Bench seats are standard, with buckets an option on the SS 396, Malibu Sport Coupe and all convertibles.

Standard engine toward the top of the line (except the SS 396) is a new 307-cu.-in. V8. For the SS, it's the 396-cu.-in. V8, also available in a high-performance version.

Again depending on what you order, *(Please turn to page 236)*

**PLYMOUTH GTX** is still the big hot one in Plymouth's intermediate lineup. Standard engine is 440 cu. in.; the 426-cu.-in. Hemi is optional

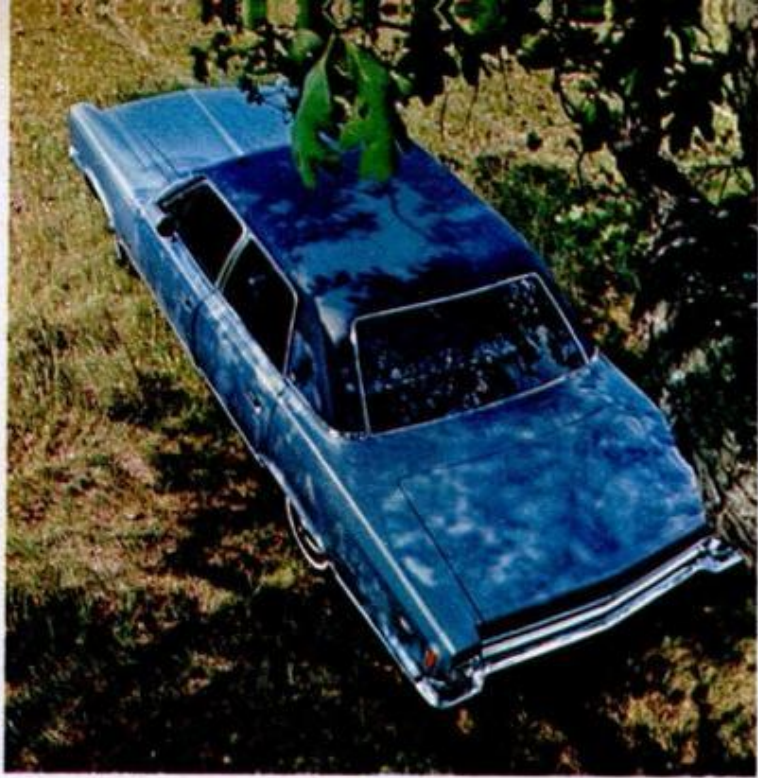
**BUICK SKYLARK**—with its wheelbase shortened to 112 inches on coupes, two-door hardtops and convertibles—has a rear deck shortened and shaped along Riviera lines











**AMC AMBASSADOR**, top left, has new hood, new molding across rear, new taillights and new plastic front grille featuring separate molded nylon headlight housings

**DODGE POLARA**, top right, sold well in '67, appears this year with lower priced 318-cu.-in. engine as standard. Lineup offers new hardtop roof for four-door models

**PONTIAC BONNEVILLE**, center, has new rear look featuring wide taillights that turn down to integrate body and bumpers, new interiors minimizing glare, brightwork

**MERCURY PARK LANE**, left, lengthened 2.6 in., is offered in four-door hardtop and sedan, two-door hardtop and convertible. All hardtop models feature new rooflines



lineup in a wide range of prices is as impressive as ever—maybe more so.

**AMERICAN MOTORS:** (Ambassador) The plushly appointed SST leads AMC's '68 line. Compared to last year's Ambassador, changes are few. There's an altered grille, new vertical headlight housings, a new recessed hood, new dual-lens taillights, new wheel covers, a unique one-hand door locking system and new flush outside door handles. Legroom up front has been increased by one inch.

The Ambassador is available in basic model and as a DPL or SST. The standard and optional engine lineup has been carried over, albeit with several minor refinements. There's no convertible this year; just a two-door hardtop, a four-door sedan and a four-door wagon.

**BUICK:** (LeSabre) Buick's promotional literature says the front end of the '68 LeSabre is "strikingly different from the 1967," but I'm hard-pressed to see how. The only difference I can detect is some slightly different ornamentation and a bumper line swept through to the front wheel wells. Outside of this, though, it looks the same as last year's car to me.

Which is not to say it isn't a lovely automobile, especially when one considers that it offers a lot for the money.

Interiors have been revised and there's a new instrument panel. Much attention has been paid to the various

safety provisions, the result being a neat, tidy appearance (with the exception, of course, of seat belts and harness).

The car is offered as a four-door sedan and hardtop, a two-door hardtop and convertible.

Engine displacement has been upped from 340 to 350 cu. in.

**CHEVROLET:** (Biscayne, SS 427, Bel Air, Impala, Caprice) Styling changes in this impressive lineup include a new grille, a new upswept hood to accommodate the recessed windshield wipers, new body side lines and a restyled rear end featuring taillights recessed in the bumper. There's also a new coupe roof line for the Caprice and the Impala Custom.

The instrument panel has been restyled, as has the steering wheel. Interiors have been revised and the "comfort and convenience" option list lengthened, enabling you to customize your Chevy to suit just about all tastes.

There's a new 307-cu.-in. engine as the standard eight. The SS 427 is just what the name implies—a big, sporty car powered by the go-devil 427-cu.-in. engine. It's an eye-popper in both appearance and performance.

**CHRYSLER:** (Newport and Custom, 300, New Yorker) Grilles have been altered, front and rear fenders slightly changed, there's a new hardtop roof line, and for the first time the 300

**PLYMOUTH SPORT FURY**, family car with racetrack name, performs big with top option 440-cu.-in. engine



**CHRYSLER NEWPORT** has lots of optional equipment for '68. Hide-away headlights are featured on 300





## FAMILY CARS—HOW THEY COMPARE

Car	Wheel- base (in.)	Track (f/r, in.)	Overall Length (in.)	Overall Width (in.)	Engines in Model(s) Series* (Displacement, cu. in.—V8 except as noted—carburetion)
American Motors (Ambassador)	118	58.58/58.5	202.50	77.24	232-6-1&2bbl. 290-2bbl. 343-2&4bbl.
Buick (LeSabre)	123	63.0/63.0	217.46	80.0	350-2&4bbl.
Chevrolet (Biscayne, SS 427, Impala, Bel Air, Caprice)	119	62.5/62.4	214.7	79.6	250-6-1bbl., 307-2bbl., 327-4bbl., 396-4bbl., 427-4bbl.
Chrysler (Newport, Custom, 300, New Yorker)	124	62.0/60.7 (221.7—"300")	219.2	78.6	383-2&4bbl., 440-4bbl., (plus HiPf option)
Dodge (Polara, Monaco)	122	62.0/60.7	219.0	80.0	318-2bbl., 383-2&4bbl., 440-4bbl., 440 Mag. -4bbl.
Ford (Custom, Galaxie, XL, LTD)	119	62.0/62.0	213.3	78.0	240-6-1bbl., 302-2bbl., 390-2&4bbl., 428-4bbl., 427-4bbl.
Mercury (Monterey, Montclair, Park Lane, Brougham, Marquis)	123	62.0/62.0	220.1	77.9	390-2&4bbl., 428-4bbl.
Oldsmobile (Delmont 88, Delta 88, Custom)	123	62.5/63.0	217.8	79.3	350-2&4bbl., 455-2&4bbl.
Pontiac (Catalina, Grand Prix, Bonneville, Executive)	121 124	63.0/64.0	216.5 223.5	79.8	400-2&4bbl., 428-4bbl.
Plymouth (Fury I, II, III, Sport, VIP)	119	62.0/60.7	213.0	77.7	225-6-1bbl., 318-2bbl., 383-2&4bbl., 440-4bbl. (plus HiPf option)

\*Not all engines available in all models

offers disappearing headlights. Even so, with the exception of the 300's headlights, you'll have to look close to recognize the '68 when you see one.

Optional on all models are cornering lamps that throw light out to the right or left whenever the turn signals are applied. This feature alone might help avoid a few night driving accidents.

New here (as on most Chrysler Corp. cars) is an optional speed-control

unit, mounted at the tip of the turn-signal lever. It's easy to use and is much handier than most cruise control setups I've seen.

There are a few engine refinements and some revised interiors and instrumentation.

My father was an all-out Chrysler man. He'd have liked these cars, too.

**DODGE:** (Polara, Monaco) A new instrument cluster features a barrel

*(Please turn to page 248)*

**BUICK LE SABRE** mates luxury and sport in 4-door sedans and hardtops, 2-door coupes and convertibles



**OLDSMOBILE DELTA CUSTOM**, partaking in annual engine displacement increase, now offers 455 cu. in.





# Luxury by the ton:



**CHRYSLER IMPERIAL** styling was new last year, has been "refined" for '68. Interior trim, fabrics are new



**CADILLAC** has new grille, elongated hood to accommodate recessed windshield wipers, is slightly longer

**FORD THUNDERBIRD** has latticed, recessed grille, slotted, two-piece bumper to improve engine cooling



**OLDS TORONADO** has all-new grille, new front and rear wrap-around bumpers, headlight arrangement

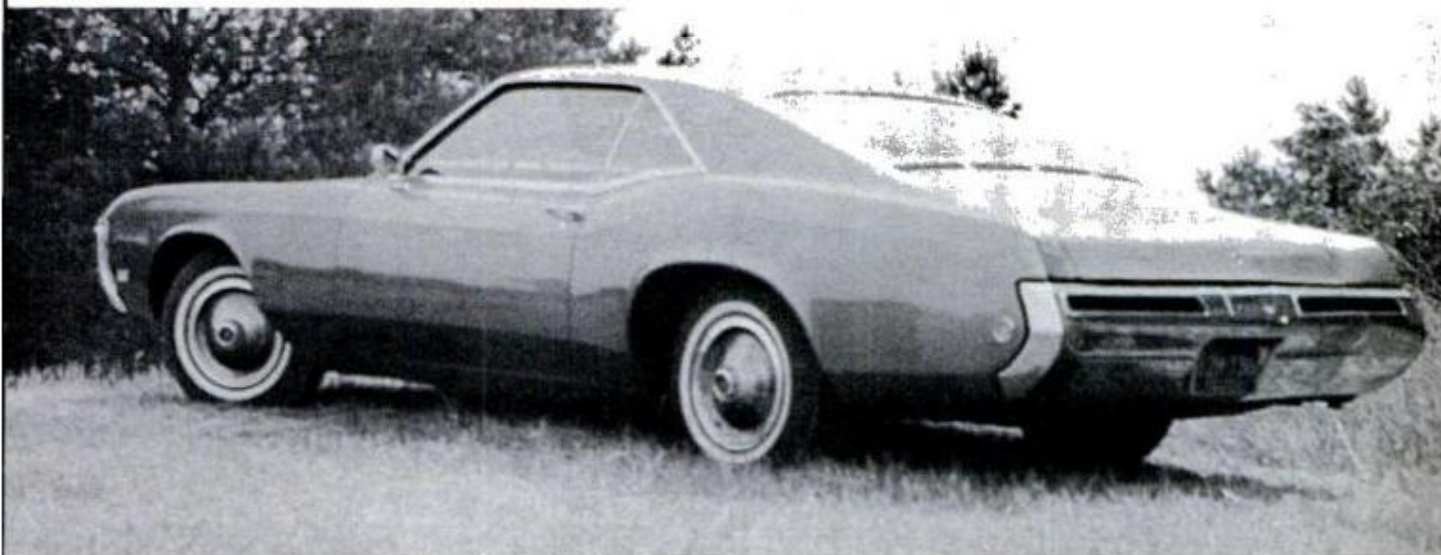




# bigger engines, more gadgets



LINCOLN CONTINENTAL features altered grille, taillamp arrangement. The convertible has been discontinued



BUICK RIVIERA has new recessed taillamps, bigger rear bumper. Grille is restyled, but basic lines remain

**N**EW AND DIFFERENT in the luxury-car field for 1968 are a 472-cu.-in. Cadillac engine, more plush interiors all 'round, even longer lists of "comfort and convenience" features and options, a smattering of styling changes, and—depending upon one's view of what is and what isn't—many "refinements."

These few exceptions aside, though, most offerings in this category are pretty much holdovers from last year, a fact indicating (among other things) that manufacturing costs at the luxury end of the auto spectrum are more critical and can't be toyed with seri-

ously, short of much soul-searching and cost analysis.

Also, Detroit's marketing wizards know Big Spenders tend to support the status quo (after all, they want to continue as Big Spenders) and can become downright cranky when, after only a year, a car that set them back several thousand dollars plainly shows its age. Thus, the prevailing "slow and easy" attitude in regard to radical changes for luxury cars continues.

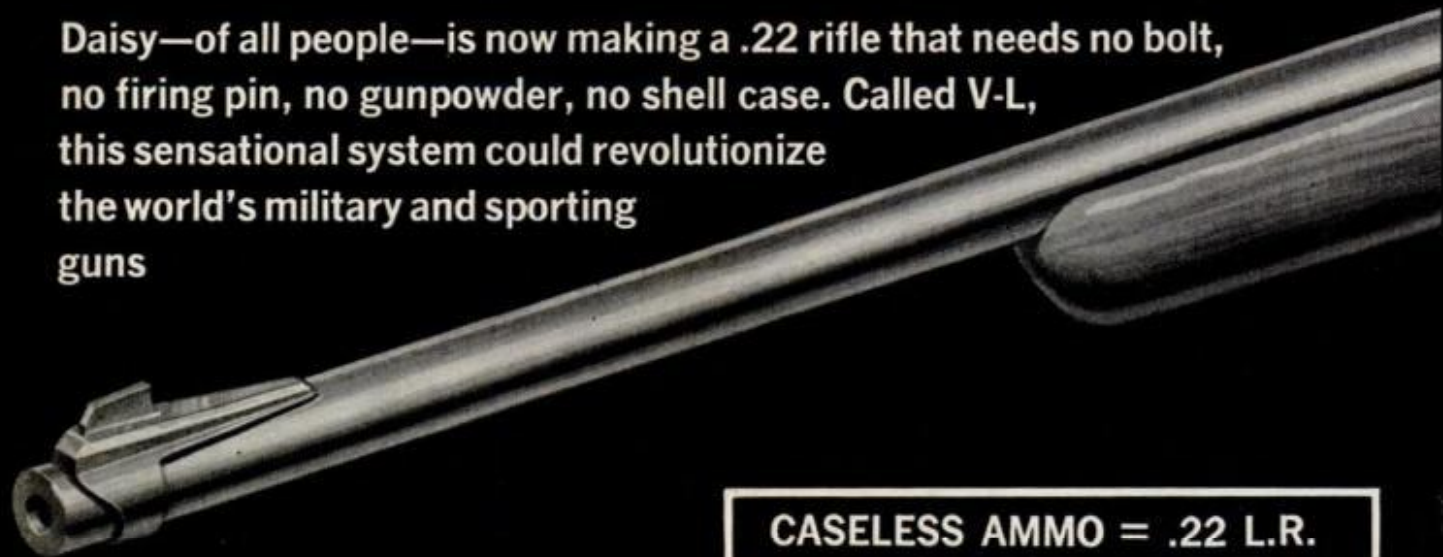
Last year's big change—Cadillac's front-wheel-drive Eldorado—for example, is rumored to have been

*(Please turn to page 246)*



# An Amazing New Kind Of Gun IT'S NOT ALL HOT AIR

Daisy—of all people—is now making a .22 rifle that needs no bolt, no firing pin, no gunpowder, no shell case. Called V-L, this sensational system could revolutionize the world's military and sporting guns



BY MAJ. GEORGE C. NONTE JR. (RET.)

Technical Art by Donald J. Evans  
Rendering by Howard J. Schafer

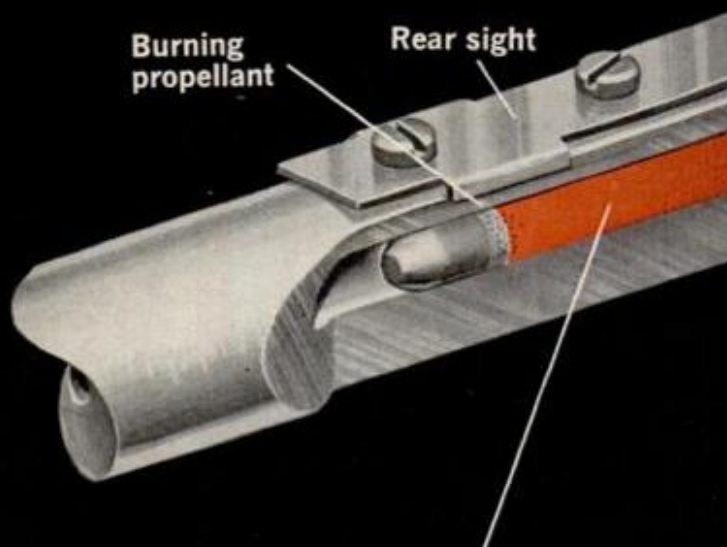
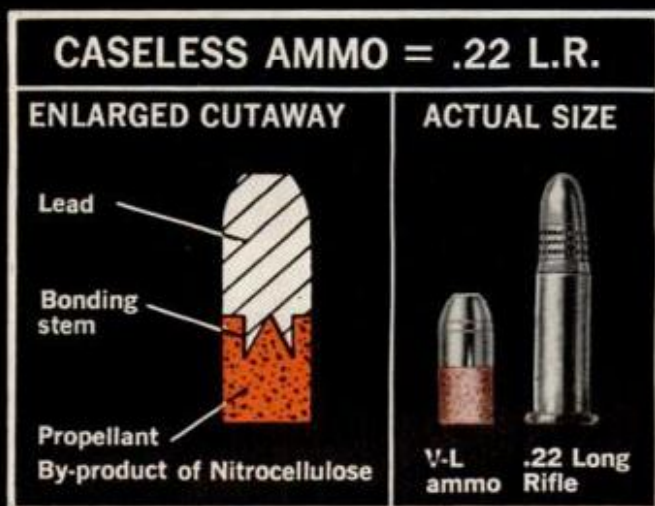
**I**N 1961, two men walked into a Paris shooting gallery carrying an amazing new rifle. After firing only a few rounds, one man suddenly whipped out his checkbook. He started writing one of the most important checks of his life.

Case Hough, president of Daisy/Heddon Div. of Victor Comptometer, was purchasing a revolutionary gun system. It had been invented by the other man—Jules Van Langenhoven, a Belgian chemical engineer.

It took seven years, but Daisy, renowned for BB guns and air rifles, is marketing the first firearm in its 81-year career. It's a rifle that's so unique it's turning heads in the gun world.

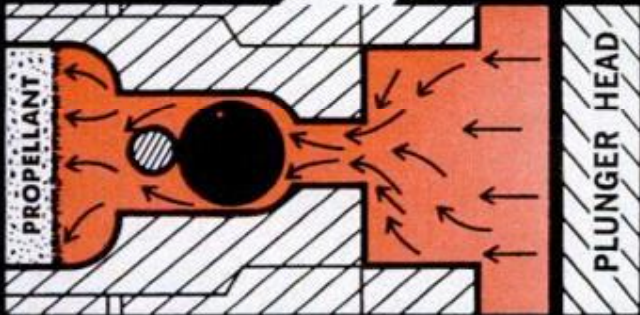
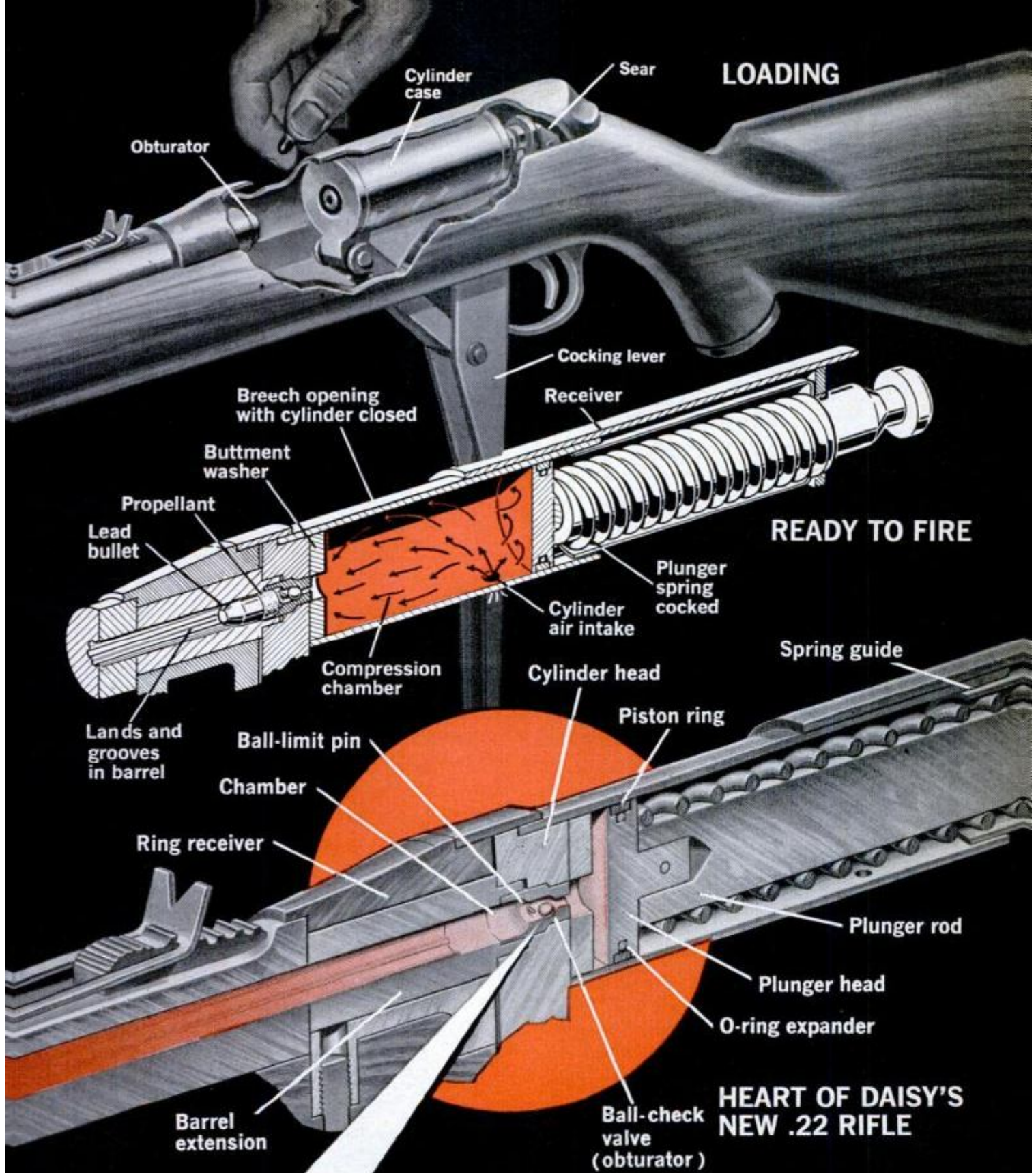
From chamber to muzzle, the V-L (named for Van Langenhoven) .22 rifle works the same as any conventional longarm—hot, expanding gas sends a bullet down a barrel. But there the similarity ends.

Back of the chamber an entirely new principle of operation is used in both

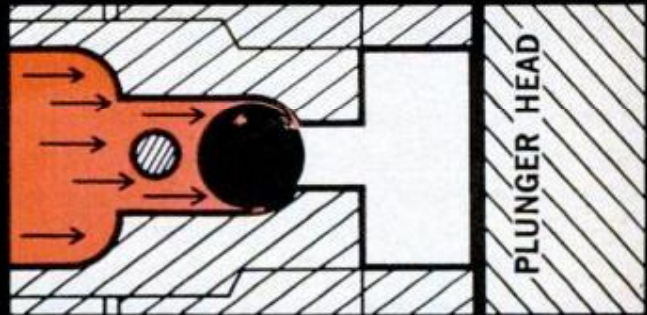


**THIS .22 RIFLE** is self-cleaning. All propellant is burned by the time the bullet reaches the muzzle. Nothing is left in gun after firing





**COMPRESSION** heats air to 2000° F, forces ball against pin opening valve, and ignites propellant



**BURNING PROPELLANT** creates gas, forces ball back which closes valve. This prevents gas from escaping





**PROFILE** of new V-L .22 rifle with cocking lever down and breech open to receive ammo. Complete burning action of propellant, leaving only the bullet, is shown, left

gun and ammunition.

In its simplest form, the system is merely a bullet to which is attached a piece of propellant, a barrel to guide it, a breech to seal in gases, and a means of smashing a jet of hot air against the propellant for ignition.

For years gunmakers have dreamed of a "perfect" system that eliminates bulky shell cases and dangerous-to-make primers. Until now, virtually all firearms have been built around this old system. But designers knew that if they weren't dependent on primers, shell cases, gunpowder, extractors, firing pins, bolts and ejectors, they could run wild producing weapons and sporting arms of dramatic new design.

Daisy's V-L system may be just the breakthrough they need, for it needs none of the old requirements.

Though Daisy is experimenting with a repeater, its new V-L .22 rifle fires one shot at a time, and is not complicated.

1. The rifle breech is opened by pulling down and to the rear on a cocking lever. The lever is partially concealed in the fore-end. This opens the breech to receive a V-L round.

2. The round is nothing but a .22-cal. lead bullet with propellant attached.

3. The propellant is a by-product of nitrocellulose. Though soft at first, the propellant hardens, bonding itself to the bullet. Daisy has had trouble in the past with propellant chipping, but says that's corrected now.

4. The breech is closed by swinging the lever back into its seat.

(A safety lock is fitted so the rifle won't fire with the breech unlocked—nor can

trigger pressure cause the lever to slam closed.)

5. With breech locked, you line up your target, pull the trigger and a 29-grain bullet speeds toward the target at 1150 feet per second. Open the breech to reload and you're in for a surprise—no empty shell.

Every bit of the V-L cartridge is either consumed (propellant) or sent out the barrel (bullet) upon firing.

How and why the V-L system works is ridiculously simple.

When the breech is opened, the cocking lever forces a piston rearward in a cylinder to be caught by a sear. This action compresses a very heavy spring. Reseating the lever brings the cylinder back into position, leaving the piston and creating an air chamber filled through the air-intake hole.

Pulling the trigger releases the piston from the sear, causing the piston to spring home with great force. This compresses the air in the cylinder. The air is forced through a small hole and around a special ball check valve.

When air is compressed, it's heated. This heat is essential to the V-L system. So when the tiny jets of compressed air drive around the ball, they're hot—2000° F. This hot air hits the base of the propellant, igniting it.

It's one of the two secrets in V-L. Instead of an explosive primer flame to ignite gunpowder in the conventional shell, V-L needs only a small jet of heated air. Thus, the V-L round needs no expensive primer, gunpowder or shell case.

The other V-L secret is the ball check

*(Please turn to page 244)*





THE FOLLOWING TABULATION TAKES ONE MINUTE TO TRANSMIT BY RIIY:

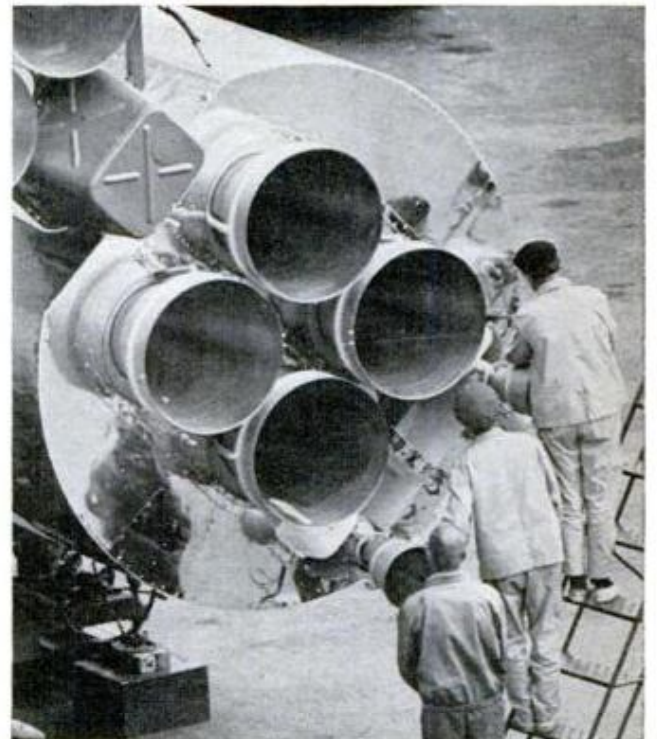
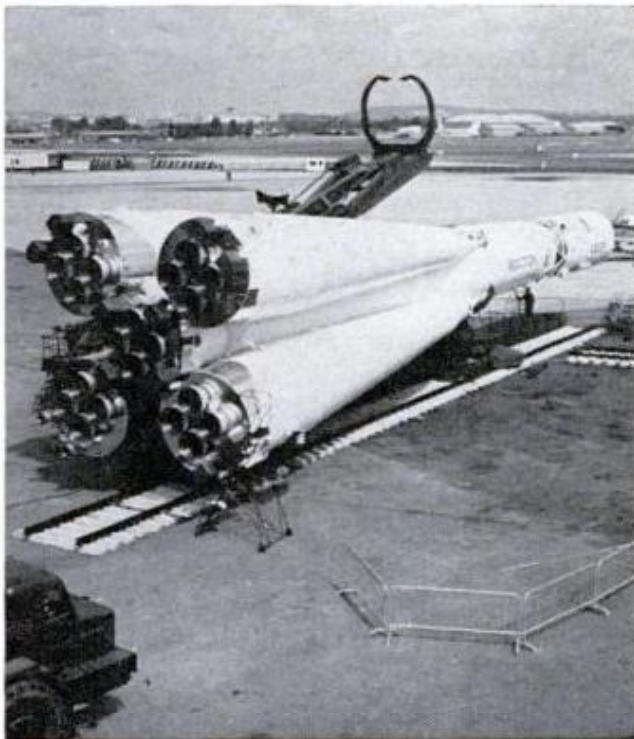
GCM959 GVP872 PED853 QVVC94  
 PST823 RQ1535 MNC885 ACV824  
 VPV537 CTH829 ABV804 VPC643  
 QIF982 GPJ341 ACP592 KDJ182  
 HUK834 KSF826 VAP372 GFG153  
 HBF749 CZV979 NPV529 JFG556  
 QCK372 GMDL40 VWN107 H13076  
 NZV556 DEK853 LBJ690 JDF485  
 POF567 KBE247 NLM824 KBF302  
 SVR789 DHJ922 VDE476 VGP487  
 CPD457 BRML54 AVC823 FZM592  
 GZS772 WEP682 YXV485 QEC483  
 DV8553 XDC248 DFB786 RP1557  
 GRM758 IFY282 ANZ835 WCC324

READ THIS LIST ALOUD (TO SOMEONE AND HAVE HIM WRITE IT DOWN) TIME IT AND COUNT ERRORS.

CODAMITE  
 ANAHEIM, CALIF.  
 .....

## Printer types out messages in police cars

Messages, license numbers—even arrest and search warrants—are received and printed in police cars by a new, miniaturized teleprinter, Codamite, that's small enough to perch under the dash of the car. Using only a small fraction of the radio band width needed for voice transmission, the new teleprinter helps relieve congestion on radio channels. It can also receive accurately under conditions of electronic interference that would make hash of voice transmissions. The unit, developed by Codamite Div. of Pacific Ordnance and Electronics Co., works at speeds from 60 to 100 words per minute. (A sample message appears above, right.) Its developers say that in addition to being more accurate than voice transmission, the Codamite system maintains secrecy, since the units will not be made easily available to the public.



## Vostok appears at Paris air show

Vostok, the Russians' man-carrying rocket booster, appeared at the recent Paris air show after a trip by boat from the Baltic Sea to the Seine River. According to information released by the Soviets, the 150-foot, 300-ton space vehicle is launched in a sequence very similar to U. S. procedure, utilizing three rocket stages to put a capsule into orbit. Facing the camera in these photos is Vostok's first-stage booster with 20 main and 12 vernier engines.





"HAP" JAMIESON uses gear of tubing to hold magnetometer in search for variations in magnetic field

**I**N JULY, 1966, the building committee of the new Madison, Conn., Elementary School was standing on the school grounds staring down a brand-new 280-foot well. There was only one thing wrong. The well was virtually dry. With 700 students enrolling in the school in September, the need for water was desperate. Then the driller came up with his ace in the hole.

He recommended that the committee call in a man he had met at the Eastern Water Well Assn. Convention in Meriden, Conn. The next day, George L. "Hap" Jamieson began scouting the property, decked out in an incredible headgear that looked for all the world like a scaffold with a large barometer dangling from it. The instrument, bearing the trademark Aquatometer, is a unique, patented magnetometer. With it Jamieson detected a rich vein of water which yields the school a gratifying 50 gallons per minute for one hour, gradually reducing until the eighth hour at which it still produces 12 gal-

# He Knows Where to Drill for Water

'Hap' Jamieson pinpoints the drilling, predicts the depth and rate of flow—and he's batting a phenomenal .900!

By GITTA L. MORRIS  
Photos by Irving Dolin

lons per minute—a very good output.

During the past year, Hap has been walking around a good many properties with his magnetometer. So far, he's been about 90 percent successful.

The magnetometer, in various stages of refinement, has actually been used since about 1850 for the detection of gold, silver, copper and minerals. The present device, as used by Hap's company, Accurate Wells Corp., is two pounds, eight ounces of brass and aluminum, and has detected water over 100 times during the past year—over 300 times since it was invented.

Accurate's clientele list is an impressive one, including contractors, schools, golf clubs, a water company and many homeowners. Whereas the yield of the average well in most areas is under 10 gallons per minute, many of those indicated by the magnetometer yield between 25 and 100.

The instrument also gives a fairly accurate idea of the depth at which a certain number of gallons can be found.





**AQUATOMETER** detects magnetic field around water that has become ionized by flowing through rock

Hap estimates that about 50 percent of these predictions are correct—the wrong ones being due at times to various factors such as a slight slant in the drilling line or a vertical, pencil-thin vein, where the driller misses by mere inches. Also, overhead electric wires, fences and underground factors not known can cause an error in depth.

“We aren’t sure just how deep the instrument detects water,” Hap says. “We believe its limit is 500 feet. It was originally designed to pick up changes in strata of rock and water.”

To operate it, Hap straps his own invention of back gear—an ingenious marriage of Boy Scout pack and aluminum tubing—to his back and hangs the magnetometer from it at about eye level. The instrument is marked in  $360^\circ$ , and Hap sets the needle at  $35^\circ$ —a figure he chooses merely for convenience. He prefers to work with it slightly off its usual horizontal reading. An average reading is a  $1^\circ$  declination in the needle, and an indication of water is a jump of  $2^\circ$  to  $3^\circ$ .

“I orient the instrument to magnetic north and begin to walk,” Hap explains. “I cross the whole property from east to west at three-pace intervals, checking the variations in the earth’s magnetic field. Since water flowing through rock becomes ionized, it has a magnetic field around it similar to an electric current. This shows on the magnetometer as an increase in intensity. By tabulating and comparing these readings with empirical data—facts we’ve found with two years’ practice, plus knowledge of data tabulated since the instrument was invented—I am able to compute with a great deal of accuracy the amount of water the well should yield.”

The prediction of which spot on the property will yield the greatest water supply, also includes a prediction of number of gallons per minute. This is

**SEARCH FOR WATER** starts with plot of property. Accurate Wells is often called in after house is built and a dry hole has been drilled. If Jamieson is wrong and location doesn’t produce, he doesn’t charge client







**JAMIESON BROTHERS** walk field east to west, recording readings. Drillers often miss water by few feet

broken down into categories of 2 to 5 gallons, 6 to 15 gallons or over 25 gallons. Then, to estimate the number of feet down to the vein, Hap deviates from the line of reading at a right angle, until the instrument registers a sub-normal reading. The distance from the drilling point is then computed from a chart and is accurate about half of the time.

Jamieson's main business is advertising. He became interested in water when the shallow well at his home near Poughkeepsie, N.Y., began drying up. "Each time we had another daughter," says Hap, whose daughters now number three, "our water supply dwindled." While inquiring about drilling a new well, he ran into the major source of frustration: no definite answers, no guarantees.

When he heard about the magnetometer in May, 1965, he recognized a good thing and moved quickly to investigate it. This one had been patented in 1964 by the inventor, a German toolmaker who took the magnetometer to the Kenyon Instrument Co., Brewster, N.Y., for manufacture and sale. When Hap bought the patent he negotiated with the Flexible Tubing Corp. of Guilford, Conn., the company that had bought out Kenyon.

"My wife, Naomi, caught my enthusiasm for the project and backed me 100 percent from the beginning," says Hap, whose enthusiasm hasn't lessened since then. "She is now secretary-treasurer of the corporation. Then to make it a real family affair, my brother, Dick, be-

came vice-president of the firm."

Before buying the patent on the magnetometer, Hap talked to experts in the field. "Most of them advised me not to touch it with a 10-foot pole." Before buying it, he tested the instrument on 15 or 20 wells, but did not get around to having his own drilled for another year.

Accurate Wells Corp. does do some local newspaper, radio and direct mail advertising, but much of its publicity comes by word of mouth. Strangely enough, Hap says that for some reason not many drillers seem interested in calling him in—many simply feel their customers don't need it. Some have contacted him about the possibility of buying the magnetometer, but it is not for sale.

Eventually, Hap would like to lease it on a yearly franchise basis, an arrangement which he has already worked out with Richard Perkins and Burke O'Brien, who operate Accurate Wells Corp. of Waterbury, Vt. Their success in predicting the rate of flow from wells has exceeded 90 percent and this in an area where dry holes of 500 and 600 feet are not uncommon.

Accurate Wells Corp. has been called in on jobs from Pennsylvania to Vermont, and Hap hopes eventually to

*(Please turn to page 208)*

**STAKE MARKS SPOT** where Jamieson predicts water will be found, depth for drilling and rate of flow







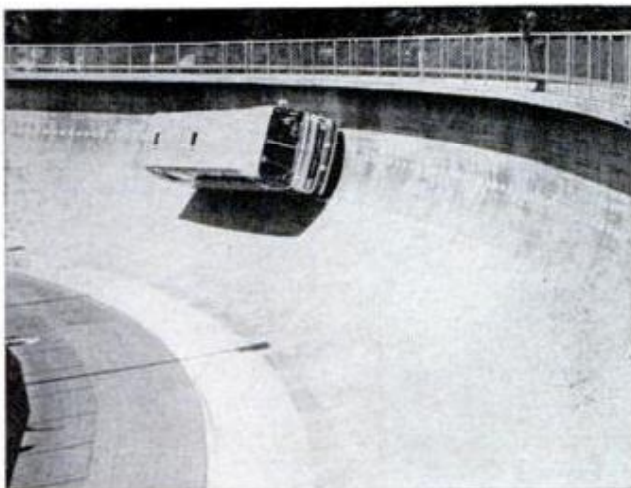
## Keeping a sharp weather ear

In Jagersdorf, Bavaria, you don't look at the sky to predict weather; you listen to a low whistle from a pipe in an old well. Residents "read" the sound like a barometer dial.



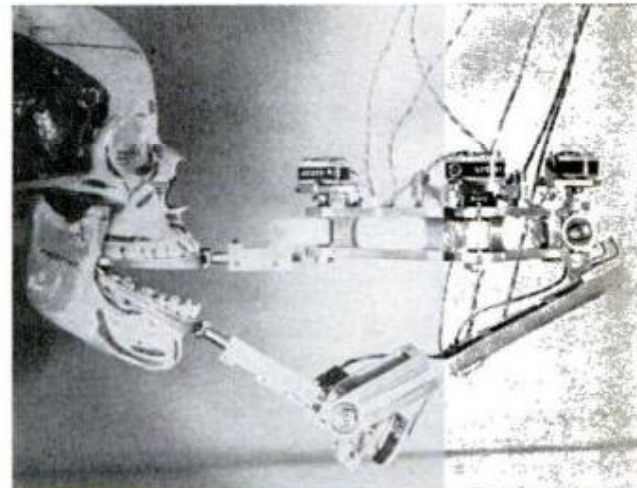
## Troubled waters on oil

Ducks that get mixed up with oil slicks off the coast of New Jersey are now being washed by conservation men in a detergent bath with the help of ultra-high-frequency sound waves.



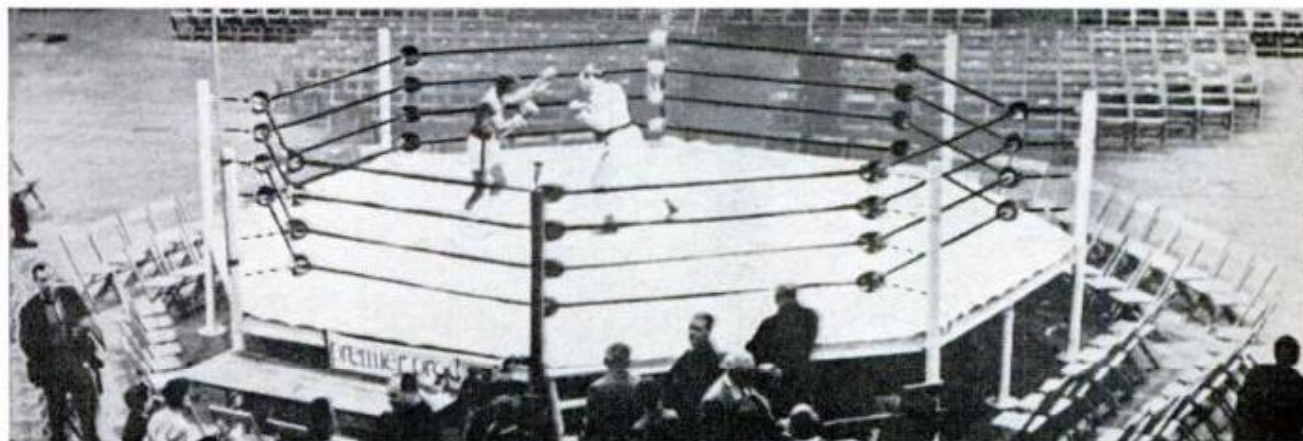
## Right-angle curve

Among the recent additions to the Daimler-Benz test track in Stuttgart is a turn that curves upward into a 90° bank. At 120 mph, the G force on a driver is 5.3 times gravity.



## Mechanical mouth

The complicated motions of the human jaw can now be analyzed accurately with an aluminum device developed by GE. It measures six angles of movement in inches and degrees.



## Hey, where's my corner?

The boxing ring that used to be a square is now an octagon—at least, that's the case at the West Orange, N.J., Armory where this new eight-sided, steel-framed ring was installed for a benefit amateur boxing match. The ring was made by Premier Products Co.



# M-16





# the gun they swear by...and at!

**There's a burning controversy over our newest weapon. Yet few people outside the military know what the M-16's all about**

**By Daniel C. Fales**

*Drawn for PM by ZIK Associates, Ltd.*

**O**NLY THE M-16 and the Vietnam jungles are hotter than the controversy over our armed forces' new rifle.

The spiffy M-16 is a sweet little weapon that can spray lead like a machine gun. It's a gas-operated "giant" that at close range packs the punch of lightning. It can empty a 20-round

clip of ammo in little over a second. It fires a .223-cal. bullet that will tumble if its line of flight is obstructed even by a leaf. At 6.5 pounds, empty, it's the lightest rifle ever handed our fighting men.

It's taken generations of development to supply our troops with a lightweight rapid-fire weapon good for close combat.

Our generals say it's the finest rifle we've ever had.

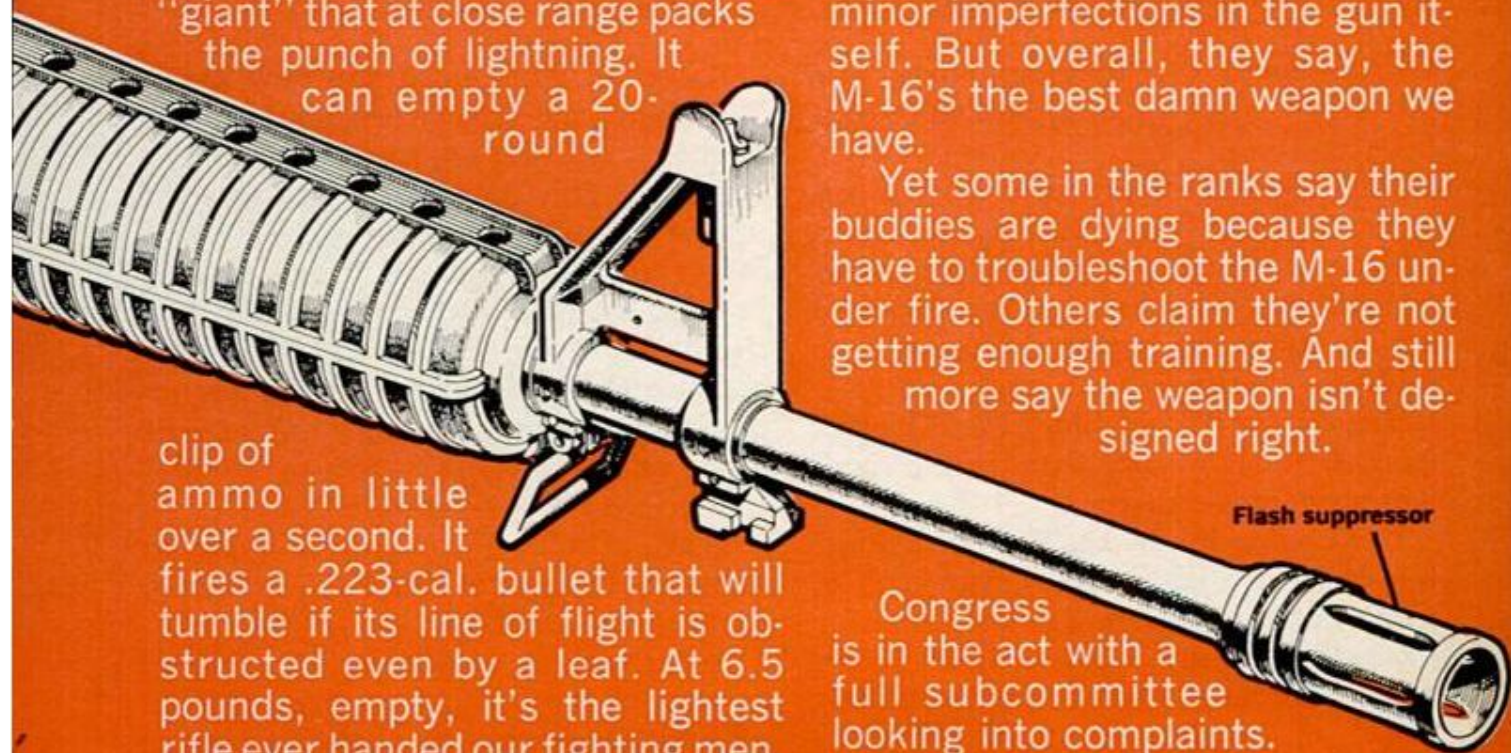
Most of the privates agree. Others say it stinks.

The controversy centers around debugging the M-16. The top brass claim the major bugs have been fired out. They say many of the complaints about jamming can be laid to inadequate cleaning, battle stress, and admittedly, to some minor imperfections in the gun itself. But overall, they say, the M-16's the best damn weapon we have.

Yet some in the ranks say their buddies are dying because they have to troubleshoot the M-16 under fire. Others claim they're not getting enough training. And still more say the weapon isn't designed right.

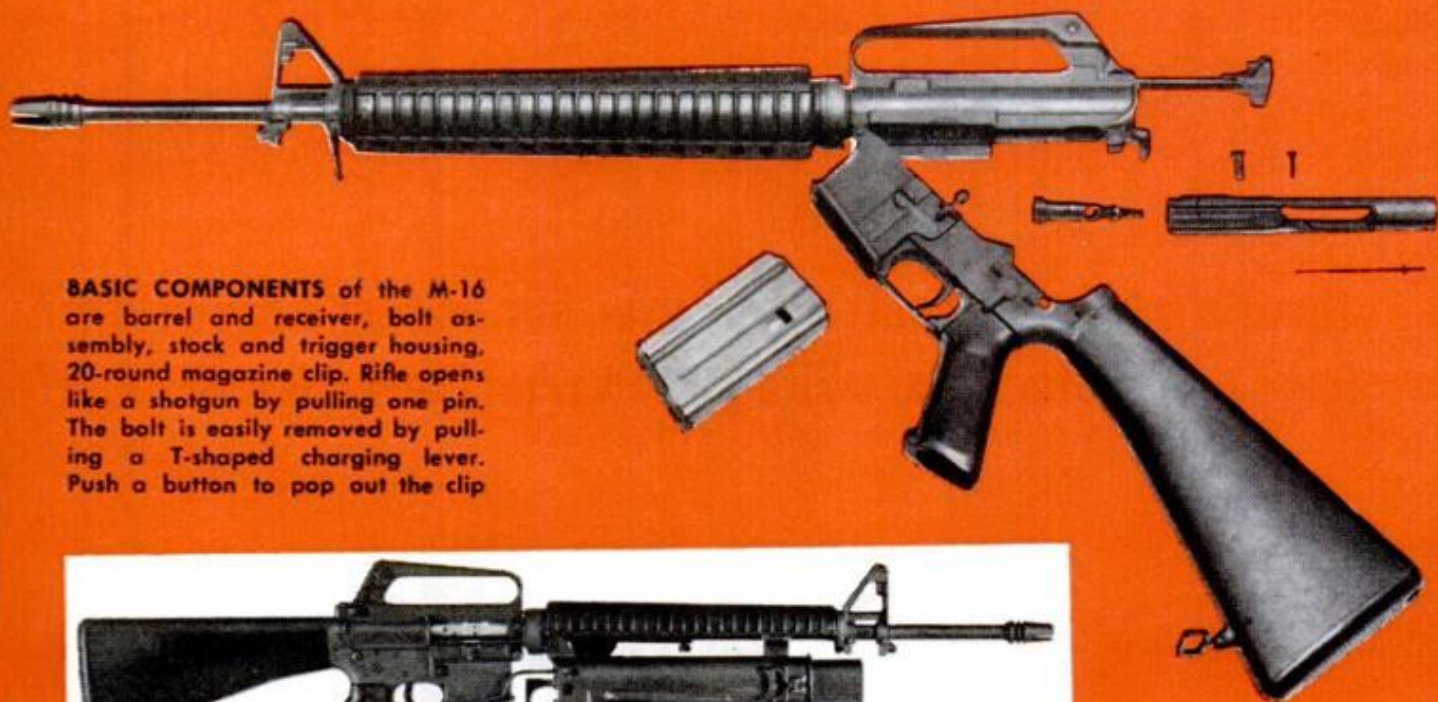
Congress is in the act with a full subcommittee looking into complaints.

Colt Industries is the sole producer of the M-16. On a recent trip to Colt's plant, company officials told me and *PM's* art director, Tom Dauer (an ex-marine), that they've received no official complaints from their customer — the Department of Defense. But Colt and the DOD say that modifications have been ordered. Meanwhile, you keep hearing the beefs



Flash suppressor





**BASIC COMPONENTS** of the M-16 are barrel and receiver, bolt assembly, stock and trigger housing, 20-round magazine clip. Rifle opens like a shotgun by pulling one pin. The bolt is easily removed by pulling a T-shaped charging lever. Push a button to pop out the clip

**GRENADE LAUNCHER** can be attached to the M-16 by removing bottom section of heat shield

about cleaning, jamming, dirty gas pipes, worn extractors, fouled chambers.

The M-16 is supposed to be the answer to what the military has been seeking for years—a lightweight infantry weapon. The heavier the gun and ammunition, the bigger the drain on a soldier's energy.

The M-1 of World War II and Korea, weighs nine pounds. Its ammo isn't featherweight either.

Next came the M-14. Though lighter, the M-14 is still "heavy." But both of these guns can shoot. They're good for hitting the enemy at 300, 400, 500 yards.

Now we've a war in the tight little world of Vietnam. Jungle fighting, it's called. You crash through the bush, trudge through mud, rarely see the enemy though he may be just a few yards away.

The answer is supposed to be the M-16—a lightweight rifle which works two ways. By a flick of a selector switch, you can pop off one shot at a time with every pull of the trigger, or you can spit lead at a fantastic rate by just holding the trigger back.

As in all rifles until the new Daisy V-L (see page 120), when you pull the trigger, the firing pin hits the primer in the shell. This ignites the gun-powder, which burns, generating gas. The gas forces the bullet out the muzzle at 3250 feet per second. That's fast—faster than the bullet of the M-1 or the M-14. But because the bullet is lighter, its energy dissipates quickly, giving it about the same energy at 100 yards as an M-1 bullet has at 300. Yet for the same weight, a soldier can carry twice as many cartridges for the M-16 as he can for the M-1 or M-14.

A gas pipe is attached to the barrel so part of the firing force can be bled off and transferred through the pipe to a chamber in the bolt. The force of this gas bangs the bolt back against the buffer spring. On its way back, the gas line parts, the extractor in the bolt pulls the empty shell case out of the chamber. The ejector then catapults the case out the breech opening. As the buffer spring slams the bolt home, a new round is picked up from the clip and sent into the chamber.

There's really nothing new about the





**TROOPS IN COMBAT** using the M-16, center, and M-16 with grenade launcher attached, left. Note pistol, right

basic principle. But what is new is how it works—its design. The rifle is straight-line construction. That means the barrel, chamber, bolt, buffer system and stock are on one line. In other guns, this isn't so. The stocks angle down. There's no spring in the stock as there is in the M-16. Results: There's little recoil in the M-16; it's easily fired from shoulder or hip; and, most important for accuracy, the M-16 doesn't "climb" in the air when fired automatically.

Some critics charge this construction makes the sights too high. But to get the sights lower you'd have to angle the stock, and you'd end up with more recoil and less accuracy.

There's something else new—the gas line. In other guns, barrel gas is bled off and fed into a piston chamber. The piston is driven back, taking the bolt with it. This means more parts, more weight.

In the M-16, the gas is fed directly to

the bolt through a gas line that separates when the bolt starts back. It is true that you've got to clean the gas line where it separates. If you don't, carbon can build up and freeze the joint. Result—jamming.

There's lots of talk about the buffer system. This spring-and-plunger mechanism is what makes the gun automatic. It also affects the rate of fire and absorbs recoil.

Until recently, the M-16 firing ability was rated at an average of 750 rounds per minute. One day, DOD called Colt and said this rate needed trimming to cut down on heat and

give the bolt a chance to really home. So Colt added a little weight to the buffer, slowing the action to 650. (Colt also made the buffer waterproof.)

Actually, it's foolish to talk rate of fire. Why? Because it's impossible to send 650 bullets down an M-16 barrel in 60 seconds. It will jam before you

*(Please turn to page 218)*

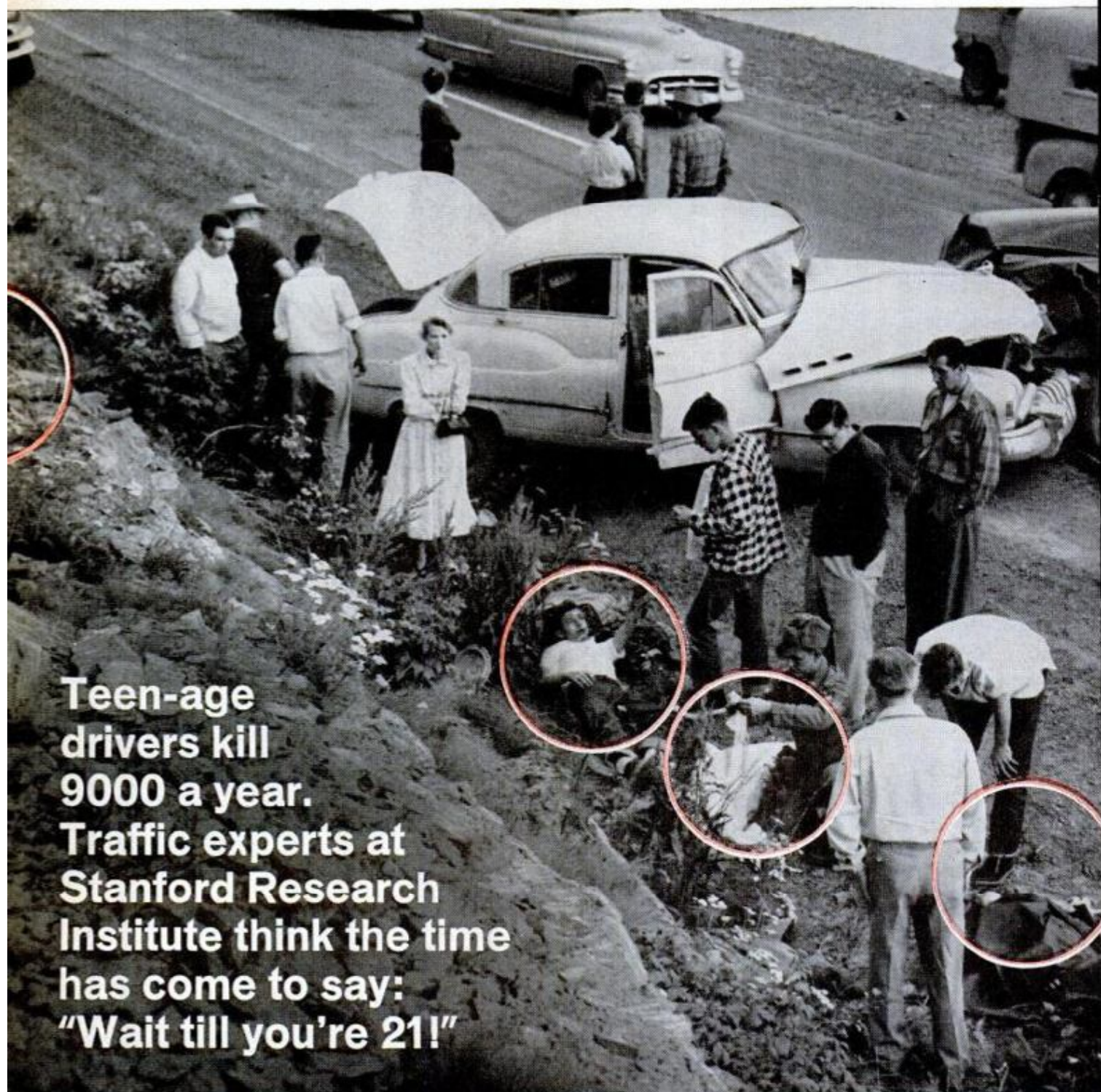
#### M-16 SPECS

Caliber	.223
Overall length	38.6"
Barrel length	20"
Width	2.4"
Weight (without magazine)	6.5 lbs.
Weight of 20-round magazine, full	.71 lbs.
Muzzle velocity	3250 ft./sec.
Muzzle energy	1285 ft.-lbs.
Rate of fire	550-750 rpm



# HOW YOUNG IS TOO YOUNG?

By TOM STIMSON



Teen-age drivers kill 9000 a year. Traffic experts at Stanford Research Institute think the time has come to say: "Wait till you're 21!"



The Stanford Research Institute's charges against teen-age drivers—and other allegedly accident-prone groups—are pretty strong. So is the remedy the Institute proposes. The latter is sure to raise the hackles of many PM readers—teen-agers to be sure, but quite likely automobile makers, driving-school instructors and rival safety experts who have solutions of their own. PM knows hundreds of teen-age drivers who are skilled and courteous and careful. We know others who shouldn't be let out of the garage. Whether the good guys should be grounded along with the hoods and hippies is something you'll have to decide after reading this provocative report.

*Robert P. Crowley*

Editor



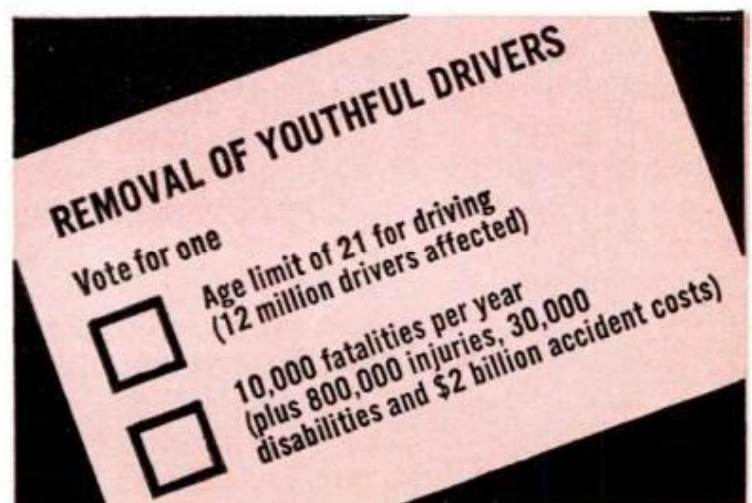
**O**N A WALL at Stanford Research Institute in California hangs a sign that reads something like this: "Allow No Drivers Under 21" and "Kill 10,000 People Every Year."

At the top there is a line: "Vote For One." Morbid? Maybe, but Richard L. Goen, SRI systems analyst, uses the sign to emphasize his belief that our 1000 traffic deaths per week could be slashed dramatically if driving privileges were taken away from youthful drivers.

If you are a teen-ager, this means you would be grounded until you reached voting age. No longer could you drive the gang to the beach or pick up your girl friend and go to the drive-in. If you have a job that requires driving, you'd have to give it up. You'd ride a bus to school, use public transportation for errands. In fact, you couldn't even be a *passenger* in a car unless the driver was at least 21.

Why the proposal to ban young drivers? Because, says Goen, statistics show that, taken as a group, young drivers kill too many

**POSTER SHOWN BELOW** puts question bluntly to all who drop into office of Richard L. Goen at Stanford Research Institute





people. One insurance survey indicates that 40 percent of all teen-age drivers are involved in an accident in any given year. National Safety Council figures show that while youthful drivers make up only 11.5 percent of all drivers, they are involved in 17.6 percent of all fatal accidents.

Goen puts it this way: "The price for allowing 1000 teen-agers to begin driving at 16 rather than at 21 is four deaths, 12 permanent disabilities, 313 others injured and accident costs of \$670,000."

Sure, Goen concedes, denying licenses to teen-age drivers would be an inconvenience to them, even a hardship in many cases. But, he points out, being killed or maimed or losing a member of your family in an accident caused by a youth is also a hardship.

"Anyone who's against raising the minimum age is saying he'd rather have 10,000 people killed every year," Goen says flatly.

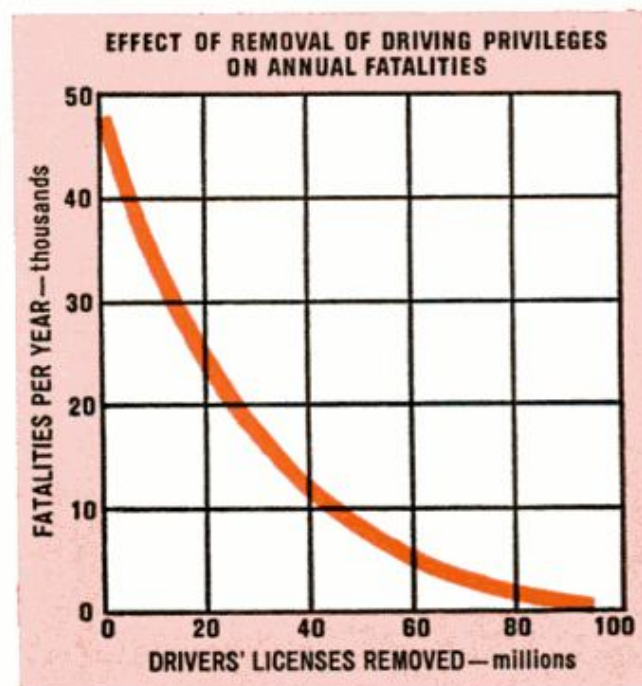
Traffic deaths have become an enormous national problem. Some drastic solutions are warranted even though they may be unpopular. By applying the same kind of systems analysis used in solving aerospace problems, 39-year-old Dick Goen and SRI arrived at some provocative recommendations for reducing accidents, deaths and injuries.

You read about one of them—that all speed limits be reduced by at least 20 percent *and enforced*—in last month's *PM*.

The second proposal slaps right at the driver himself. Some driver groups, says SRI, can be identified statistically as being more dangerous than others. Why not, asks Goen, remove the dangerous drivers from behind the wheel? It's a tradeoff—the inconvenience caused the high-risk groups versus the number of people they will kill if they keep on driving.

Goen admits that his arithmetic is based on generalities, that for simplicity he has left out some factors that could modify some of his totals. For instance, if no teen-agers were allowed to drive, the accident rate for drivers

**DEATHS WOULD DROP 50 PERCENT**, says SRI, if 20 million drivers making up groups causing most of the fatalities were to be denied licenses. Removing another 20 million would cut the toll in half again



in their early twenties might climb during their learning period.

Teen-agers aren't the only high-risk drivers, of course. There are three, possibly four, other groups with higher-than-average accident rates. Elderly drivers are one. With slowed-down reflexes, often with impaired sight and hearing, the "Medicare set" accounts for 4.7 percent of traffic fatalities. Goen estimates that if licenses were cancelled when drivers reach 70, some 2500 lives would be spared each year.

A third dangerous group is the "worst" five percent of *all* drivers between 21 and 70. They can be identified by the large number of traffic citations they acquire. Although the chance of getting a ticket for a single safety infraction is less than the chance of hitting the jackpot on a slot machine, some drivers violate traffic laws so regularly that they collect a higher-than-average number of tickets. They obviously have personality characteristics that make them unsafe. A legislator in an eastern state has suggested making such drivers carry special markers on their bumpers, much like those "rookie" drivers are required to carry at major speedways.



Cost per 1000 drivers licensed at 16 instead of 21



**4 DEATHS**



**12 PERMANENT  
DISABILITIES**



**313 OTHER INJURIES**



**\$670,000 ACCIDENT COSTS**

S.R.I.

“Drivers with high violation records have five times more accidents than the average driver,” Goen points out. “This means we can identify drivers who are going to have more than their share of accidents. Getting the worst five percent off the roads would save some 3770 lives per year.

“Assuming an average of 40 years of driving per person, the price we pay for allowing 1000 high-risk drivers to remain at the wheel is 36 deaths, 108 permanent disabilities, and 2772 other injuries. And, don’t forget, the rest of us pay higher insurance rates because of them. We should remove them from the roads entirely.”

When you add up the figures, it’s obvious that SRI’s “drastic” proposals are drastic indeed. Youthful drivers (11 million), elderly drivers (four million), and the “worst” five percent (four million) amount to 19 million drivers. Eliminate that many drivers and what happens to the automobile industry, not to mention such satellite businesses as car financing and insurance?

The benefits? Cutting traffic deaths in half. Right now that would mean saving 25,000 lives per year. (The SRI

figures show that the three groups above cause one third, not one half, of today’s deaths, but Goen assumes that the “deterrent” effect on other drivers and the wider use of public transportation would bring the total up to 50 percent.)

So far, not a word has been said about drunk drivers—the worst killers of all. It’s hard to lump them together statistically. One reason is that a driver may drink to excess only occasionally. Goen cites a study by Professor R. F. Borckenstein of Indiana University which estimates that 11 percent of drivers at a given time have been drinking, yet are involved in 21 percent of the accidents. But he says that rather than the social drinker, it is the heavy drinker and the alcoholic who are the main problem. These cause about 50 percent of all traffic deaths.

Present attempts to curtail drunken driving, Goen is convinced, are hopelessly inadequate. He agrees with Sen. Gaylord Nelson, of Wisconsin, who says, “Our efforts to keep drunks off the highways have been almost a complete failure.”

Goen even goes so far as to suggest

*(Please turn to page 204)*





## By land or by sea

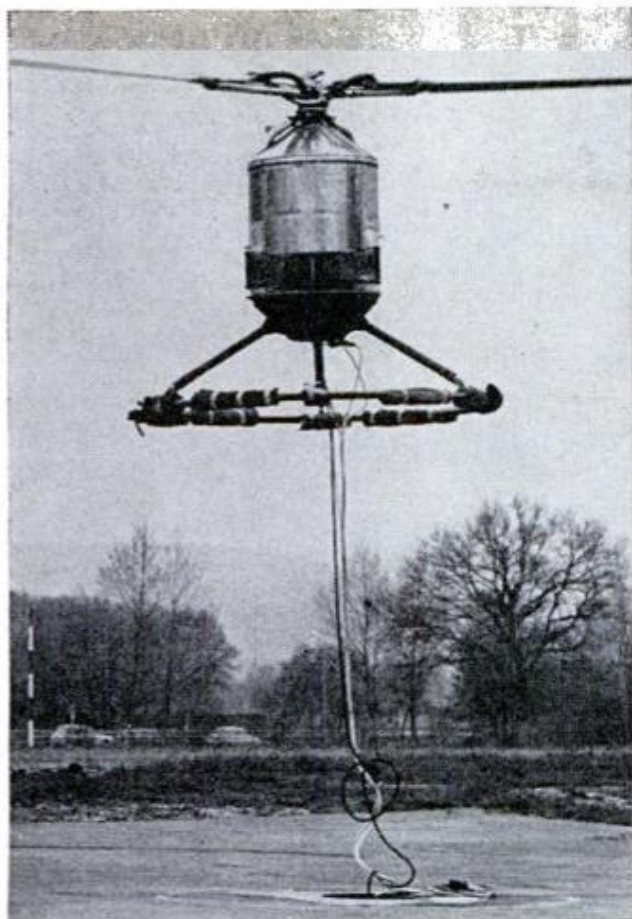
You can combine houseboating and trailer camping with a new British rig that's as much at home on water as it is on a road. Towed behind a car, the Creighton Gull amphibious trailer is simply backed into water (it needs just 20 inches to float) when the travelers want to go boating. A 9½-hp outboard motor pushes the vehicle along at eight knots. Made of fiberglass and expanded polystyrene, the unit has living and sleeping space for four. Other appointments include a butane-gas stove, sink and storage cabinets for clothing and cooking utensils. For swimmers, a set of folding steps drop down into the water to make it easier to climb back into the trailer.



## Researcher is looking for a break

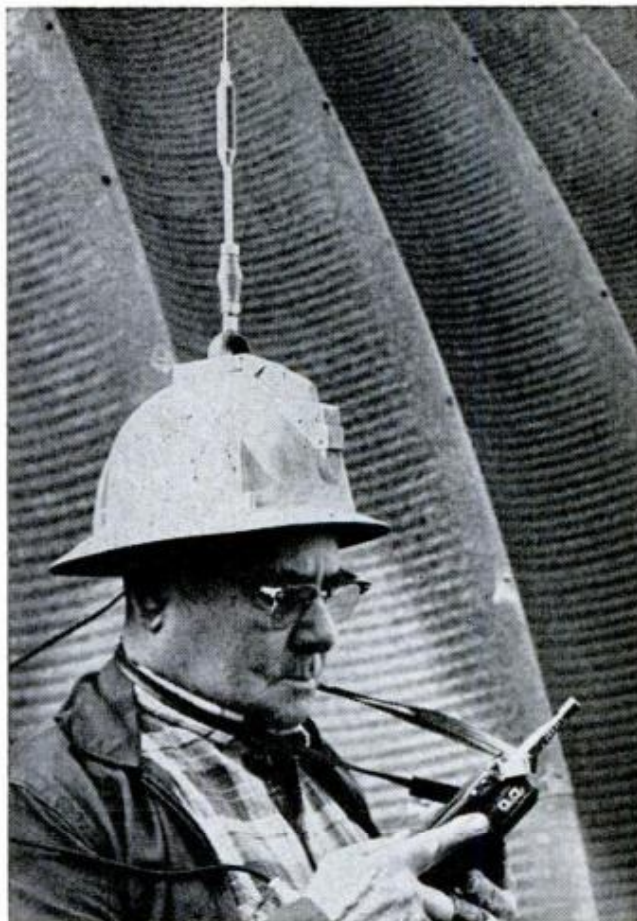
Can a pitcher actually make a baseball "break?" That's the problem being studied by the builder of this pitching machine, Dr. Seville Chapman, head of the physics div. of Cornell Aeronautical Laboratory. A lawn-mower engine turns two rubber-tired wheels so that balls fed between the wheels zing out at a speed of 80 feet per second. Varying the speed of one wheel produces a curve ball—but, so far, not a sharply breaking one. Even so, the lab's ball team (coached by Dr. Chapman) finds the machine great for batting practice.





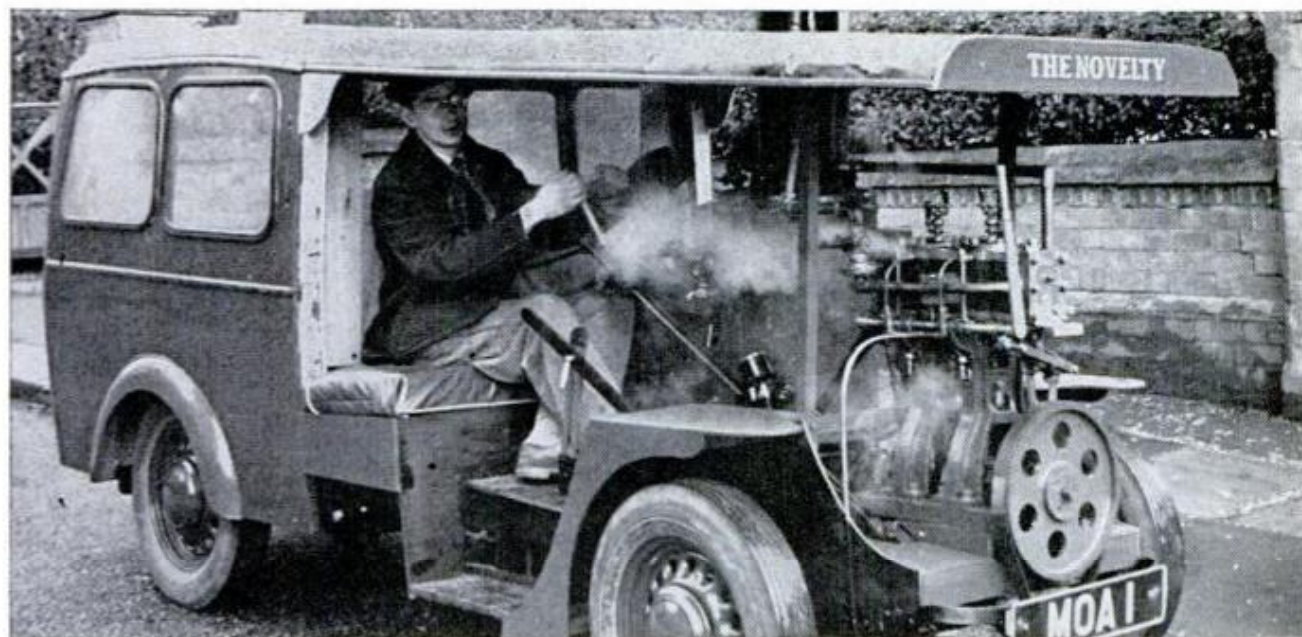
## Sky raft

Flying at the end of its tether, the Dornier rotor platform will carry TV or radio transmission equipment to a height of 1000 feet. The German Defense Ministry will also load it with radar for aircraft detection. The tether carries fuel and electronic information.



## High-hat sheriff

Complaining that the antenna on his handheld, two-way radio was too awkward, Deputy Sheriff Rollo Jamison of Grant County, Wis., replaced it with an 18-inch aerial on his helmet. He says the coiled antenna is the equivalent of a 102-inch straight one.



## First, take an old steamboat . . .

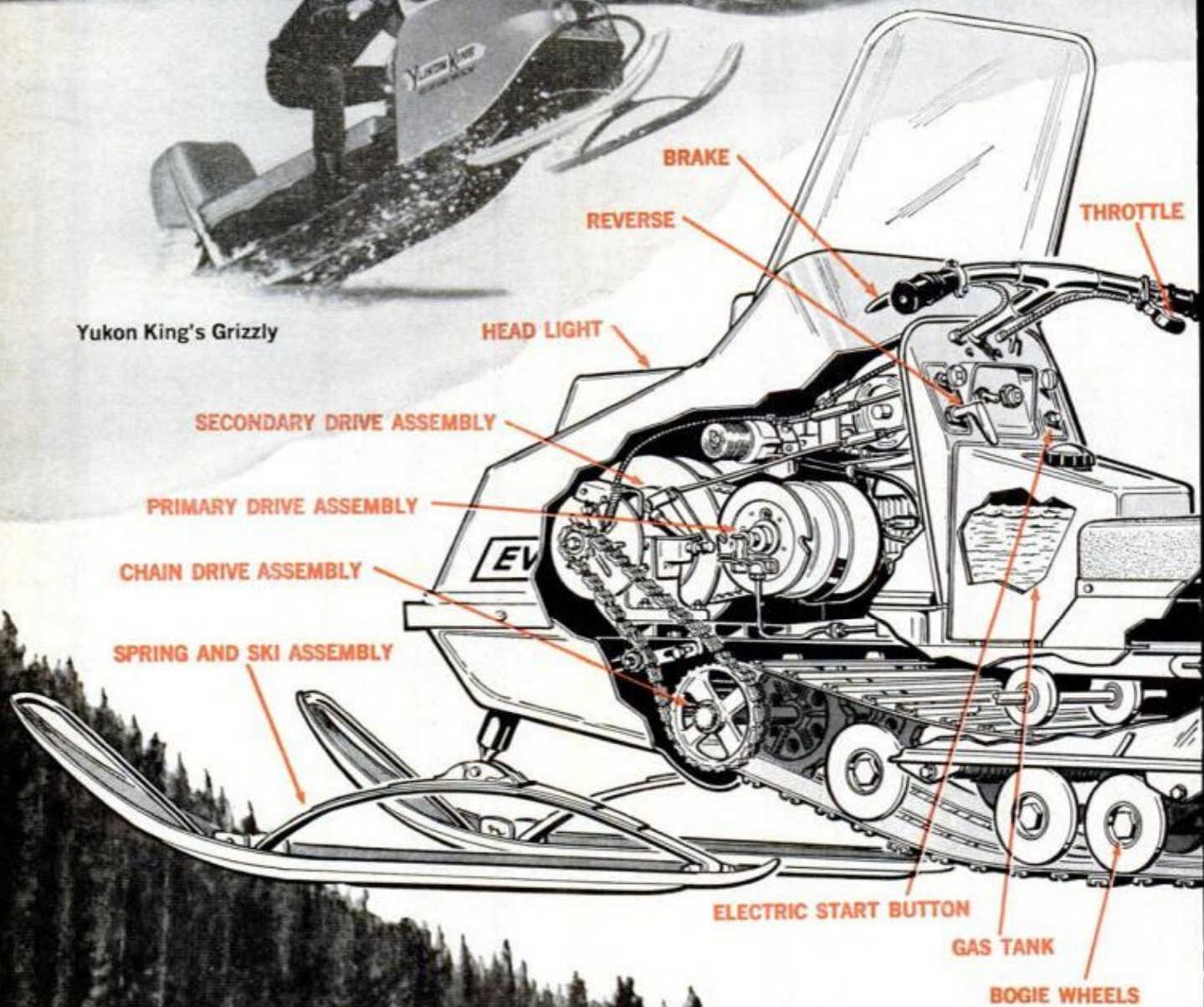
If you have an old steamboat on your hands and don't know what to do with it, you might try converting the engine for road travel as this retired English engineer did. John Harding put such an engine in a Jowett Bradford van, and now he chugs along on steam power at 20 mph. His mileage? He gets over 40 miles to the hundredweight (112 pounds) of coal.



**SNOWMOBILES**



Yukon King's Grizzly

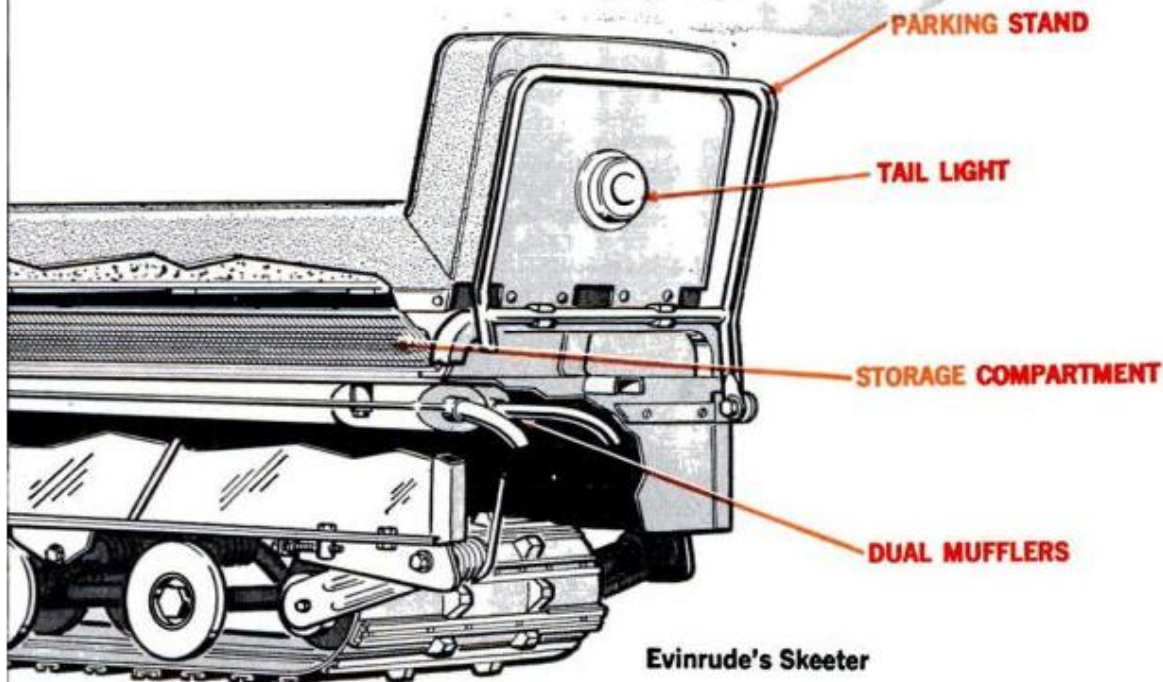


AMF's Ski-Daddlers





Johnson's Skee-Horses



Evinrude's Skeeter

← CLEATED TREAD

# '68—THE BIG YEAR FOR SNOWMOBILES

**This is the year of improved engineering, bringing greater reliability, easier starting and more speed**

By DANIEL C. FALES, Outdoors Editor

*Illustration by Don Evans*

**S**NOWMOBILES can let you and your family have more fun this winter than you've ever had before. If you live in snow country, you've seen your neighbors take to snowmobiling like kids to ice cream. You may have done it yourself. If you're below the snow line, you've probably spotted weekenders heading north towing snowmobiles on trailers.

To find out what's in store for you this winter, I visited leading snowmobile makers last spring. You're in for a surprise.

I found the manufacturers have gotten the wrinkles out of engines,





**DIABLO ROUGE** is the most unusual-looking machine of all the snowmobiles on the market today. You sit on a sled and steer "tractor" by moving handlebar

transmissions, bogies and treads. They have good machines and are starting to add extras. This is the year of the electric start, reverse, sturdy hoods, better clutches, improved treads, less weight and lower price.

The most drastic change I saw was in the Johnson and Evinrude machines. The Johnson Skee-Horse and the Evinrude Skeeter have been completely redesigned. Both these companies use 16-hp Outboard Marine Corp. engines. A new motor modification permits easier pulling of the motor-start cord. A compression release valve has been installed in motors not equipped with electric start. Opening this valve means that even a woman can yank the starter cord.

Both Johnson and Evinrude ma-

**POLARIS** high-speed models this year will take jumps in stride. Experts say it would cost \$100,000 to build a car that would stand the banging snowmobiles take



**SKI-DOO** is a smooth-looking machine this year, with a retractable headlight in the hood. This cuts down on wind resistance during high-speed races

chines have electric start and reverse equipment as options. And to combat the ever-present noise, these two firms have added dual mufflers to cut the high-decibel sound level.

Each company has three models ranging from \$985 to \$1255, depending on size and options.

Those snappy yellow machines you'll see zipping over snow fields this year are Ski-Doos, made by Bombardier of Canada. For 1968, they have really souped-up the Ski-Doo for more speed and power. At the low end of their six-model line, Ski-Doo is offering a 255-pound, 10-hp machine for \$695 (\$50 more in the West). This is the Olympique—one of the lightest and lowest priced machines on the market. But probably the most popular Ski-Doo will be the Super 370. It's a 300-pound machine with an 18.5-hp motor that costs about \$995.

I ran across a surprising twist when I visited Polaris in Minnesota. Most manufacturers will give you a 90-day warranty. But Polaris, this year, is backing up its three different models with a full-year warranty. Polaris has souped up all its models including the snappy little Colt, which has a 15-hp engine and weighs 368 pounds. At the top of the line is the sturdy Super Voyage with engine options from 17-hp to 30-hp. It weighs 477 pounds. Polaris prices run from \$795 to \$1695.





**LARSON** snowmobiles can zip you over flat snow plains at 40 mph or weave slowly through forests

With all snowmobiles looking much alike, it's a pleasure to see one of different design. Bolens makes such an unusual machine. Called Diablo Rouge (red devil), this snowmobile uses a "tractor" to pull a passenger sled. Bolens uses a 300-cc Hirth 2-cycle motor that develops 16 hp. You can go 40 mph if you wish. Cost of the Diablo Rouge is \$970.

The American Machine & Foundry Co. is marketing the Ski-Daddler—a line of three machines with motors

**BOATEL** has a time-tested hood made of Cyclac. This lightweight, tough material is excellent for the front end, which takes a lot of punishment



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from 10.2 hp to 21 hp. These snowmobiles have steel chassis and fiberglass hoods, plus rear mounting stands for stationary operation in engine warm-up. The AMF machines run from \$840 to \$1300.

Almost all snowmobiles have tracks that run on bogie-wheel systems. But when I was at Arctic Cat, I saw a model which uses a new torsion-spring suspension system instead of bogies. This new system, the company says, decreases the number of moving parts in the track assembly by 80 percent compared to regular bogie systems. Arctic Cat has the Panther series (which has the new suspension) with five models, and the lighter Cougar series with three models. Prices range from \$795 to \$995.

Moorehead Plastics, Inc., which makes Silverline boats, builds Yukon King machines. The largest YK snowmobile is the new Kodiak—a stable machine with either a 15-hp or 20-hp motor. The Kodiak has what YK calls a Sence-C-Matic transmission, which is a heavy-duty torque-conversion unit. This transmission, plus dual gas-line filters is also available on YK's Grizzly model, which is a bit smaller and faster. YK prices range from \$1169 for

*(Please turn to page 232)*

**ARCTIC CAT** has aluminum chassis in Panther series. This lessens weight, while retaining sturdy construction. The leopard-skin seat covers are a trademark







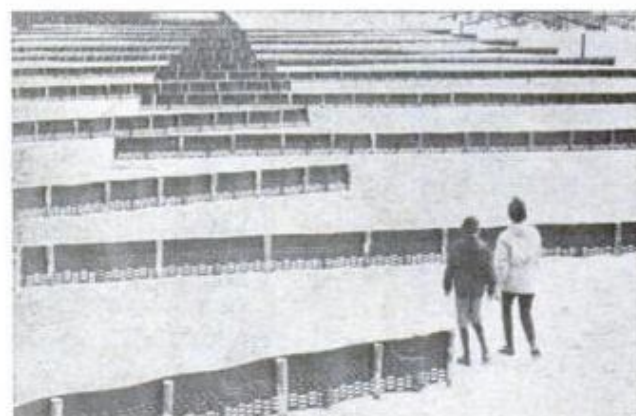
### **Hammer-and-nail artist**

David Partridge, a London artist, needs only a hammer and a few thousand nails to create a work of art. Driving nails of many sizes to varying depths, he creates sculpture-like "paintings" on flat or round (far right) surfaces. Partridge got the idea for nail



### **Plowless planting**

Corrugated colters mounted ahead of the seeders on the Allis-Chalmers "No-Til" planter stir up a seedbed; no plowing is needed.



### **Sand stoppers**

The best way to control drifting coastal sands is by use of plastic fences, the Germans find. They're easily removed and reused.



### **Warm-up suit**

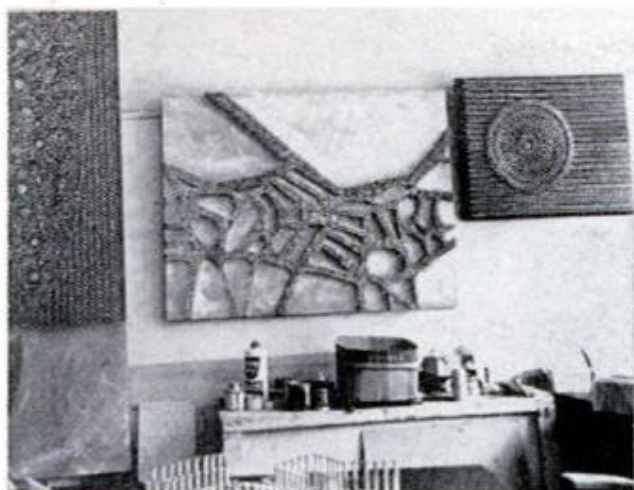
Almost hidden by smoke and fire is a nery Briton who's demonstrating the Bell aluminized protective suit. The outfit is designed for rescuers who must enter blazing crashes.



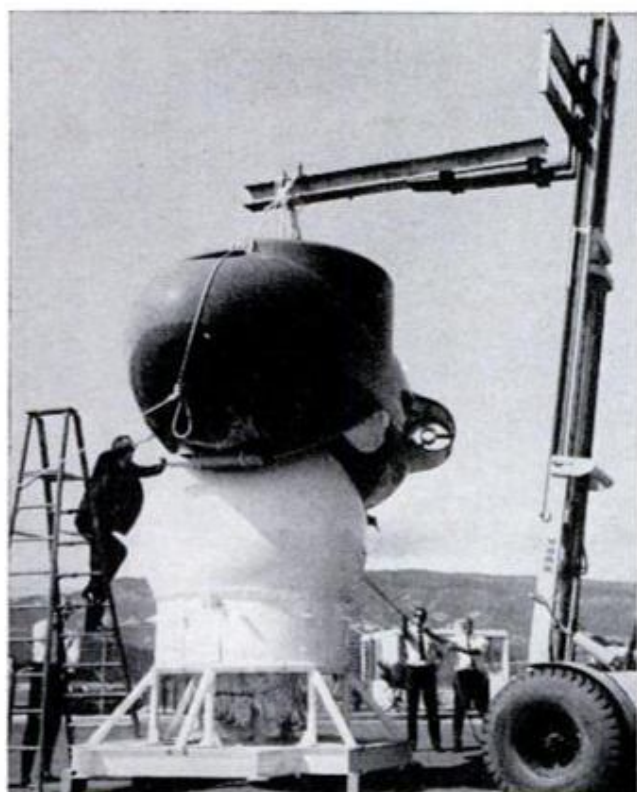
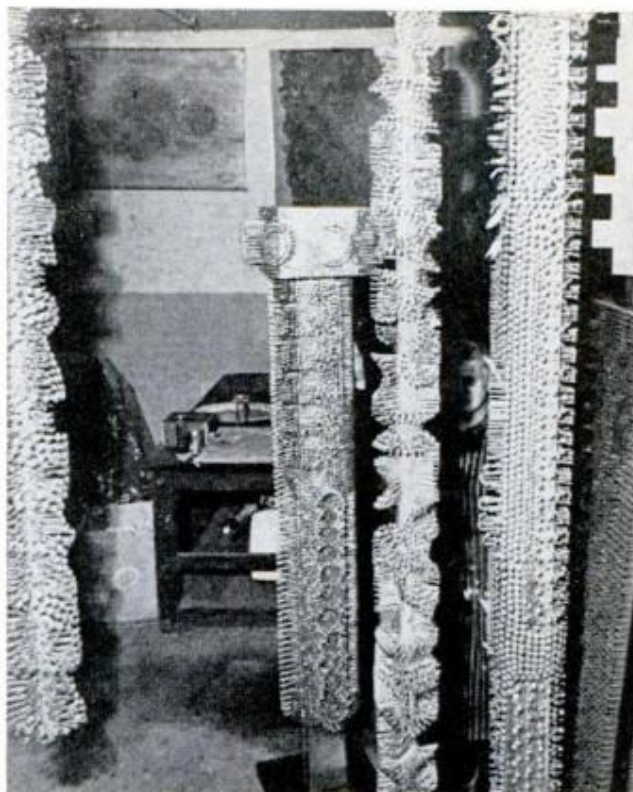
### **Pit stop**

Southampton University's No. 5 car gets a new driver with just 30 minutes to go in the Bristol University Rag Week 24-hour pedal-car race. The Royal Agricultural college won.





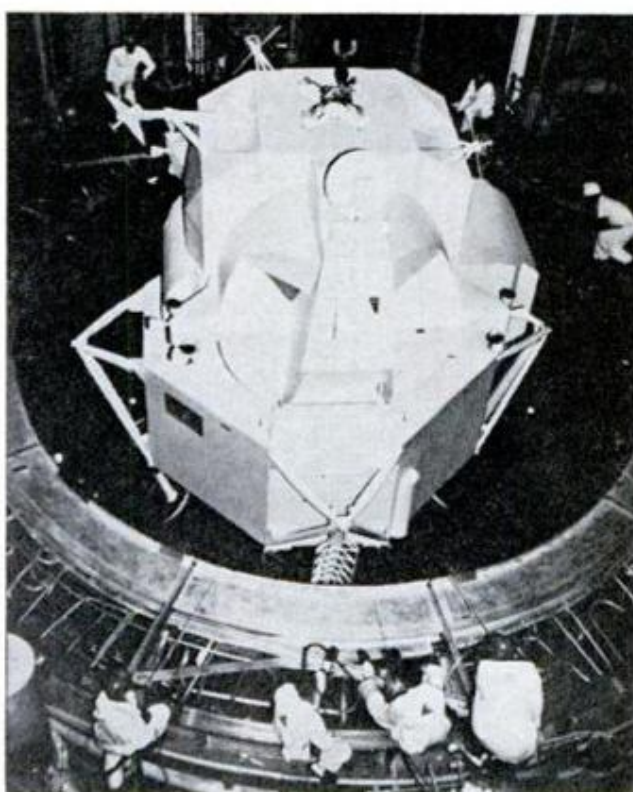
paintings when he came across a discarded box of nails in his garage studio in London. He began experimenting with the unusual art medium, and soon was selling his works regularly. One recent work, *Cratered Column* 1966, was displayed at Expo 67 in Montreal.



## GM gets ready to dive in

The fiberglass fairing of the two-man Deep Ocean Work Boat (DOWB) makes a tight fit as it's lowered over the 80-inch pressure sphere in which the crew will be housed. The craft was designed by the General Motors AC Electronics-Defense Research Laboratories for scientific research and antisubmarine surveillance development to depths of 6500 feet. The 17-foot craft has a range of 30 miles.

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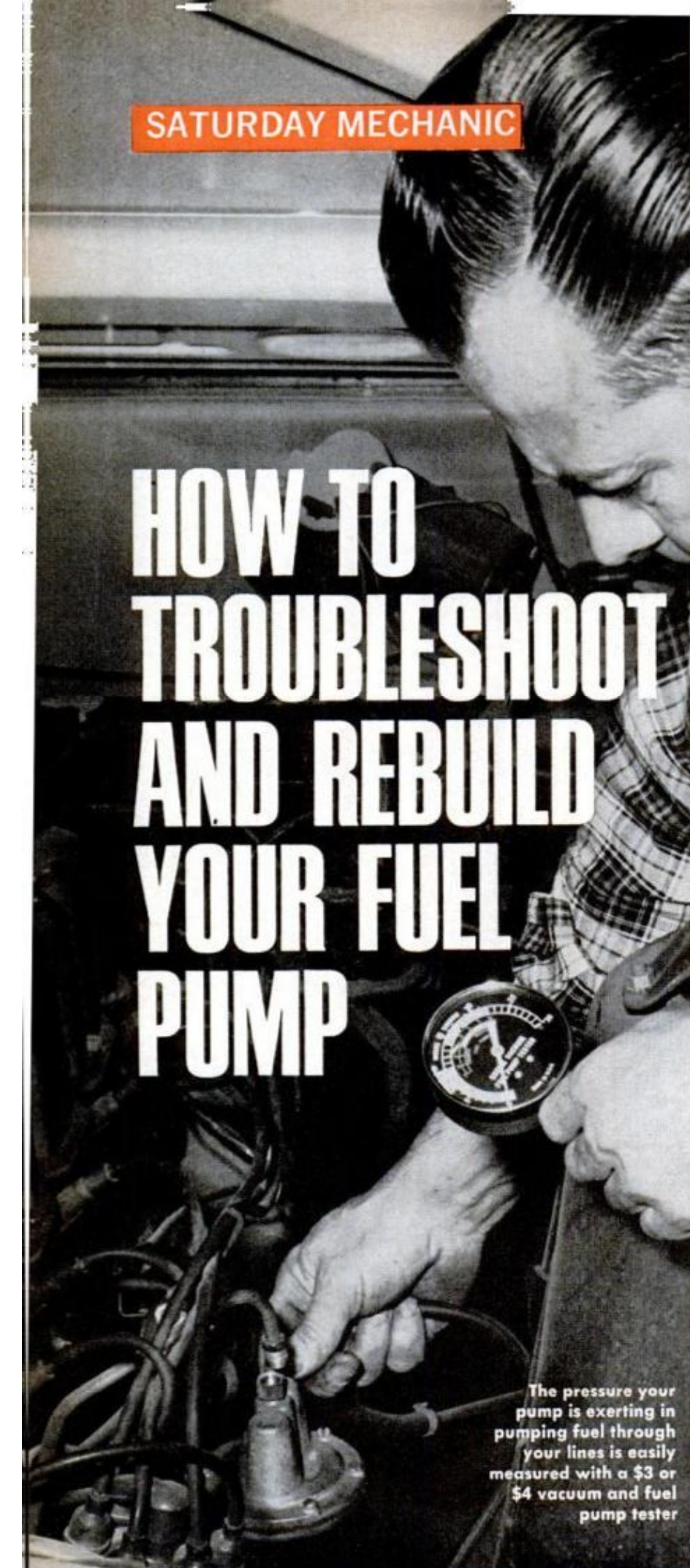


## Lunar lander gets a workout

Being put through its paces at the Manned Spacecraft Center in Houston is a mock-up of the lunar module that will carry two Apollo astronauts to the surface of the moon. Technicians are shown guiding it into position to check the module's compatibility with the other Apollo components. Upon leaving the moon, this module will rejoin the orbiting command module for the return to Earth.



# HOW TO TROUBLESHOOT AND REBUILD YOUR FUEL PUMP



The pressure your pump is exerting in pumping fuel through your lines is easily measured with a \$3 or \$4 vacuum and fuel pump tester

By MORT SCHULTZ

**T**HIS MAY very well be the last article on fuel-pump overhaul that you'll see in *PM*.

Without any fanfare, Detroit designers in 1965 started to replace the traditional fuel pumps, which can be overhauled, with sealed pumps that cannot be rebuilt! You can't take a sealed pump apart. The two halves are pressed together at the factory, and the only way you're going to get inside is to pry open the case—and that ruins the pump.

So if you have a 1965-1967 car with one of these sealed pumps, you'll have to do what the factory dictates. You can't beat the system. Pontiac, for example, says in its 1966 service manual: "There are no repairs possible to the fuel pump . . . when a malfunction is detected it will be necessary to replace the pump assembly."

But the majority of cars on the road still have fuel pumps that can be stripped down for overhaul. So, for the time being anyhow, it's good to know what makes them tick and how to keep them ticking.

Although fuel-pump repair is a relatively simple job, there's no sense doing it unless you have to. First you have to determine if the pump is defective. If the symptoms of fuel pump failure exist, test the pump.

Aside from a pump that leaks gas or oil, which isn't too common but requires immediate attention if it happens, a fuel-pump problem is only one of two kinds. Either the pump isn't supplying enough gas, which is usually what happens when it goes bad, or it's supplying too much gas, which is rare.

If the pump isn't supplying enough gas, the engine will refuse to run or it will cough and falter. If the pump is supplying too much gas, you can usually see fuel dripping from the carburetor, or the engine won't idle smoothly. Engines are often hard to start



when they are getting too much gas.

If one of the above symptoms exists, how can you tell if the pump is at fault? After all, any one of them can result from other things than the fuel pump.

Let's assume an apparent inadequate fuel supply to the engine. The easiest way to determine if the fuel pump is at fault is to disconnect the fuel pump-to-carburetor line at the pump and crank the engine a few times. If the gas spurts, it's safe to assume the fuel pump is okay. (For safety's sake, perform this test with the engine cold.)

If gas does spurt, it's possible the cause of your trouble is a clogged fuel line. Remove it and blow it out with compressed air.

Don't forget that most cars have a fuel filter somewhere between fuel pump and carburetor. It could be clogged, causing an obstacle to fuel delivery. If the filter hasn't been replaced in some time, now's a good time to do it.

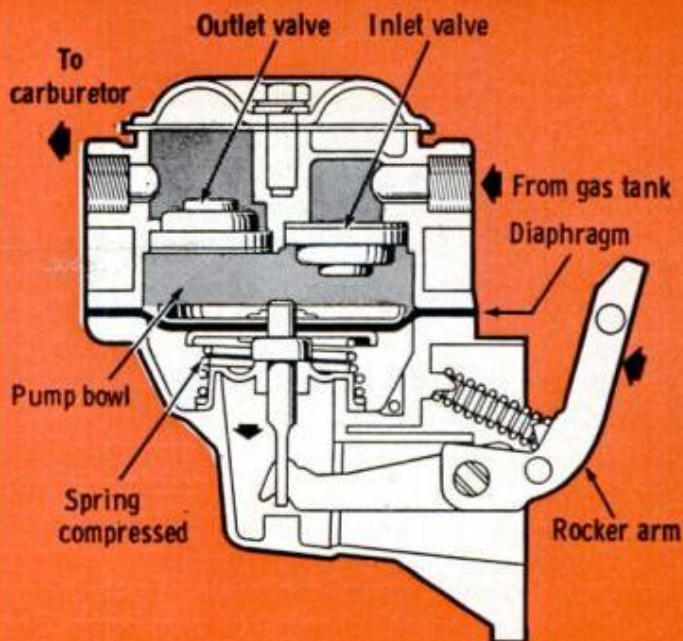
The fuel filter could be located on the fuel pump itself or at the carburetor. Most cars, though, have one cut into the fuel line. This is the so-called in-line fuel filter which is usually in the line near the carburetor.

If the obstacle still exists, inspect fuel lines for deterioration, leaks, kinks and other damage. A bugged fuel line could cut off the fuel supply. Also make sure that the pump assembly and all lines are tightly connected. An air leak can cause a reduction of fuel supply.

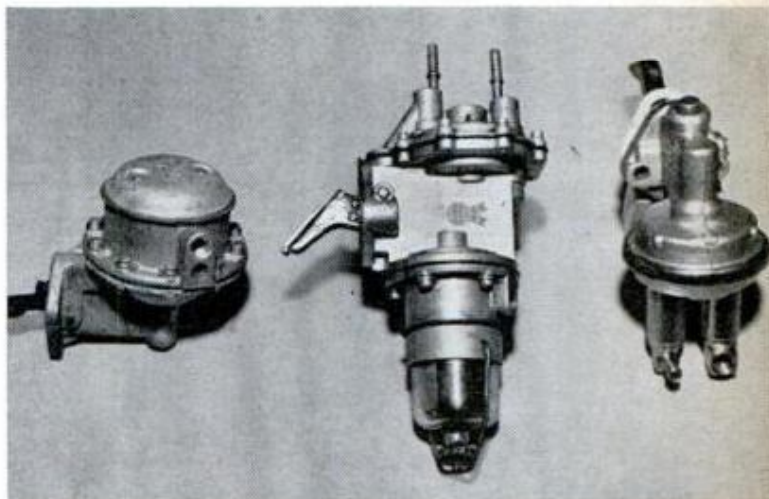
If after making these preliminary checks the trouble still persists, there's every reason to suspect the fuel pump. An exact test of pump performance can be made with what's often called a fuel pump analyzer, which is simply a pressure gauge. It allows you to determine whether a pump is operating within its specified pressure range.

Pressure gauges for checking fuel pumps are often double-duty instruments, having the capacity to measure vacuum as well as pressure. A typical vacuum and fuel-pump tester costs around \$4 and is designed to measure roughly 0 to 7 pounds pressure and 0 to 30 inches vacuum.

The tester is tapped into the pump to measure pressure. Proper pressure varies somewhat from car to car, so check the specifications. Usually, though, if the gauge shows a minimum of 3 pounds and a maxi-

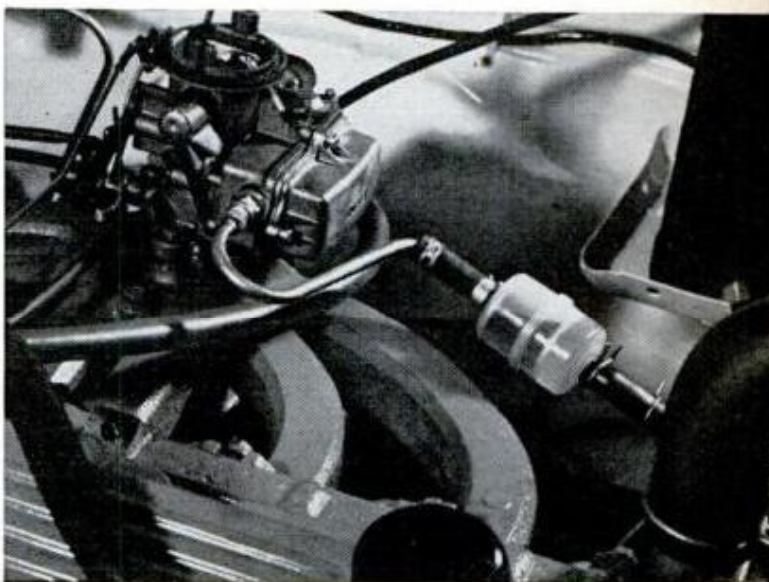


**SINGLE-ACTION PUMP** is shown at the end of intake stroke after sucking gas into its fuel reservoir



**NONOPENING PUMP** (it cannot be rebuilt) appears here to right of single and double-action types

**FUEL FILTER** on this car is the transparent, in-line type usually located close to the carburetor inlet





mum of 5 pounds pressure, the pump's okay.

If too much gas is being supplied, keep in mind that the oversupply is usually the result of trouble other than with the fuel pump. First check for a defective automatic choke or excessive use of a hand choke, a punctured carburetor float, a defective carburetor needle valve, or an improper carburetor adjustment.

Before you take the fuel pump off the engine for overhaul, determine which type of pump you have. You may have one of three types of pumps—four actually, but I'll not even mention electric fuel pumps. Only a few foreign cars have these as original equipment.

On American-made cars, you'll find a double-action fuel pump, a single-action pump that can't be taken apart, or a single-action pump that can be taken apart.

A double-action pump is a combination fuel and vacuum pump. It pumps fuel to the carburetor and also boosts intake manifold suction to provide uniform operation of vacuum windshield wipers at all engine speeds. Both the fuel and vacuum sections of the pump are actuated by a single rocker arm that works off an eccentric on your engine's camshaft.

#### Single action on most new cars

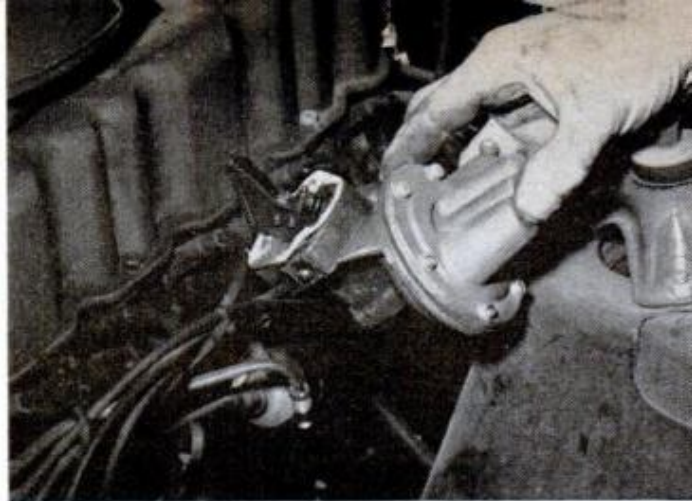
Not many late-model cars use combination pumps. Most are equipped with electric windshield wipers, so a vacuum section is not necessary.

Exceptions since 1960, though, have been Rambler and Willys. Several models of both use the combination-type pump. Others include some 1961 and 1962 Fords, Mercurys and Oldsmobiles.

As we mentioned, since 1965 the trend in fuel pumps has been to the sealed variety. If tests indicate a bad fuel pump, and you don't see any bolts on the fuel pump, replace it. What else can you do?

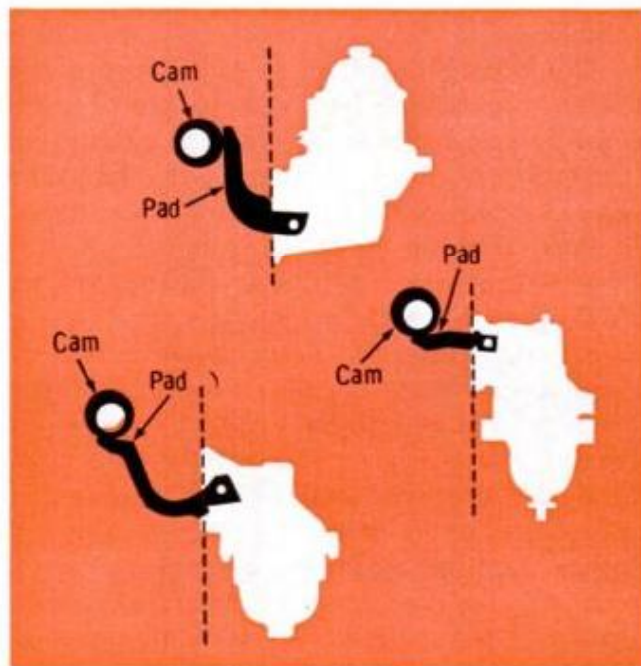
Single-action fuel pumps that can be stripped down for overhaul are recognizable by a series of bolts holding the two castings together. A rebuilding kit for every one of them, no matter what design, is available. You can get one at a local automotive parts supply store.

When ordering your rebuild kit, give the man behind the counter the pump identification number, which is usually stamped on the edge of the pump mounting flange, or the make, year and model of your car.



**GASKET BETWEEN PUMP AND ENGINE** should always be replaced whenever you remove the pump

**PUMP ROCKER ARM** engages the engine camshaft in any one of several ways, as shown in drawing below



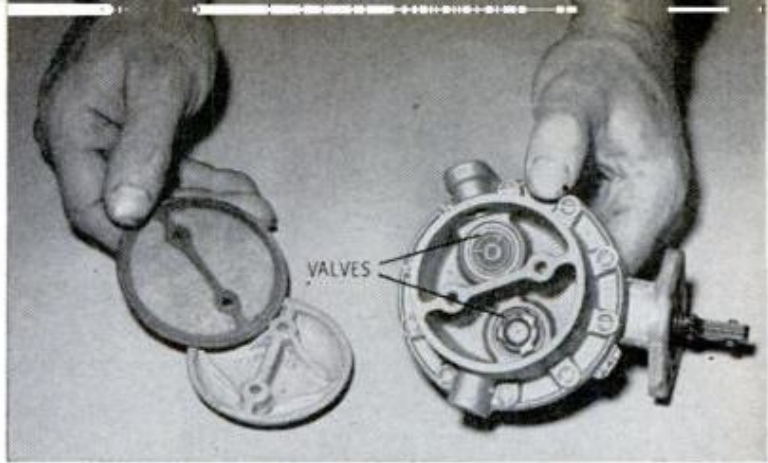
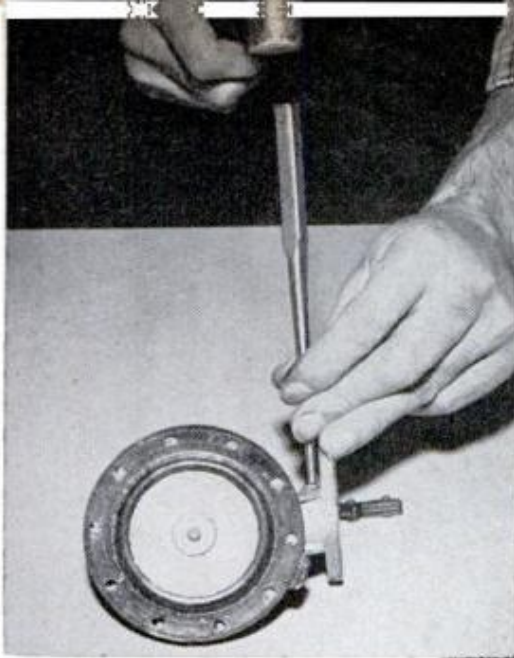
A typical kit contains new diaphragms, gaskets, springs, links, pins, valves and seats—all the parts needed to thoroughly rebuild the pump.

To take the fuel pump off the engine, first disconnect the fuel lines at both inlet and output sides of the pump. Now remove the bolts and lock washers holding the pump to the engine and pull the pump away from the engine.

You'll find a gasket between the pump and engine block. Discard it because there's a new one in your repair kit. If this gasket splits when you pull off the pump, make sure you get all material off the pump rocker-arm face and the engine block.

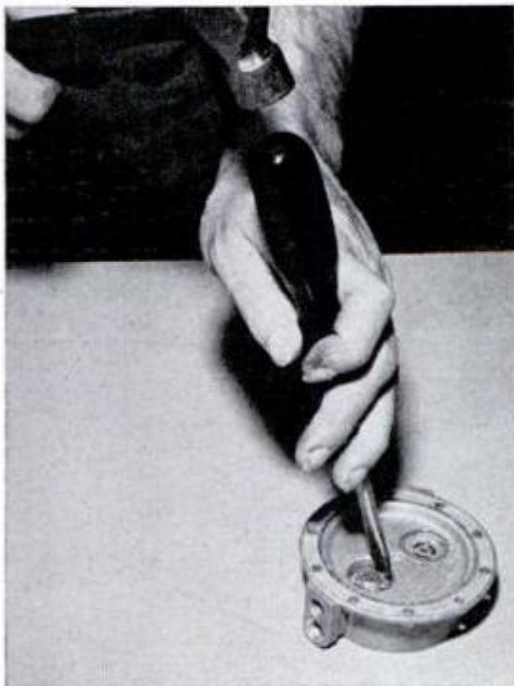
The cutaway drawing of a typical single-action pump shows you what to expect when you start to take the pump apart. It might be a good idea to make notes or draw a sketch as you disassemble the





**SINGLE-ACTION PUMP** is pictured being disassembled in these photos. Top view of fuel pump (above) shows inlet and outlet valves, which alternately open and close from pressure of fuel

**REMOVING ROCKER ARM** (above left) is done by first driving out rocker-arm pin. Only then can diaphragm be removed. Holes around edge of diaphragm align with those on pump flanges



**INLET AND OUTLET VALVES** (below left) are usually pressed in and can be tapped out with screwdriver and hammer. When installing new valves, be sure inlet and outlet aren't reversed

**FUEL-PUMP DIAPHRAGM** (below) is pulled from pump body after hook on rocker-arm link is disengaged from diaphragm shaft. Spring, which forces diaphragm against fuel, is replaced



pump. It helps when you put it back together after installing new parts.

As a precaution, file a mark across the flanges of the top and bottom halves of the pump before you remove the bolts. This mark will be your guide when putting the pump back together again, assuring that inlet and outlet holes line up as they must.

To get the diaphragm out of most pumps, you must remove the rocker arm. The rocker-arm link is hooked to the diaphragm shaft.

To do this, knock out the rocker arm pin and work the rocker arm around until it comes out.

When you get to the check valves, note their positions before you remove them. The outlet valve has its flat side against its seat, while the inlet valve has its flat side facing up. The point is that you must make sure replacement valves go into the pump in the manner in which the old

valves are positioned.

Some valves, incidentally, are held in place by an arm that's secured to the fuel-pump casting. Just remove the screw to replace the valve and arm assembly.

Most valves are pressed into position and are firmly held by little nibs. To remove these valves, pop them out with a screwdriver and hammer. When putting the replacements back in, you may have to peen the nibs back down over the valve.

With the pump rebuilt, one critical job remains. You have to put the pump back on the engine. In so doing, you must make sure the rocker arm engages the cam eccentric properly.

The "pad" (flat surface) of the rocker arm has to rest against the cam. How it does this depends on the pump's design, several of which are shown in the accompanying drawing. If rocker arm and

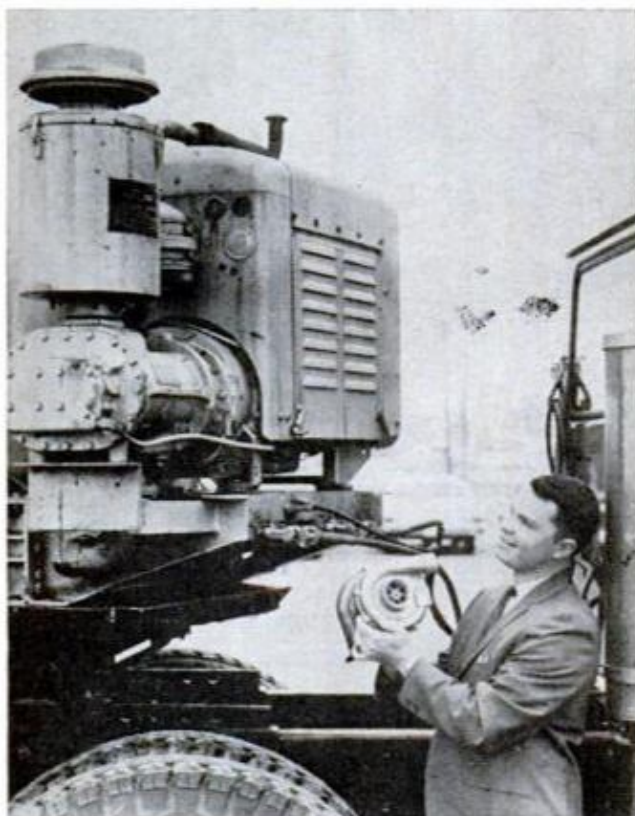
*(Please turn to page 227)*





## New fishing boat is made of steel and cement

Pipe, wire mesh and cement are the unlikely materials that have gone into the hull of a new fishing boat being built in Victoria, B.C. Working in his back yard, the builder, Gordon Ellis, has constructed most of the 44-foot boat himself, working from the design of a conventional wooden boat. His first step was to make the basic form of half-inch water pipe. Next he attached quarter-inch iron rods lengthwise. Over that frame went eight layers—



## David and Goliath

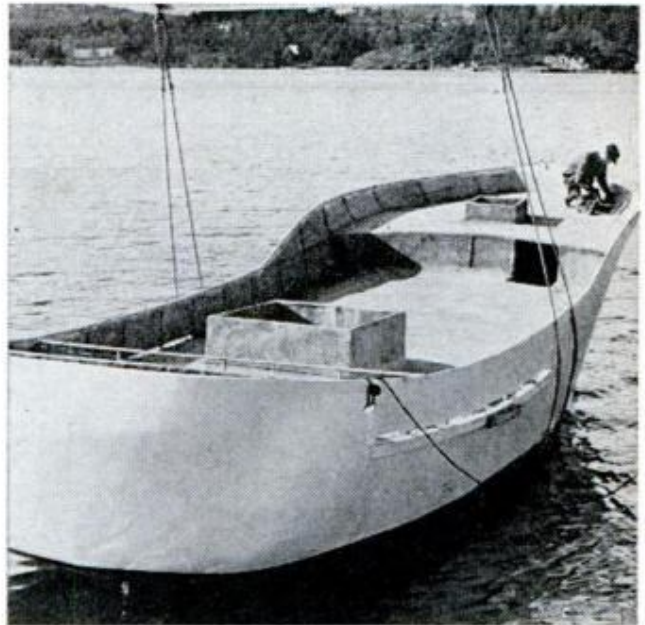
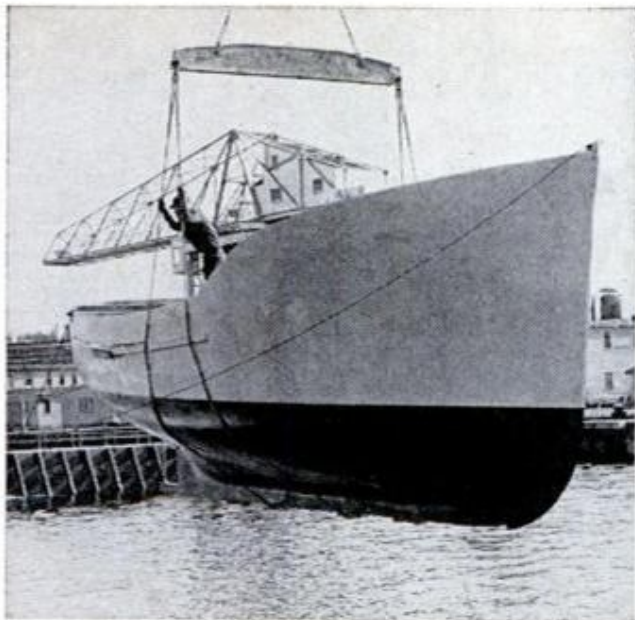
That little turbocharger in the man's hands can unload a truck just as capably as the big auxiliary engine and air compressor shown beside it. Using power from a diesel truck's exhaust, the little unit "turboconveys" powdered, granulated or liquid cargoes into receiving bins. Maker: Schwitzer Div. of Wallace-Murray Corp.



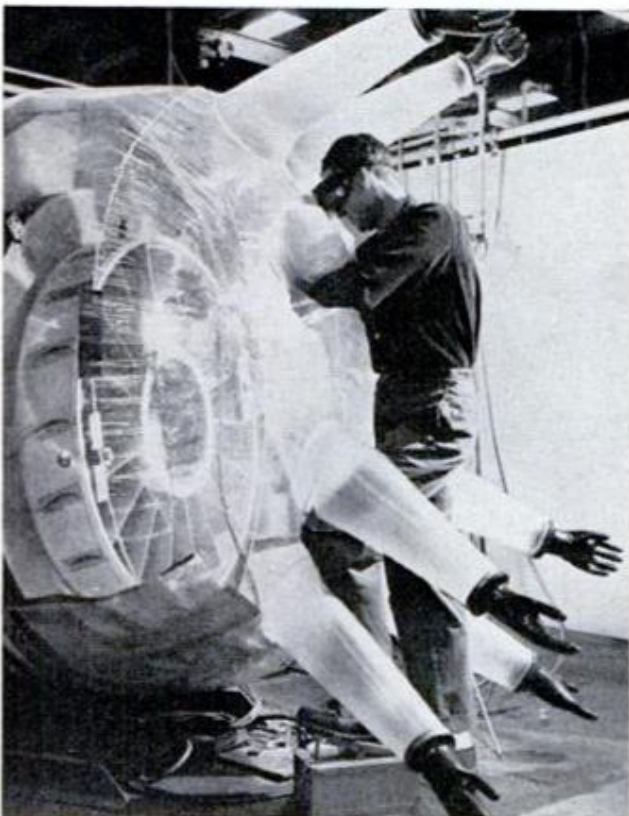
## Sharpshooter's glasses

Members of the Australian pentathlon team plan to wear special spectacles in the pistol events at the next Olympics. The pair shown are for a "right-eye" shooter. The stop in the sighting lens increases the eye's depth of field beyond that of an unaided eye and helps the shooter align his pistol sights and target.





four to a side—of half-inch wire mesh. The next stage was a 17-hour “scramble” when cement was sprayed on with a pump, forced into and through the mesh with trowels, pushed in and around the pipes with vibrators and then dressed for painting. It took 10 plasterers to do that job. Ellis, who plans to build the cement boats for sale, feels that the three-quarter-inch-thick hull will be practically impervious to the stresses of time and weather.



## Helping hands

Rubber-gloved “arms” on a plastic cocoon help workmen do the high-purity welding required for making titanium jet-engine parts. The arms permit the operator to handle welding equipment in a pressurized atmosphere of inert gas. In the photo, a welder works on a compressor fan at TRW’s Cleveland plant.



## Brighty gets a lift

A primitive, hand-powered cable tramway that once spanned the Colorado River in the Grand Canyon was recreated near the original site for the motion picture, *Brighty of the Grand Canyon*. Building it was easier this time; the moviemakers used helicopters instead of kites to get the cables across the river.



# Weekend Projects



**TEXTURED LEATHER.** Faithfully reproduced in every detail, the surface of this hardboard panel comes as close to real leather as imaginable. Exceptionally durable surface wipes clean, defies marring

While Marlite's new tapestry and leather paneling is really for walls, it's also a great craft material

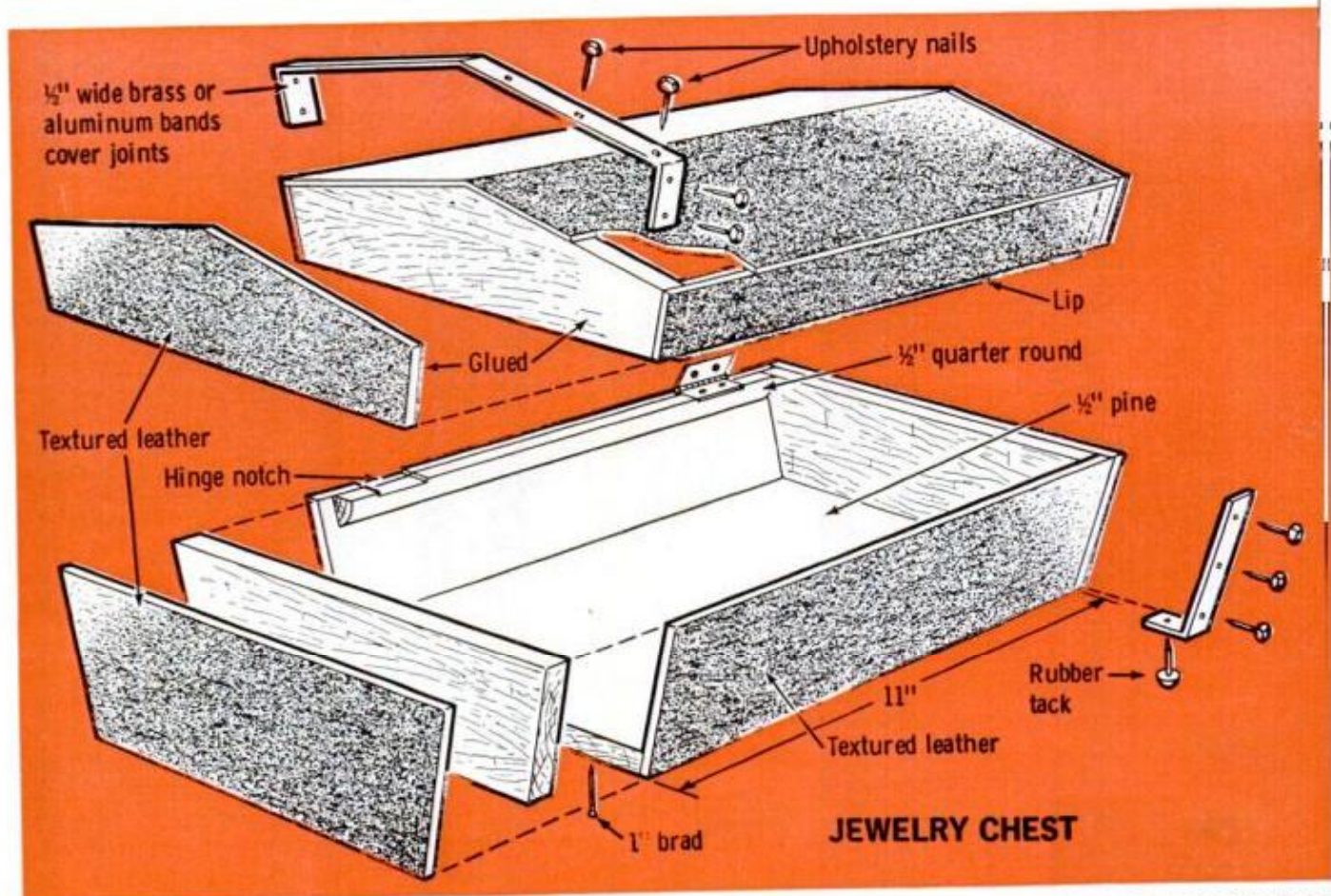
*Technical Art by Graphic Presentations*

**F**ROM MISSOURI OR NOT, you have to see and *feel* these two new textured hardboards to believe them.

One simulates rich Morocco leather, the other luxurious floral tapestry, and at a glance, it's hard to tell them from the real thing. What's more, you might say they're better than the real thing since they're both soilproof and practically marproof.

The two textured boards are actually wall paneling, but like other prefinished materials, these boards, in particular, are ideal project materials for making many attractive items for your home.

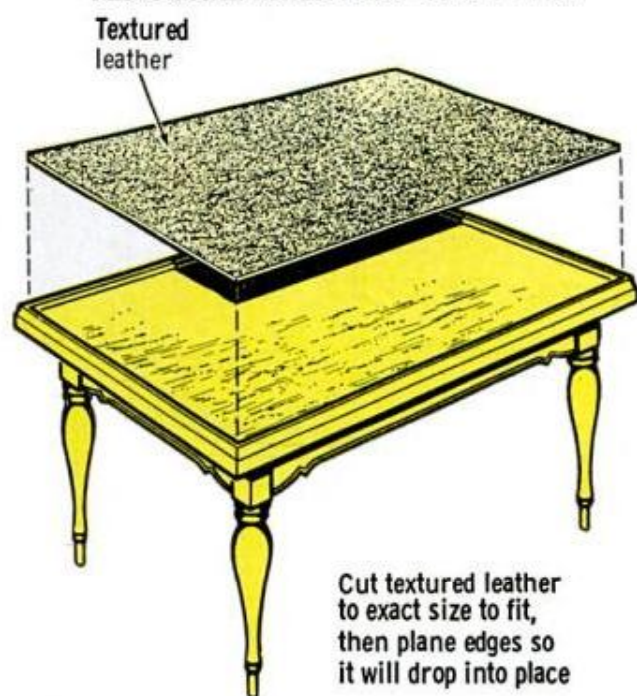
The projects presented here are good examples of how leftovers from a paneling job can be combined with wood to produce such items. The "leather" covered





# from Textured Hardboard

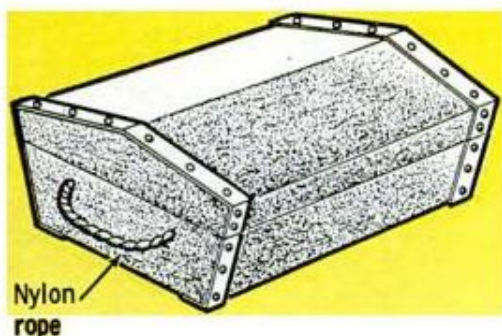
## TEXTURED LEATHER TABLE TOP



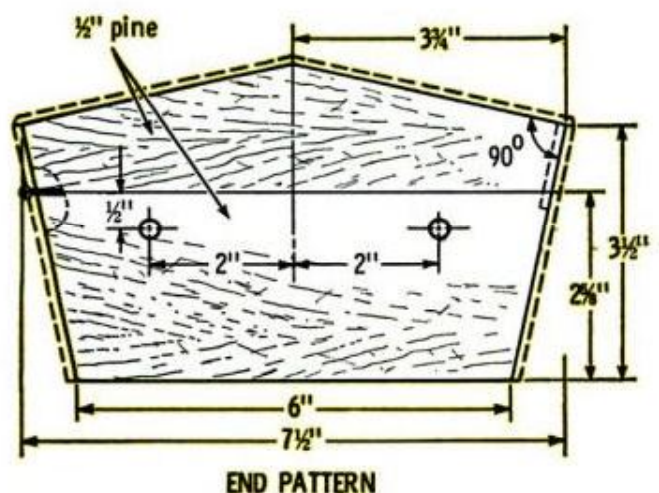
WHEN THE TOPS of occasional tables are marred, rich-looking leather hardboard provides a quick and simple way of adding a new finish. Even serves as a good substitute when a glass tabletop gets broken



TEXTURED TAPESTRY. Looking more like hand-woven fabric than mere hardboard, amazing board captures beauty of classic floral designs in minute detail. Soilproof plastic finish wipes clean with damp cloth



jewelry chest with its metal trim makes a handsome piece that turns out to be more durable than if covered with real leather. A fingernail rubbed hard across the surface will not mar it and it wipes clean with a damp cloth. Leather hardboard also makes perfect tabletops. It's available in 4x8-ft. panels, 1/8-in. thick, and comes in four colors: white, beige, light brown and dark brown.

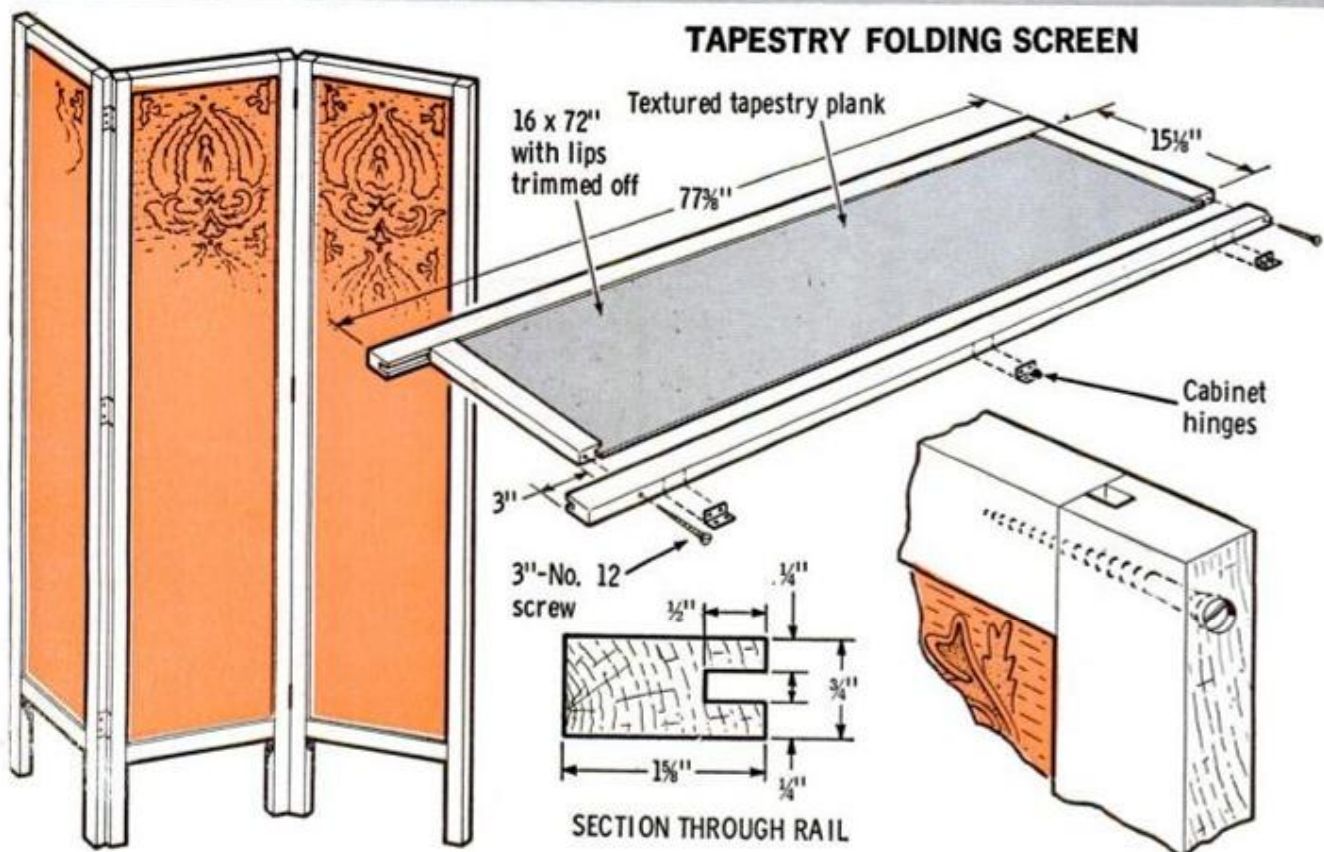
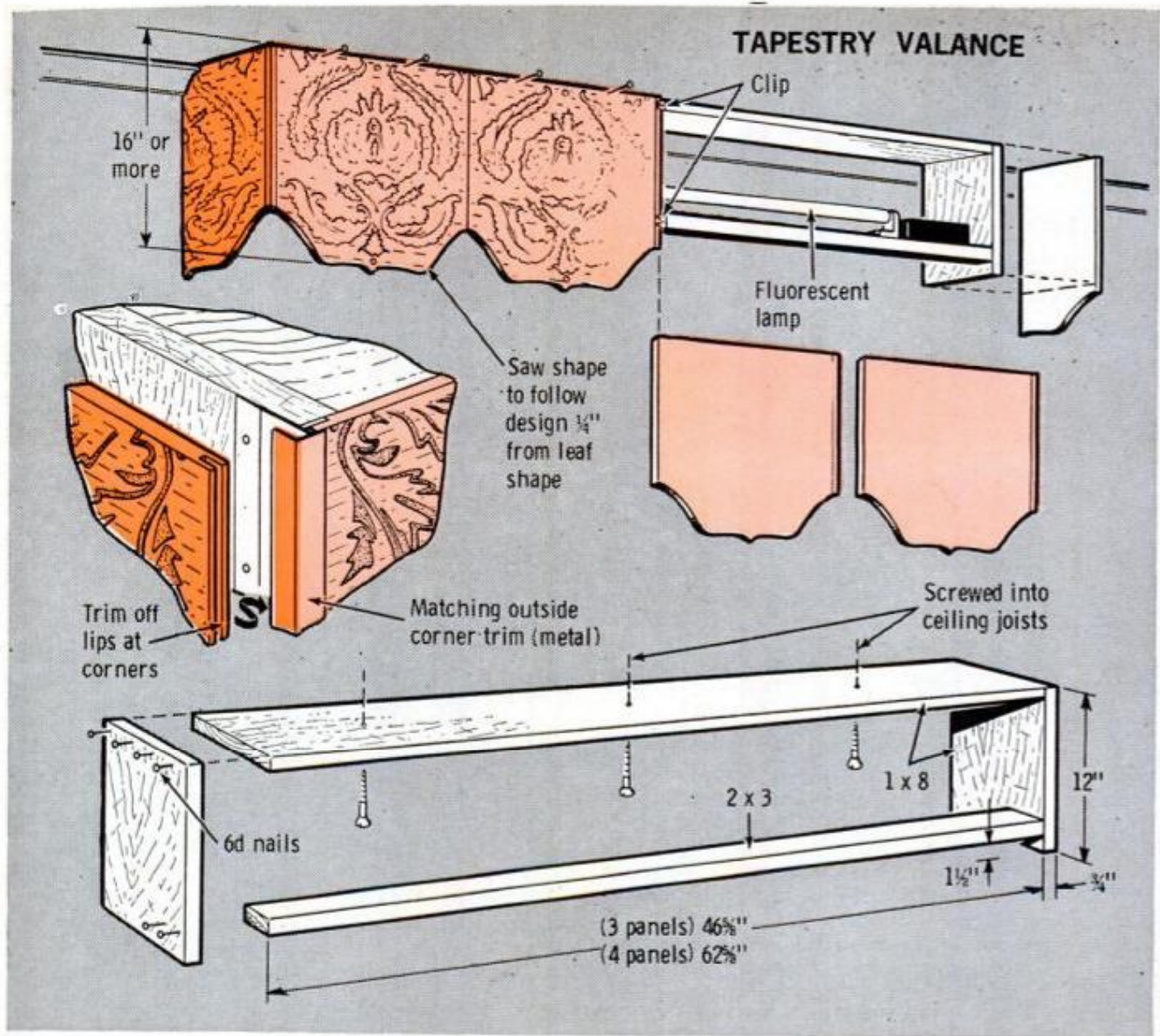


As for tapestry hardboard, it's ideal as a "fabric" covering for window valances, inserts for folding screens and panels for headboards, to name a few. It comes in tongue-and-groove planks 16 in. wide, 8 ft. long and 1/4 in. thick, with a choice of three colors: gold, green and red.

## JEWELRY CHEST

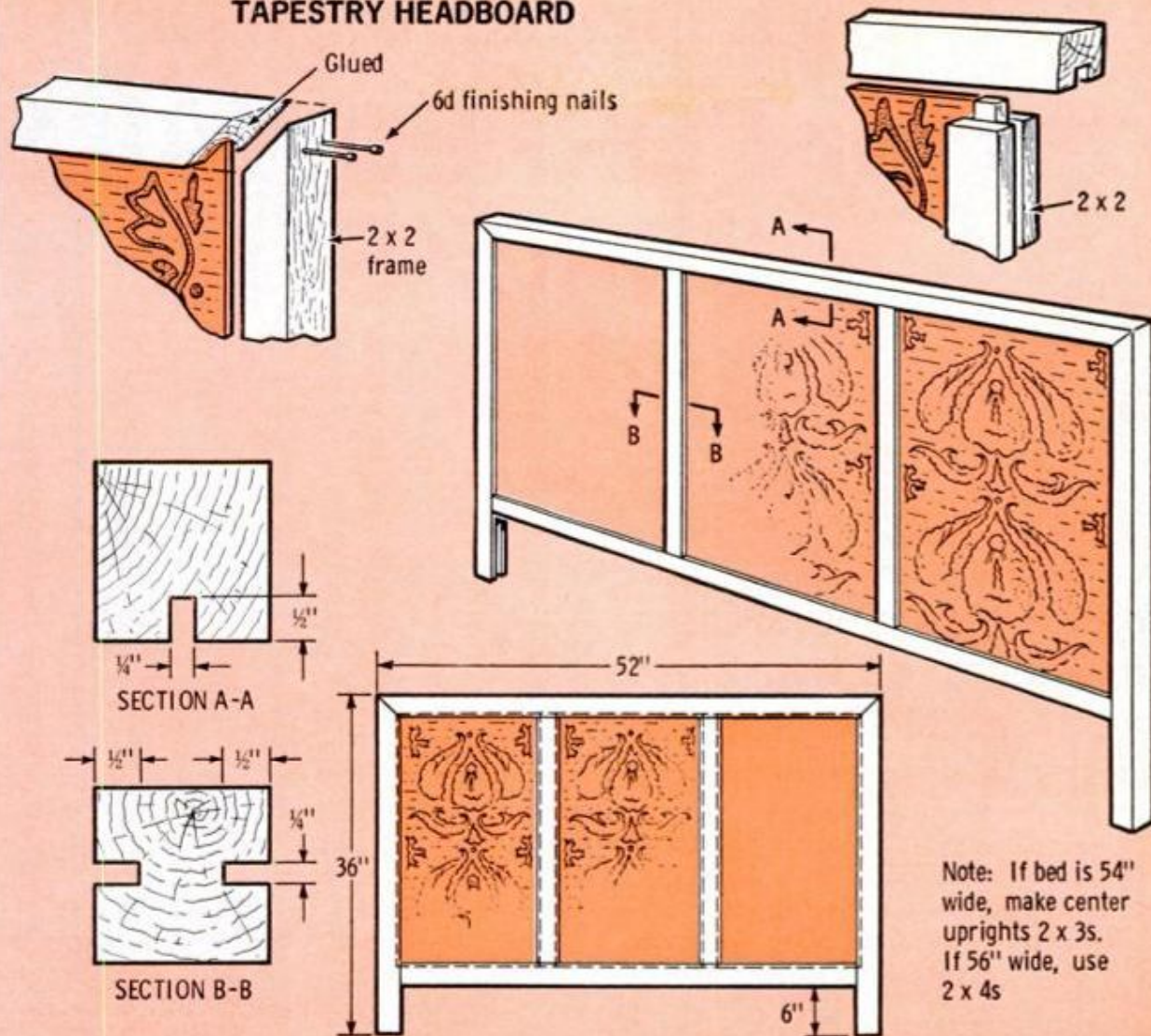
To make the chest, you start with the 1/2-in. wooden parts which include the bottom and the two ends. As shown in the detail at the left, the latter are first cut as whole ends, bored for the rope handles and then ripped in half. Box and cover become two separate assemblies. It's a good idea







## TAPESTRY HEADBOARD



Note: If bed is 54" wide, make center uprights 2 x 3s. If 56" wide, use 2 x 4s

to rip both ends at one time so they'll be alike and the cover will fit accurately.

The wooden ends are nailed to the bottom board first with 1-in. brads driven up through the underside. Note that the two long edges of the bottom are beveled to conform to the slant of the ends.

The textured leather is applied to the sides first, then the ends, using glue only. Again, note that the side pieces are beveled.

The leather is applied to the cover in the same order, first the sides and top, then the ends. Strips of 1/2-in. quarter-round are added to both halves of the chest to attach the hinges. These have to be beveled a bit to make them level with the top of the box. A lip is formed along the front edge of the cover with a hardboard strip glued to the inside.

The brass or aluminum banding not only adds a decorative touch, but covers the lapped joints of the leather. Studded upholstery tacks are used to nail it in place,

with four rubber tacks being used to hold it to the bottom. The chest is completed by poking nylon rope through the holes and either knotting or gluing the ends.

## LIGHTED VALANCE

Here, as with the jewelry box, the textured tapestry is applied over a simple wood framework. Its length should be the multiple of three or four panels (16 in.) to retain the full width of the floral pattern. Likewise, the depth should be at least 16 in., with the scroll edge cut about 1/4-in. outside the leaf pattern.

Lapped corners of the hardboard are concealed with pieces of standard metal molding which are designed as trim for outside corners and come in colors to match the tapestry used.

The front panels are applied first, then the molding and then the end panels. You can use either the clips that come with the paneling or a glue to attach the

*(Please turn to page 220)*



# Repairing Drywalls:

# Rx for POPPED NAILS, CRACKS and HOLES

By STEVEN J. HOWARD

Illustrations by Don Evans

**As with ailments requiring a doctor's care, each of these common problems can be cured by a specific remedy**

**T**HE Rx IN THE TITLE isn't there just for aesthetics, but rather to acknowledge that owning a home today demands that you be much more than just a homeowner.

Indeed, you, as a typical *PM* reader, are an engaging combination of electrician, carpenter, remodeler, designer, plumber, mechanic, gardener, machinist, photographer and, of course, medical practitioner. Don't mistake the last—sure, you practice first aid when necessary, but we're talking

now about your ability to diagnose and treat common household problems. Thus here are the proven Rx for popped nails, cracks and holes in drywalls.

Nail popping is perhaps the most common of these three and occurs for one of two reasons: Either the plasterboard wasn't nailed properly when the walls or ceiling was first installed; or the studs have shrunk and squeezed out the nails.

First, it's necessary to reinforce the area, thereby taking pressure off the popping nail. Begin by driving a 1¼-in. annular-ring or drywall nail about an inch and a half above or below the nail that's popped. This provides the extra holding power needed to resist the outward forces working against the nail.

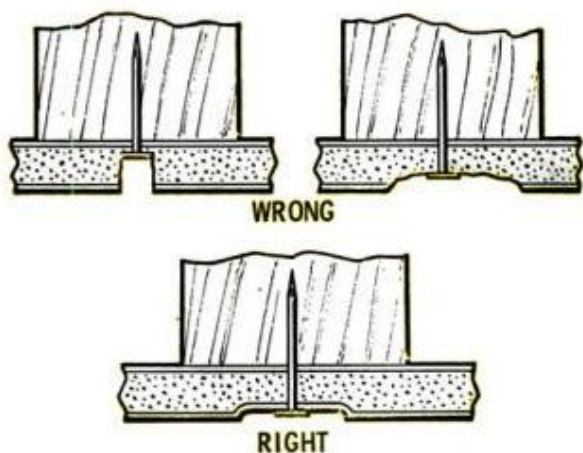
While hammering, apply pressure against the drywall to bring the panel flush with the stud. On your last blow with the hammer, slightly dimple the surface of the board, driving the nailhead just below the wall surface. Then do the same with the popped nail. If it's stubborn and won't sink, use a nailset and then dimple the panel.

Don't, however, go wild and send the nail completely through the board. Nor should the dimple be so deep as to rip the paper surface of the board. If too deep, plaster inside the board will crumble and reduce the nail's hold.

**MATERIALS YOU'LL NEED** are joint compound for dimpled areas and bad cracks, spackling compound for small cracks and joint tape for masking badly cracked areas





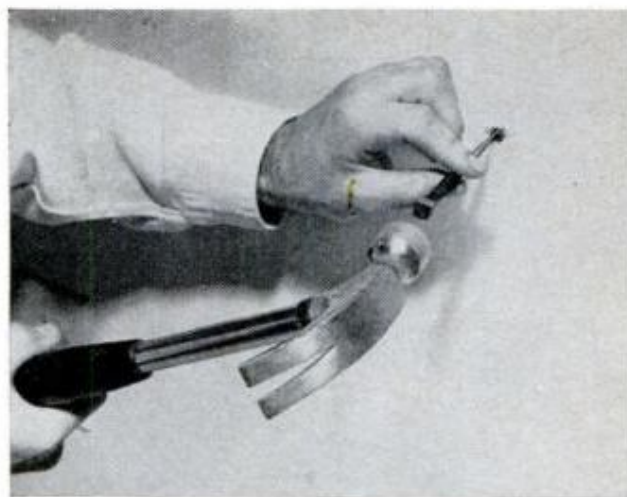


**THERE'S ONLY ONE RIGHT WAY** to dimple a nail in a drywall panel. Go through too far with a nailset and the panel will tear loose before long. Wield hammer too heavily and the gypsum will crumble

The patching material to fill the dimpled area should be a good grade of joint compound. It comes ready to use or in a form that you mix yourself. If you choose to use the powdered material, make sure you follow the mixing instructions on the package to the letter. Success or failure of the repair depends in good measure on the consistency of the compound.

To test the compound you mix for proper consistency, scoop up a hefty amount with a broad-bladed putty knife and then turn the knife over. The mixture should stick to the blade for a few seconds before dropping off.

If the compound has been mixed too thin, it will run off like cake batter. If too tacky, it will adhere to the blade for more than a few seconds. In either event, don't



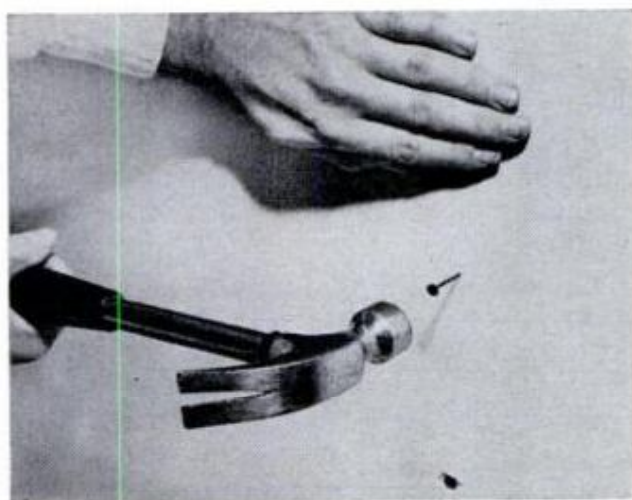
**RESET POPPED NAILS** by driving them back into the wall studs. If nail proves stubborn and won't take hold, use a nailset. Then dimple the area around the nailhead as shown in the sketch at left

try to thicken or thin the bad batch. Mix a fresh supply.

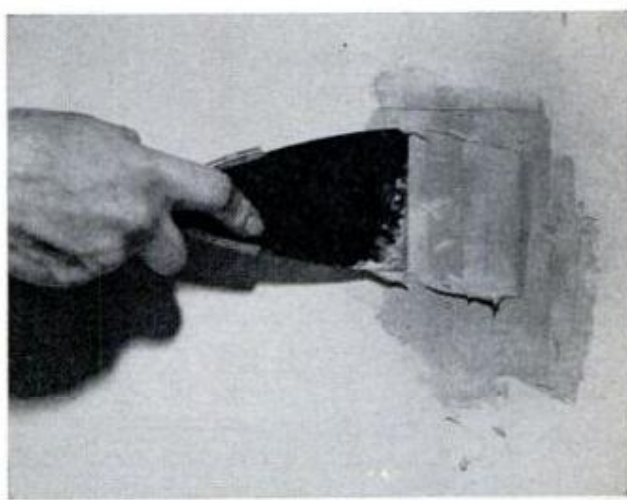
Use the knife to apply the joint compound over each nailhead, filling the dimpled areas completely. Then scrape off the excess by pressing firmly on the knife to level the compound with the wall surface.

Let the repaired areas dry overnight. The next day, the compound should appear chalky white and also should have shrunk slightly, forming a small indentation. Apply another coat of joint compound. Let it dry and lightly sand the area. Then follow with still another coat of compound, letting it dry and again sanding. When the areas are perfectly smooth, apply paint.

Cracks in drywall represent another homeowner's plague. They are often found around door and window frames, where

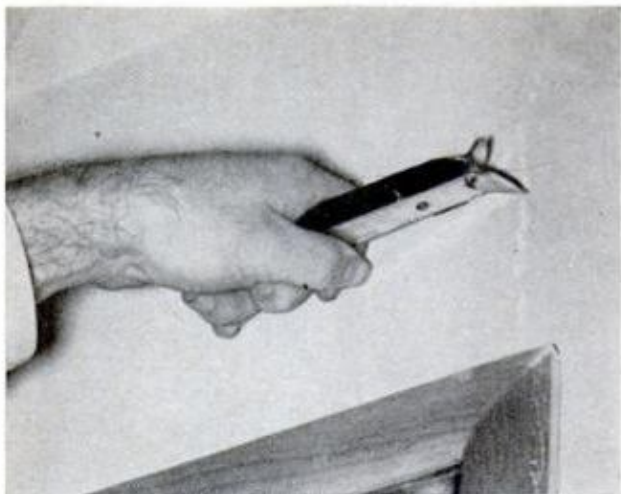


**REINFORCE THE AREAS** surrounding the popped nail by driving in another nail about 1½-in. above or below the troublemaker. Dimple the panel where new nails have been added, then prepare joint compound



**FILL DIMPLED AREAS** with joint compound. When first applied, compound will be gray in color; when thoroughly dried, it will change to white. Sand and apply another coat. Let dry, sand again and paint





**WIDEN THE CRACK** so the filling material will find a solid footing. Probably the best tool you can find for the job is a beer-can opener. Use only moderate pressure, however, then brush the opening clean

they've been produced by normal settling of the house as well as by expansion and shrinking of framing.

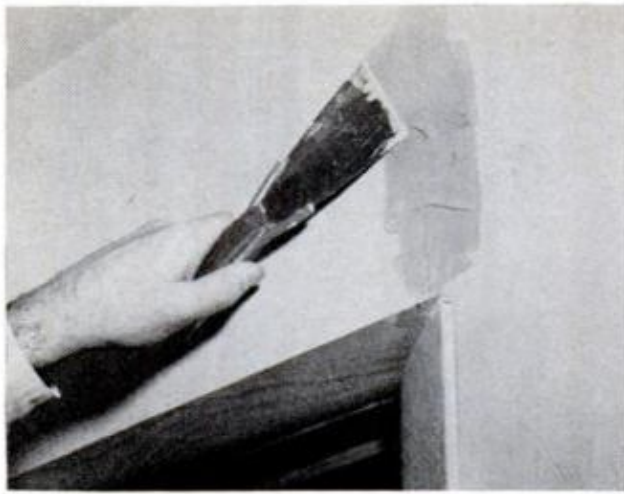
Eventually, every house will settle to a point where drywalls will no longer be affected. Thus, if you have an older home, you can probably get by with just a simple repair of cracked areas.

First, widen the crack and brush it out so the repair compound can find a good footing. If the surface is rough, sand lightly.

Spackling compound is the repair material and, like joint compound, it comes ready-to-use or in mix-it-yourself form. Fill the crack with spackling compound, bringing it out beyond the edges of the crack. Scrape off any excess and, using a damp sponge, wipe down the area. This assures that the compound will dry rela-



**IF THE CRACK REAPPEARS** soon after spackling, a more drastic repair must be made. Open the crack again, but this time use joint compound as the fill material. Then press on joint tape as detailed



**APPLY Spackle** as detailed in the text. Remember that Spackle is a filling material only, and should not be used in place of joint compound, especially if the crack should require patching with joint tape

tively smooth, eliminating the need for heavy sanding.

Let the compound dry for a few hours, sand lightly, then apply another coat. This time, however, feather the edges; that is, bring the spackling compound out about 1½ in. beyond the damaged edges before smoothing it off into the wall. Again wipe the area with a damp sponge. When completely dry, the area can be sanded lightly, then painted.

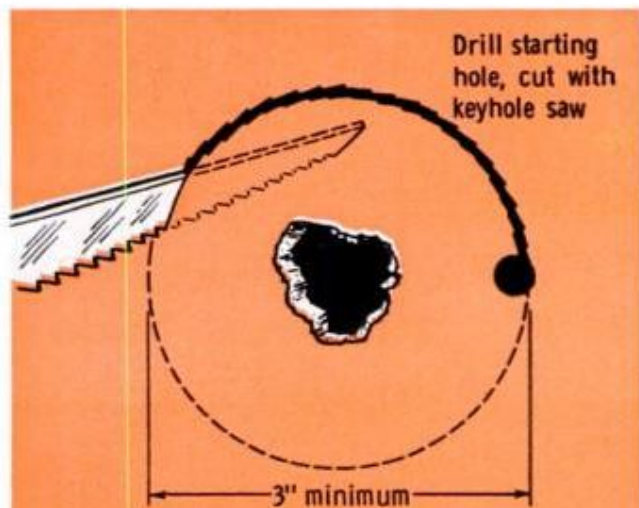
If a crack should appear soon after the job's done, the remedy—more drastic—calls for *covering* the crack, *not* filling it.

To do this, apply a good bit of *joint compound* over the crack, bringing it out about 2 in. beyond the edges. Then cut a length of 2-in.-wide drywall joint tape to size and press it immediately into the fresh compound. Use a broad knife to smooth out any humps or wrinkles.

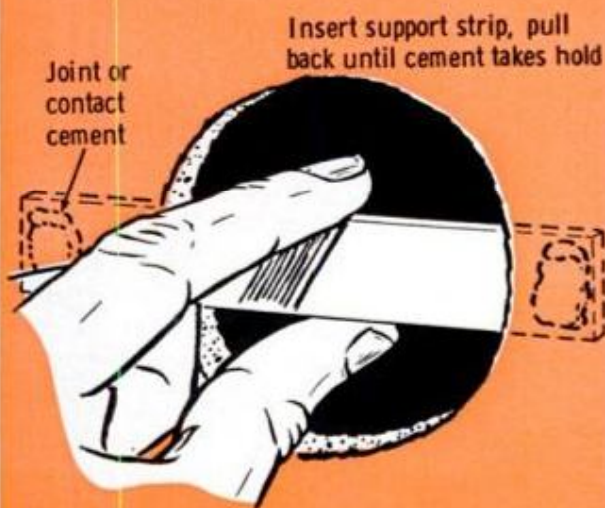
With the tape in place, apply a covering coat of joint compound and remove any excess by drawing the knife evenly across the surface. Let the compound dry overnight and then apply a fresh coat of compound, making sure to feather it 1½ in. beyond the edges of the previous coat. Allow this to dry thoroughly and lightly sand the entire area. Finally, apply one more coat of compound, bringing it out 2 in. beyond the preceding coat. Let it dry, sand lightly and paint.

Another material you might consider whenever crack repairs are necessary consists of an adhesive base and a thin fiberglass tape that's ¾ in. wide. Although this is somewhat easier to use, it is a bit more expensive—costing about \$4

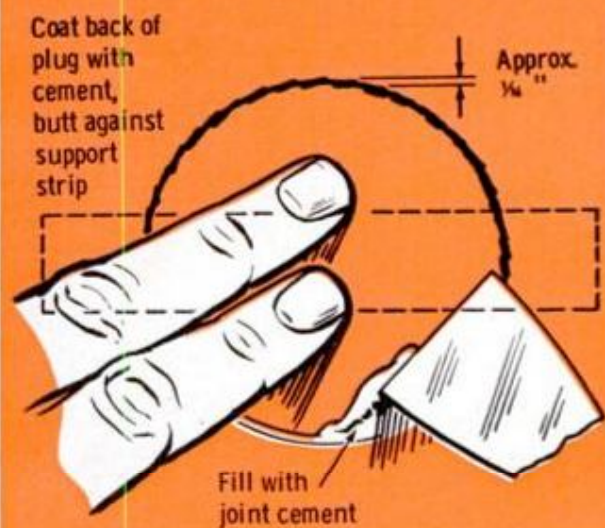




**FIRST STEP:** scribe a circle around the hole using a compass, coffee cup or other suitable object. Drill a starting hole and carefully cut out the circular area with a keyhole saw



**SECOND STEP:** prepare a support or backing strip that's at least 2 in. wider than the hole, but narrow enough to hold with fingers. Cement in place, allow ample drying time



**THIRD STEP:** place a generous coat of joint compound on the back of circular plug before pushing it up against the support strip. Then fill and tape the same as with bad crack

for a quart of adhesive and a roll of tape.

Holes are just as easy to fix, once you've the hang of it. The secret is to make the repair using a plug of scrap drywall material. First draw a circle around the hole. It should be at least 3 in. in diameter—larger, of course, if the hole itself is larger. You need at least a 3-in. hole to get working room for your fingers. A coffee cup, by the way, is a good pattern for the circle.

Use a keyhole saw and cut out the piece outlined by the circle just drawn. Then take a piece of scrap drywall with the same thickness as the drywall being repaired and cut out a circular plug about  $\frac{1}{16}$  to  $\frac{1}{8}$  in. smaller in diameter.

From that same piece of drywall, cut a rectangular backing strip at least 2 in. longer than the diameter of the plug. Thus, if the plug is 3 in. in diameter, the backing strip should be at least 5 in. long. The width of the strip isn't too important. It should be strong enough to resist bending and cracking, yet narrow enough to hold in place after it's in the wall.

Cover the ends of the strip with a generous amount of joint compound or contact cement and insert the strip into the hole. Then pull it toward you until it lies flat against the inside surface of the wall. Hold it there until it takes hold and then let it dry thoroughly.

You can also hold the strip tight against the inside wall by using a strong rubber band and a piece of scrap 1x2-in. stock. Before inserting the strip into the wall, slip or tie the rubber band around the center portion of the strip. Then insert the strip, slip the piece of 1x2 in the exposed loop and twist it until it pulls the strip tight against the inside surface. If necessary, add spacers between the 1x2 and the wall to maintain pressure on the strip.

After the cement on the strip has dried, coat the back of the circular plug with more joint compound or contact cement. Place it in the hole and push it back until it butts against the strip.

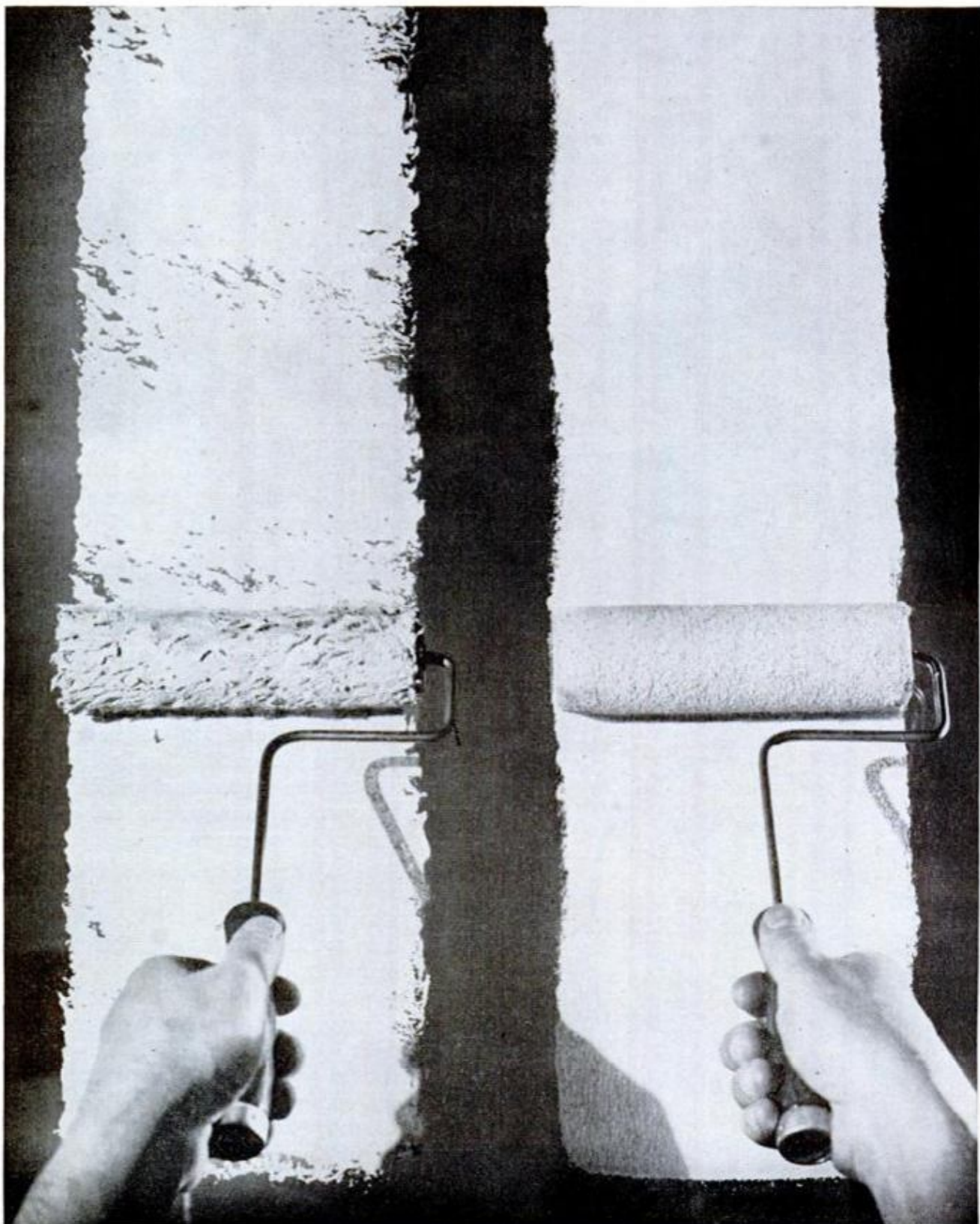
Let everything dry overnight and then fill the crack between the wall and the plug with joint compound. Cover the patched area with strips of joint tape, apply more compound and allow it to dry.

Sand lightly, apply another coat of compound over the entire area, and let this dry. Sand once more, apply a final coat of compound and smooth it out well. When dry, sand lightly and paint. ★★★



# What You Should Know

Team up the right roller with your choice of paint, match it to the wall surface, and you can be sure of turning out a successful job. Here's how to do it





# About Paint Rollers

By B. W. POWELL *Technical Art by ZIK Associates*

**F**EW WEEKEND PAINTERS appreciate just how important it is to start out a job with a paint and paint roller which are properly matched to each other and to the surface to be painted.

To illustrate, let's suppose you want to paint an interior wall having a sand-finish plaster surface. Referring to the chart on the next page, you'll note that there are seven basic paint types that will yield optimum results. From this relatively broad selection, let's assume you choose a flat, latex-base paint.

Now, reading across the chart to the box under flat, latex-base paint, you'll find that only two roller fibers are recommended—Dynel and mohair. (Dynel is a synthetic fiber made by Union Carbide Corp.; mohair is the hair of a species of goat.) A roller having fibers of either type completes the right three-way combination for your hypothetical painting project. The reason for such a choice of rollers is in the nature of the fibers themselves.

Today's roller covers fall into two broad types—those with synthetic fibers and those with natural fibers. Each type has advantages under certain conditions. No one fiber is best for all occasions.

However, most natural fibers and many synthetic fibers absorb water, a fact of

particular importance when you plan to use a water-base or latex paint. Such fibers will "pulp up" causing the roller to lose its efficiency.

Dynel fiber is impervious to water. To a slightly lesser extent, so is mohair. Thus, one of these would be the choice when applying a water-base paint.

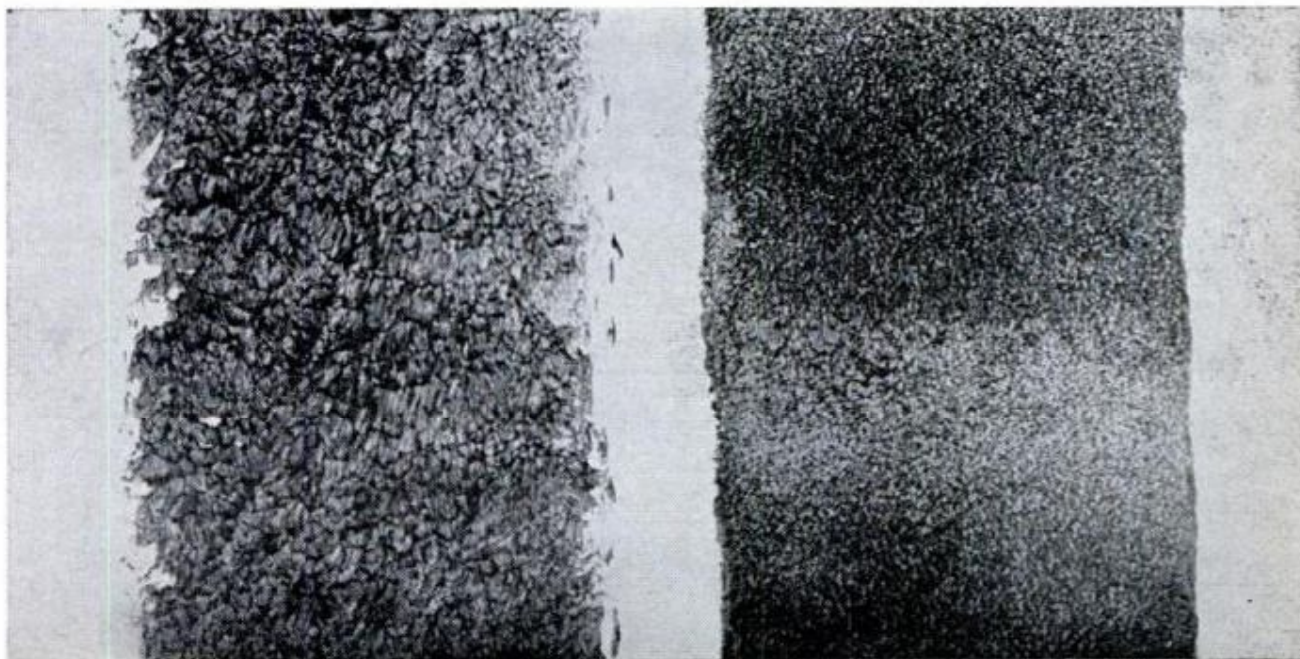
The length of the fiber, or nap, is also important. A good rule of thumb is "the smoother the surface, the shorter the fiber." Almost all of the interior painting situations listed in the chart refer to naps of  $\frac{1}{4}$  to  $\frac{3}{8}$  in. Heavy Spanish plaster requires a longer nap, and as you move up to stucco and cement block, naps up to  $1\frac{1}{4}$  in. long may be required for best results.

Using a short nap on a rough surface results in "skips" or background show-through, since the fibers are unable to reach to the bottom of all the irregularities.

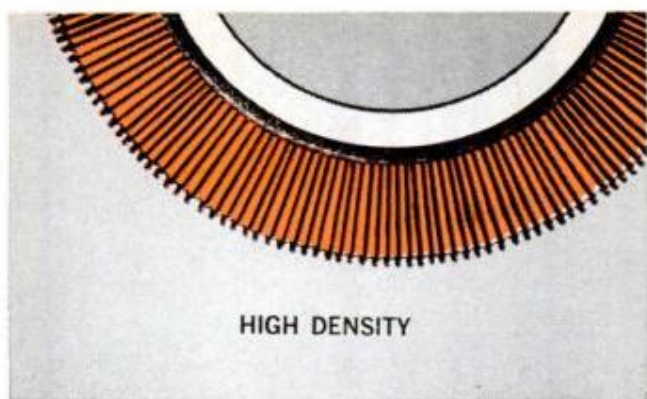
Another point to consider is how densely the fibers are distributed on the roller. Cheap rollers often have too few fibers per square inch to pick up the paint, hold it and meter it out properly to the surface.

A too-dense nap is just as bad. Here, capillary attraction and other factors make it difficult for the roller to give up

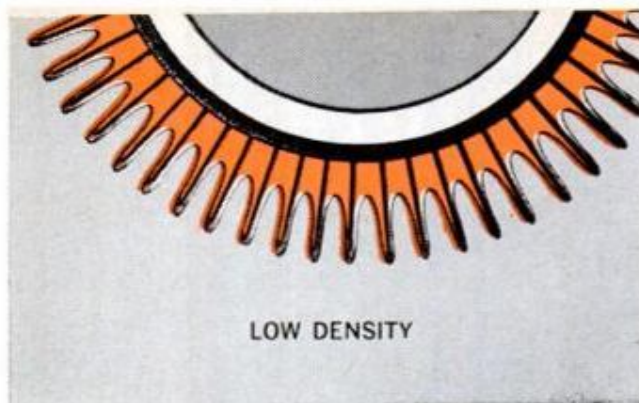
**BACKLIGHTED VIEW** of paint rolled on glass contrasts a bargain roller, left, with a good quality roller







HIGH DENSITY



LOW DENSITY

**NUMBER OF FIBERS** per square inch is a critical factor. A too-dense fiber arrangement cuts down on the paint-holding capacity of the roller and also interferes with roller's ability to meter out paint evenly

the paint. You can wear out your arm trying to roll the paint onto the surface.

The optimum density for effective painting is neither too sparse nor too dense, but a compromise which allows the roller to pick up and transfer paint in the most efficient fashion.

Remember that fresh paint is up to 70

**SPARSE DISTRIBUTION** of fiber in roller cover is just as bad. When manufacturers skimp on fibers, the roller lacks sufficient elements to flow paint onto the surface evenly resulting in a spotty job

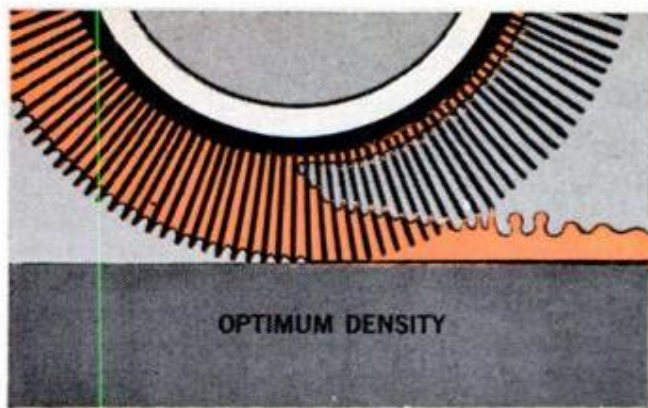
percent solvent. Because of this, a poor paint job will look almost the same as a good one, right after it goes on. It's only after the solvent has evaporated that the truth emerges.

Most of today's paints are self-leveling, but they never level perfectly. The peaks and valleys in the paint film formed as the

## SPEEDY GUIDE TO CHOOSING THE RIGHT PAINT ROLLER

	Alkyd Resin, Flat	Latex-Base, Flat	Interior Wall Primer	Flat Oil-Base	Enamel (Gloss or Semigloss); Floor and Deck Varnish	Enamel (Flat or Satin)	Rubber-Base Texture Paints
Sand-Finish Plaster, Drywall (Interior)	Dynel Mohair	Dynel Mohair	Dynel Mohair	Dynel Mohair	Mohair Dynel Foam	Dynel Mohair Foam	Frieze Carpet
Putty Coat, Smooth Plaster (Interior)	Dynel Mohair	Dynel Mohair	Dynel Mohair	Dynel Mohair	Mohair Dynel Foam	Mohair Dynel Foam	Frieze Carpet
Light Spanish Plaster, Acoustical (Interior)	Dynel	Dynel	Dynel	Dynel	Dynel	Dynel	•
Heavy Spanish Plaster (Interior)	Dynel (Long-Nap)	Dynel (Long Nap)	Dynel (Long Nap)	Dynel (Long Nap)	Dynel (Long Nap)	Dynel (Long Nap)	•
Light Stucco, Smooth Concrete, Flex Board (Exterior)	•	•	•	•	•	•	•
Bricks, Heavy Stucco, Rough Cement, Cinder Blocks (Exterior)	•	•	•	•	•	•	•
Exterior Wood Siding	•	•	•	•	•	•	•
Woodwork	Mohair Dynel	•	•	Mohair Dynel	Mohair Dynel Foam	Mohair Dynel	•
Stippling Surfaces (Interior)	Carpet Frieze	•	•	Carpet Frieze	•	Frieze Carpet	•



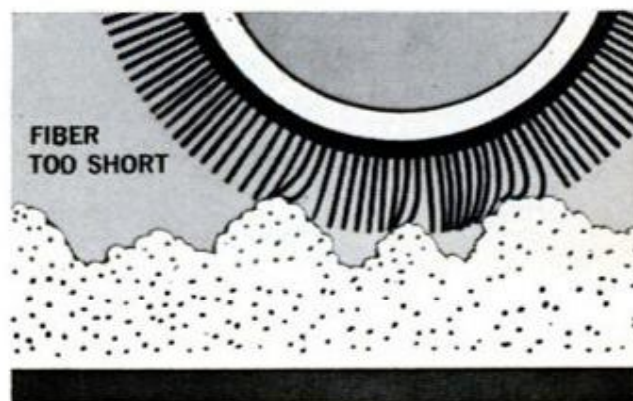


**PROPER NUMBER** of fibers meters out a uniform coat of paint which is relatively smooth as it goes on. Low-density roller flows on coat with high peaks and valleys, resulting in showthrough when it dries

paint is released by the roller simply settle to the surface being painted. Thus, the bottom of a valley may look the same as a peak while the solvent is still present, but turn into a spot of "show-through" once the solvent has passed off. This type of failure is offset by the smoother flow put out by a roller of the proper density.



**WHEN FIBER LENGTH** is properly matched to surface roughness, roller cover reaches bottoms of surface irregularities, as shown in this magnified sketch, for smooth, uniform coating without "show-through"



**WHEN FIBER LENGTH** is not matched to surface roughness, roller cover fails to reach bottoms of valleys in rough surface. Result is spotty coating with "show-through" or "holidays" when wet paint dries

Shellac; Satin or Exterior Varnishes	House Paint; Exterior Trim Enamels	Exterior Rubber- Base PVA	Clear Water- proofing
•	•	•	•
•	•	•	•
•	•	•	•
•	•	•	•
•	Dynel Dacron	Dynel	Dynel
•	1 1/4" Long- Nap Dynel	1 1/4" Long- Nap Dynel	1 1/4" Long- Nap Dynel
Mohair Dacron	Dacron Dynel	•	•
Mohair Dacron	•	•	•
•	•	•	•

Properly cared for, a good paint roller will last through many jobs. However, this doesn't mean you have to clean it the minute you stop painting. If the project takes more than one day, just wrap the roller in foil or slip it into a plastic bag and store it in the refrigerator overnight. It will be damp and ready to go when you start again in the morning. When the job is completed, give the roller a thorough cleaning with the proper solvent. Then remove the roller cover from the frame and hang it up to dry.

#### Stand on end only when dry

Never stand a roller on end to dry. It will continue to ooze paint and solvent, and you'll wind up with a dried paint rind ruining one end. Instead, tie a small dowel or pencil to one end of a short length of twine and slip the roller over the twine until it rests on the dowel. Then take it outside and hang it where any paint which oozes out will drip harmlessly to the ground. When dry, the cover should be stored on end. ★★ ★



# New tools you should know about



## Hand tool drives 15 nut sizes

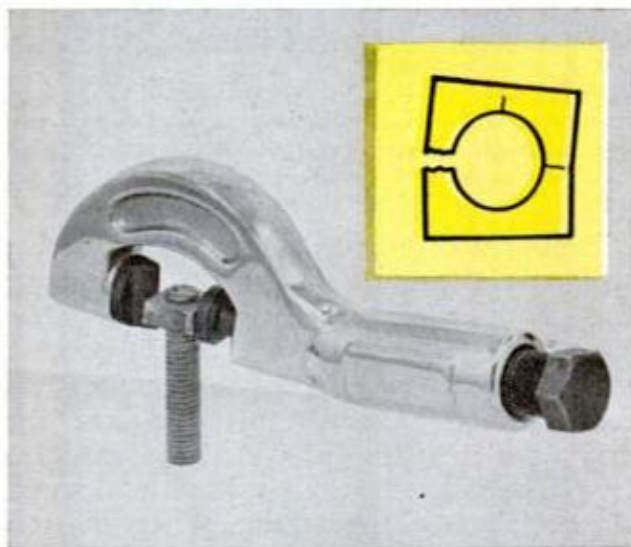
Featuring a six-finger collet chuck, the Hex-a-Matic tool from Stanley adjusts to any of 15 standard nut sizes, automatically locking in position when the driver is pushed down. Accommodates five hex-nut sizes from  $\frac{1}{4}$  to  $\frac{7}{16}$ -in.; five sizes of hex-head screws from No. 6 to  $\frac{1}{4}$ -in., and five socket-head cap screws from No. 8 to  $\frac{5}{16}$ -in. Dept. PID, Stanley Works, New Britain, Conn. 06050.

## Quick-setting nut remover

Here's a tool to remove a troublesome nut without damaging the bolt or stud. Called the Nut Buster, it will handle nuts from  $\frac{5}{16}$  to  $\frac{13}{16}$ -in. (measured across the flats). When a wrench is applied, about 25,000 lbs. of pressure is developed to crack the nut. It's made by Roycraft Industries, 1020 E. 79th Terrace, Kansas City, Mo. 64131.

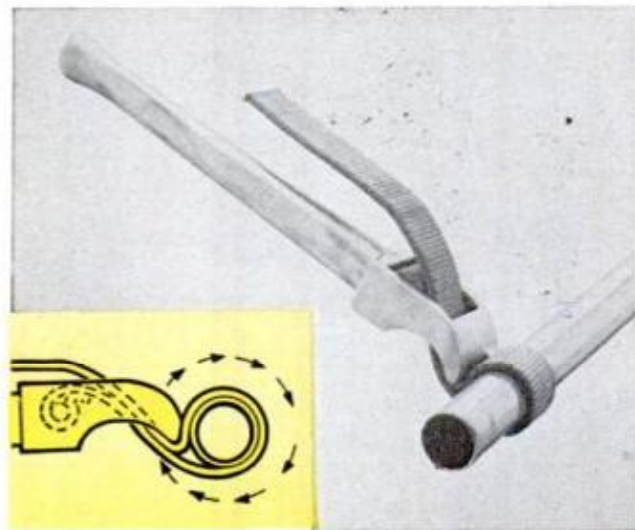
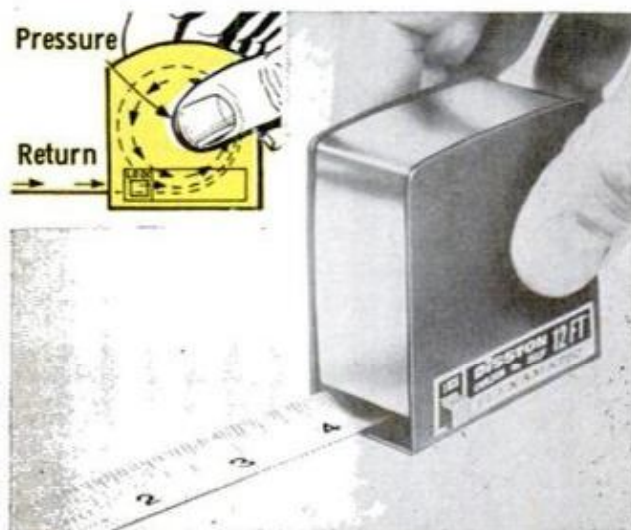
## Case triggers rule return

Available in lengths of 10, 12 and 16 ft., the Flexamatic rule has a molded nylon case that, when squeezed, acts as a return spring to trigger blade retraction. To prevent the accidental return of the blade when measurements are being made, a pushbutton is used to nullify the spring return mechanism. Made by H. K. Porter Co., Inc., Porter Bldg., Pittsburgh, Pa. 15219.



## Lightweight strap wrenches

Two aluminum alloy strap wrenches from S-K Wayne Tool Co., 332 So. Michigan Ave., Chicago, Ill. 60604. Weigh only half as much as conventional types, yet do so without sacrificing strength. Ideal for non-marring use on plated tubes, the 12-in.-long wrench has a capacity of  $\frac{1}{2}$  to 2 in., while the 18-in. wrench handles 1 to 5-in.-dia. tubes.





# How you can install an illuminated ceiling

You can turn the entire job over to a contractor and pay an arm and a leg—or you can complete the basic installation and then proceed at a leisurely pace to suit the time, and the cash, you have to spare

**O**NCE UPON A TIME, the barest remodeling of a basement, kitchen, bath or attic would have required many days, and many dollars, spent just in the preparation of a subceiling. Joists or rafters would have to be hidden, wiring for lights would take hours, even installing the basic lighting fixtures often meant “dinner’s delayed for Dad.”

All this—and more—for just a subceiling that had yet to be tiled, papered or, worse still, covered with a skin of plasterboard (which meant cutting awkward boards, fitting and refitting each piece, filling the joints, sanding the filler, painting the ceiling, shying at sags and praying the house wouldn’t settle any more).

Luckily, that tale of woe has ended. Deft designers using modern materials have afforded us with innumerable innovations and praiseworthy products that not only make the job easier, faster and less costly, but also impart





**SCREW OR NAIL** the angle molding around the perimeter of the room. Use a carpenter's chalkline and a reliable level to make certain that angles on each of the walls are aligned and perfectly level



**DETERMINE THE LOCATION** of the main grid members and screw eyehooks at least an inch into the joists or ceiling structure. Place these directly above the holes drilled along the length of the member



CUT  
FOLD  
TAPE

ILLUMINATED  
CEILING

**ATTACH LENGTHS** of No. 12 or No. 14 ga. wire to each eyehook and run the other end through the holes in the member. No need to be fancy—just bend wires over and twist until tight. Double check height

a bit of fun into the installation process.

Not too many years ago, one such concept, the suspended ceiling, was introduced to the acclaim of homeowners and housebuilders alike. One thing led to another, the question of lighting was raised, and before too long, illuminated ceilings were being installed during the construction of new homes.

This, however, left the home remodeler with the sole alternative of devising his own method of mounting and wiring fluorescent lighting fixtures, tacking up a panel here, hanging another there and, in general, jury-rigging the entire job until he had, finally, an illuminated ceiling.

Today, however, thanks first to the suspended ceiling concept, and second to the development of another new product, any homeowning remodeler can become his own lighting expert. Starting your own illuminated ceiling actually begins with the installation of a suspended ceiling (loosely



**FOLLOWING THE HANGING** of each main member from wall to wall, snap in the cross members to produce a grid system comprised of 2x4-ft. sections. Check that grid is level and that all wires are tight

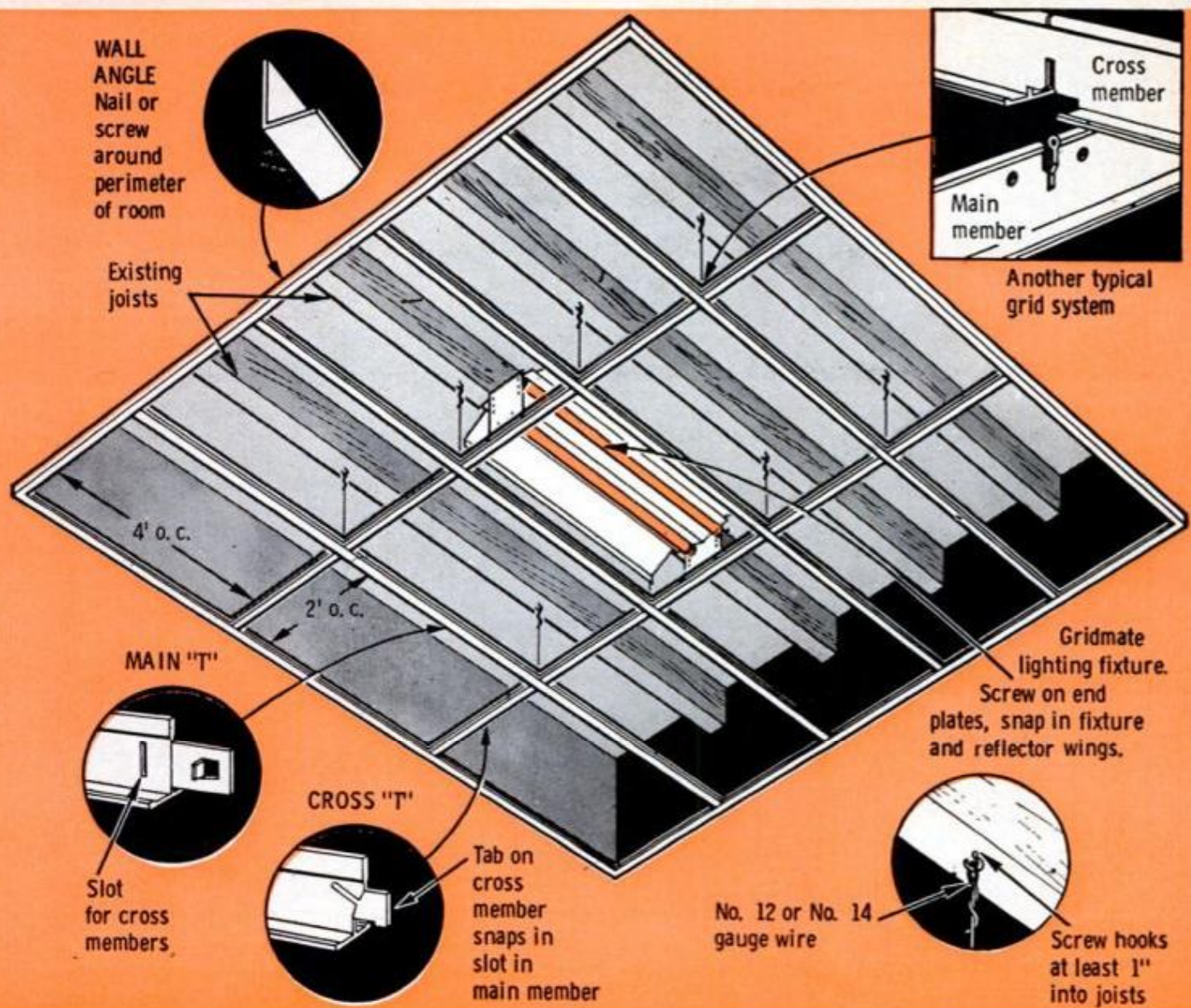
defined as any number of 2x2-ft. or 4x4-ft. ceiling panels supported in a metal frame or grid network, and hung from the ceiling or joists by wires or straps).

Once the grid is in place, it then becomes a simple matter of clamping on as many lighting fixtures as you wish, be it two or a dozen, then adding suitable luminous plastic panels.

The idea of a lighting fixture that can be put up in minutes without drilling (and even moved from panel to panel months later) can really be appreciated when you consider that:

- You could install the grid and start off with just one fixture, then add as the budget allows, until you have a fully illuminated ceiling.
- If you should decide only a few strategically placed lights are needed for the room, you can locate them where they will do the most good (including hard-to-light areas like alcoves, corners and other





odd-shaped sections). Then if your wife should decide your den corner belongs on the other (unlighted) side of the room, or if a future remodeling job should include a room division, you won't need more than a few minutes to remove and reinstall the lights to suit the new layout.

Sounds intriguing, doesn't it? But even more noteworthy is the reasonable cost involved. Depending upon your geographic location, you can expect to pay \$60 to \$90 for a suspended ceiling for an average 12x15-ft. room, exclusive of luminous panels. The panels, in turn, will cost from 35 cents per sq. ft. for a plain white frosted design to 85 cents per sq. ft. for a louvered or egg-crate design. Finally, the new lighting fixture, made by the Armstrong Cork Co., and called the Gridmate, will cost between \$15 and \$17. While each Gridmate fixture can be wired according to standard wiring practices, Armstrong Cork is quick to recommend that any

wiring you complete be checked by a reputable electrical contractor.

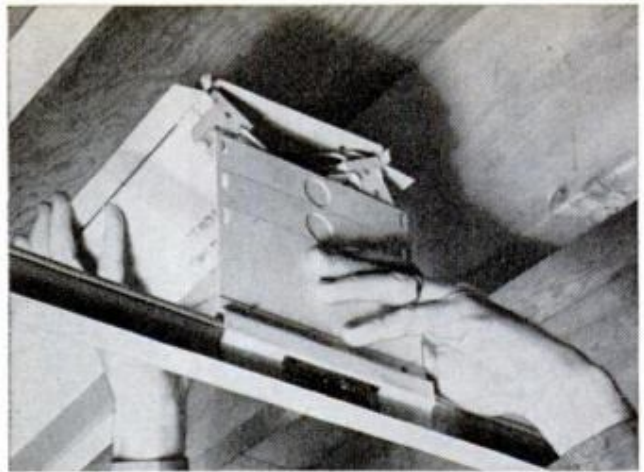
In fact, because wiring codes vary so much throughout the country, it might even be worthwhile to turn the electrical part of the installation over to a contractor. The time he'll require to complete the job should be minimal, as should be the fee. In either event, it's safer to pay for professional advice than to have any insurance claim for a fire possibly negated because the wiring was inadequate.

Depending upon the make of suspended ceiling you purchase, the method of attaching the grid components will vary. They do, however, have one common feature—they simply snap together with tabs, tongues or a similar locking system. If your tastes have you planning a room finished in either rustic or contemporary wood, don't turn up your nose at the thought of the aluminum grids commonly found on the remodeling market. Two al-





**END PLATES** for Gridmate lighting fixtures are locked in the center of the 2-ft. wide grid openings. One advantage of screw-clamp method used is that the entire light can be easily moved later, if desired



**MAIN BODY OF LAMP** is snapped into the slots provided in end plates. There are three sets of slots (5, 6½, 8-in.) so the lamp can be positioned to clear overhead obstructions such as pipes and ducts



**REFLECTOR WINGS** are final items to be added to lighting unit. These help to direct the light properly and also prevent the loss of light due to absorption characteristics of wood above the lamp



**PANELS**, whether decorative, acoustical or luminous, will complete the installation of the new ceiling. Due to low height under the lamps, luminous panels must be slid into place from an adjoining opening

alternatives are feasible: the first being simulated wood-grain beams that just snap onto the grid members (available from Celotex); the second being the imminent development of redwood grids now rumored to be nearing completion.

In answer, then, to the question "How can you install an illuminated ceiling?" the reply is simple: Install the grid first

and then, in order, the lighting fixtures, the luminous panels and either decorative or acoustic panels to fill the remaining openings.

One final note regarding the selection of the type of fluorescent lamps deserves mention. There are actually two types of lamps you're likely to encounter: cool white and warm white. The cool white lamps produce a light similar to natural outdoor light, while the warm white lamps produce light like that of conventional incandescent bulbs. Thus warm white fluorescent lamps are usually best for illuminated ceilings in the home.

In the event you should decide to install a partially illuminated ceiling as shown directly at left, bear in mind the amount of use the room will receive when selecting the ceiling panels. If the room is to be primarily a recreation or children's play area, sound-absorbing acoustical ceiling panels are definitely recommended. ★★★

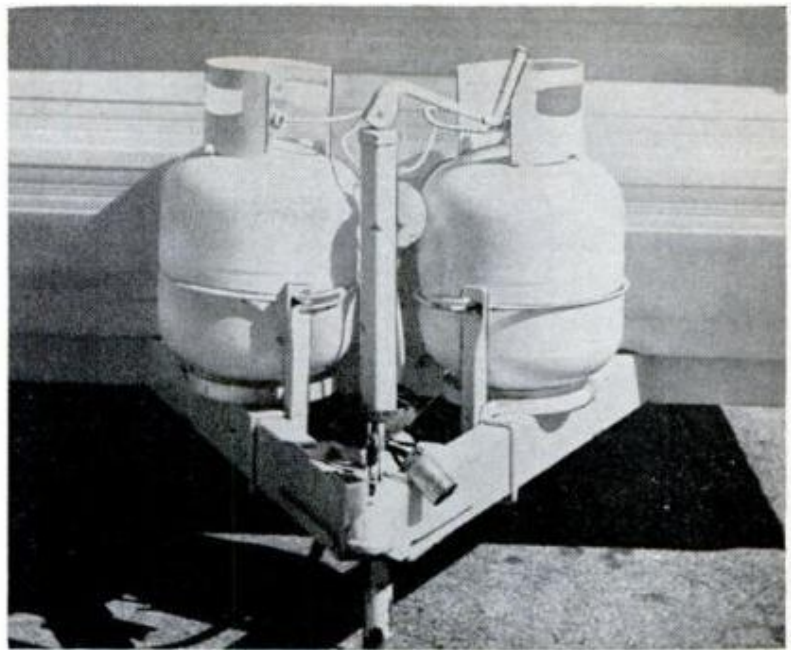
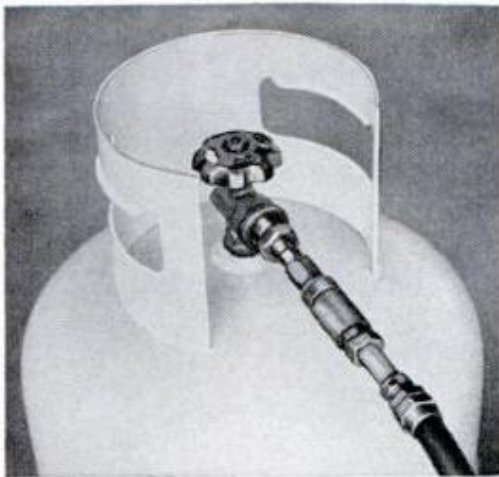
**ATTRACTIVE CEILING** is only partially illuminated





# HINTS

FROM READERS



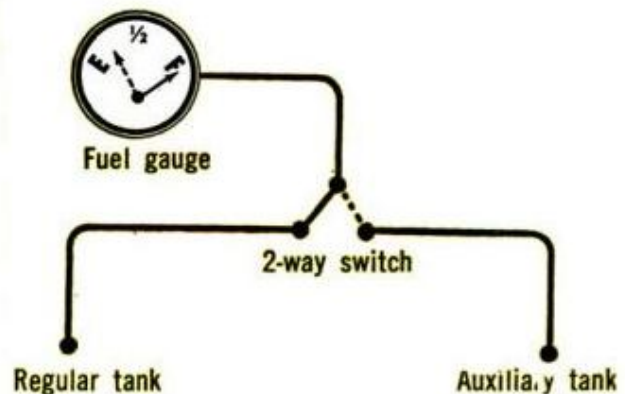
## Portable compressed-air tank made from LP-Gas bottle

If you do much camping in the boondocks with a pickup camper or tent trailer, a handy accessory is a compressed-air tank made from a propane-gas bottle. Filled to 140 lbs. pressure, it will inflate a couple of tires or blow out a clogged fuel line. The tank should be mounted in such a way that it can easily be unclamped from its stand so that you can use it to pump up a soft tire without having to remove the wheel. All that you need for the conversion are standard pipe fittings, an air hose and a chuck. The tank is filled through the opening in the tee, which is equipped with a suitable fitting. Check pressure frequently when filling to avoid going over 140 lbs.—*H. Josephs*

## Twin-tank fuel gauge

If your boat or truck has an auxiliary fuel tank equipped with a float for an electric fuel gauge, you can install a two-way switch in the regular fuel-gauge wire which will enable you to check the fuel level in either tank by flicking the switch. Just splice the switch into the wire from the main fuel tank and connect the float-gauge of the reserve tank to the remaining terminal on the two-way switch. Mount the switch on the dash.

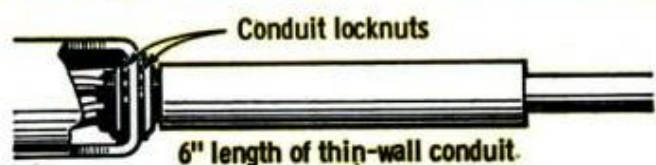
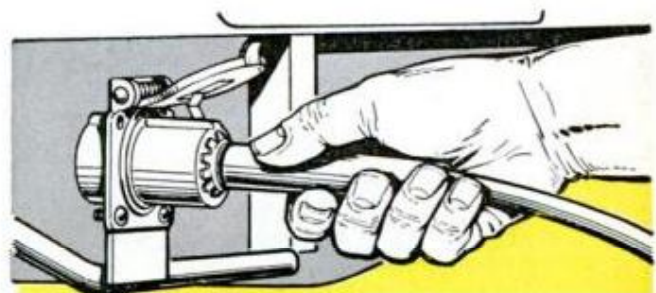
—*Leon Boeck*



## Trailer hookup handle

No more pulling the wiring loose when disconnecting your trailer lighting hookup if you make a simple handle from a short length of thin-wall conduit. Disassemble the plug and insert the conduit into the plug housing. Secure it with a pair of conduit locknuts, one on each side of the housing. Then thread the wires through the conduit handle and connect them to the plug again, adding open-end terminals to assure better electrical contact.

—*Louis R. Hathaway*





# HOW TO PICK THE RIGHT MASONRY PAINT

There are only seven common types of masonry coatings. Know the facts about them and you'll have no trouble choosing one that will be just right for your problem.

By JAMES P. SCHENLEY



**R**AW MASONRY IS DRAB and hard to keep clean. Moreover, it can eventually dust, scale or even crumble under the attacks of moisture and abrasion. The obvious solution to these problems is a masonry coating. But which one?

At first glance, there seem to be dozens to choose from. Actually there are only seven basic types, each designed primarily for one specific use.

For example, old-time *portland cement paint* is still one of the best materials for sealing porous interior masonry walls which have never been painted before. It's inexpensive, easy to apply, alkali-resistant and also resistant to moisture penetration. Its main virtue is the ability to penetrate deep into the surface of cinder block, rough poured concrete, rough brick and porous stucco and seal the surface. The sealer loses much of its value, though, if applied over an old finish. In fact, most manufacturers recommend that if a surface has been previously coated, the old finish should be removed by wire brushing or sandblasting.

Portland-cement paint is a dry powder that you mix with water. The surface to be painted must be dampened and kept damp until the cement in the paint matures, which usually takes 48 to 72 hours.

Cement paint should not be applied over efflorescence—nor should any other masonry finishes. It can cause a finish to fail, so remove it, by washing with a 20 percent solution of muriatic acid (one part of acid to four parts water). After four hours, flush with clear water.



Incidentally, never use cement paint on masonry floors. It can't take the punishment. And remember that cement paint chalks freely when exposed to the elements, so you're probably better off with another type of finish for masonry outside the home. This chalking also makes it tough to apply another paint over it in the future, since a new finish won't adhere to a chalky surface.

The newer, more colorful *latex masonry paints* are designed for use on both exterior and interior masonry surfaces which are well-cured, either painted or unpainted. Separation of these water-thinned paints into classifications such as styrene-butadiene, polyvinyl acetate, liquid-vinyl and acrylic no longer mean much. The various latex products share nearly all the same properties.

Latex paints are alkali-resistant and easy to spread. They retain their color and have good hiding powers. Perhaps their biggest advantage, though, is the ability to prevent moisture from penetrating through them into walls, while still being sufficiently porous to allow moisture from within to pass out and evaporate without blistering the paint film.

Keep in mind, however, that latex paint will not withstand a steady concentration

of water. So, avoid using it where water stands or accumulates, such as in a swimming pool and below grade in contact with soil.

When applying latex, the surface should be dampened and absolutely free of peeling and chalking paint. In cases of extreme peeling or chalking, the surface will have to be sandblasted, but such occasions are rare.

To be on the safe side when applying latex over an old finish, first treat the surface with a penetrating sealer or a masonry conditioner. Latex paints won't adhere to a chalky surface.

Although latex paint is alkali-resistant (meaning it can withstand chemicals thrown off by concrete) it shouldn't be applied to a new masonry surface. The amount of surface alkalinity present will deteriorate a fresh layer of latex. Give new concrete a year or so to weather before coating with latex.

While some latex paints have abrasive resistance qualities, the usual wall paints are not so designed and should not be used where abrasion is expected. If the product isn't specifically labeled floor paint, don't use it as floor paint.

It's also tough to get metal stains off a latex-coated surface, so metal objects in

## MATCH THE PAINT TO THE JOB

WHAT'S THE JOB?	INSIDE OR OUTSIDE?	USE THIS PAINT	PRECAUTIONS
Sealing new or old unfinished masonry walls	Inside	Portland cement paint	<ul style="list-style-type: none"> <li>● Dampen surface before application and keep new finish damp for 48-72 hrs.</li> <li>● Don't use on masonry floors</li> </ul>
Preserving new (but not raw) previously finished masonry	Both	Latex masonry paint	<ul style="list-style-type: none"> <li>● Don't use on new surface; allow aging</li> <li>● Don't use wall paint on floors</li> <li>● Don't apply to areas where water stands</li> <li>● Treat previously finished surface with a conditioner</li> <li>● Prime metal that is close to the surface to prevent metal staining</li> </ul>
Finishing masonry floor	Both	Floor and deck paint (oil-base, rubber-base or latex)	<ul style="list-style-type: none"> <li>● Don't use on vertical surfaces</li> </ul>
Painting swimming pool	Both	Rubber-base swimming pool paint	<ul style="list-style-type: none"> <li>● Don't use on floors</li> <li>● Can be used on masonry walls other than pools</li> </ul>
Strongest coating	Both	Catalyst coating	<ul style="list-style-type: none"> <li>● Expensive, so make sure you need it</li> <li>● Must be mixed thoroughly</li> <li>● Brief pot life</li> </ul>
Waterproof coating for basement masonry	Inside	Silicone-fortified coating	<ul style="list-style-type: none"> <li>● Clear type loses waterproofing advantage if thinned too much</li> </ul>
Water barrier for foundations	Outside	Bituminous coating	





**CLEAN SURFACE** thoroughly with a wire brush before applying fresh paint to previously finished masonry

the area should be primed to avoid bleed-off onto the paint surface.

*Oil-base stucco and masonry paint* has taken a back seat to latex because of its lower resistance to alkali. However, those designed for masonry floors are still valuable.

Some oil-base products generally used as wood paints are said by their manufacturers to be suited for masonry walls. While labeled shingle and shake paint, the label states that they also can be used for masonry. Frankly, both latex and portland cement paints offer greater advantage from an alkali-resistant standpoint.

Oil-base paints designed specifically as floor and deck enamels are something else, however. They contain resins to improve resistance to alkali and have excellent abrasion-resistant qualities.

*Solvent-thinned rubber-base paints* provide good resistance to alkali, do not allow water penetration and resist abrasions. For these reasons, they are recommended for use in swimming pools, on walls exposed to water and on masonry floors. There are two types—"floor and deck" paint and "swimming pool" paint. Don't use the floor type on vertical walls, even in a swimming pool. The high concentration of resins to resist abrasion makes these "heavy" paints sag when applied to a vertical wall.



**PORTLAND-CEMENT PAINT** is sold in powder form. You must mix it with water before you can go to work

Catalyst coatings (epoxy, urethane or polyester resin) are the top masonry finishes, but don't run out and buy one yet. You may not need it and, believe me, its chief drawback is price.

Enough base and reactor to make two quarts of this stuff—sufficient to cover only 100 square feet—will cost you about \$12. A gallon of one of the other products will run from \$4.50 to \$6.50.

But if you need a coating where extraordinary resistance to abrasion is required, where damage can result from mechanical objects or where chemicals, solvents, water and detergents are present in abundance, one of these catalyst coatings will be just right for you.

They generally come in two parts that have to be mixed thoroughly. Both colors and clear finish are available. And catalyst coatings can be applied to raw masonry surfaces as well as surfaces that are older and have been previously painted.

Where can you use them? Anywhere! However, on exterior surfaces they do have a tendency to chalk when exposed to weather. But after the beginning stages of chalking are over, subsequent loss of film thickness is negligible.

If you decide to use a catalyst coating, you can often save money by first applying a fill coat of a lower-cost material. But

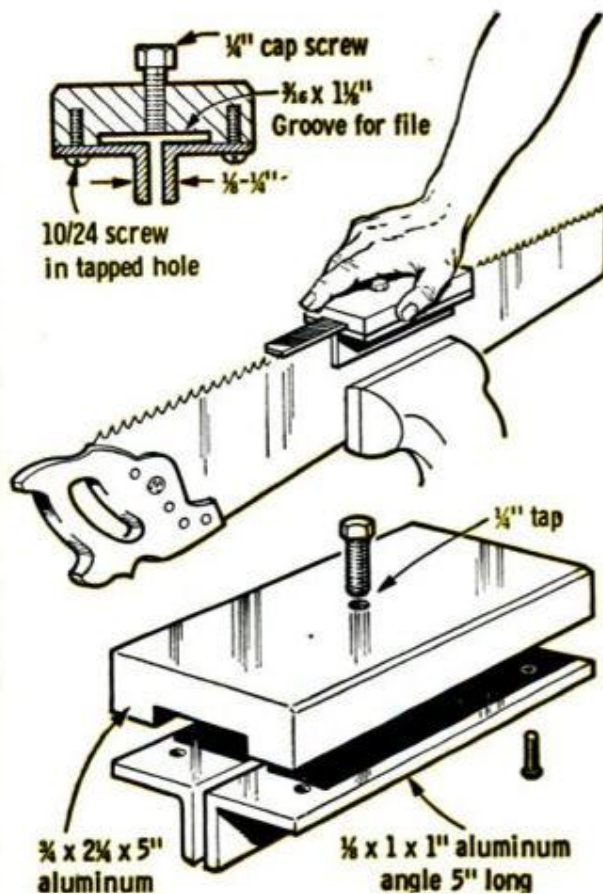
( [Please turn to page 226](#) )



# HINTS FROM READERS

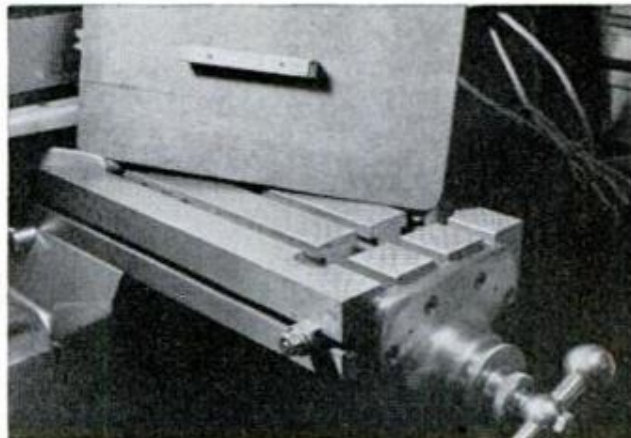
## Handsaw jointer

After repeated filing, the teeth on a handsaw become uneven and require jointing to even up the points again. You can do this with a flat file alone, but it's not so handy or as safe as when the file is held in a special holder which straddles the blade. As shown in the illustration at the right, the body of the holder is made from a piece of aluminum stock machined to the required shape. (If desired, however, a block of hardwood can be substituted in place of the aluminum.) Two lengths of aluminum angle are attached to the body of the jointer by means of two pairs of roundhead machine screws. The location of the pairs will determine the width of the saw slot and, therefore, they should be positioned after the jointer is fitted on the saw (s). To clamp the file, use a cap or thumbscrew.—*Frank L. Rush*



## Milling-table protector

An exposed table on a milling machine often will suffer rapid wear from chips and carelessly handled tools. But protect the table on your machine with a shield like that at the right and you'll add years to the life of the table. Make the shield of hardboard at least 1/8-in. thick. Cut a strip of wood to fit the center "T" slot and then attach it to the shield with two flathead wood screws.—*William J. Hitchen*



## Improving auto "breathing"

Noticing that my car was getting sluggish, I checked it for restrictions in the breathing department. I found caked deposits in the cleaner that the serviceman had ignored. I also noticed that the small end of this opening was smaller than the carburetor air intake so I took a hacksaw and pruned off all but 2-in. of the intake horn. This increased the effective breathing area by 2 1/2 times.—*P. M. Wilson*

## Billfold ruler

Ever wish you could measure something to see if it would fit at home? Next time remember that dollar bills measure just a snitch over 6 in. Pace one off along the item in question and you'll obtain a pretty close measurement.—*Marion Morey*

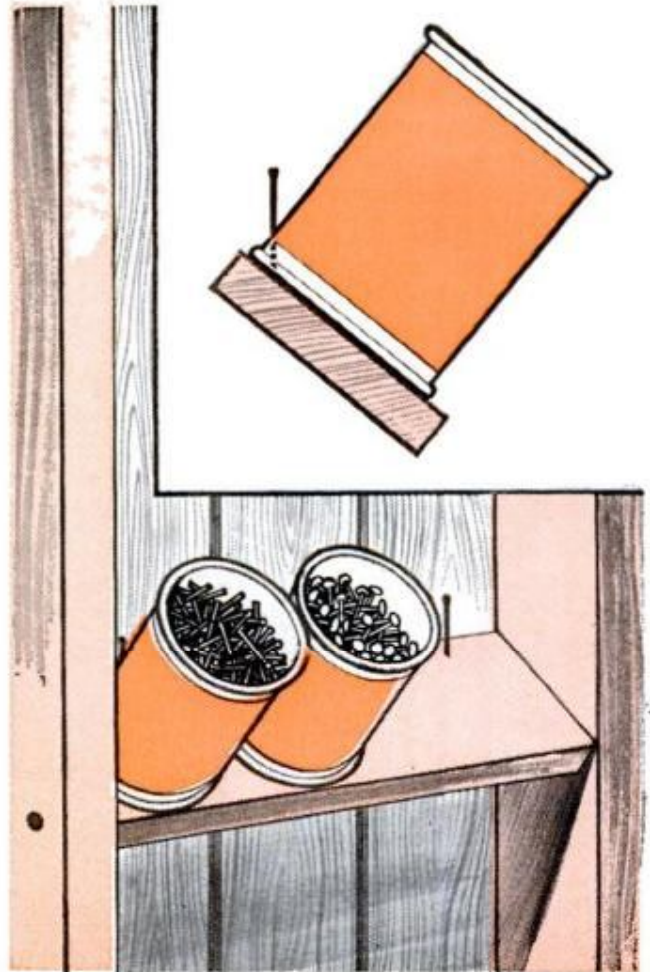




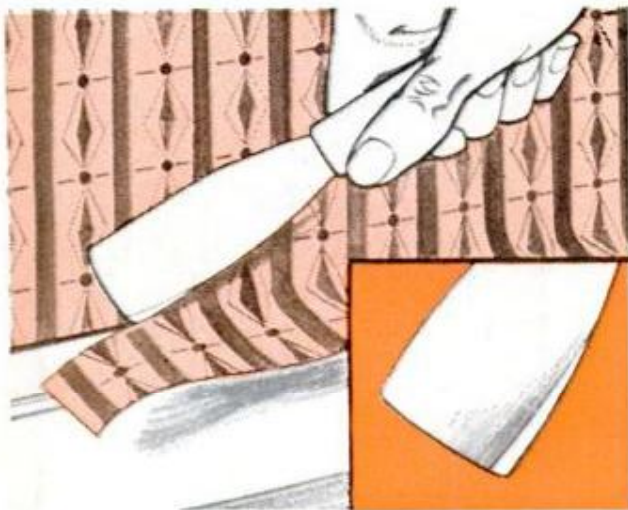
# Solving home problems



**INSTANT BOOKCASE** for the kids' room can be improvised from the drawers of an old shallow chest. Just remove the pulls and stack the drawers. Deep drawers can be made shallow by installing a stop



**HANDY BINS** for storing nails, screws, washers and other small objects in your shop are just angle-hung coffee cans. Punch a hole through the side and bottom, as shown, and mount on board between studs

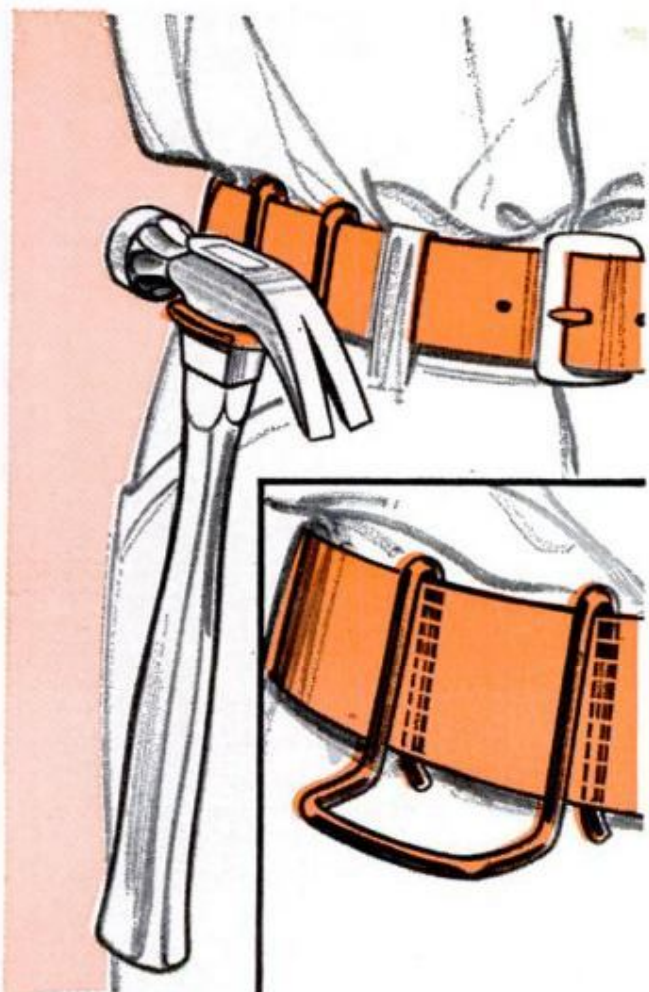


**SHARPENING THE CORNER** and a portion of one edge of the putty knife you use when you are applying wallpaper will give you a handy tool for trimming paper at the baseboard and around openings



**BEFORE YOU START TO PAINT**, bend a loop in the wire bail of the can to form a spring fit around the narrowest portion of the paintbrush handle. It makes a neat and dripless holder for your paintbrush





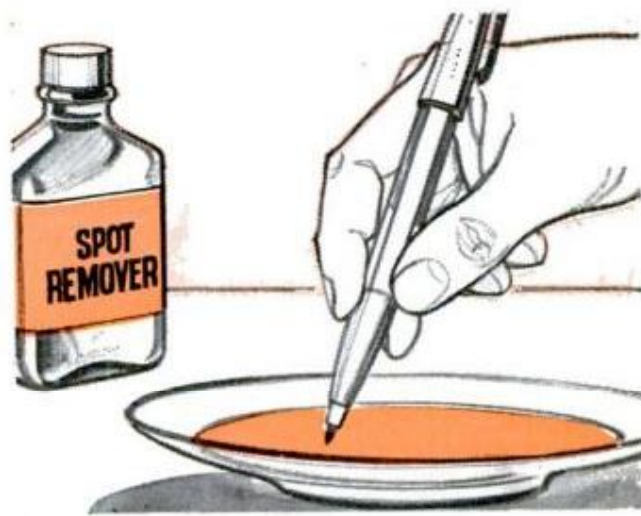
**HAMMER HOLSTER** slips over your belt, provides a place to put the hammer when you need your hands free for something else. Make it by bending a length of heavy coat-hanger wire. Round off ends with a file



**IF YOU'RE A NOVICE** with an ax, one of the safest methods of splitting wood is to prop the log upright inside a couple of old tires. If you should miss the log, the tires will absorb the shock without moving



**TO PLANT FINE SEEDS** easily and efficiently, use an eye dropper as a seed dispenser. It allows for much better seed spacing than sowing by hand. For extra-small seeds plug part of opening with a toothpick



**TO SOFTEN THE TIP** of a felt-tipped marking pen which has hardened after being left uncapped for a long time, place a few drops of spot remover in dish and work the tip around in it. When soft, wipe tip



# 3 easy recipes for finishing furniture with wax

Don't hide a bit of that beautiful grain. Enhance it with the glowing patina of a hand-rubbed wax finish

*Technical Art by ZIK Associates, Inc.*

**A**NYBODY CAN TURN OUT a top-quality wax finish. You don't have to worry about spoiling the job with runs or brush marks as you do with regular finishes. Once you've spread the wax evenly over the surface, the only requirement is plenty of elbow grease.

These three variations on a simple hand-rubbed wax finish were developed by Johnson's Wax. Each is designed to emphasize the character of the grain in a slightly different way. The sealer-wax combination, for instance, provides a satin finish only a trifle darker than the natural shade of the wood. It's especially recommended for antiques.

Using white shellac cut with an equal amount of alcohol will produce a slightly higher luster without deepening the color

appreciably. If you want to darken the wood or emphasize grain contrast, an oil stain may be applied before the shellac.

Be sure to sand all surfaces thoroughly before applying any of these finishes. Start with 3/0 grit—even coarser if required—and work up to 4/0 or 5/0.

To maintain a wax finish, apply paste wax two or three times a year. Surfaces subject to heavy wear, such as tabletops and chair arms, should be given an additional waxing occasionally for extra protection.

Frequent dusting will help to preserve the finish, since dust particles can become ground into the wax and dull the finish. When cleaning is necessary, use a cleaning wax to remove oily film and dirt without damaging the wax finish. ★★★

## SEALER/WAX

1. Apply penetrating wood sealer generously with brush and allow to stand for 10 to 12 minutes.
2. Wipe off surplus sealer with clean dry rag. Don't attempt to wipe dry; this is simply to even the application.
3. Let dry for 24 hours.
4. Rub lightly with a small pad of 000 steel wool to smooth off any roughness.
5. Dust surface thoroughly with a clean dry cloth or tack rag.
6. Apply second coat of sealer, following steps 1 through 3 above.
7. Work paste wax into 000 steel wool pad and apply it to the wood, rubbing with the grain using just enough pressure to remove any unevenness in second sealer coat. Test surface with your fingertips for smoothness.
8. Wipe off excess wax and polish with a clean dry cloth.
9. Apply second coat of wax, using the wiping cloth from preceding step. Polish with dry cloth while wax is still moist.



## SHELLAC/WAX

1. Apply a light coat of 4-lb.-cut white shellac diluted with an equal amount of denatured alcohol. Do as little brushing as possible. Try to cover the surface quickly and evenly, because the shellac begins to set very soon after application. (When you're done, clean the brush immediately with denatured alcohol.)
2. Let dry overnight.
3. Using an 000 steel wool pad, apply paste wax to the shellacked surface. Rub with just enough pressure to smooth the surface, stroking *with the grain* rather than across it. Run your fingertips over the finish frequently to check the progress of this smoothing operation.
4. Use a dry cloth to wipe excess wax off the surface, then switch to another clean dry cloth and polish the finish.
5. Give the finish another coat of wax, applying it with the first cloth used in the step above. While the wax is still moist, polish it with a dry cloth.



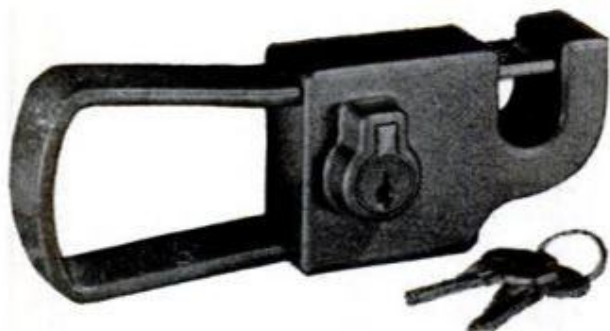
## STAIN/SHELLAC/WAX

1. Brush on a generous coat of oil stain and let stand a minute or two.
2. Wipe off surplus stain with clean dry rag, rubbing across the grain.
3. Let dry overnight.
4. Apply one coat of 4-lb.-cut white shellac diluted with equal amount of denatured alcohol.
5. Let dry thoroughly (about 4 hours).
6. Using a 5/0 sandpaper, sand this first coat lightly with the grain to remove any roughness.
7. Dust thoroughly with a clean dry cloth or tack rag.
8. Apply second coat of shellac.
9. Let dry overnight.
10. Work paste wax into 000 steel wool pad and rub it into the surface, working with the grain and using just enough pressure to knock off any roughness in finish.
11. Wipe off excess wax and polish with clean dry cloth.
12. Apply second coat of wax and polish with clean dry cloth while wax is still moist.

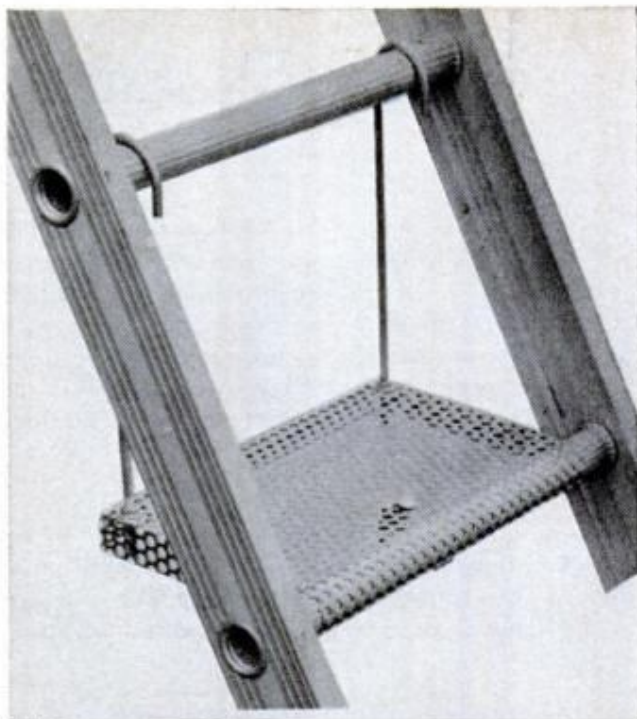


# EXCITING NEW PRODUCTS

By CAROL SCHULTZ



**CAR LOCK** fits cars with shift lever on steering column, locks steering wheel and gearshift lever together. Compact in size, it stores in glove compartment. \$5.75 postpaid. J. C. Whitney & Co., 1917 Archer Ave., Chicago, Ill.



**LADDER-STEP** makes a handy shelf to hold buckets and tools. Attaches quickly to any round-rung ladder and can be removed by loosening one wingnut. The steel step has a perforated nonslip surface. \$4.95 postpaid. From Venture Products Co., Box 77, Olney, Md.



**DECORATIVE CEILING TILE** with its wide-bevel edge has an elegant, sculptured appearance most appropriate for period decorating themes. "Brunswick," a wood-fiber ceiling tile, is nonacoustical, sells for about 30 cents a square foot and has the advantage of being easy to install. By Armstrong Cork Co.



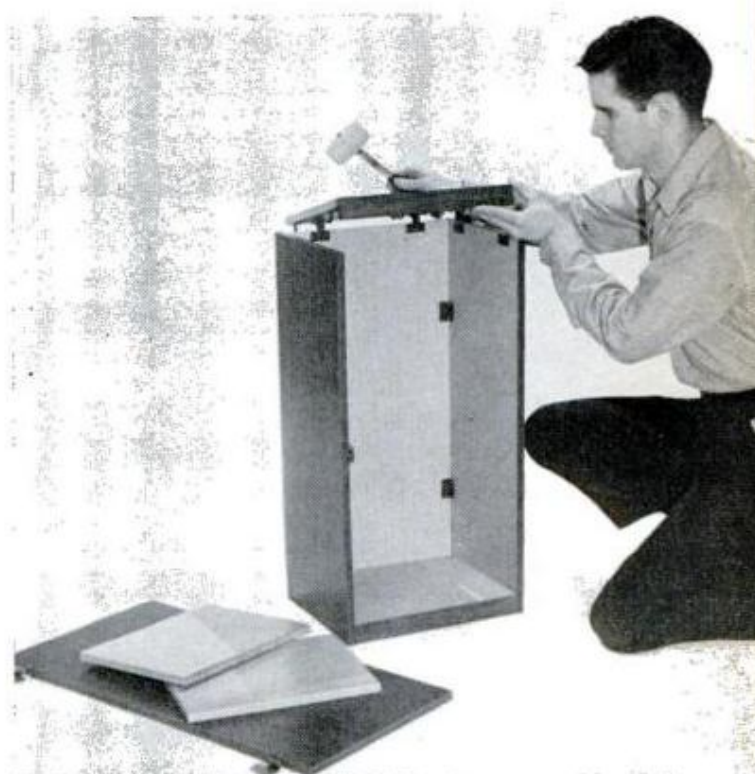




**COMPACT WATER PUMP** weighs five pounds and provides a quiet and dependable automatic water facility for 12-v. current. The "Hush Pump" is ideal for travel trailers. Costs \$59.50. By Humphrey Products, Div. of General Gas Light Co., Box 2008, Kalamazoo, Mich.



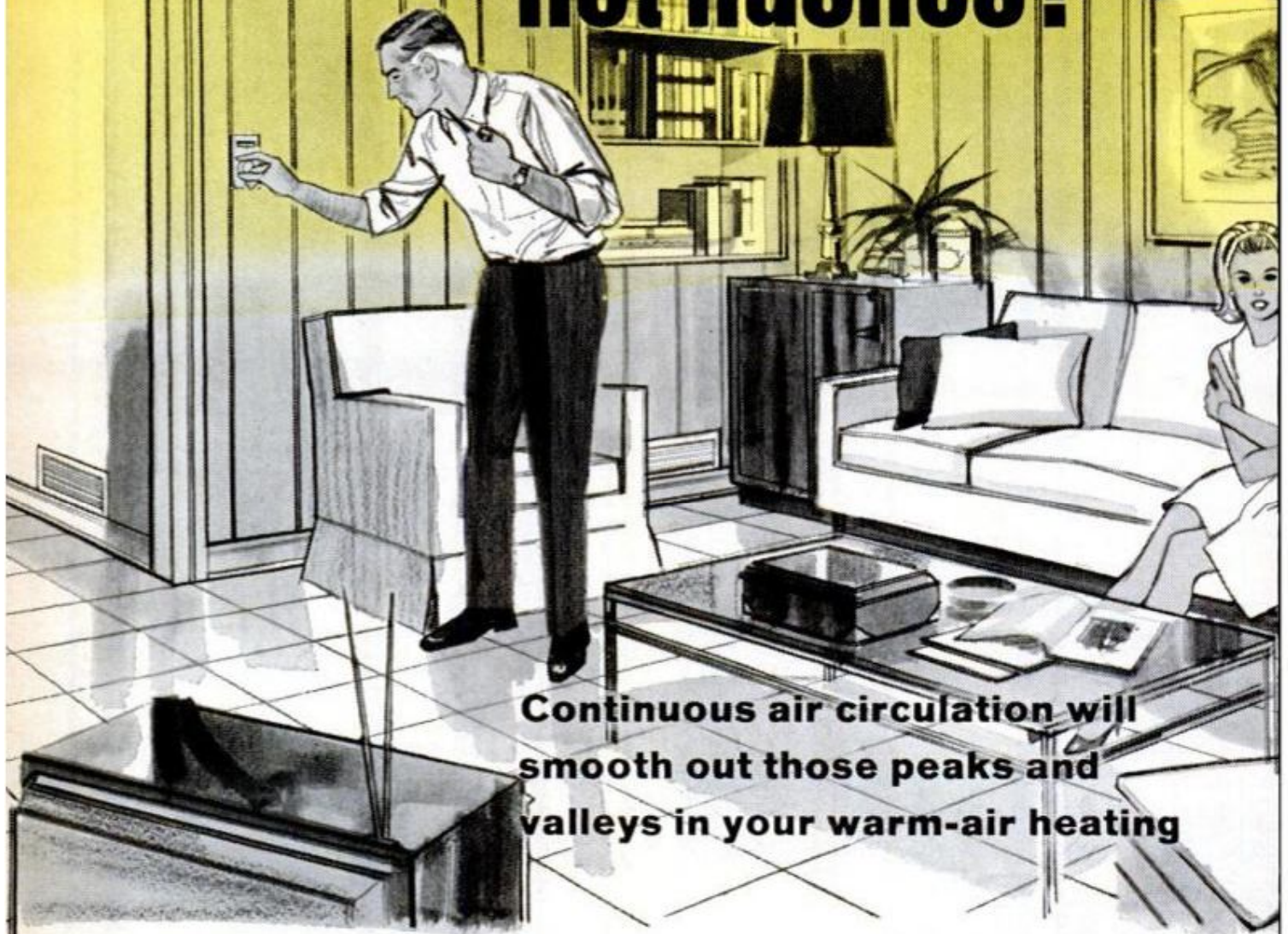
**NO-DRIP TAPE** on pipe permanently stops cold-water condensation drip. This tape is self-sticking, and unlike fiber tape it cannot rot. Comes in white only but can be painted any color. Available in 16-foot rolls for \$1.89, it's made by the J. W. Mortell Co., Kankakee, Ill.



**QUICK ASSEMBLY KITCHEN CABINETS** feature "tap-a-lock" fasteners that snap together with a tap of a rubber mallet. The "Zell Space Cabinets" come in a complete range of base, wall and corner styles, in single and double-door models laminated inside and outside in beautiful warm wood grains of teak, cherry and white imperial walnut. Available from Zell Brothers Inc., P. O. Box 8, McKeesport, Pa.



# Cold drafts and hot flashes?



**Continuous air circulation will smooth out those peaks and valleys in your warm-air heating**

*Illustration by Eldridge King of Worman Associates • Technical Art by ZIK Associates, Ltd.*

**I**F YOU HAVE forced-air heating, chances are the blower is set to operate only when the thermostat calls for heat. It runs until the temperature rise is sufficient for the thermostat to shut off the furnace burner; then, within a minute or two, it stops. And herein lies one of the biggest problems with forced-air heating.

When the blower stops, the air no longer circulates and mixes. Warm air collects near the ceiling. Colder air settles to the floor. The room feels chilly, your feet become cold. Things stay that way until the next full heating cycle, which could be half an hour later. Even then, the room is likely to remain uncomfortable for a time.

When the temperature of the air near

the thermostat falls to the point where the furnace is triggered into operation, the first change you're likely to notice is a blast of cold air from the registers. The blower, set to run at high speed, must first push the cool air out of the duct system before it can deliver heated air. Once the temperature reaches the desired level, the thermostat shuts off the burner. However, the blower continues to operate for another minute or two, pushing even more heated air into the rooms. This usually results in overheating.

The solution to such problems is obvious—slow down the blower speed and set it to run continuously. In other words, Continuous Air Circulation.

C.A.C. isn't a new idea, by any means;



## SETTING FOR CONTINUOUS AIR CIRCULATION

The following procedure is used by heating experts to set forced-air system for C.A.C.

**General information.** The furnace burner's heat output in a properly engineered installation matches the particular building being heated. This means that, in coldest weather, the burner should operate almost all of the time. (If you have any questions on this point, see your installer or any reputable heating contractor.)

Be sure your room thermostat is equipped with a heat-anticipation device. This is especially important with older systems. Newer homes have this as standard equipment. Thermostats should be located on interior walls, and generally close to the center of the living area. Be sure furnace air filters are clean.

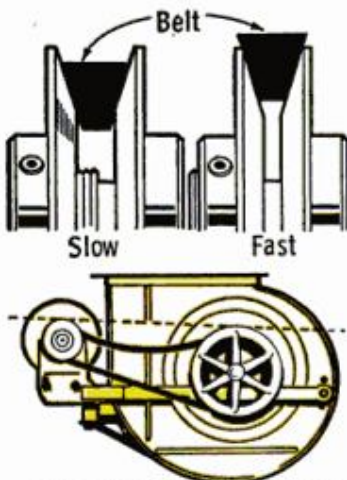
**Set your blower for constant operation.** A careful survey of your furnace blower and its controls is very helpful before attempting to set your blower motor for continuous operation. Due to the varied types of blower controls, one explanation cannot cover every possible furnace application.

The easiest method of setting for constant operation involves a simple on-off toggle switch which, in many models, is called a summer fan switch, usually located on or near the furnace. For both summer and winter operation, switch the control to the "summer" or "on" position for constant air circulation.

If you do not have a summer switch on your furnace, then locate the blower or fan control. For constant blower-motor operation (continuous air circulation) set the dial or lever indicator to the lowest temperature possible.

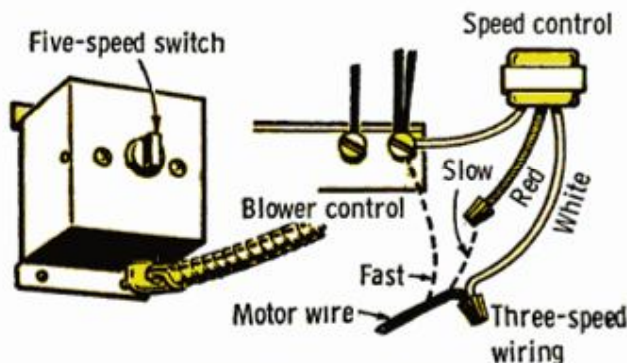
**How to adjust the blower speed.** Now that the air is continually circulating throughout your home, it is necessary to adjust the actual flow from the system. The blower speed is very important for your total comfort result. The engineering design of modern warm-air heating systems provides for approximately 3½ to 4½ air changes per hour when the blower is adjusted to the proper speed. The average handy homeowner has neither the engineering data nor the equipment to set the exact blower speed accurately.

This may be done, however, on a trial-and-error basis by using comfort and the absence of excessive drafts as basic criteria. When adjusting (as described below), give the system an opportunity to produce the desired effect.

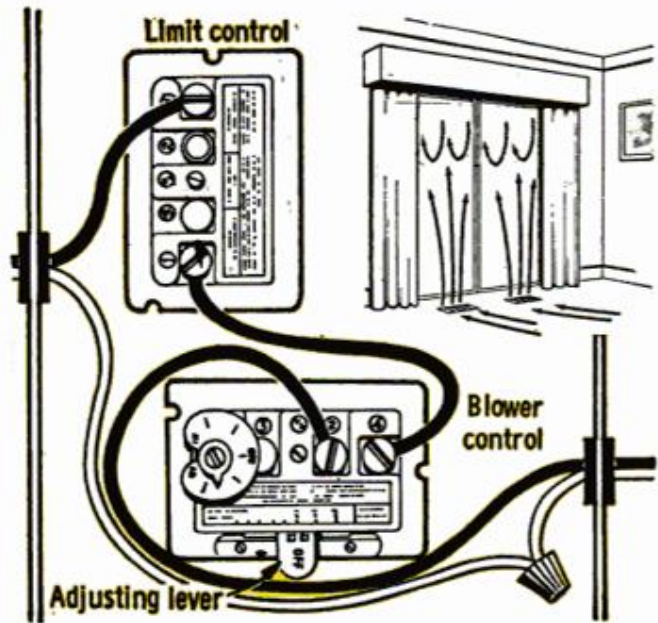


BELT-DRIVE ADJUSTMENT

do not widen the pulley halves so much that the belt rides on the hub. Tighten the setscrew, making sure it engages the flat portion of the hub. Also, check



DIRECT-DRIVE ADJUSTMENT



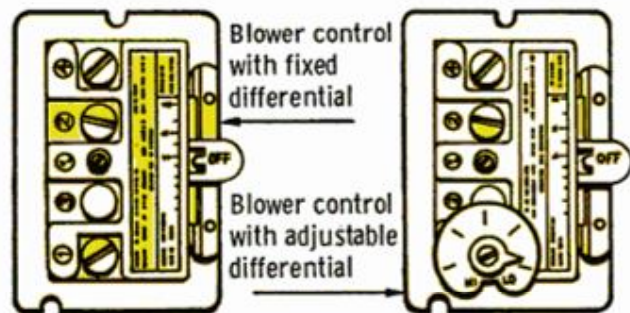
alignment between motor and blower pulleys. Poor alignment will cause abnormal belt wear, noise and excess power consumption, or may even make the belt jump off the pulley. Adjust belt tension, using the lock bolt on the motor base. Leave the belt loose enough to allow 2 in. of slack.

**Direct-drive adjustment.** As for direct-drive blowers, some have a five-speed switch which controls the blower speed. Other direct-drive blowers have no switch, but can be set for three different speeds by changing wire connections. Factory setting is usually for medium speed. To slow the blower, connect the black motor wire to the red wire. To speed the blower, bypass the speed controller and connect the motor wire directly to the blower control.

**Important to remember.** In a system adjusted for C.A.C., air coming from the registers will sometimes feel cool. This is normal.

After the burner has been off for a while, the air coming from the registers is only a few degrees warmer than the room air. But, because it is moving, it feels cool. Therefore, supply registers and furniture must be located so that occupants are not in the direct flow of air.

Narrow, perimeter diffusers in the floor usually provide the best air circulation and will not diffuse outward on occupants. These diffusers are best located under windows where warm air can counteract the cold air that cascades down from cold surfaces.



**How to adjust limit control.** Now that you have adjusted for C.A.C., it is a good idea to check your "limit control." The warm-air limit control has a fixed factory setting. However, if the limit control on your system has pointers, set the "off" pointer at 200 F. and the "on" at 180 F.



CUT  
FOLD  
TAPE

HEATING  
COMFORT

it was developed some years ago by Lennox Industries, Inc., one of the world's largest manufacturers of home heating and airconditioning equipment.

The advantages of such a setup are self-evident. A constant gentle circulation mixes warm air, which was formerly wasted heating the ceiling, with cool air. Instead of being stratified into hot and cold levels, the air is homogenized so evenly that temperatures between floor and ceiling don't vary more than 2° F.

And contrary to what you might think, it's even less of a strain on the blower motor. Constant start-stop action is more of a burden than continuous operation.

There are other benefits, too. All forced-air furnaces are equipped with some sort of filtering device, but these are effective only when the blower is operating. Air cleaning is a continuous process when the system is set for C.A.C., a fact of particular importance to people with allergies, especially those who have had an electronic air cleaner installed in their forced-air system. With C.A.C. the entire volume of air in every room is replaced with freshly treated air three to four times each hour.

But in order to understand fully the advantages of C.A.C., let's review just how a forced-air heating system works.

The furnace contains the *burner* which supplies the heat. This is surrounded by a tight steel *heat exchanger* which absorbs heat from the flame and combustion gases. The heat is then picked up by the air which the *blower* forces over the heat exchanger. The insulated *outer casing* of the furnace keeps this air in close contact with the heat exchanger.

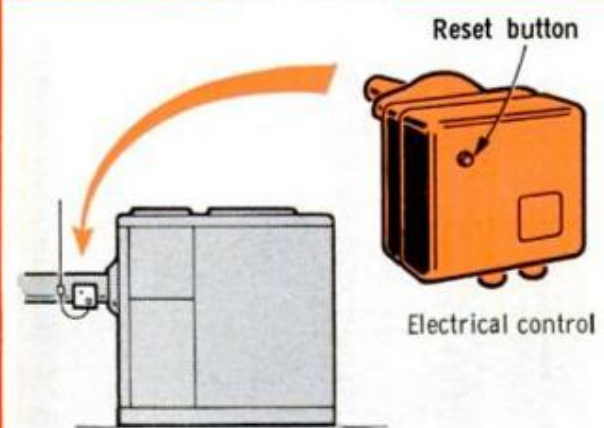
After the air flows over the heat exchanger, it enters a metal chamber attached to the furnace called a *warm-air plenum*. Often, there is a *humidifier* in the plenum to add moisture to the heated air. From the plenum, *ducts* branch out to carry the warmed air to the rooms.

After the air circulates through the rooms, it must be brought back to the furnace to be cleaned and reheated. This is accomplished by means of *return ducts*. The same blower that pushes warm air out to the rooms also pulls return air back to the furnace. As this air enters the furnace, it is drawn through an *air filter* which removes dust and lint that the air has picked up while being circulated through the house. Finally, the air reaches the blower again and is ready to be recirculated.

As for controls, the furnace burner is operated by the *thermostat* on which you set the room temperature you desire. The blower is controlled by an automatic *blower control* located very near or be-

### IF THE BURNER FAILS TO OPERATE

#### OIL FURNACE

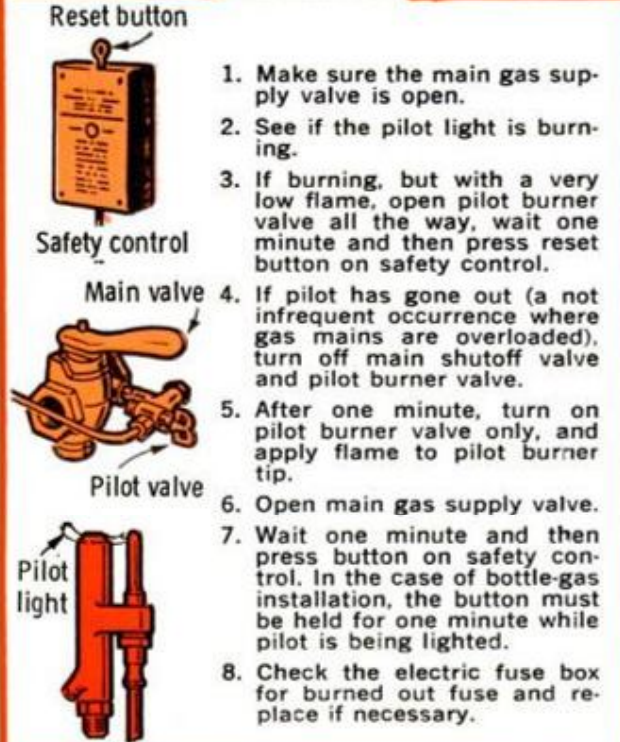


Reset button

Electrical control

1. Check the oil tank to see if sufficient fuel is available. Also, make sure the valve is open.
2. Check the electric fuse box for a burned-out fuse and replace if necessary.
3. If fuses appear to be all right, make sure that they are screwed tightly in place.
4. Press the reset button on the electrical control attached to the flue pipe.
5. If your oil-burner motor is equipped with a reset button, press this button to restart motor.

#### GAS FURNACE



Reset button

Safety control

Main valve

Pilot valve

Pilot light

1. Make sure the main gas supply valve is open.
2. See if the pilot light is burning.
3. If burning, but with a very low flame, open pilot burner valve all the way, wait one minute and then press reset button on safety control.
4. If pilot has gone out (a not infrequent occurrence where gas mains are overloaded), turn off main shutoff valve and pilot burner valve.
5. After one minute, turn on pilot burner valve only, and apply flame to pilot burner tip.
6. Open main gas supply valve.
7. Wait one minute and then press button on safety control. In the case of bottle-gas installation, the button must be held for one minute while pilot is being lighted.
8. Check the electric fuse box for burned out fuse and replace if necessary.



**AIR FILTERS**

Filters should be inspected at least once a month during the heating season; even more often if unit is set for Continuous Air Circulation. If dirty, they should be cleaned or replaced. If cleanable, follow instructions on the filter.

**MOTOR BELTS**

A visual inspection of the belt will reveal cracks, unraveling or erratic wear. Replace those that are showing cracks or unraveling. If wear is erratic, check alignment of blower and motor pulleys. This inspection can be done during filter check. (Of course, some units are equipped with blower wheels driven directly by the motor shaft, and have no belt or pulleys.

**LUBRICATION**

**BLOWER BEARINGS:** Some bearings are sealed and permanently lubricated. Others have grease cups packed with special lubricants. If the lubricant is low, contact the manufacturer or your local heating contractor for a new supply. *Never use any other grease or oil.* If you find the bearings have oil cups, they should receive a few drops of No. 40 motor oil twice a year.

**MOTOR BEARINGS:** Most blower motors are permanently lubricated and require no service.

**BURNER MOTORS:** For oil-burner motors, add a few drops of SAE No. 10 nondetergent oil before each heating season.

**HUMIDIFIERS**

**PLATE TYPE:** Evaporator plates should be replaced before each heating season. Keep float assembly and reservoir as free from sediment and water solids as possible. In areas of extremely hard water, plates should be cleaned once a month during the heating season.

**POWER HUMIDIFIERS:** Cleaning and service instructions are usually printed on this type of unit. If you cannot find them, contact the manufacturer for complete directions. Be sure to include the model number.

**EVERY HEATING SYSTEM** should be examined and cleaned once a year by your local heating contractor. Inexpensive, planned maintenance contracts are now quite common and very reassuring to homeowners. Having a preventive maintenance contract puts the entire burden of servicing and keeping your entire system in first-class order on your heating contractor.

tween sections of the heat exchanger. When air at this point reaches the temperature set on this control, it automatically starts the blower. When the air has cooled to a predetermined temperature, this control shuts off the blower.

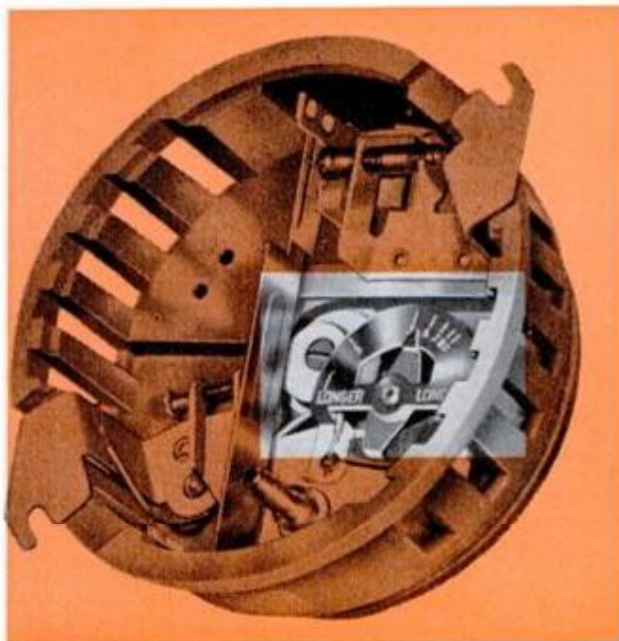
For added safety, every forced air furnace also has at least one *limit control* which will over-ride the thermostat and shut off the burner if, for any reason, the furnace should overheat. Often, it's com-

bined with the blower control, in which case it's called a *fan-limit control*.

Setting the dampers to achieve the desired heat distribution to each room is called *balancing* the system. The basic adjustments were made when the system was installed, but since you may have a different opinion than the original installer had concerning just how much heat should go to each room, it's a good idea for you to balance the system again after setting it for C.A.C.

Work one room at a time. If the room containing the thermostat tends to be overheated, it's best to start with that one. By partially closing dampers to outlets in any rooms which are too warm, you will automatically increase air delivery to formerly underheated rooms. It's a trial-and-error operation which takes quite a bit of time. Be sure to allow enough time for temperatures to stabilize before you change an adjustment, and keep tinkering with the dampers until you achieve the desired temperature balance between rooms.

Of course, setting for C.A.C. and doing a thorough balancing job may not entirely solve your problem. To achieve good system balance and the ultimate in indoor comfort, you may need added runs or additional return air inlets. If you've exhausted all these suggestions and feel your system is still not quite right, by all means contact your heating contractor. ★★ ★



**MODERN THERMOSTAT** has adjustable heat anticipator which shuts off the burner before temperature in room reaches thermostat setting, thus allowing residual heat in system to finish the job. Older models have only one setting and cannot be tuned



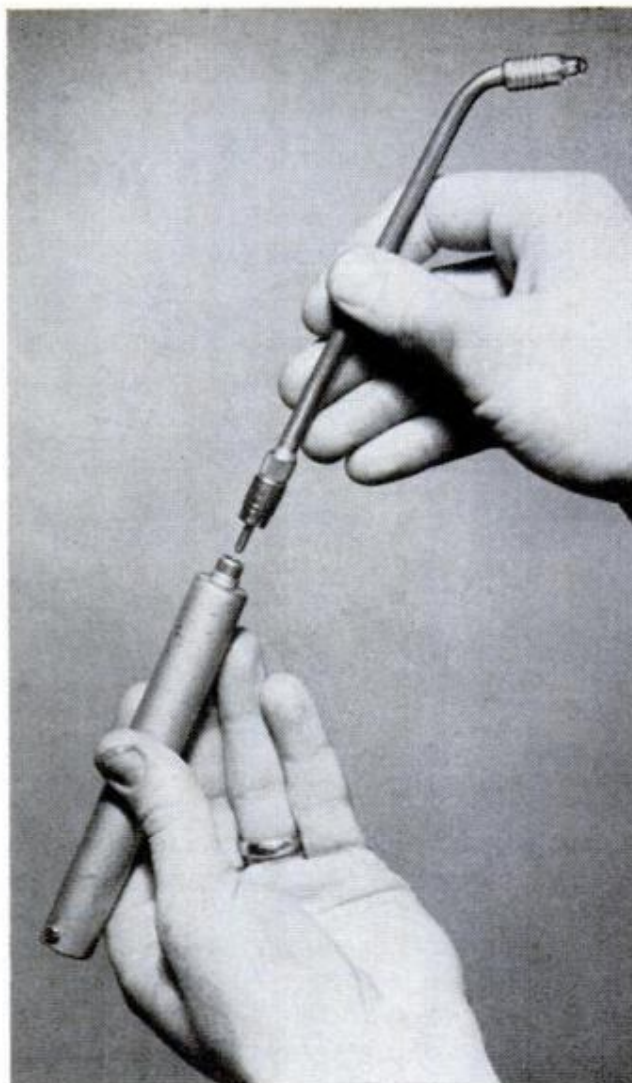
# Probing lights let you see around corners

PLUG TOGETHER the two halves of this compact inspection probe and you'll have at your command a penetrating beam of light that you can aim from the side or even around corners without blocking your line of sight.

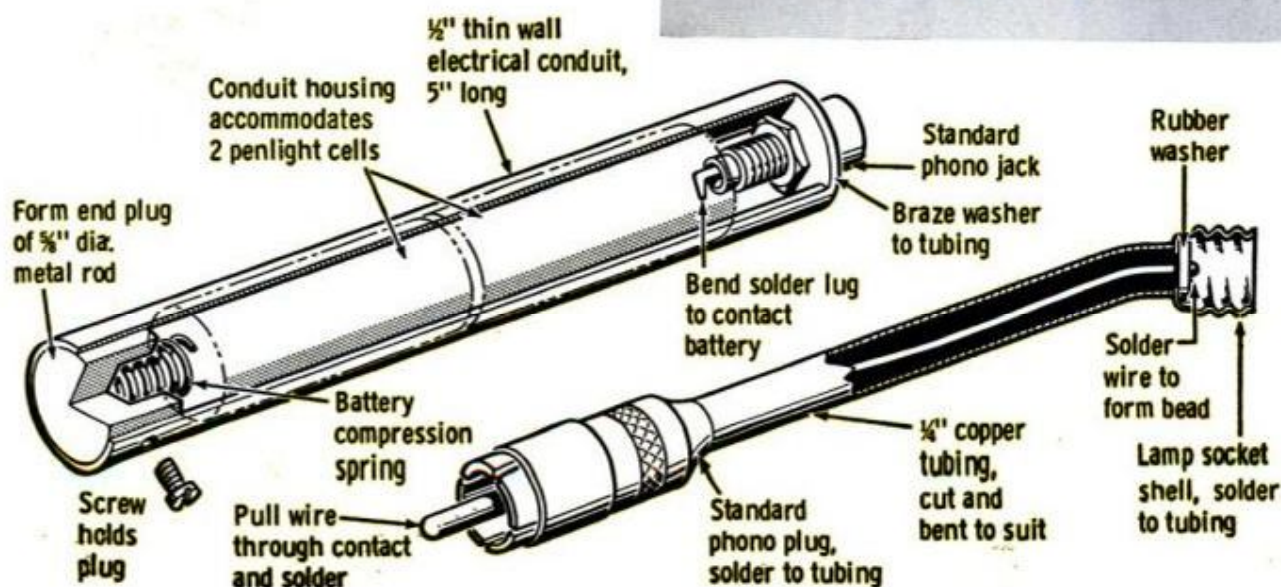
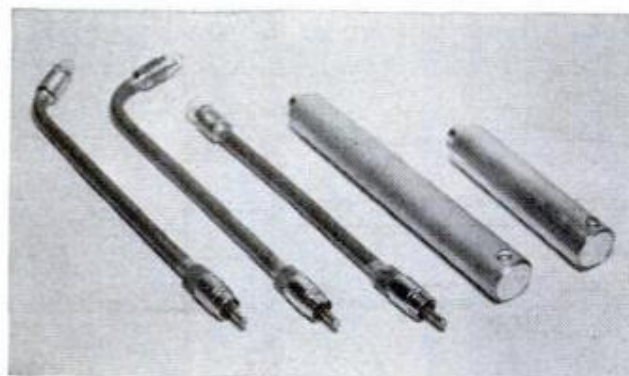
The light consists of two main sections: a battery case and a probe with a lamp at one end. No switch is used since the combining of the two sections turns on the light; separating them turns it off.

Two types of lamps can be used in the probing light. If a highly-directional beam is desired, a No. 222 bulb will fill the bill, but a No. 14 bulb should be used for a floodlighting effect.

Construction of the probe is straightforward and should present no problems. In the event you expect to use the light to illuminate the innards of electrical appliances, first be certain to insulate the entire metal probe by wrapping electrical tape around exposed surfaces.—*Ray Shoberg*



**MATING THE PLUG** on the probe with the jack on the battery housing turns on the light. Shown directly at right are probes with varied shapes, a two-battery housing and a housing that accepts one battery only. While the one-battery housing is more compact, it requires more frequent battery replacement, as well as different bulbs. Use No. 112 bulbs in place of No. 222 and No. 123 instead of No. 14



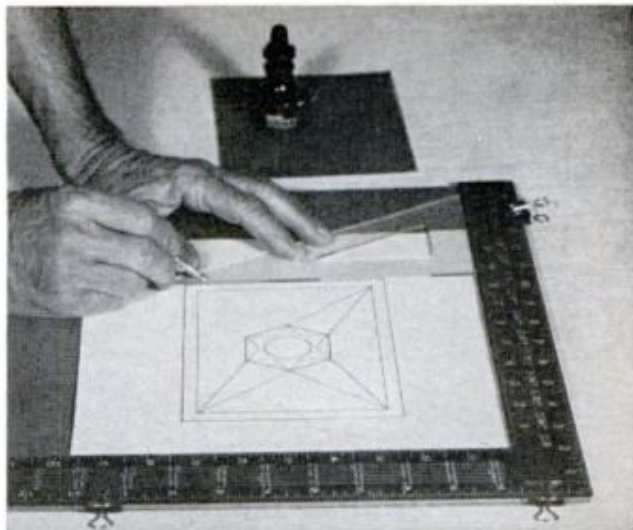


# HINTS

## FROM READERS

### Workshop drawing board

No T square is needed with this simple drawing board that consists of a carpenter's framing square, a sheet of tempered hardboard, some plastic combination triangles and three strong spring binder clips. Just sandwich the paper between the square and board, clip as shown and you have a drawing board with two built-in straightedges and rulers. Thus you move only the triangles.—*John Arnold*



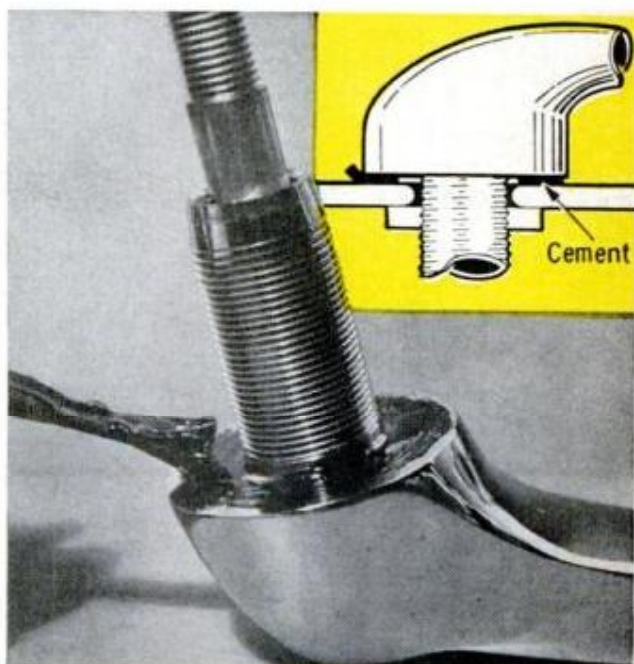
### Driving home with plywood

Plywood usually presents problems whenever transportation is involved, yet a luggage rack isn't needed often enough to be purchased. An easy solution is to toss four C-clamps into the car before taking off for the lumber yard. When tightened at each corner of the plywood, the clamps provide a safe and secure anchor for tie lines to the front and rear bumpers. Do, however, drive slowly.—*John Wolfe Jr.*



### Hiding faucet gaskets

Most faucets are fitted with a rubber gasket between the faucet body and the sink to prevent marring or scratching the porcelain surface. When the fastening nut is tightened, however, the gasket is often squeezed out from between the two and spoils the appearance. Avoid this by lightly coating the gasket with gasket cement before installation. When tacky, it can be installed without slipping.—*Charles Cohn*



### Inner-tube fan belt

Recently I found myself about 20 miles from town when my fan belt broke. I remembered an old inner tube in the trunk, so I tried cutting a substitute belt. The first band wouldn't stretch enough, but it was only after a few tries that I discovered the trick is to cut the tube diagonally, producing a band about 4-in. wide and about 3-in. shorter than the fan belt. It worked fine.—*D. A. Cauble*

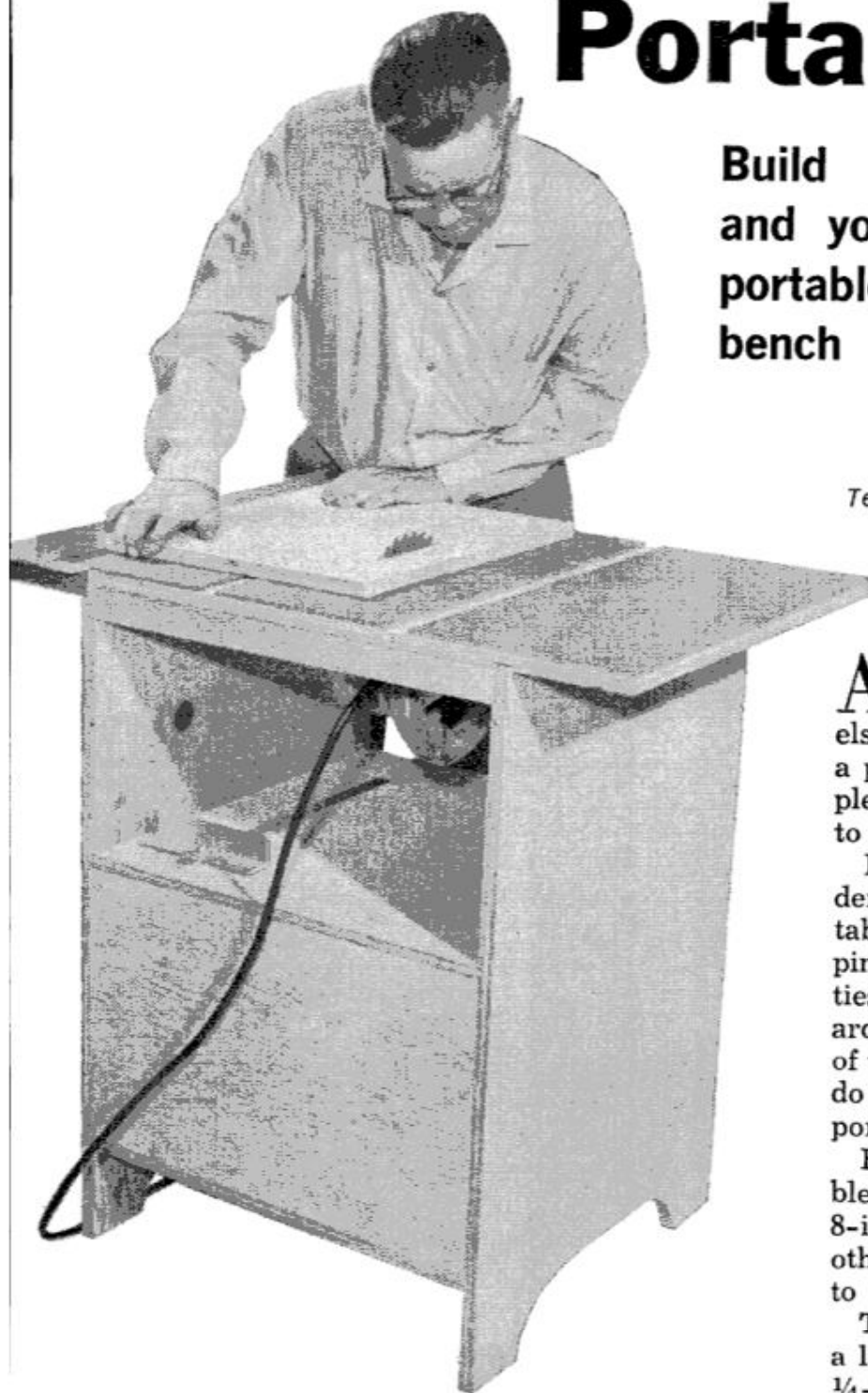


# Get Double Duty from your Portable Saw

Build this plywood stand  
and you can convert your  
portable electric saw to a  
bench unit in just seconds

By MANLY BANISTER

*Technical Art by Don Evans*



**READY FOR BUSINESS** as bench unit with rip fence and miter gauge, saw can be readily removed for portable use, yet quickly transformed back to table saw

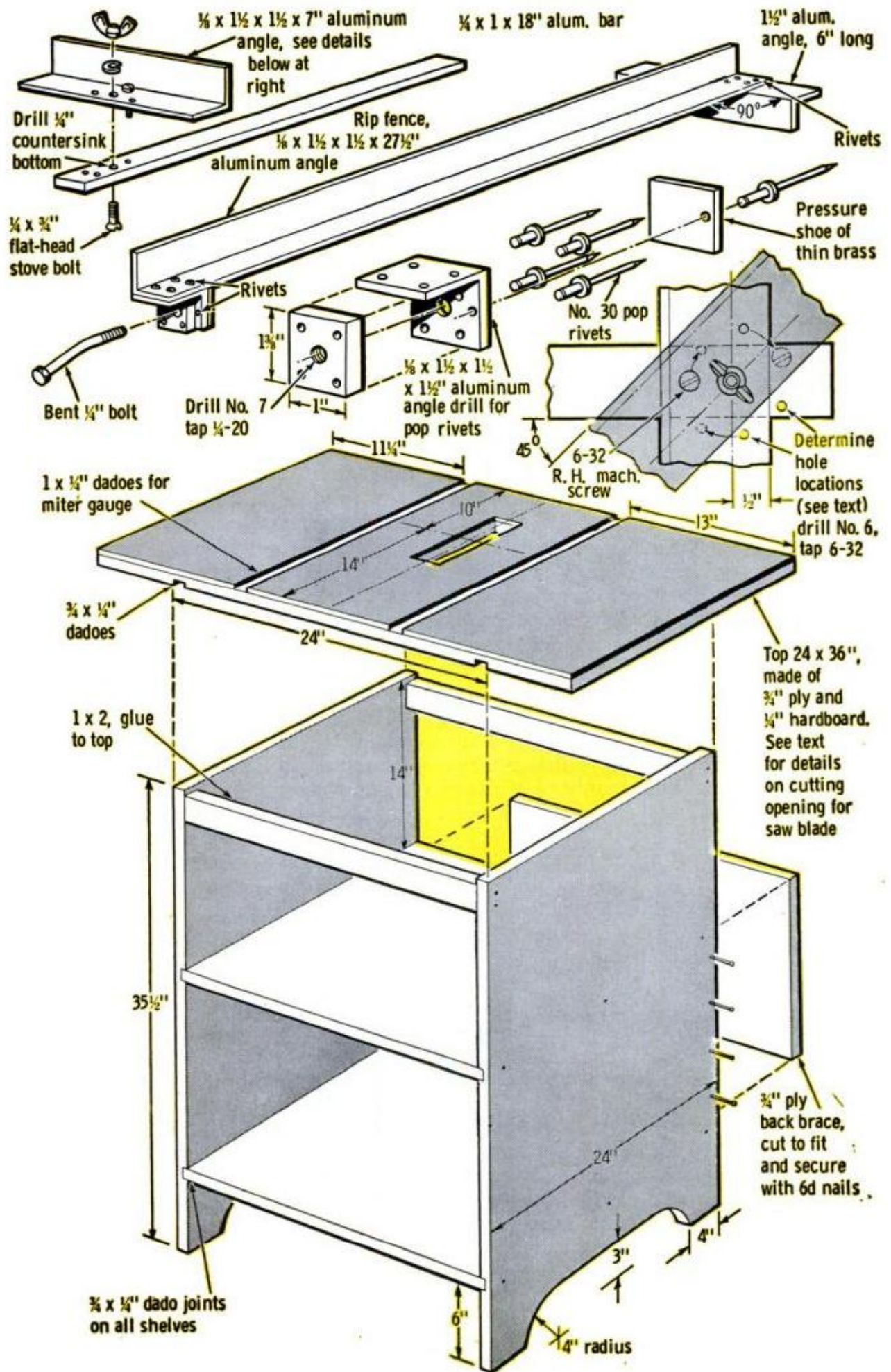
**A**LTHOUGH it can't be beat for big jobs like cutting panels or sawing boards and lumber, a portable electric saw is a complete failure when it comes time to start cutting small items.

But just slap your portable under the top of this easily-built table and it will then perform ripping, cutoff and other cutting duties as well as any bench saw around. When you need the use of the portable once again, all you do to "unconvert" from bench to portable is loosen four wingnuts.

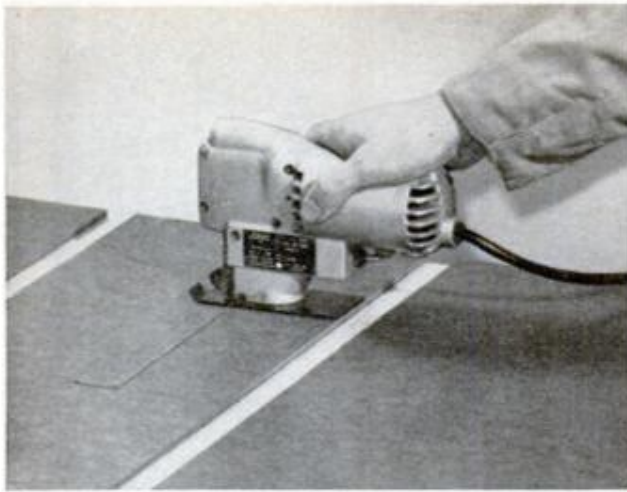
Better yet, even though this table was designed for Stanley's 8-in. Builder's Saw, almost any other make of saw can be adapted to it, regardless of blade size.

The top of the table is actually a laminate of  $\frac{3}{4}$ -in. plywood and  $\frac{1}{4}$ -in. tempered hardboard. The hardboard can be secured to the top piece of plywood with either  $\frac{7}{8}$ -in. brads or white glue. If you use brads, however, be sure to locate them where they will not

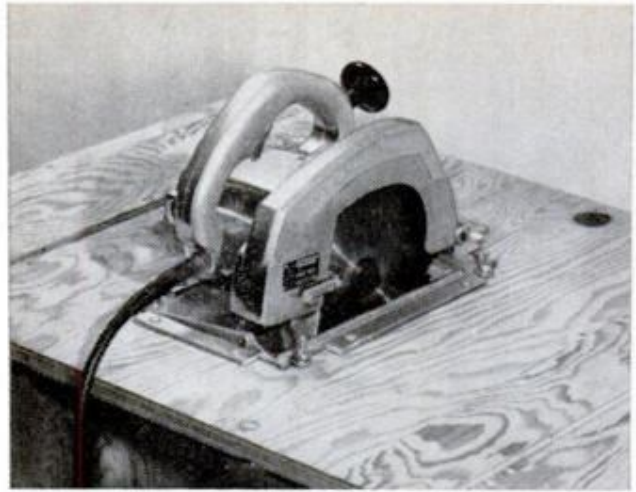








**CUTOUT FOR SAW BLADE** is as long as the opening in the shoe of the saw, but must be wider. First mark off the width of the slot, then add the thickness of top (in direction of blade tilt) and jigsaw



**HELD IN PLACE** by stove bolts and wingnuts, the saw is also surrounded by lengths of aluminum bar. These act as alignment guides so the portable can be quickly converted again to a useful bench saw

interfere with grooves for the miter gauge.

The use of a radial-arm saw will simplify the cutting of the slots for the miter gauge, although the slots also can be cut with the portable saw (use a straight board clamped to the top to act as a guide). If the hardboard is nailed to the top, you'll only have to make two saw cuts for each slot—the waste between the cuts will lift out easily.

Dado joints are used throughout the rest of the construction. These can be cut with a router, or, if none is at hand, you can make an appropriate number of passes with the portable and chisel out the rest.

#### **Cut slot for blade**

Cut the opening for the saw blade with a portable jigsaw. This can also be used to cut the curves at the bottom of each side member. The opening for the blade should be as long as the opening in the shoe of the saw. To determine the proper width, however, first mark off the width of the shoe, then increase this width in the direction of blade tilt by the *thickness* (1-in.) of the tabletop. This additional width will permit the blade to clear the tabletop when tilted up to 45°. If necessary, increase the size of the opening so the blade guard will have sufficient freedom to rotate smoothly while still protecting the blade when work is not being cut.

Before nailing the top to the base assembly, set the saw in place and adjust the blade so it is exactly parallel with the miter-gauge slots. Then secure the saw to the top with four ¼x1½-in. flathead stovebolts (one at each corner) fitted with

wingnuts, lock washers and standard washers large enough to overlap the saw shoe. Finally, screw down ¼-in. wood or aluminum guides on the four sides of the saw (so you can install or remove it quickly and accurately) before nailing the top to the base.

#### **Bench-saw accessories**

The miter gauge is fabricated of a length of ¼-in. aluminum bar stock and a piece of ⅛x1½-in. aluminum angle. The angle is secured to the bar with a ¼x¾-in. flat-head stove bolt and wingnut, but to hold it positively and prevent slipping, a 6-32 roundhead machine screw is used to connect both members just in front of the wingnut. To position this screw, use a combination square and adjust the two pieces of the gauge until they're exactly perpendicular. Then drill and tap through both members simultaneously.

To prepare the 45° left- and right-hand miter-gauge settings, use the 45° angle of the combination square and adjust the gauge first to one side, then the other. Again drill and tap the matching pairs of holes simultaneously. If intermediate positions are desired, drill and tap each set of holes in a similar manner.

The rip fence is simply a length of aluminum angle with a short piece riveted squarely at one end. The other end, as shown in the drawing, is fitted with a simple but effective mechanism to permit locking the fence to the top of the saw table. The fence also could be made of a straight length of hardwood fitted with an adaptation of the locking device. ★★



# HINTS FROM READERS

## Aligning holes through pipe

If you've ever attempted to use a portable electric drill to bore a hole through both walls of a pipe, you can understand the difficulty of aligning the holes so they are exactly 180° apart. One solution is to form a paper tube that fits snugly over the pipe. Fold the tube and then clip off both corners at an angle. When fitted over the pipe, the tube will have notches showing exact location of holes.—*Stephen Stresnic.*

## Cards copy contours

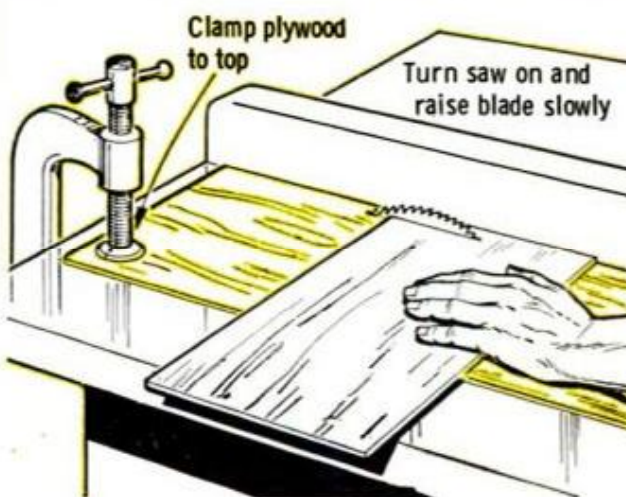
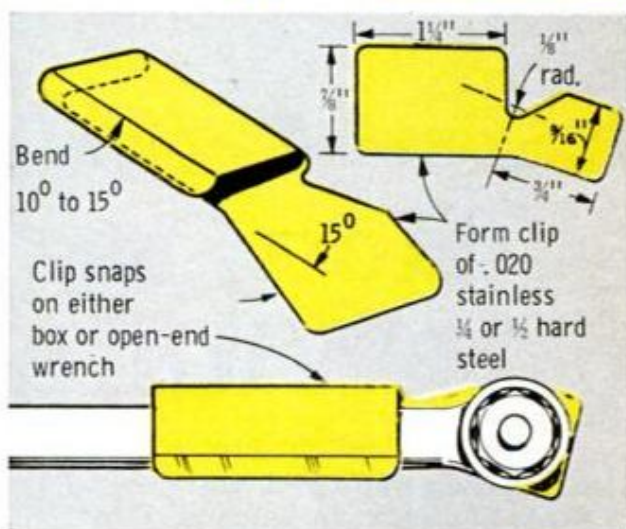
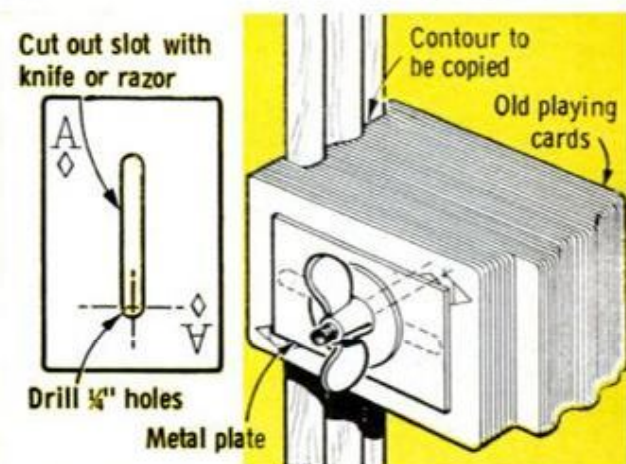
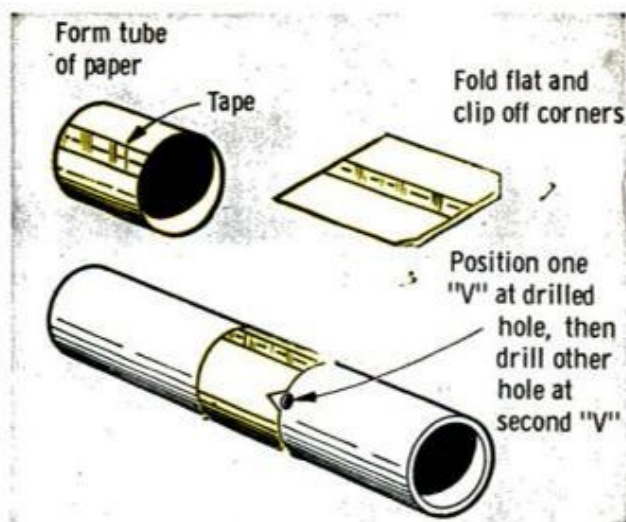
Copying the curves and contours around molding and other irregularly shaped pieces of wood can be accomplished accurately with the help of a few decks of old playing cards. Slotted as shown, the cards are held together by means of a wingnut and bolt or threaded rod of convenient length. Don't try to do without the metal end plates; they keep the cards flat and also enable you to draw smooth copies of the curve.—*S. Inserra*

## Wrench clip gets nuts started

Installing nuts in small, tight spaces is extremely difficult without some means of holding the nut in the wrench. Members of one school tape a strip of sheet-metal to the handle of the wrench (admitting that this method soon becomes a nuisance). Another, and much easier, solution is to form this steel clip that can be snapped on and off open-end and box wrenches in most standard sizes. Starts the nut every time.—*F. Fehely*

## Saw thin pieces on plywood bed

Cutting a number of extremely small or narrow pieces of wood on a power bench saw is quite difficult because the opening around the saw blade tends to "catch" the pieces being cut. A fast and easy solution is to lower the blade and clamp down a new bed of thin plywood. Then turn on the saw and slowly raise the blade through the plywood. The result is a work surface without any openings to catch or hang up the work.—*Michael Ligocki*







# How to Turn Pro With a Router

Take an hour to practice with this extraordinary tool that possesses built-in skill and you'll wonder at your newfound master's touch

By JOHN BURROUGHS

*Technical Art by Don Evans*

**T**HERE'S NO MYSTERY about the built-in skill and versatility that make the router one of the most desirable tools you could ever hope to employ in your workshop. For with just one short session of trial-and-error experimentation on scrap stock, you'll become accustomed to the tool's rather disconcerting whine as it spins a chisel-sharp bit at speeds greater than 20,000 rpm.

Just as quickly, and with little coaching, you'll discover how natural the router

feels when it's guided rather than pushed. You'll find out how to let the router whir its way cleanly through the wood, instead of holding it back to the point where it burns the wood surface—you'll also learn to avoid forcing the router into the work so quickly that it literally chews and gouges its way through the wood.

But most of all, you'll end this session full of awe at the professional results you would not be likely to obtain in a month of chiseling, carving and sanding—while





**A ROUTER** is simply a high-speed, universal (a.c./d.c.) motor with a collet chuck that accepts the shank of a bit. While all models are mounted on an easily-handled base, their adjustment features may vary

simultaneously contemplating how you can next wield this tool of incalculable uses. Incalculable, indeed, for the router will shape edges, slice veneers, trim laminates, and cut rabbets, dadoes, mortises, tongues, dovetails, tenons, slots, chamfers and more in less time than it takes to set up any other tool for the job.

Simply speaking, a portable router is

**BLIND-SPLINE A JOINT** using a router and it will be easier and stronger than if doweled. Clamp the parts to be joined in line and use either the router's edge guide or clamped straightedge to insure straight cut



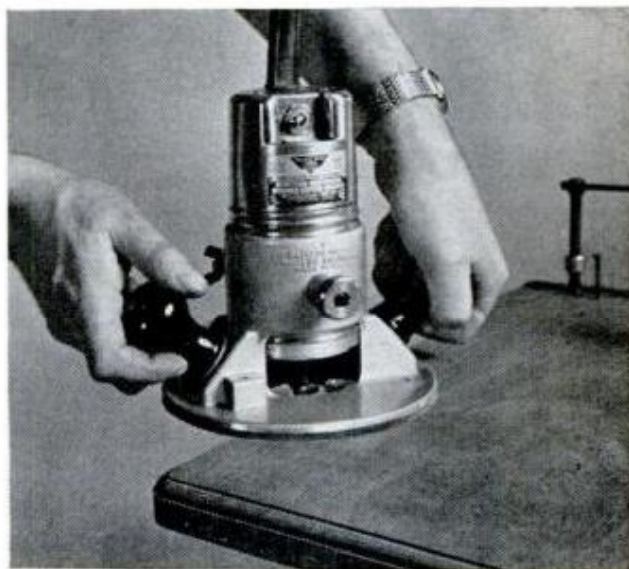
OCTOBER 1967



**REMOVED FROM ITS BASE**, a router motor doubles as a hand-held grinder. Be sure to use a grinding wheel designed for high-speed operation, such as the cup wheel shown. Take care never to overload motor

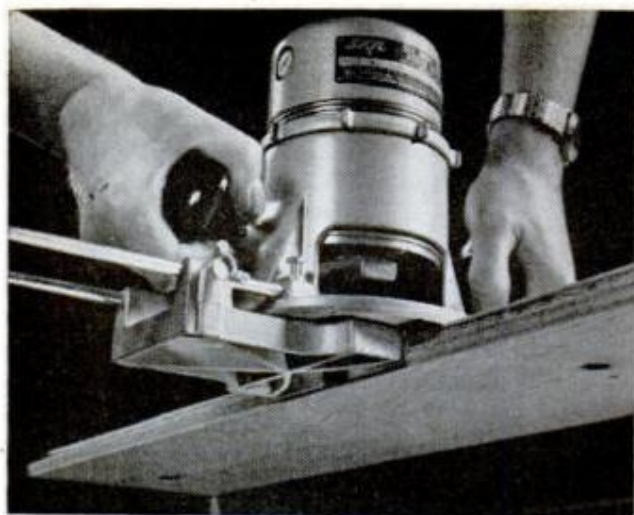
basically a high-speed a.c./d.c. motor mounted on an easily-handled base. The array of models offered by most major tool manufacturers is divided into two classes: light-duty units which develop  $\frac{1}{2}$  to  $\frac{1}{3}$  hp and draw about 3 amps., and heavy-duty units which develop from  $\frac{3}{4}$  to one hp and draw about 6 amps. Don't be misled, however, by these ratings—a

**EDGE-SHAPING HARDWOOD** with a pilot-tipped bit chucked in a small router must be done with light stroking cuts, much as you'd plane wood with a block plane. This keeps pilot from burning wood edges



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**ADJUSTABLE EDGE GUIDE** makes it possible to rabbet the edges of plywood panels. It is probably the accessory you'll use most. Deep rabbets or dados should be cut in two passes to avoid overloading tool



**FITTING HINGES FLUSH** with the door's edge is just one more piece of cake for a router. The use of a template greatly simplifies matters. If necessary, square the corners inside routed area with chisel

small router can do the same job as a larger model, only not as quickly.

Various makes of routers have different provisions for depth-of-cut adjustment. On some tools, the motor unit screws up or down in the base, while on others a rack-and-pinion raises and lowers the motor unit. Still others have threaded stop-collars on slip-in motor units. These differences are superficial, however, since all units have motors that turn at speeds between 19,000 and 30,000 rpm, are fitted with high-speed ball bearings and are equipped with collet chucks that accept bits with 1/4-in.-dia. shanks.

Router bits you're most likely to run across are made of high-tungsten steel. Some have a single cutting edge, or flute, while others have two or even three flutes to snick off smaller chips per revolution and

thereby produce a smoother, uniform cut.

Although there are literally hundreds of router bits for special jobs, you'll find that an assortment of six to eight bits will be sufficient for most applications. (A good selection is shown at the top of the next page.)

Using a router efficiently is largely a matter of devising a way to guide it. Usually one of the following five methods will enable you to complete the job at hand swiftly and skillfully.

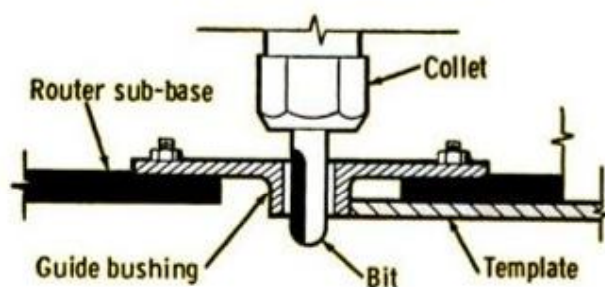
The first, and perhaps most commonly used method is to guide the router along a straightedge that's been firmly clamped to the work surface. In many cases, pulling the router rather than pushing it will provide you with better control. But always place the guide in the direction of the sweep of the bit—otherwise the bit will tend to "walk" away from the guide.

Second, you can use an edge guide, circular guide or other accessory made for

CUT  
FOLD  
TAPE

**ROUTER  
KNOW-HOW**

**TEMPLATE GUIDE BUSHING SET-UP**



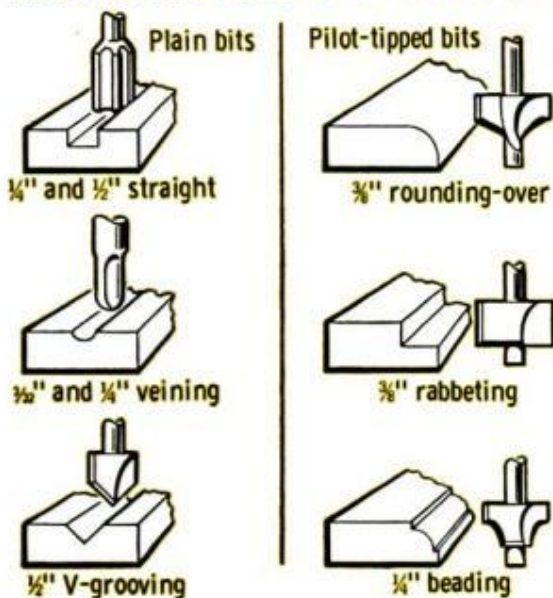
**GUIDE BUSHINGS** for popular makes of routers can be found in hardware stores or bought directly from manufacturer. If you can't find one, however, you can either lathe-turn or braze one together as shown



**BUSHING SHOULD BE CENTERED** exactly on the base and project enough to meet edge of the template (but not so far as to scratch or cut into the work). A good template material is 1/8 or 1/4-in. hardboard



THE ROUTER BITS YOU'LL FIND MOST USEFUL

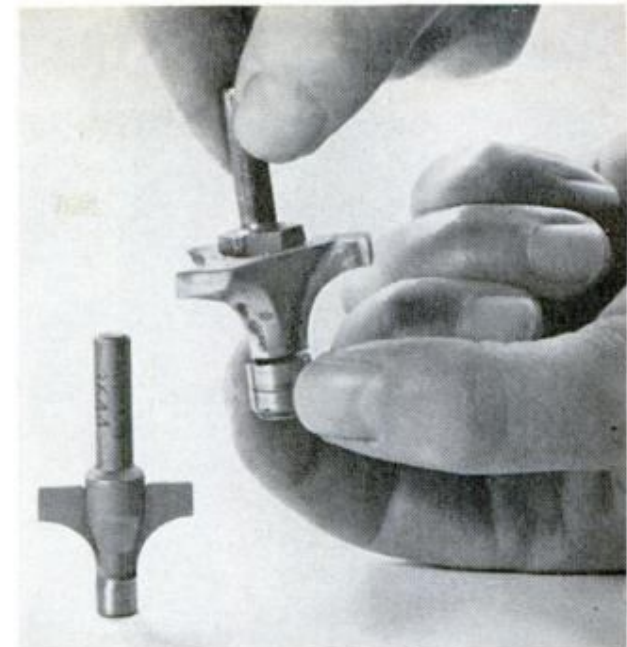


**SELECTION OF BITS** shown above will enable you to produce professional work every time. It's possible to vary the cut made by each bit by varying its position (see *Tilt Your Router*, page 100, Sept. '67 PM)

the particular job you're attempting—rabbeting plywood panels or discs, for example. This type of accessory is generally inexpensive, yet helps you do the job better than any other tool in your shop.

The third method is to use a pilot-tipped bit to produce the desired cut. The pilot button below the flutes of the bit enables you to contour the edges of furniture, frames, or other work uniformly.

A fourth method involves the use of a template guide bushing as shown at the bottom of the opposite page. Such bush-

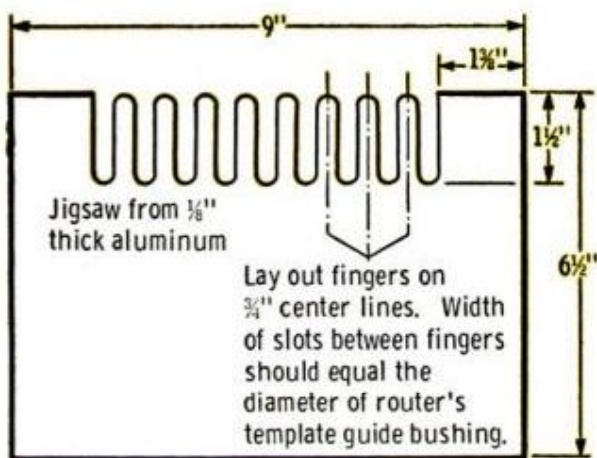


**PILOT-TIPPED BITS** must be kept free of burned-on gum deposits. Ordinary gum-and-pitch remover and toothbrush will turn the trick if applied regularly. To sharpen dull bits, you'll need grinding accessory

ings are available for some makes of routers, but not all. Thus, if you should find it difficult to purchase one, you can either lathe-turn or braze one together as detailed in the sketch.

The fifth and final method described here is one of the most fascinating. It's freehand routing, and as with the other methods, a guide is used—but this time, it's a steady eye. Using just a penciled outline and a small veining bit, you'll find you can rout freehand with a precision and accuracy that's almost uncanny. ★ ★ ★

DOVETAILING TEMPLATE FOR USE WITH 1/2" BIT



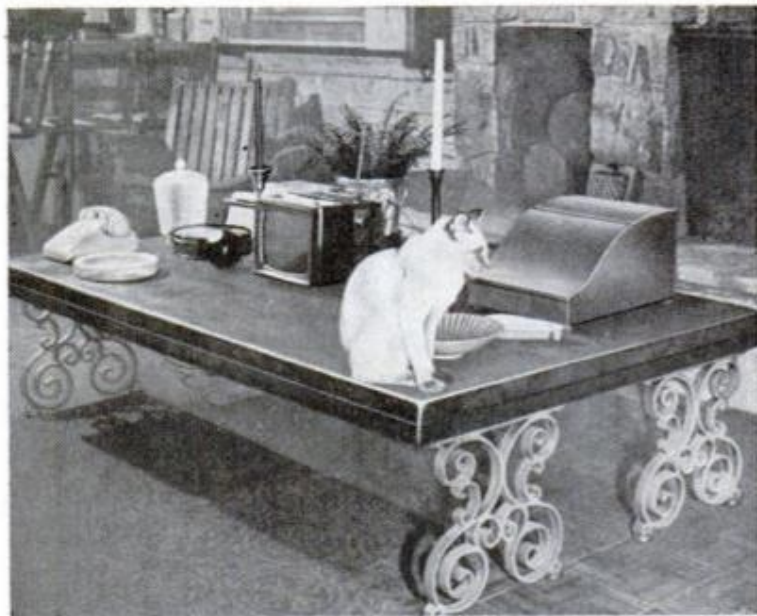
**DOVETAILING TEMPLATE** made of aluminum will seem indispensable after you've used it once. But instead of trying to jigsaw inner curves, first drill holes of the correct diameter and then saw the slots



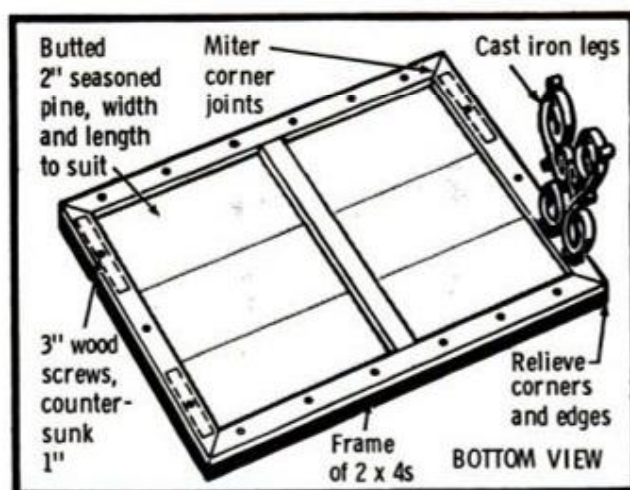
**CLAMP TEMPLATE AND STOCK** so that a single pass with the dovetail bit will leave a tenon in one piece of wood and a matching mortise in the other. Templates for this purpose can easily be purchased



# King-size coffee table built in an evening



A SINGLE EVENING is all the time you'll need for the king-size table shown above, right. If you haven't room for such a large table, however, or if you'd rather make it a half-an-evening project, consider fabricating a smaller, but just as handsome, coffee table as shown directly above. The top in either case is well-seasoned 2-in.-thick knotty pine. To duplicate the 65x41x17-in. king-size table, three sections of pine are needed. Two are 13 in. wide; the third, 15 in. Plane the edges to be butted, join the sections with mitered 2x4s and add cast-iron legs.—Bill Barr



## NEXT MONTH IN SHOP AND CRAFTS

**SEVEN WANTED CHRISTMAS GIFTS.** Get a head start in your workshop and by Christmas you'll have made enough of these handsome gifts to bestow upon friends and relatives. Construction plans will be shown for a butcher-knife holder, shoeshine kit, poker-chip-and-card holder, coaster set, magazine rack, wall plaques and a holder for table-tennis balls and paddles.

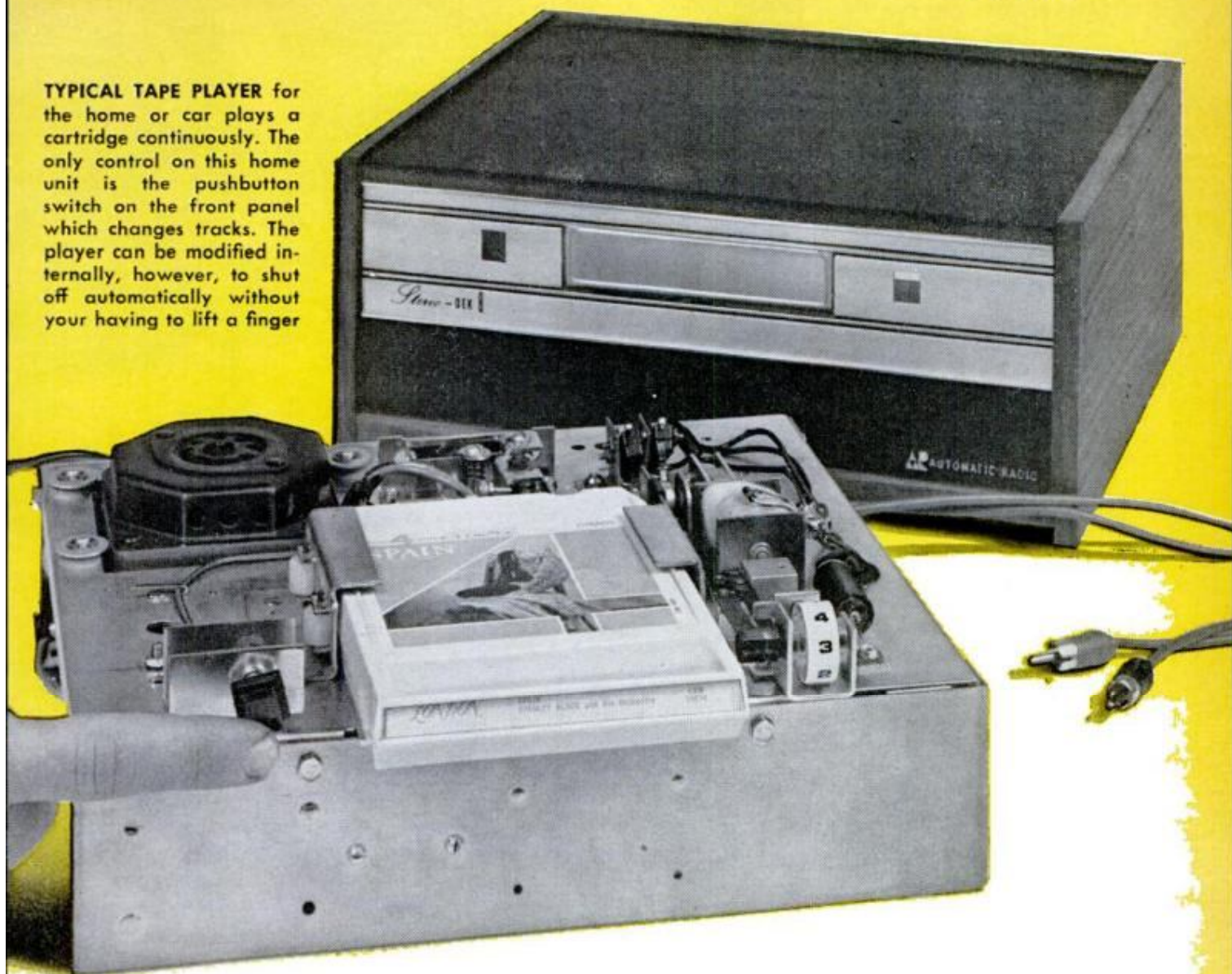
**WINTERIZING YOUR INBOARD-OUTBOARD.** There's more to preparing your stern drive for the long winter months in storage than just disconnecting the fuel lines and battery cables. For the A-to-Z story on how to set up your boat's motor for safe off-season storage, be sure to look for this informative article in next month's issue.

**MAKE AN ABRASIVE CUTOFF MACHINE.** Plans for a bracket of strap iron will show how to team up a portable electric saw, a cutoff wheel and a machinists' vise to produce an efficient cutoff machine capable of slicing through tempered steel. The bracket pivots on the sliding beam of the vise, which, in turn, holds the metal being cut.

**THE ZIPPY LITTLE JIGSAW.** A profusely illustrated story will point out how you can use this spunky little tool to whip through tough jobs like cutting pipes, making decorative cutouts in panels, and trimming troublesome materials such as chipboard, veneers, balsa and even leather. Look for and heed the collection of tips in November *PM*.



**TYPICAL TAPE PLAYER** for the home or car plays a cartridge continuously. The only control on this home unit is the pushbutton switch on the front panel which changes tracks. The player can be modified internally, however, to shut off automatically without your having to lift a finger



# Stop the music with an Automatic Tape Shutoff

A cartridge tape player will repeat the same cartridge again and again unless you add some hardware to turn it off after it plays the last track

By WALTER G. SALM

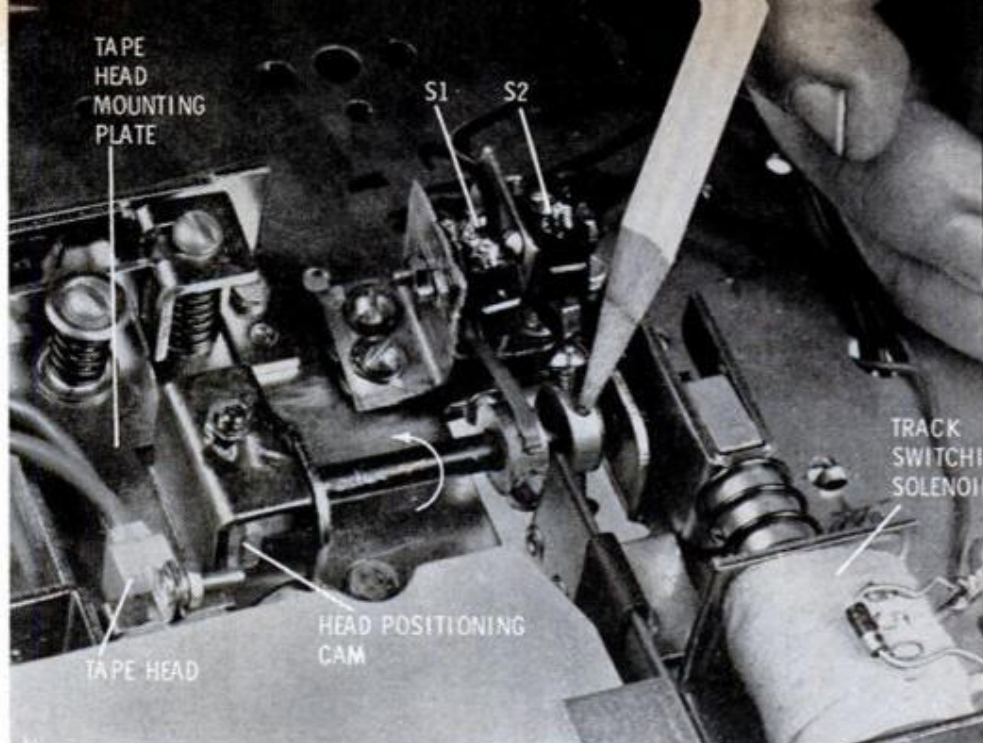
**E**NDLESS-LOOP TAPE cartridges are a great convenience, but they have one shortcoming—they never end. The tape does not stop or run out after the last selection. Instead, in current cartridge players, the playback head assembly shifts back to the first pair of stereo tracks and the music starts all over again. The machine turns off only when the cartridge is physically removed from contact with the tape head and capstan drive.

You can stop the player immediately after the last selection only by removing the cartridge at the right instant. On the highway, this could be dangerous; at home, it's a nuisance. And if you miss pulling the cartridge out before the first pair of tracks starts playing again, there's no way to rewind; you have to run through the selection to get back to the beginning.

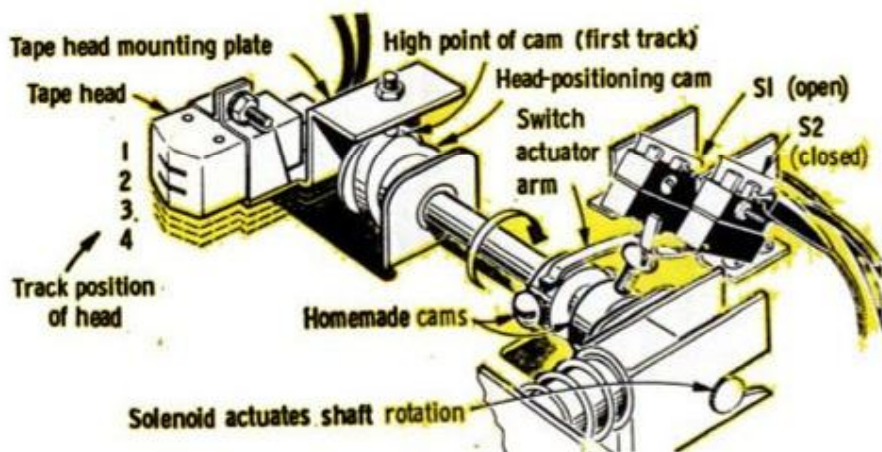
Installing an automatic shutoff in a



**TAPE PLAYER CHASSIS**, as viewed from the top, has plenty of room to add the additional components for the automatic shutoff feature. The two homemade cams, pointed out here, are slipped onto the solenoid-actuated cam shaft, and the switches, S1 and S2, are secured to the chassis. As the shaft turns, lifting and dropping the head by means of a cam (see drawing below), the homemade cams actuate the arms of the switches



**SWITCH ACTUATION** as a function of head position can be visualized in this drawing of the key components shown in the photo above. The player's head-positioning cam has eight steps (one-half revolution therefore moves the head across four pairs of stereo tracks of one cartridge). For this reason, each homemade cam has two screws 180° apart



conventional reel-to-reel recorder is quite simple. All that's needed is a pressure-operated snap-action switch with a leaf actuator that's held closed by the tension of the tape running between two reels. When the tape releases at the end of the reel, the machine is turned off.

The endless tape cartridge presents quite a different situation. Tape tension is always present, so the snap-switch idea will not work. What is needed is a limit switch arrangement that will sense the motion of the playback head assembly as it moves up to the first program position after it finishes all four programs.

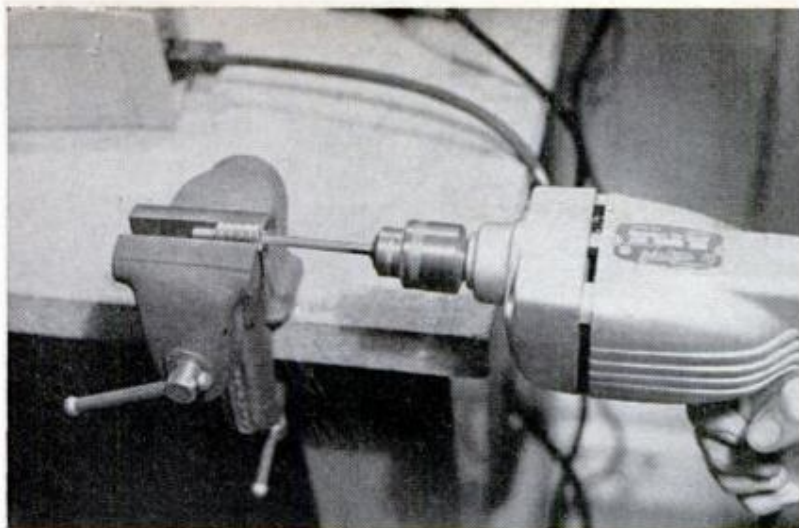
In its simplest form, this could provide a kind of semiautomatic shutoff. As the head snaps up to the first program position, a microswitch would sense the motion and shut off the mechanism. A manual override switch on the front panel would be needed for the machine to play again. This system will work, but it still isn't fully automatic.

The system here, however, is fully automatic. Two microswitches are used to sense the two extremes of travel of the head for the fourth program, or track, and the first program. Since the distance that the head assembly travels is not great enough to operate the microswitches accurately, you have to install a pair of homemade cams on the solenoid-actuated camshaft, which turns one-eighth of a revolution every time the first program is changed on this particular machine.

The machine modified here is a 115-v.a.c. Automatic Radio Stereo-Dek 8—an 8-track home cartridge player. Other players work pretty much the same way and can be modified in a similar fashion.

The cams are made from lamp-shade risers, available for about 25 cents in most large variety stores. Two sections, each  $\frac{3}{8}$  in wide, were sliced off the brass-plated riser for the two cams. These slices were then drilled on opposite sides,

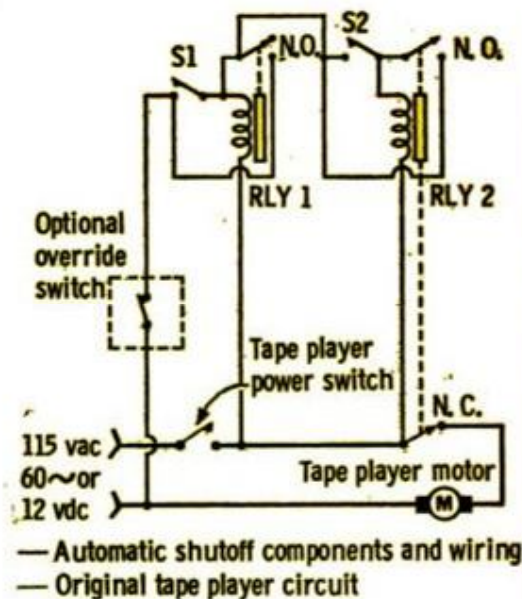
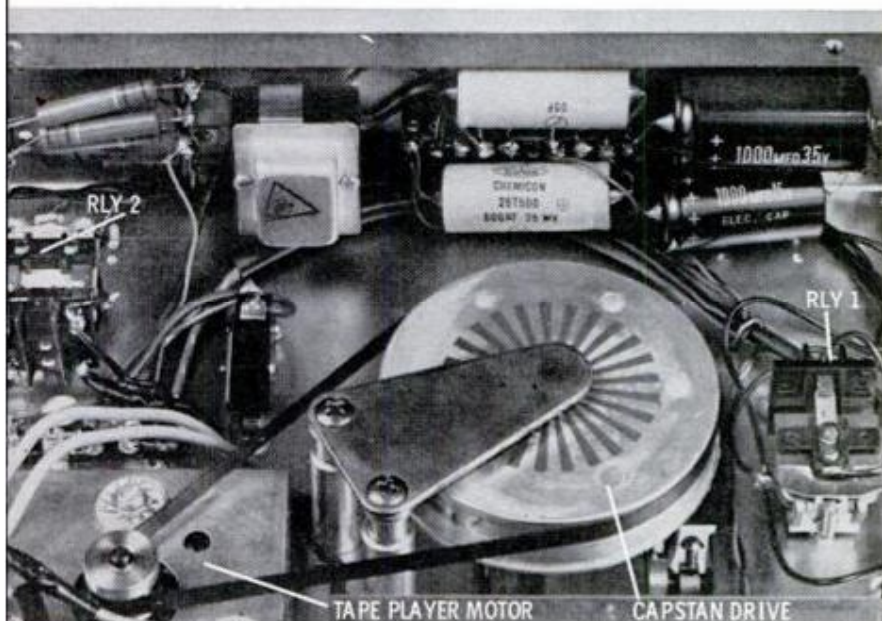




**HOMEMADE CAMS** are fashioned from lamp-shade risers available at most five and dime stores. Center holes had to be enlarged to fit camshaft of Automatic Radio tape player. Each cam must also be drilled through its diameter and the two resulting holes tapped to receive the No. 6 screws that trip actuator arms of switches S1 and S2

**TAPE PLAYER CHASSIS** is viewed from bottom in photo at left, below. There is sufficient room to position relays

**SCHEMATIC DIAGRAM** of modified tape player is shown below. For specifications of required parts, see the text



tapped with a 6-32 tap, and slipped onto the solenoid-actuated camshaft that lifts and drops the tape head mounting plate on the player. Two 6-32 screws, which are cut to size to actuate switches S1 and S2, secure the riser sections to the shaft. Two screws are used for each cam, since the shaft only rotates through 180° for all four programs. Another cartridge and four more programs complete the camshaft revolution.

### Screwhead eccentrics

The heads of the screws act as the cam eccentrics, operating the microswitches. When installing the microswitches on the tape player chassis, bend their actuator arms so the switch contacts will open and close at the right time and will operate smoothly on the screwhead cam assembly.

Installing the microswitches is the most ticklish part of the operation. The switches themselves work in conjunction

with two relays wired to act as a binary logic circuit, something like the kind of circuits used in computers. The first relay pulls in when the first microswitch, S1, is closed as the camshaft positions the head assembly for playing the third program. This screwhead must be positioned on the homemade cam to close S1 when the cam shaft rotates to the third program position.

The armature contact arrangement of RLY 1, which is normally open, is wired to bypass microswitch S1 as soon as the relay pulls in—keeping the relay energized indefinitely until the main power source is disconnected.

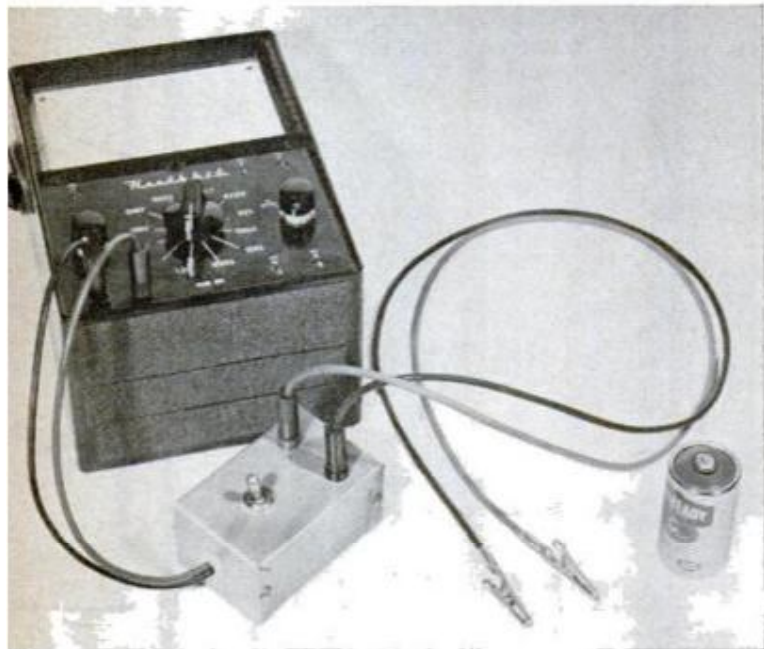
When the tape head shifts up to the first program, the second microswitch, S2, is closed, activating the second relay (RLY 2) circuit. Again, this relay will stay energized indefinitely until the main power switch is opened. RLY 2 has double-pole contacts. One set of contacts bypasses

*(Please turn to page 240)*



# 2 ONE-HOUR

## FLASHLIGHT-BATTERY TESTER



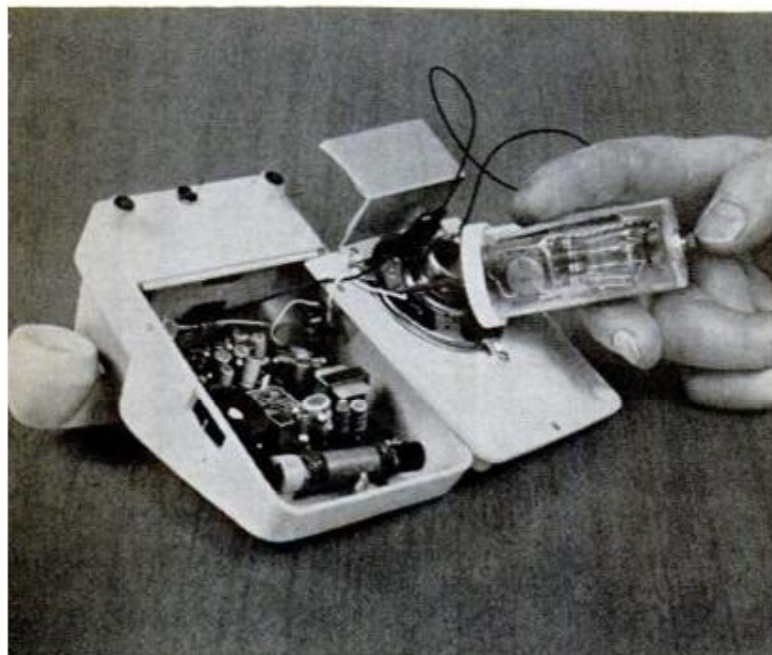
Checking your batteries under load is the trick that shows just how long they'll last when you really need 'em

TESTING A BATTERY in your flashlight is no measure of its condition. A weak battery will often light a flashlight bulb bright enough for you to think you've got a good, fresh battery working for you.

There's a better way to check a battery—one that's not hit or miss and won't literally leave you in the dark some night. Using a voltmeter, you can measure the voltage across a battery. Regardless of battery condition, you'll likely read 1.5 volts. But the measurement is taken without a load on the battery, unlike the condition in actual use.

## SIGNAL-INJECTOR PROBE

This handy little 1000-kilocycle multivibrator in a pill container makes troubleshooting a quick and easy one-handed operation.



A SIGNAL PROBE simplifies the checking of troublesome audio amplifiers, AM, FM or shortwave receivers (both tube and transistor types), headphones, loudspeakers and any other audio equipment.

Using this probe, with a radio, for example you start at the speaker end and work backward, injecting a signal at each step. As soon as you lose the signal, you know you've got trouble between the previous stage and the stage where no signal got through to the speaker.

The convenient "hypodermic needle" type of operation of this signal injector is achieved by wiring the components on a piece of perforated circuit board and enclosing the board in a small plastic vial. Since current draw of the probe is low, the battery can be soldered right into the circuit, although you may have room for a clip-type connector.

The pushbutton switch is held in place by a stiff wire looped between two holes in the circuit board. The pushbutton protrudes through the bottom of the vial and

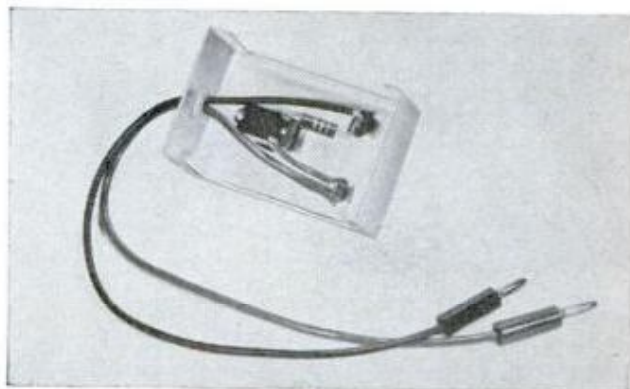
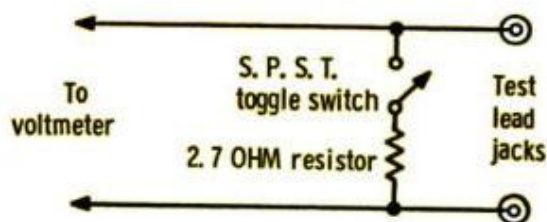


# PROJECTS

The tester shown, when connected between the battery and your voltmeter, allows you to put a load on the battery with a flick of a switch. It adds a 2.7-ohm resistance to simulate the current draw of the battery in use in a flashlight.

In use, the meter will indicate 1.5, the unloaded battery voltage. But, when you close the switch, the added load will cause the cell voltage to drop. The drop will be only slight with a fresh battery, but with a weaker battery, it will be several tenths of a volt or more.

All components are readily available from any electronic parts distributor. The resistor, single-pole single-throw switch, and test-lead jacks can be mounted in a small aluminum chassis box. The plugs should match the jacks on your meter, and the test leads can be terminated with alligator clips.—*Marshall Lincoln*

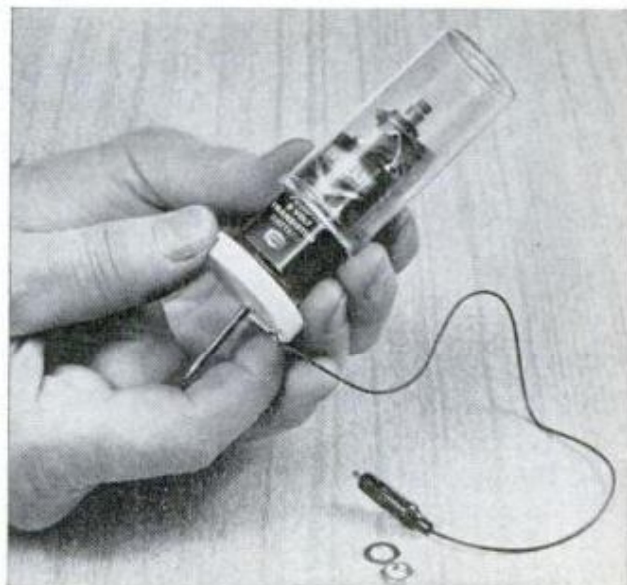
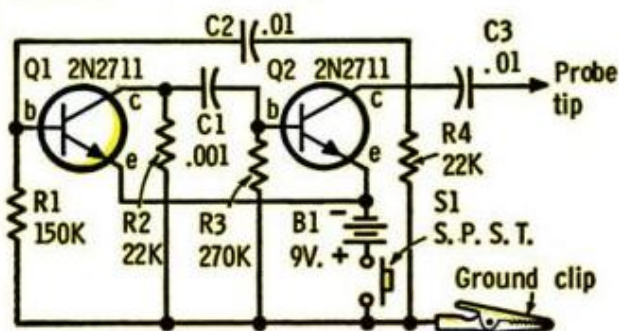


is secured with its hex nut. The probe tip is actually a 1½-in. nail with its head flattened so it can be held in place on the perforated board. Except for its tip, the nail is covered with tubing to prevent an accidental injection of the signal into other parts of a circuit being tested. The nail and ground-clip lead protrude through two holes punched in the cover of the vial.

The heart of the probe is a 1000-kc. multivibrator circuit whose output is rich in harmonic frequencies (2000 kc., 4000 kc. and so forth.) It's so rich that you will actually get a fully audible signal when the probe is applied to the antenna terminals of an FM receiver tuned to approximately 100 megacycles.—*Rudolf F. Graf*

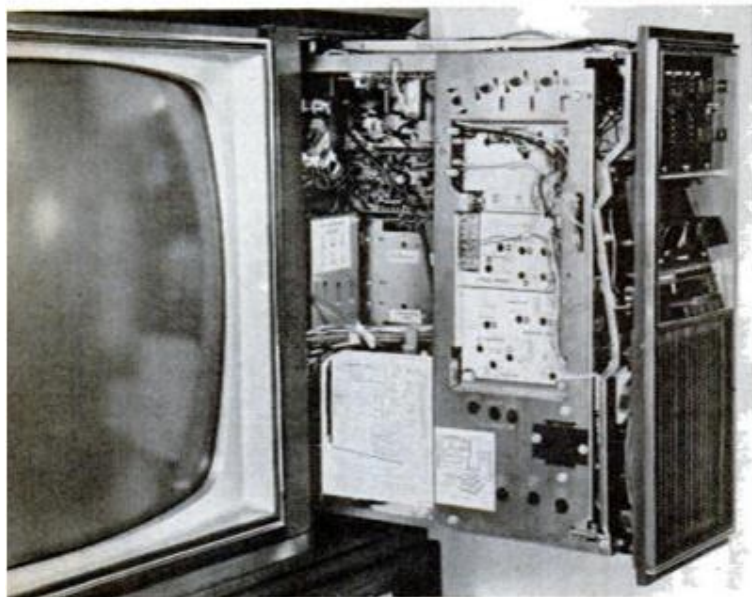
## PARTS LIST

- B1—9v. battery (Eveready No. 222 or equiv.)
- C1—.001-mfd. 200-w.v.d.c. miniature capacitor (Sprague 192P series or equiv.)
- C2—.01-mfd. 200-w.v.d.c. miniature capacitor (Sprague 192P series or equiv.)
- C3—.01-mfd. 1-kv. ceramic disc capacitor
- Q1, Q2—2N2711 transistors or equiv. npn substitutes
- R1—150,000-ohm, ½-watt resistor
- R2, R4—22,000-ohm, ½-watt resistors
- R3—270,000-ohm, ½-watt resistor
- S1—S.p.s.t. pushbutton switch (Switchcraft type 951 or equiv.)
- Misc.—Small plastic vial, perforated circuit board, nail, alligator clip, wire, solder





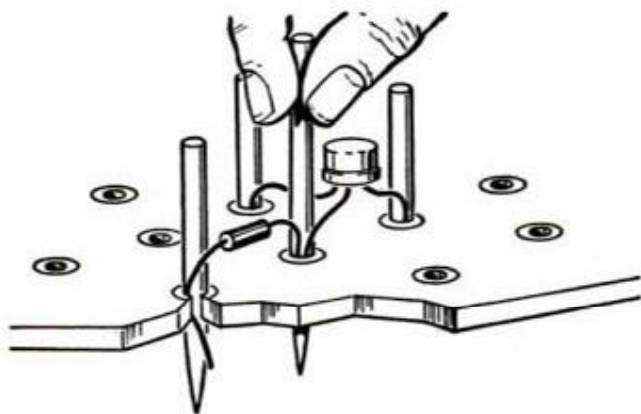
# NEW in ELECTRONICS



**FIRST SOLID-STATE COLOR TV** is from Motorola. The pull-out TS-915 chassis is all transistor except for the rectifier and picture tube. There are 21 models in the line



**A RESERVE BATTERY** has been developed by the Mallory Battery Co. It remains inert in storage for years until the top terminal cap is turned to release liquid electrolyte to activate the cell. Part of the "Duracell" line, the battery will be available initially in the common "D" flashlight size. It will cost only a bit more than a regular battery.



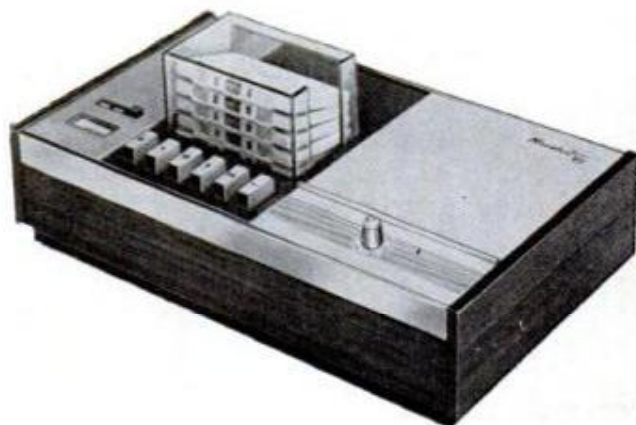
**"LECTRONIC PEG BOARD"** makes circuit breadboarding quick and easy. A 9x12-in. board with the pegs and layout sheets is \$11.90 from Berkley Applied Research Corp.



**PHASE SEQUENCE INDICATOR**, connected across a 3-phase line, shows the correct way to hook up motors or other equipment. It's \$27.50 from Associated Research, Inc.



**SOLID-STATE AMPLIFIER-SPLITTER** boosts the signal from a TV antenna to feed up to four TV or FM sets. The low-power-drain "Homer" is \$27.50 from the Blonder-Tongue Labs, Inc.



**FIRST AUTOMATIC CASSETTE CHANGER** loads six tape cassettes for a 4½-hour play time. The Norelco 2502 plugs into your existing hi-fi equipment, will sell for about \$100





21 exciting new motors -- 1½ to 115 horsepower  
....and featuring a sensational new mid-range motor  
that combines the size and economy of a compact "50"  
with the speed and performance of a hot "65" ...



# new EVINRUDE TRIUMPH 55 hp

## It does everything our competitors were afraid it would

It puts fast runabouts and hot ski boats in the over-40 mph class. Pops gangs of skiers out of deep water, and pulls single skiers at tournament speeds. And does big-motor duty at the fuel cost of the smallest motors in the mid-range class.

Everything about the new 3-cylinder Triumph 55 is designed to deliver more speed and more thrust from less bulk and less fuel.

The fueling and combustion system is not just different — it's more efficient than any high performance outboard ever built before.

The lower unit shape is straight out of a computer.

The tuned exhaust is jetted through the propeller hub in a space age refinement of a system first developed by Ole Evinrude for the high performance engines of two generations ago.

The power is put to work by a selection of high rake, progressive pitch propellers that combine high thrust with high speed to a degree never achieved before.

And the Triumph's performance is matched by its luxury.

Push button electro-hydraulic shifting is standard (with controls furnished). So is high intensity CD electronic ignition, full-range sound-sealed quieting, electric starting, automatic choke, 9 amp alternator, thermostat temperature control, and adjustable stern brackets.

We call it the Triumph — one ride and you'll know why.

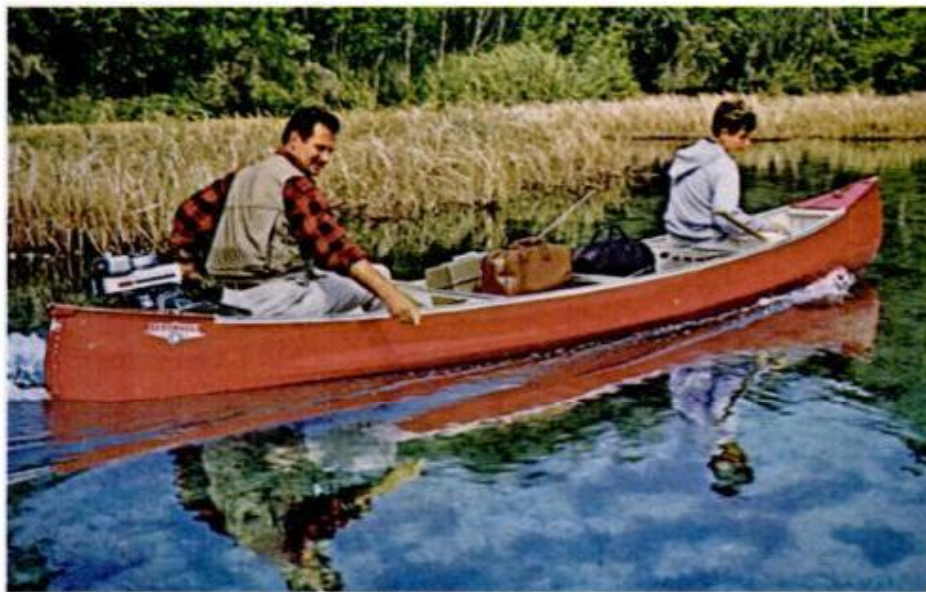


**Left above** — Upward-slanted intake ports aim the incoming fuel charge directly into the top of the combustion chamber — eliminating the need for a piston deflector to keep the fuel charge from "short circuiting" across the top of the piston.

**Right above** — An ingenious Thrust Accelerator Ring (Pat. Pending) squeezes the flow *inward* — in a converging cone that confines exhaust thrust to the vortex directly behind the propeller hub — preventing exhaust gases from reaching the propeller blades and causing cavitation.



# new EVINRUDE MATE 1 $\frac{1}{2}$ hp



**Weighs just 19 lbs.  
— pushes a loaded canoe  
twice as fast as you can**

A lot of people have waited a long time for a motor as small, and light, and powerful as this.

Just 19 lbs. — yet its geared-down, high-thrust propeller will push a load of 1900.

It will cruise as fast as 8 mph., and as far as five miles on a pint of fuel.

But don't let its small size or low price fool you.

It's *all* Evinrude. Made the same way the big Evinrudes are made. With cast iron cylinder liner. And a full set of controls and adjustments (including 360° steering). With anti-friction bearings and balanced crankshaft, intake and exhaust silencing, and quiet gears. Fully salt water engineered.

It's the most motor made — for anywhere near its size or price.

## 21 new motors—1 $\frac{1}{2}$ to 115 hp



Four new compact 3's



New 65 and 85 hp motors



New lower units on 6, 9, and 18



### **new features, new performance, new styling**

New quiet, new compactness, new smoothness, new efficiency, new reliability — hundreds of engineering improvements to bring you better performance no matter what horsepower size you prefer.

**FREE: COLORFUL 32 PAGE ILLUSTRATED BROCHURE** giving you a preview of our new Triumph "55" — and all that's better and new in fun power for 1968. Fill out the coupon and mail today. See your Evinrude dealer — he's listed in the Yellow Pages under "Outboard Motors."

EVINRUDE MOTORS  
4265 N. 27th Street, Milwaukee, Wisconsin 53216

Name.....

Address.....

City.....

State..... Zip.....



# new '68 EVINRUDE SKEETER

50% quieter  
60 lbs. lighter  
100% more fun...



Good news for peace-loving snowmobilers!

The new '68 Skeeters are **50% quieter**.

How did Evinrude do it? By enclosing engine and drive train, by using sound baffles, tuned exhaust, and dual mufflers.

Even with more power and more luxury features, the '68 Skeeters are lighter — **60 pounds lighter** in the case of the sport-track model. Both sport-track and wide-track models have more flotation, better balance, more speed.

The new Skeeters are **100% more fun**. You can start them electrically, idle in neutral, shift into reverse (a unique feature). They're smooth-riding, ruggedly built, and dependably powered with an Evinrude 2-cylinder engine.

Do something nice for yourself (and your neighbors) — drive the *quiet* one.



New Sleigh-Mate makes Skeetering a family affair. Send for catalog on '68 Skeeters and accessories.

**EVINRUDE**  
first in  outboards  
Div. of Outboard Marine Corp.

Send coupon on preceding page for your copy of the new 1968 Skeeter catalog. Evinrude Motors, Milwaukee, Wis. 53216.



# You're like a kid with a new sled.

Forget all your ideas about winter driving! Join the 'Jeepster' crowd, and show winter who's boss. Flip a lever—at any speed—and you're in 'Jeep' 4-wheel drive. Sit back in those bucket seats, and go! This baby really loves the deep stuff! Choose the 'Jeepster Commando' Station Wagon or the

'Jeepster' Convertible with continental spare. 4-wheel drive and 4-cylinder engine are standard on all models. Add sporty options like husky V-6 with (or without) Turbo Hydra-Matic\* automatic transmission; sports console; power brakes; air conditioning. There's also a jaunty Roadster model. And a

snappy Pick-up. All smooth performers on the road...all tougher than nails in the rough. **Holy Toledo... what a car!** You've got to drive it to believe it. See your 'Jeep' dealer for a test drive. Check the Yellow Pages.

'Jeepster' and 'Jeepster Commando' are trademarks of vehicles made by and only by  
**KAISER Jeep CORPORATION**  
TOLEDO, OHIO 43601



**'Jeepster'**  
4-wheel drive fun cars



## HOW YOUNG IS TOO YOUNG?

(Continued from page 135)

that we should make it easier for drunks to drive more safely than they do—at least until we've achieved an effective campaign to really end drunk driving. Safer conditions for drunk drivers would include better highway illumination and more one-way streets (to reduce headlamp glare and head-on collisions). Goen would make drunks (and the rest of us) slow down after dark. Reducing speeds at night by 40 percent would cost an average of eight more minutes driving time per driver each night and would save 21,000 lives per year, SRI estimates.

### Would curb drunk drivers

Although drunk driving "offenses" are believed to number in the hundreds of millions a year, Goen figures less than one in 1000 drunk drivers is caught. He thinks 10,000 patrol cars should be assigned to catch drunken drivers before they cause accidents. He suggests that a graduated point system might be adopted; that is, your license would be automatically revoked if you acquire 10 points (equal to about three citations for driving with a high alcohol-blood ratio) in three years. "Several million drivers, particularly the heavy drinkers, would probably lose their driving privileges," he says, "but this is a small price to pay for the saving in lives."

Recently the California Highway Patrol became concerned with the growing number of single-car fatal accidents. Together with other agencies, it made an exhaustive study of this kind of crash. Typically, a single-car accident occurs when a driver loses control, runs off the road and hits an object or rolls over. According to a survey of more than 600 such wrecks, about 70 percent of the male drivers and 40 percent of the female drivers had been drinking heavily enough to have their judgment blurred and their reflexes slowed down.

The same survey disclosed another group of deadly drivers whose existence had hardly been suspected. Evidence shows that *dead men*—men who are actually dead at the wheel—are causing accidents. In about 10 percent of the cases studied, a corpse had been in charge of a hurtling automobile.

The 63 already-dead drivers were all male, from 39 to 79 years old. The most critical years appear to be those from 64 to 68.

Heart failure was the chief reason for death. When next-of-kin were questioned, it was learned that only about half

the drivers knew of a heart condition.

A typical case report read, "A 72-year-old driver and a passenger were traveling on a throughway when the driver slumped at the wheel and the car veered into a power pole and bounced back 20 feet. The passenger was thrown through the windshield, sustaining severe injuries. The driver was dead on arrival at the hospital. Examination revealed a recent thrombosis. The driver had been aware of his heart condition for seven years and had been taking nitroglycerin for his heart, plus medication for high blood pressure."

The California Highway Patrol report suggests that, instead of causing a mere single-car accident, death-at-the-wheel is most likely to occur in congested traffic where the result is a multicar crash. The report points out that if the driver then receives injuries that could account for

---

*Young men who own cars have more accidents than their contemporaries who drive the family car, according to a University of Michigan survey. The study also finds that young blue-collar workers do not drive as safely as students.*

---

his death and no autopsy is performed, the actual reason for the accident would not be known.

The Patrol's report concludes that medical screening of all drivers over 40 might be made a requirement for licensing. In addition to reducing highway accidents, identification of a driver who has heart disease and doesn't know it could lead to medical care that might prolong his life.

Dick Goen emphasizes that the traffic-safety problem is even graver than the statistics indicate, for deaths and injuries are increasing every year. Last year's 52,200 deaths could climb to 200,000 per year within 20 years if drastic measures aren't taken. Taking licenses away from high-risk drivers would be one effective step, but there's a big loophole that must be closed before this would really work.

### License or not, they're driving!

Several months ago when the California Highway Patrol began flagging down cars at random for roadside safety checks, officers discovered that at least 38 percent of people whose licenses had been suspended were still driving their cars, and that at least 63 percent of those whose licenses had been *permanently* revoked were continuing to drive. "Effectiveness of license removal is largely nullified by inadequate enforcement," says Goen. ★ ★ ★



HERE!  CHEVROLET

# '68 JOB TAMER TRUCKS



Half-ton Fleetside pickup

**Look at all you get you can't get anywhere else!**

**Only Chevrolet gives you all these features that make holidays more enjoyable, work-days more profitable!**

**Truck-tough cab and body with double-strong construction.** All Chevrolet pickups have more than one cab. There's the one outside plus the one *inside*. Double-wall construction does it. Double strong! Cowl, windshield pillars, roof and door openings are double strong to resist twisting and keep cab tight for years. Fleetside pickup boxes have full double-wall sides and tailgate. The strength of

two boxes in one—and no external welded joints to rust!

**Road-balanced ride with rugged coil springs all around!** Coil springs deliver an extra-smooth ride. That's why we put truck-designed coils at all four wheels of the popular 1/2- and 3/4-ton Chevy pickups. Add work-proved Independent Front Suspension and you have the easy ride plus toughness that comes only with a '68 Chevy pickup!

**Extra workpower with job-tailored engines!** Just check all the engines available for conventional pickups in '68! Begin with the 155-hp 250 Six—biggest standard Six you can buy. Or ask for the 292 Six. *There's a brand-new 200-hp 307 V8 that's standard*

*in V8 models. Specify a 327 V8 or 310-hp 396 V8! You won't find a broader range of power in any popular pickup.*

**Styling with a purpose that sets the pace!** The low silhouette of the '68 Chevy pickup helps provide road-holding stability and cuts wind resistance. And Chevy's new hood gives a better view down front for greater maneuverability and safety.

**Biggest service network.** You're never far from a Chevrolet dealer . . . because there are *more of them*, ready to help keep you rolling. Visit your nearby dealer and see the '68 Job Tamer trucks. . . . Chevrolet Division of General Motors, Detroit, Michigan.





### **Knight clothes from junk**

Metal from junked cars—bumpers, body panels, fenders and so on—is fashioned into suits of "medieval" armor by a German craftsman. He's Heinz Schneider of Wurzburg, who made the first suit as a hobby and now produces a suit a month for collectors.



### **Blossom time**

The auctioneer at flower auctions in Aalsmeer, Netherlands, is a clocklike dial with a hand that moves from 100 down to 1. When the price is right, any one of the 160 wholesale dealers present pushes a button that stops the clock. The sale is made at that price.



### **On a bicycle built for two . . . and two . . . and two . . . etc.**

All 28 students in this class at Zug (Switzerland) Teachers College have to agree on their destination when they go riding, because they're all in the same boat, so to speak. They made the 65-foot-long 28-passenger vehicle in their spare time at a cost of about \$200. They're shown here on their first trip—from Zug to the Swiss Traffic Museum in Lucerne.



**When Ford built this \$100,000 GT,  
they weren't about to scrimp on spark plugs.  
So they got Autolite plugs. Like you buy.  
About \$1 each.**



Last year, the Ford GT became the first American car ever to win the grueling 24-hour Le Mans race. (This year, another Ford GT did it again, to make it two in a row.) It's probably the finest racing car \$100,000 can buy. The transmission alone cost \$25,000. The engine cost as much as a small house.

And the spark plugs? About a dollar a throw. They're Autolite plugs. The same kind *you* buy.

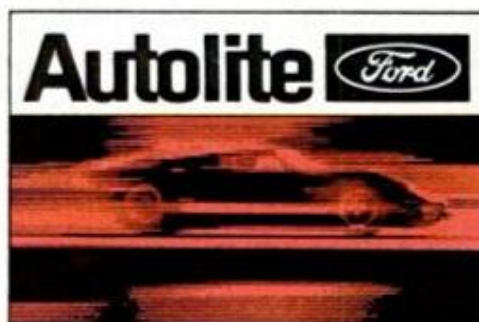
What are \$1 Autolite spark plugs doing in a \$100,000 car? Simple. There *are* no better plugs. Not at *any* price.

Autolite spark plugs have a stronger, tougher insulator. To resist corrosion from dirt, gas and carbon deposits. Plus a special alloy electrode for long spark

plug life. To top it off, molten glass is used to form a true hermetic seal. One that guarantees zero leakage.

Put this kind of spark plug in your kind of car. Whatever kind you drive.

Autolite...the only name you need to know for spark plugs, batteries, filters, shock absorbers and complete ignition systems.





Any way  
you  
slice  
it,  
it  
seems  
like  
baloney



Whether you're woodcutting by hand or with power, it's like slicing through baloney when you use a Nicholson saw blade.

Nicholson's Stainless Steel handsaws are taper-ground to glide through lumber. And Nicholson's Magicut power saw blades have individually set and sharpened teeth with real bite in them.

Get either . . . and you'll *cut it like you never cut it before!* That's no baloney.

There's never a dull moment with  
**NICHOLSON**

Nicholson File Co., Providence, R. I.



Quality cutting tools



New Nicholson presents Frank Gifford on  
"Worldwide Sports," CBS Radio Network.

## WHERE TO DRILL FOR WATER

(Continued from page 126)

cover the entire country "At least 30 percent of our clients come to us after having drilled at least one well with no results. Many people assume that because their neighbors all got good water without having to dig to China to get it, that they will, too."

This doesn't hold true; often a very poor well can be found only feet away from a good one. Often, too, the land surrounding a stream or lake will not yield water.

On the other hand, Hap recently designated a well 15 feet off the banks of the polluted Hudson River in Yonkers, N.Y. "We got 100 gpm at 175 feet—and the purest water found in that area in years!" he says proudly.

Very few of Hap's predictions have proved dead wrong. "I did bring in a dry well in East Hartford, Conn., once," he admits, "and haven't the slightest idea what went wrong; there were three other dry holes on the same property, though." Sometimes, too, Hap has found someone so desperate for water that he will insist on drilling in spite of the fact that the magnetometer indicates almost no water on the property. In such cases Hap has obliged by finding the most likely spot to drill, but he says that he prefers simply not to continue the job. "It doesn't pay to try to force your own interpretation into the instrument. Either it's there or it isn't."

### Factors that affect cost

The cost of the services rendered by Accurate Wells Corp. varies with several things: the terrain, the time spent on the property, the distance from Poughkeepsie. Hap estimates that the average homeowner pays from \$125 to \$170. When contractors or commercial or industrial establishments request a pump test, Hap likes to enter into a per-gallon-produced agreement—\$50 per day expenses plus a fee of \$10 per gallon for the gpm production rate of the well, with a minimum yield dependent upon the circumstances and needs.

In the rare event that the magnetometer proves dead wrong, the charges are dropped. This gives skeptical prospects a sense of security, as in the case of the Madison School Building Committee, who said when they called Hap in, "After all, what have we got to lose?"

As one contractor put it after he had gone through several low-yield wells on the property of a nursing home he was building: "I just wish I'd known about the magnetometer \$4000 earlier." ★★



# JUST SAY... "WEN"

...and get with America's finest family of quality power tools and soldering guns.

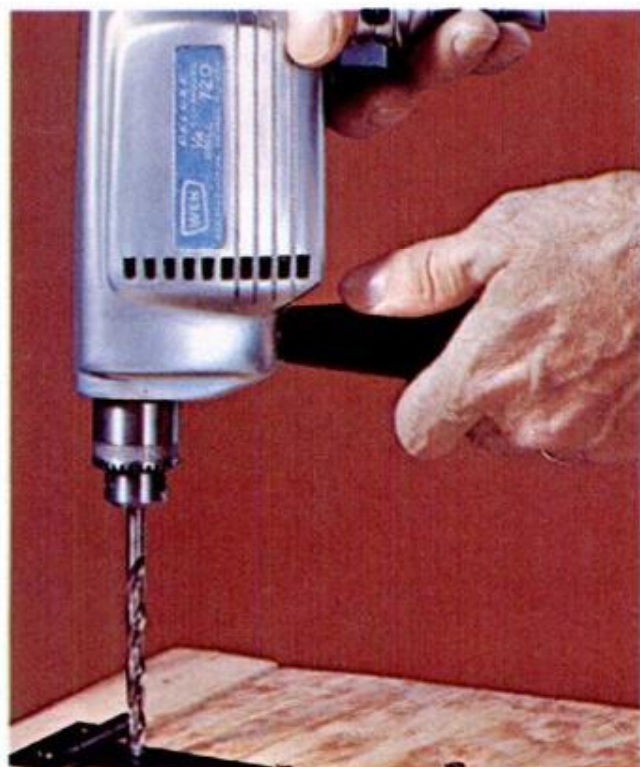
COMPARE PRICE, VALUE AND PERFORMANCE OF THESE WEN TOOLS WITH OTHER BRANDS ... THEN



All Wen Tools 100% American Made



ADVERTISEMENT



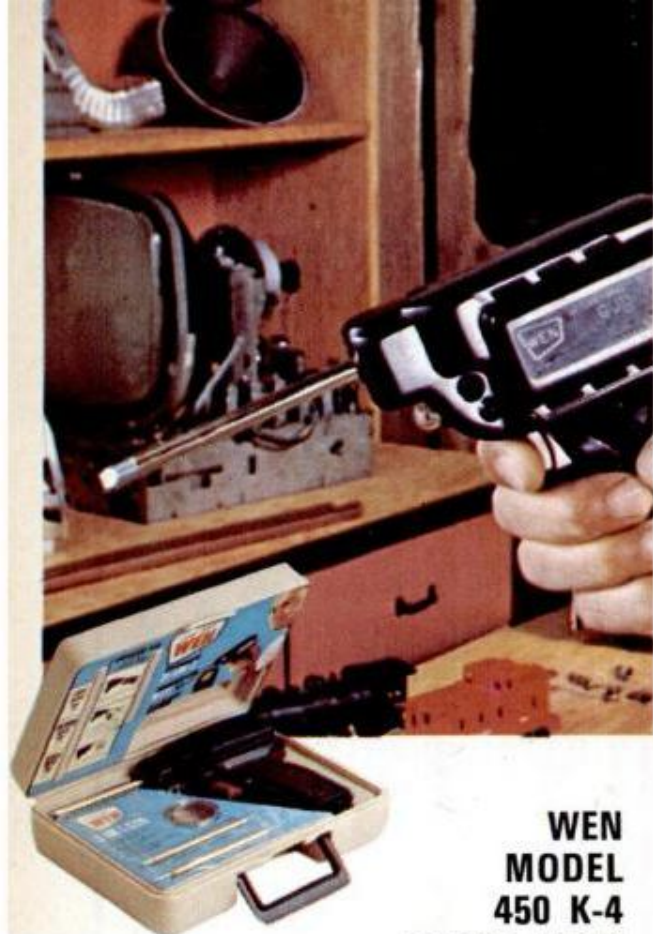
## 1/4", 3/8", 1/2" STANDARD, DELUXE, VARIABLE & HEAVY DUTY DRILLS

**A powerful drill for every purpose at a price for every pocket.**

All nine models feature Machine-Gun-Grip Auxiliary Handle; Heavy Duty Bearings; Double Reduction Heavy Duty Gear Train; Welded Burnout Proof Armature; Jacobs Chuck; Die Cast Aluminum Housing; Ball-Brite Finish; 6' 3-wire cord and adapter. Each is custom designed and value priced to fit your needs.

EXAMPLE: The #821 Deluxe 3/8" Variable Speed has 0-1100 RPM, locking at full speed with safety release; 3.2 Amps 115 V AC High Torque Motor; Needle Bearings at heavy load point, Ball Thrust Spindle Bearings and Oil Impregnated Sleeve Bearings... all for only \$29.95 Mfr's. suggested list.





**WEN  
MODEL  
450 K-4  
HEAVY DUTY  
SOLDERING KIT**

3-in-1 kit! Here's everything! A new kit specially designed to handle every soldering job from the most delicate printed circuit, to the most rugged sheet metal work. Includes three single post interchangeable tips, providing 25 to 450 watts of controlled heat power—more than any other gun! Gun, three tips and roll of solder come in convenient carry-case for only \$15.95 Mfr's suggested list.



**WEN  
MODEL  
199K  
HOME  
UTILITY  
SOLDERING KIT**

Complete with soldering gun and long-nosed tip, tile-cutting and putty-removing tip, flat tip, solder and metal case. This time-tested unit develops 130 watts of heat power in 2½ seconds for professional or home use. Features built in work spotlight and shock resistant case... and all for only \$9.95 Mfr's suggested list.

**USE AS A HANDY SHOPPING GUIDE**

**VAL QUALITY TOOLS  
VALUE & PERFORMANCE OF THESE  
SOLDERING GUNS WITH OTHER BRANDS  
... THEN**

American made



**C., 5810 Northwest Highway, Chicago, Illinois 60631**





### **WEN 950 4 SPEED REVERSIBLE 1/2" DRILL**

1/2 HP 6 Amp motor that is a cool worker delivers heavy duty torque on smooth ball thrust and needle bearings. Split second gear changes get it into wood, masonry, steel, cement or concrete quickly, and reverse gets it out smoothly. Burnout proof armature, locking instant-release trigger, auxiliary handle, ball-brite finish, perfect balance and 1/2" Jacobs chuck . . . it's all there, and for only \$44.95 Mfr's suggested list.

### **WEN MODEL 930 ELECTRIC PLANE WITH 2 1/8" CUTTING WIDTH**

For edges or flat work it does the job quickly and smoothly. A cool running 6 Amp 1/2 HP burnout proof motor goes to a professional finish while the air stream chip ejector clears the way. Adjustable depths to 1/16"; 14,500 RPM cutter speed; welded steel armature; removable guide plate and full 16" shoe all help smooth the way. And for only \$44.95 Mfr's suggested list.



### **WEN MODEL 940 7" COMBINATION SANDER POLISHER**

Only one tool, but it does the work of two. It's a tough 7" sander/polisher combination. Flick the 3 position switch from 3400 rpm to 1800 rpm and go from sander to polisher. The 1/2 H.P. motor stays cool on needle point bearings and a burn out proof armature rates it for the big jobs. The price rates it an outstanding value . . . only \$44.95 Mfr's suggested list.





### **WEN MODEL 320 STRAIGHT LINE/ORBITAL DUAL ACTION SANDER**

Goes from 4200 orbital strokes per minute for rough work to 9000 3/16" straight line finishing strokes with the flick of a lever and smoothly delivers professional results. Balanced design; Ball-brite aluminum casting with ball thrust bearings plus ball and sleeve spindle bearings. Complete with 6' 3-wire cord and assorted sandpaper. You get it all for only \$27.95 Mfr's suggested list.

### **WEN MODEL 910 HEAVY DUTY 3" BELT SANDER**

The one that takes on the toughest jobs with ease. It will sand farther, better and for less than any of its imitators. 1/2 HP, 4 1/4 Amp, 110-120 v., powerful AC motor is air cooled. Get the professional sander that started the trend to professional finishes for only \$44.95 Mfr's suggested list.



### **WEN MODEL 310 PROFESSIONAL QUALITY STRAIGHT LINE SANDER**

The new WEN economy model Sander is ahead of its time, and at the head of its class. Wear-out proof, burnout proof and foolproof, the cool running, powerful motor needs no lubrication and cannot overload. Light in weight, heavy on power, the 310 Sander gives 7200 full 3/16" strokes per minute for professional results that amaze both men and women. Get next year's sander now for only \$14.95 Mfr's suggested list.





**WEN MODEL 75  
LIGHTWEIGHT  
SOLDERING PISTOL**

Controlled heat flow single post tip that can't overheat... can't underheat. The perfect gun for the young hobbyist. Ideal for fast, lightweight work. Delivers from 25 to 100 watts of heat power with .45 amp, 120v AC. Features work spotlight, trigger switch and comfortable pistol grip. All at a low \$4.95 Mfr's suggested list.



**WEN  
MODEL  
222 K-5  
HOT ROD  
SOLDERING KIT**

Two heat-controlled single post interchangeable tips plus a handy plastic cutting accessory for cutting plastic tile, leather tooling, etc., flat iron accessory for sealing plastic bags, ironing out dents, etc. Handles hundreds of household chores. Includes light duty tip, 25 to 100 watt range; medium duty tip, 100 to 200 watts of heat power; roll of solder and rugged carry-case. All for only \$11.95 Mfr's suggested list.

**KEEP THIS COLORFUL BROCHURE AN**

**All WEN tools and soldering guns  
are built to rigid professional standards  
... and priced to fit the homeowner's needs.**

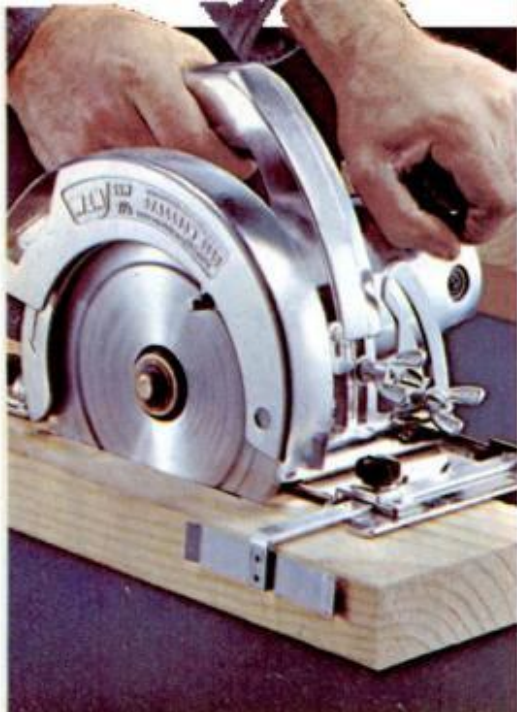
**Each is industrially rated,  
carries WEN's one full year guarantee  
and is 100% American Made.**

**FOR PROFESSIONALS  
COMPARE PRICES  
WEN TOOLS AND**

**All WEN Tools ... 100% American Made**

**WEN PRODUCTS INC.**





### **WEN CONTRACTOR'S MODEL 1000 7 1/4" CIRCULAR SAW**

Loaded with power, loaded with features: 12 Amp 2 1/2 H.P. motor running on all frictionless ball and needle bearings; burnout proof armature; depth and angle adjustments up front; rigid steel angle quadrant; heavy cast aluminum depth quadrant; heavy duty chrome plated base plate; 16 gauge 3-wire cord; auxiliary knob . . . the finest saw available for only \$54.95 Mfr's suggested list.

### **WEN MODEL 909 HEAVY DUTY ALL SAW Available as a two-speed model—the 909D**

A 6 1/2 lb. heavyweight performer that makes its own starting hole, and goes straight through metal up to 1/2", up to 2" on pipe and thinwall, 2" x 2"s, 4" x 4"s, even 6" x 6"s. Seven blades cut curves or circles with fingertip control. At 3400-1" strokes per minute the 1/2 HP, 110V, 6-amp, AC motor stays cool—and so do you. For only \$44.95 Mfr's suggested list.



### **WEN MODEL 920 FREE HAND CUTTING ZIPP SAW**

Cuts anything from in corners to up trees. Its 115V, 4 1/4 Amp 1/3 HP. AC. motor never strains running at 3200 1" strokes a minute. Seven blades let you custom cut any material . . . 6" logs, 4 x 4's, walls, pipe, metal, or any free hand cutting job. Get more for less than anything else in its price class for only \$44.95 Mfr's suggested list.







# READY TO TOW

**Now you can get prompt delivery on a new TRAVELALL**

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# HOMEOWNERS' CLINIC

BY W. CLYDE LAMMEY

## Water marks on doors

*My basement flooded to a depth of 6 in. or so last fall, leaving water marks on two doors leading to an adjoining recreation room. No other damage is apparent. The doors are a laminated or hollow type and have been stained a reddish-brown color. Can I eliminate the water marks without completely refinishing the doors?—N.H., Mo.*

Possibly. Get a small tube of artist's color in burnt sienna and thin a small amount of the color with turpentine to form a paste. Apply this to the marked surfaces with a soft cloth, rubbing the color off until you get a shade matching that of the unmarked areas. This light staining must be allowed to dry thoroughly and then can be coated with a semi-gloss varnish. However, if the burnt sienna color first appears too reddish, add a small amount of burnt umber to the prepared stain before application.

## Problem wall

*My old-style kitchen sink is located about midway on an inner, windowless wall, but exactly opposite a double window. I can't move it to the outside wall unless I install new plumbing and new windows because the present windows are too low. What can I do to make the kitchen more attractive?—W.G., Canada.*

Your sparse description of the layout leaves little on which to base a suggestion. If the dining room is on the other side of the wall where the sink is located, you could cut an opening in the wall over the sink. Frame it in and have a wide, pass-through serving shelf. Then you could hang planters filled with artificial plants at each end of the opening to add a touch of color. A scalloped board across the top would also add an eye-catching detail to what otherwise would be a plain rectangular opening.

If an opening isn't practical, look for a large mirror as long as the sink is wide, and as high as it is deep. Mounted above the sink, it would "picture" the window opposite and also include the view outside. In effect, the overall illusion would be akin to that from a window directly above the sink.

Mounting a wall mural over the sink might solve the problem. In this case, the view should strike your fancy, yet be something you would be content to live with for a time.

## Burn out a tree stump

*A year ago an elm tree was cut down in my yard and the stump is still there. I'd like to get rid of it, but how? It was cut close to ground level and seems quite dry and dead. I once tried to burn it out, but had little success. What else can I do?—E.L., Iowa.*

With a little extra doing it can be burned out, or at least reduced sufficiently below ground level to permit covering with new topsoil and grass. One way that's quite effective is to bore a random pattern of 1-in.-dia. holes 6 to 10 in. deep in the wood. Then fill the holes with fuel oil (the grade used in oil-burning furnaces). Cover the stump to keep it from getting rain-soaked. In three weeks to a month, the oil will have been absorbed into the wood. Then build a good, hot fire on top of the stump, if possible, using hardwood as fuel. Keep the fire going until the stump is fully aflame. Thereafter it will usually burn out without adding more fuel.

## Mildew takes to siding

*My home is in the woods and my problem is mildew that grows on the wooden siding of the house, especially on the north wall. The siding was painted two years ago but the mildew didn't show up until last summer. Now it's bad and seems to be getting worse. What can I do about it?—T.N., Ga.*

I wonder if you used one of the mildew-resistant paints. These usually are quite effective or at least they appear to control some conditions favorable to mildew growth. You can scrub off most of the mildew and the resulting discoloration with a medium-to-strong solution of trisodium phosphate if you're persistent. Make up the solution with 3 oz. trisodium phosphate, 1 oz. detergent, 1 pt. household bleach and 3 qts. water. This is a pretty strong treatment and while it may dull the paint somewhat, it cuts the mildew quite effectively as a rule. Wear rubber gloves when working with it and protect your eyes from spatters.

If there are high shrubs or low-hanging tree limbs along the wall, it's a good idea to do a little trimming. This will promote good air circulation, a mildew deterrent in itself. When you repaint I suggest you use a mildew-resistant product. ★★★



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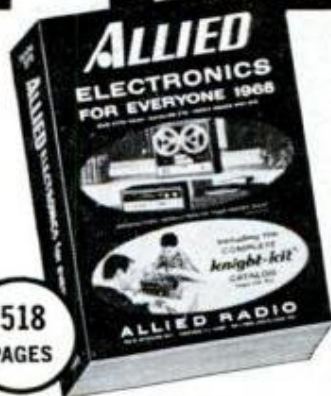
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## M-16: THE GUN THEY SWEAR BY

*(Continued from page 131)*

get half that many through the barrel.

Surprised? Well, there's not a gun around that can be fired at its rated speed. First, a soldier doesn't carry 650 bullets at a time. Even if he did he couldn't feed the gun that fast. Besides, heat works against him.

Every time a shell is fired, tremendous heat is generated in the chamber. Not only heat, but pressure—about 50,000 pounds per square inch. Not even a machine gun can dissipate the heat it generates fast enough when fired continuously. Result is a hot chamber and barrel—really hot.

Actually, after 250 rounds of continuous firing the M-16 chamber is so hot the rounds "cook off." Cooking off happens when the chamber heat is so intense the gunpowder in the cartridge starts burning before the firing pin hits the primer. Not only does the bullet lose energy when fired prematurely, but the operating cycle of the gun is thrown out of whack. Result—jamming.

But fire rate is important when you're talking about microseconds needed to fire each round. A soldier firing the weapon automatically usually burps the gun—a few quick shots at a time. It's important to have rapid fire rate (which is fire power) though he's only blasting off 5 or 10 rounds.

Even at normal firing rates, heat and pressure in the chamber can create a problem—chamber pitting. Because of pressure, carbon and dirt can become almost welded to the chamber walls. This makes the chamber hard to clean and accelerates pitting. Another chamber enemy is corrosion. To a brass shell in a steel chamber add jungle dampness, and you've got corrosion. In some cases, dirt and pits have caused a shell case to be frozen in the chamber. The extractor, unable to budge the case, has stripped off the head of the shell. Result—jamming. Solution—chrome the chamber. It's being done now. This should cut pitting and make chamber cleaning easier.

Unlike the M-1 and M-14, the M-16 has several extra features.

- A dust cover. To help keep mud, rain, sand and dust out of the breech and chamber, a dust cover can be snapped over the breech. It opens automatically when the gun is fired.

- The rifle is almost totally safe for the shooter. It's fail-safe. Even if the barrel is jammed with dirt, the gun won't explode in your face.

- Silent bolt close. A notch in the bolt

lets you home it quietly if need be.

- A bolt assist. This extra mechanical device is pushed with the palm of the hand to make sure the bolt is closed. (A rifle with the bolt assist is technically known as the M-16A1; it's used by Army and Marines. The plain M-16 used by the Air Force doesn't have this feature.)

- If only the barrel and chamber remain, the rifle can still be fired. Should stock and receiver be damaged, a soldier can still fire the weapon by hitting a stick placed over the primer.

- Like a shotgun, one quick operation breaks the rifle open in the middle for cleaning.

- Tension on the magazine-release button can be increased or decreased. When the release button is pushed, a small bar protrudes from the other side of the trigger housing. Turning the bar loosens or tightens spring tension on release button.

- All pins are designed to fit only one way. This prevents getting parts in wrong.

- A bullet can be used as a tool. The M-16 is designed so there's no need for special tools. A bullet head can be used to push out pins or adjust sights.

- No "click" system on sights. With the M-1 soldiers would often fiddle with sight-adjust knobs while waiting for action. So many clicks of the knob were needed to zero each rifle. Often the rifle zero was off after the knob had been unconsciously clicked. But you need a bullet head to adjust sights on the M-16.

- Pistol-grip storage space. Though not in use now, cleaning equipment can be stored in the grip. Presently, troops are carrying cleaning gear in their belts.

- Arctic use. Both the trigger guard and the bolt-lock lever are designed for use by troops wearing mittens.

Colt has recently made a number of changes.

1. A ring has been added to the front of the flash suppressor at the muzzle. Soldiers complained that the open prongs of the original suppressor were catching on trees and vines.

2. The forearm heat shield, made of fiberglass (as is the stock and pistol grip) has been changed so that the two pieces making up the shield are interchangeable. Early specs called for left-hand and right-hand pieces that were not changeable. The new shield has a corrugated design to disperse barrel heat instead of the original smooth configuration.

3. Chrome plating is being added to the chamber.

4. The buffer is heavier so as to cut fire rate.

The military has also issued directives

*(Please turn to page 220)*



# The how-to-glue chart.

Type of Material	Glue For General Usage (In Order of Preference)	Glue For Maximum Waterproof Durability (Boats, Exterior Construction, etc.)
All general gluing of hard and softwoods	Elmer's Plastic Resin Glue Elmer's Casein Glue Elmer's Glue-All	Elmer's Waterproof Glue
Particle and chip boards to wood	Elmer's Plastic Resin Glue Elmer's Casein Glue Elmer's Contact Cement Elmer's Glue-All	Elmer's Waterproof Glue
Plywood to decorative plastic laminates	Elmer's Casein Glue Elmer's Contact Cement Elmer's Plastic Resin Glue	Elmer's Waterproof Glue
Laminating heavy framing members	Elmer's Casein Glue	Elmer's Waterproof Glue
Veneering, inlays, cabinetwork	Elmer's Plastic Resin Glue (extended) Elmer's Glue-All (small jobs)	Elmer's Plastic Resin Glue
Bonding oily woods (teak, pitch pine, osage, yew, etc.)	Elmer's Casein Glue— sponge surface with dilute caustic soda one hour before gluing	Elmer's Waterproof Glue
End-wood joints, mitered joints, scarf joints	Elmer's Glue-All Elmer's Plastic Resin Glue (heavy mix)	Elmer's Waterproof Glue
Loose-fitting joints, relatively rough surfaces	Elmer's Glue-All Elmer's Casein Glue (heavy mix)	Elmer's Waterproof Glue
Doweling	Elmer's Plastic Resin Glue Elmer's Glue-All	Elmer's Waterproof Glue
Hardboard to ply- wood, wood or itself	Elmer's Plastic Resin Glue Elmer's Casein Glue Elmer's Glue-All Elmer's Contact Cement	Elmer's Waterproof Glue
Gluing porous mate- rials—linoleum, can- vas, etc. to wood	Elmer's Plastic Resin Glue Elmer's Casein Glue Elmer's Contact Cement	Elmer's Waterproof Glue
Gluing plastics, metal foil, etc. to wood	Elmer's Casein Glue (sand both surfaces)	Elmer's Contact Cement
Gluing non-porous materials— glass, metal, iron, aluminum, bronze, brass, etc.	Elmer's Epoxy Glue	Elmer's Epoxy Glue

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## M-16: THE GUN THEY SWEAR BY

*(Continued from page 218)*

to help improve the action of the M-16. Some troops had been jamming 21 rounds into the 20-round clip. This damages the magazine and results in malfunctions.

Troops have now been ordered to put only 20 rounds in a clip.

A better oil has also been authorized. Because of the M-16's rapid action and because of quick-corroding conditions in Vietnam, oil for the rifle is a must. But too much oil or the wrong kind can be damaging. Several reports indicate that a few troops have been dipping the rifles in motor oil. And they've been oiling ammunition. Both practices can lead to trouble.

Lt. Gen. Lewis Walt has been the commander of combined Marine and Army forces in Vietnam. He thinks the M-16 is great. Upon his return from Vietnam, he reported that a field survey by his commanders in Vietnam shows that 30 million rounds were fired through 12,676 M-16s. Only 1243 malfunctions were recorded. All these rounds were fired under combat conditions. That's an average of 10,500 rounds fired per malfunction. This, he says, is "remarkable." ★★★

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## WEEKEND PROJECTS

*(Continued from page 153)*

hardboard to the framework. A ledge inside the latter provides a place to mount a fluorescent lamp and ballast.

### FOLDING SCREEN

Each screen section consists of a full-width tapestry panel set in a frame of 1x2s. A ¼-in. groove, ½ in. deep, is run down the center of the strips to fit over the edge of the ¼-in. hardboard. Long screws, plus glue, driven into the cross-rails tie the whole assembly together. Three plain butt hinges are applied in screen fashion to permit it to stand and fold.

### BED HEADBOARD

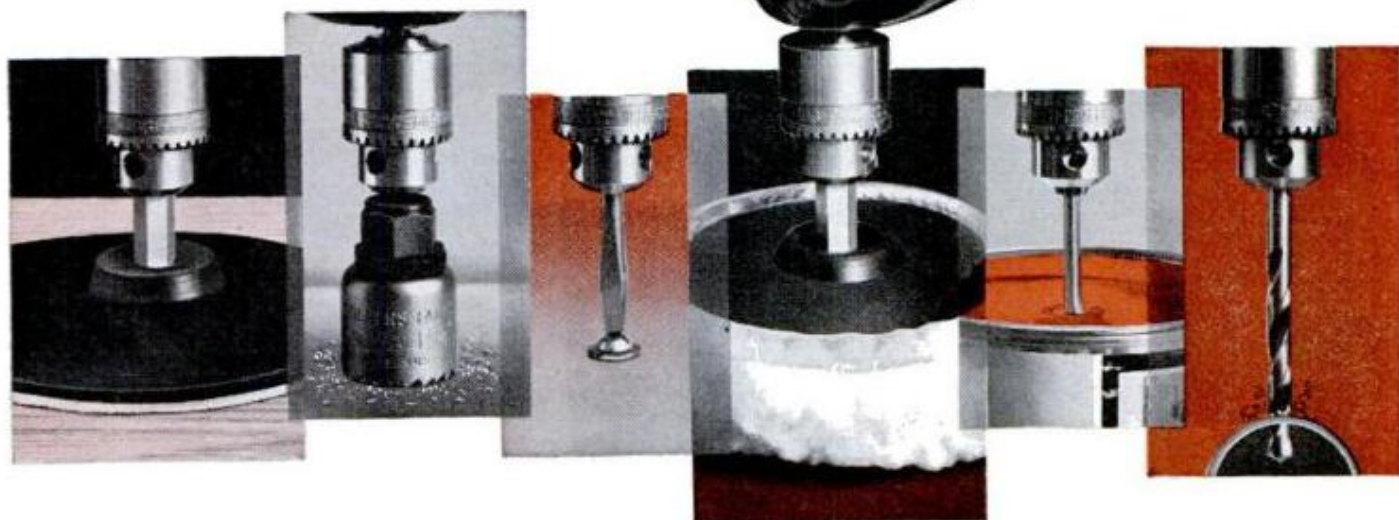
Both leather and tapestry hardboards are appropriate for bed headboards. The thing to remember in using one or the other is that the grooves in the framing members must be made to suit the thickness of the material.

Construction is similar to that of the folding screen, 2x2s being used here instead of 1x2s. The upper corners are mitered and nailed, while tenons on the ends of the dividers engage the center groove. ★★★



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## '68 OUTBOARDS

(Continued from page 93)

screws with a coin. The built-in fuel tank holds a quart.

The 55-hp Triumph is the first three-in-line in the company's history. In addition to the new cylinder design with "loop charging" (see the drawing on page 91), it's the only Evinrude equipped with prop-hub exhaust.

A converging ring at the rear of the prop hub squeezes the water flow in and augments the thrust of the prop. The push-button shifting is an electro-hydraulic arrangement that uses manual clutch dogs activated by an electrical impulse.

All models except the high-speed X-115 are covered by Evinrude's two-year warranty.

### Homelite

America's only four-cycle outboard remains basically unchanged for 1968, with only minor Volkswagen-type improvements under the shroud.

### Johnson

Johnson's Sea Horse stable for 1968 includes just about any size motor you could want. At the top end, there's the high-performance GT-115, a "super engine" that will kick a light high-speed hull up to 65 mph. The smallest is the 1½-hp mini-motor, which is just about as far as you can go in portable power for a boat.

The most newsworthy, though, is the three-cylinder 55 with loop-charged design. It uses a piston with an almost flat dome, running in a cylinder having two slanted intake ports. The angle of these ports makes the fuel charges converge and flow toward the cylinder head and over the sparkplug. After combustion, the burned gases then flow down and out through the exhaust ports on the opposite side of the cylinder wall. The flat piston and ideally shaped cylinder head make for smoother and more efficient combustion than that in engines with conventional cross-flow scavenging. Less piston surface is exposed to the hot gases; the piston, being thinner and lighter, runs cooler; vibration is reduced; and engine life is increased.

The new engine also differs from other Sea Horses in having a water-shielded exhaust for improved silencing. It consists of inner and outer exhaust housings with a water chamber between. The exhaust passages are tuned for greater efficiency, and the flow exits through the propeller hub.

The low gear ratio (.42) and large propeller diameter (14-in. high-rake with progressive pitch) produce high thrust for

fast acceleration and popping skiers out from a deep start.

The Sea-Horse 3, no longer the baby of the family, has been restyled to look more like the 5 and 6. It now has a separate three-gallon tank as standard equipment. You also get a nine-foot hose, so you can stow it under the seat of just about any fishing boat, no matter how long.

### McCulloch

If you're a fisherman or general outdoorsman, then McCulloch's '68 line is aimed right at you. In order to concentrate more fully on the under-10-hp market, the company has dropped every model above that limit except the 75 and 45. In fact there is some doubt at this writing as to whether the 45 will still be available in '68. No basic changes are planned for the motors still in the line.

### Mercury

In addition to the new Merc 1250, Kiekhaefer is introducing a new 100-hp six-in-line. Other highlights include Thunderbolt ignition for every model above 50 hp and a new electric-starting version of the 20-hp Merc 200. The latter is an easily-installed accessory which provides turn-key starting either at the engine, or if you have remote controls, up forward.

The big gun, though, is the Merc 1250. Kiekhaefer engineers claim that this is the world's most advanced outboard. The powerhead incorporates a new piston design, a rugged new power train and improved carburetion for greater acceleration.

Nonalternator models getting Thunderbolt ignition this year (65-hp and two 50-hp models, one manual-starting), have the new Lightning ignition energizer which replaces the magneto. The system requires no battery and has an ignition timing compensator which maintains rpm to provide smooth power output when shifting and at idle.

### Montgomery Ward

One new motor—a 20-hp model—is the only new addition to the Sea King line for 1968. Other models remain unchanged.

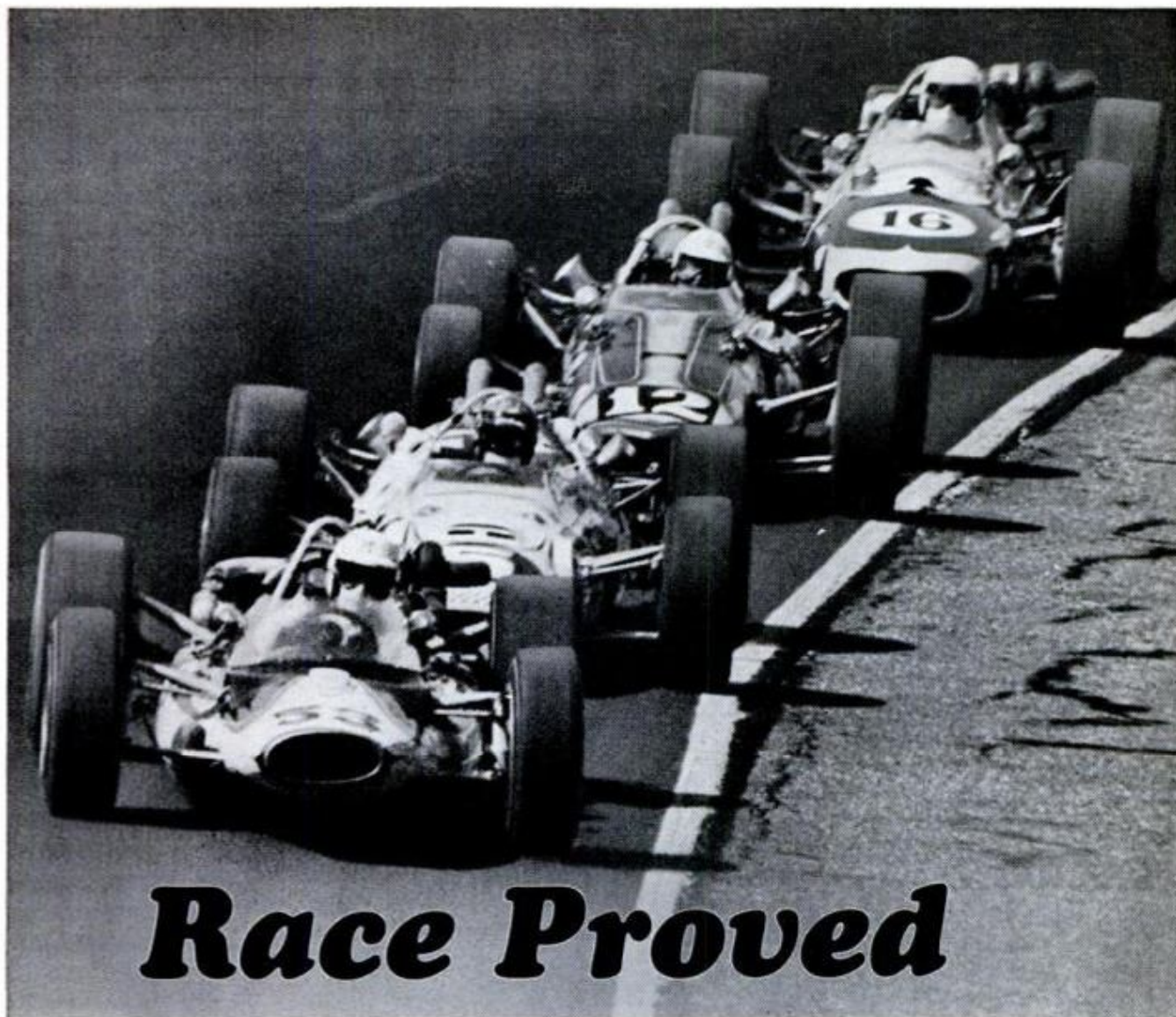
### Seagull

Billed as the "best sailboat kicker for the world," the Seagull line goes into '68 without a change anywhere.

### Sears

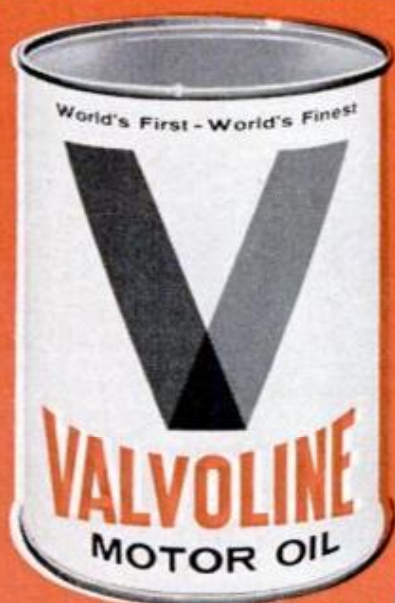
No major changes for 1968 in the Sears lineup. The feeling seems to be, "When you've got a good line, why tamper with it?" Who can argue with that? ★★★





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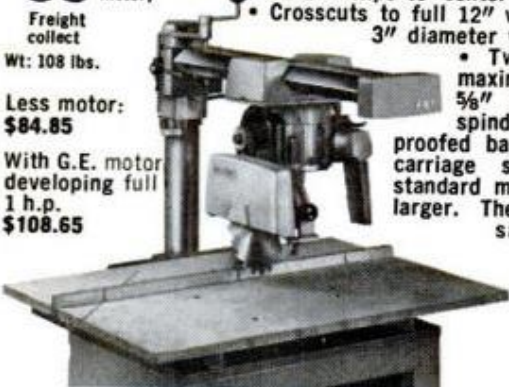
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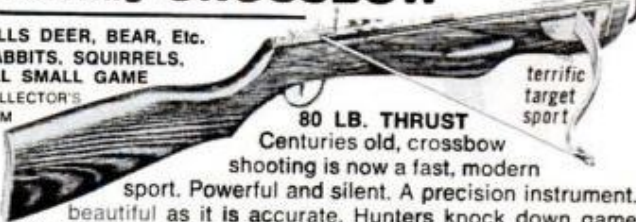
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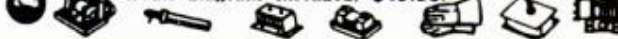
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## THE RIGHT MASONRY PAINT

(Continued from page 170)

keep in mind that catalyst coatings have a limited pot life. If you have to take a break, put the can in the refrigerator (the pot life becomes longer as the temperature drops). Naturally, never mix more than you will need in one session.

There are one-component catalyst systems on the market that have a longer pot life, but their performance just can't compare to the two-part coatings.

### What about waterproofing?

The catalyst coatings have had the effect of knocking two so-called masonry waterproof coatings out of the limelight. Keep in mind, though, that when we speak of waterproofing, nearly all the finishes we've mentioned so far have some waterproofing effect. Waterproofing means preventing water from entering the masonry. If the water is already in the masonry and the problem is to keep it from coming out, that's a different story.

If there isn't very much water and it isn't under too great a pressure, it is possible to keep water from escaping with a coating. One of the major characteristics for this is the coating's ability to adhere to the masonry surface. In this respect, then, nothing beats a catalyst coating.

But let's get one thing straight. Water inside masonry that is under pressure can build up to a point where any coating (plus a layer of masonry) will eventually let loose.

Coatings designed primarily for waterproofing are a *silicone resin* in a solvent and *bituminous* coating. The silicone material is clear, so you can give masonry areas better protection against moisture without covering their natural look, if you wish.

This type of clear coating can be used on both exterior and interior walls. However, manufacturer's instructions should be followed carefully. If the product is thinned out too much, it loses its waterproofing advantages.

### Two types of floor coatings

Clear coatings are also available for concrete floors. These help to eliminate dusting problems, especially on newer floors. There are two types. Chlorinated rubber-base coatings are available for both interior and exterior use, while moisture-cured urethane and emulsion polymer-base coatings are recommended for indoor use.

The other type, bituminous, provides a powerful moisture barrier at relatively low cost. It is recommended for use on the



though, here are points to keep in mind concerning these masonry protectors and their use:

Always read the label on the can before using the product and follow instructions to the letter.

Clean that surface. This rule applies whether the surface is new or old. Use a wire brush to remove dirt, loose particles and other foreign matter that will interfere with adhesion.

Make sure that efflorescence isn't present. If it is, remove it.

Grease and oil stains can be removed with a strong detergent mixed in water and a stiff brush. If this doesn't work, try trisodium phosphate.

### Choosing an applicator

Here's a tip or two on what applicator to use when painting masonry surfaces:

If you prefer a brush, an ordinary wall brush  $\frac{7}{8}$ -in. or 1-in. thick is okay. Since you'll probably be painting a fairly large area, select a brush anywhere from 4 to 6 in. wide.

If you can handle a larger brush, there's no reason not to select a flat calcimine type. Fine for masonry, these are available in 6, 7 and 8-in. widths. Dutch calcimine brushes are even wider.

If you like a roller, the best type to use for masonry is a long-nap roller (See *What You Should Know About Paint Rollers*, page 158). It has a greater ability to hold paint than other roller types and is recommended for rough surfaces, such as masonry, where a greater thickness and coverage of paint are needed. ★★★

## YOUR FUEL PUMP

*(Continued from page 147)*

cam engagement is not correct, the arm or link can be damaged. You could even damage your engine.

To get the pump's rocker arm into position on the cam, you may have to kick the engine over via the starter to get the cam to line up with the pad. When the pump goes into the engine easily and mounting holes in the pump line up with mounting holes in the block, you know the arm's seated properly.

With the pump properly placed and the gasket between pump and engine, insert bolts and lock washers and run them up finger tight. Now wrench them tight—good and tight. ★★★

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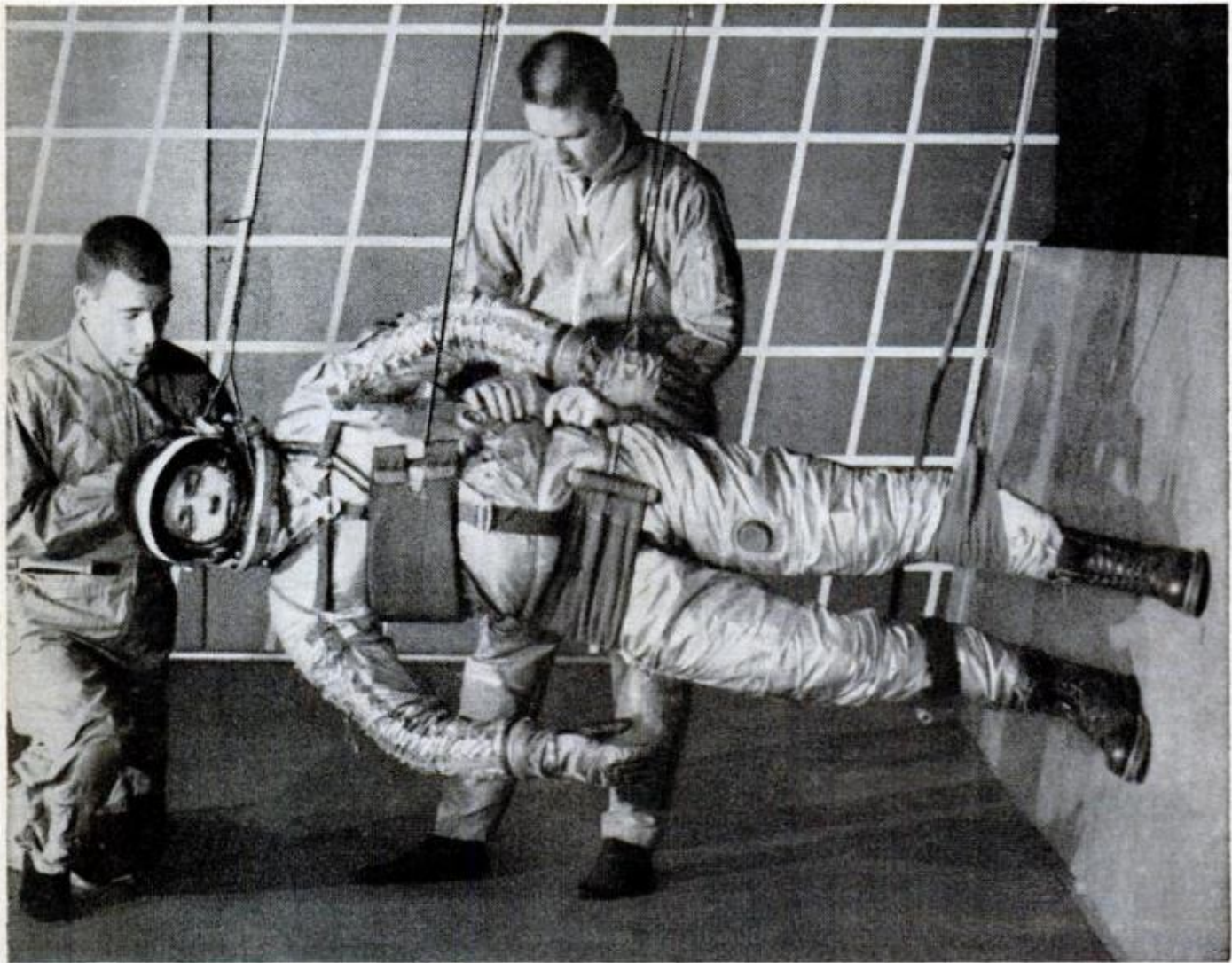
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It's not as easy as it looks. The astronauts will be making effortless 14-foot leaps, but will have trouble keeping their balance in the moon's low gravity or even keeping both feet on the . . . ah, moon.

By JAMES BERRY



**IT'S ALL RIGHT**, the picture is right-side up. The man in the spacesuit, who appears to be standing sideways, is actually hanging in slings strung from an overhead cart. The device simulates moon walking

**T**WO YEARS AGO, astronaut Richard Gordon—exhausted and with sweat running off his face—cut short his walk in space and wearily regained his Gemini spacecraft. The strain of his working in no-gravity conditions perplexed space officials and underscored a vexing question.

How will astronauts work in the low gravity of the moon where they'll have to explore terrain, build bases and repair equipment and homebound rockets?

At the National Aeronautics and Space Administration's Langley Research Center in Virginia, researchers are finding out. Gravity can't be eliminated entirely on or near Earth, except for tantalizingly short parabolic flights in airplanes, but a recently developed gravity simulator has enabled NASA scientists to reduce gravity to moon level.

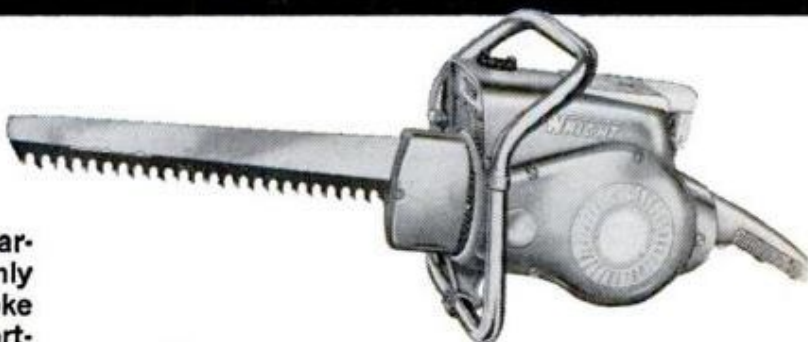
The gravity simulator resembles a tilted  
*(Please turn to page 230)*



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## WALK ON THE MOON

*(Continued from page 228)*

fence. The researcher stands on the fence horizontally, held up by slings around his legs, arms, torso and head. The slings are attached to 40-foot cables strung from an overhead cart. As the man walks along the tilted fence, the cart follows on a track. The walkway's tilt and the height of the cables are so adjusted that a man presses against the walkway with just one-sixth normal weight. Moon gravity!

The gravity simulator has given NASA scientists their first good picture of what moon work will be like. Predictably, men will be able to make 14-foot, slow-motion leaps. They'll do backflips and other gymnastics like professionals, and easily scamper up ladders and poles with their arms. But low lunar gravity will cause problems, too.

Keeping balance is a big one. An astronaut's feet won't press down hard enough to give clear clues to their position. Subjects using the gravity simulator unconsciously bend forward, one foot ahead of the other, and rock back and forth trying to sense the position of their feet. Many subjects ended up on their tiptoes, where all weight was concentrated on a smaller area. Preserving balance during long leaps is even more difficult.

One consolation: Even a bad moon fall will be so gentle it won't hurt.

Another problem, however, is lack of traction. Walking on the moon will be like traveling on ice. One sudden move will send an astronaut sprawling.

Engineers are busily working to solve these and other problems that will confront moon explorers. Shoes will have high-traction soles that dig into the moon's surface. Stairs will sport higher steps and wider treads for easier mounting. In shirt-sleeve bases, stairs might be scrapped and poles substituted instead. And ceilings will be 10 to 12 feet high so a fast or sudden step won't cause a cracked head. ★★ ★



**ALLEZ OOP!** This picture is tilted sideways to show you how spaceman takes off in 14-foot effortless leap. Device absorbs five-sixths of his weight, so his leaps—and all other movements—are similar to what he would experience on moon, where gravity is one-sixth that of Earth



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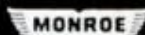


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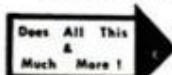


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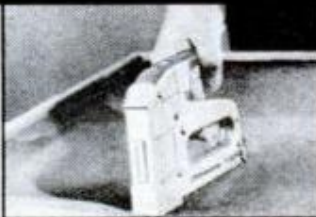
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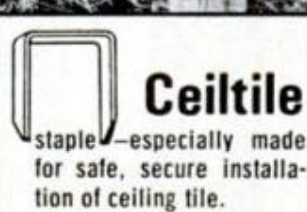
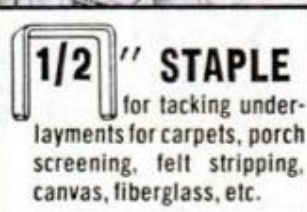
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## '68—SNOWMOBILES' BIG YEAR

(Continued from page 141)

the Kodiak to \$695 for the standard Husky.

Larson Industries has three models from a speedster, to a family machine. The Falcon is a lightweight sport model with 15-inch track and a 292-cc JLO engine. It sells for \$835. The Hawk, a medium-size machine, has a longer track good for deep powder snow. This model with its 297-cc engine runs \$995. Finally, Larson makes the Eagle—a large family or mountain machine with a 372-cc engine, selling for \$1155.

While most snowmobile manufacturers use fiberglass for engine coverings, I found the Boatel Co. introducing its Ski-Bird line with Cyclocac front ends. Cyclocac is a hard, dent-resistant material used in telephone cases, football helmets and campers. The Ski-Bird models this year will have engines running from 10 hp to 30 hp. The line will also include a number of features preferred by racers, like a 4½-inch-thick foam-padded seat, reinforced ski mounts, replaceable wear-runner skis and "seamless" track. Depending on engines, prices are from \$825 to \$1425.

Not far from the Boatel plant in Minnesota is Trail-a-sled Co., which makes the Scorpion machines. This three-model line uses Sack and Hirth engines from 12.5 hp to 30 hp.

Snowmobiling is big business. So big that you'll see other large companies getting involved. A natural is Yamaha because of its motorcycle engine. Yamaha is testing a few machines this year. Also out testing is the Kiekhaefer Corp. (Mercury).

Almost 150,000 machines will be sold this year. But this isn't the top. Many experts feel that in the next few years there'll be 250,000 machines sold each year. As more and more companies get into snowmobiling, the machines will get more and more sophisticated.

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CL-298



## INTERMEDIATES

*(Continued from page 113)*

transmissions include two three-speed manuals with an overdrive option, a four-speed manual and two automatics.

It's tough to fault Chevy. What they do, they do well. Maybe that's why they're Numero Uno.

**DODGE:** (Coronet—Deluxe, 440, 500, R/T) Dodge calls the Coronet its "bread and butter" car and claims it follows a "something for everybody" theme. Dodge may have a point. Your Coronet can purr or growl.

All models for '68 are three inches longer. Two-door hardtops are two-and-one-half inches lower, four-door sedans an inch. The hood has been ironed out. A two-door coupe with a hardtop roof line replaces the two-door sedan. The brassy R/T features a simulated hood air scoop. Overall, on all models, the emphasis is on aerodynamic lines.

Available on the R/T as an option is the new Charger's canted instrument panel. Bench seats are standard in the Deluxe, the 440, and the 500 convertible and wagons. Buckets are standard in the R/T two-door hardtop and convertible and the 500 two-door hardtop.

Standard in six-cylinder models is the 225-cu.-in. Six, in Eights, the 273-cu.-in. V8. The 318-cu.-in. V8 is standard in 500 models, optional on everything but the R/T. Standard in the R/T is the 440-cu.-in. "Magnum," the 426-cu.-in. Hemi being the all-out option. There's a manual three-speed, a manual four-speed and an automatic transmission.

Like they say, Coronets cover the waterfront.

**FORD:** (Fairlane and 500, Torino) All-new styling here. Length overall has been upped four inches. The grille has been changed and the headlights are now side by side. Hood lines are lower and longer. The rear deck is shorter. You can see Mustang influence everywhere you look. Taillights are tucked behind the rear quarter panels. The Torino is a pushed-up version of all this, complete with a few distinctive touches. All two-doors are hardtops, and all hardtops feature ventless windows.

The four-pod instrument panel is new. Steering wheels (as is the case with all Ford Motor Co. cars) are wide, two-spoke designs with padded inserts in raised center sections. There are new fabric and trim designs throughout.

Engines run from the docile to the delirious, and transmissions include three and four-speed manuals and an automatic. Mounting of the latter is up to you.

In summary, a prime middleweight contender.

**MERCURY:** (Montego, Comet) As mentioned elsewhere, Montego is the new name for the Comet series, the only hold-over being the Comet Sports Coupe. The name is new, but the cars—with the exception of the Cyclone fastback (see page 103)—aren't. Not too much so, anyway.

In general, Montegos look like slightly smaller, full-size Mercurys. I drove a Montego MX Brougham for two minutes before I realized it wasn't a Marquis. Perhaps by that point in the day I was numb, but I can't help feeling there ought to be sharper distinctions between the two.

Up front, Montegos feature a full-width grille that extends forward at the outer edges, accentuating side view length. Headlights are horizontal, mounted in individual housings. The hood is formed with a "power dome" center section that runs forward and down to blend neatly with the center section of the grille. The result is high style.

Suspension has been modified, as have engine mounts and antinoise provisions. The car is quiet and comfortable to drive.

The Montego offers engine and "comfort and convenience" options galore, including the option to make it a real fire-breather. Transmissions are a column three-speed manual, a four-speed console manual, four-on-the-floor, a column and console automatic.

**OLDSMOBILE:** (F-85, Cutlass and Supreme, 4-4-2) The newsmaker here is the 4-4-2, not because it has been drastically restyled, but because there are several interesting things going on under the hood. Olds says its entire intermediate line has a "completely changed" appearance. Well, maybe if you look real close. I didn't get to see and drive the cars, just saw pictures, and I don't recall being impressed by any startling changes.

New on the 4-4-2 is a ram-air performance option with a high-output cam, heat set valve springs and a special axle ratio. Marking a 4-4-2 thus equipped are twin intake scoops located just below the front bumper. There are other modifications, but this one will make the news.

New in the Cutlass series is a model subdivision called the "S" coupe, only slightly milder than the 4-4-2 and offering about the same aggressor options.

Based on the photos I saw, other Olds entries in this category retain their neat, somewhat understated good looks that I hope aren't lost on the "youth market" at which they are aimed.

**PLYMOUTH:** (Road Runner, Belvedere, Satellite, GTX) New this year is the

*(Please turn to page 238)*



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Our torch has a self-cleaning head. Adjusting the flame to low cleans it. Theirs runs on propane, it can clog. When that happens you have to use a pin (which they thoughtfully supply) to clean it. But what happens if you lose the pin?

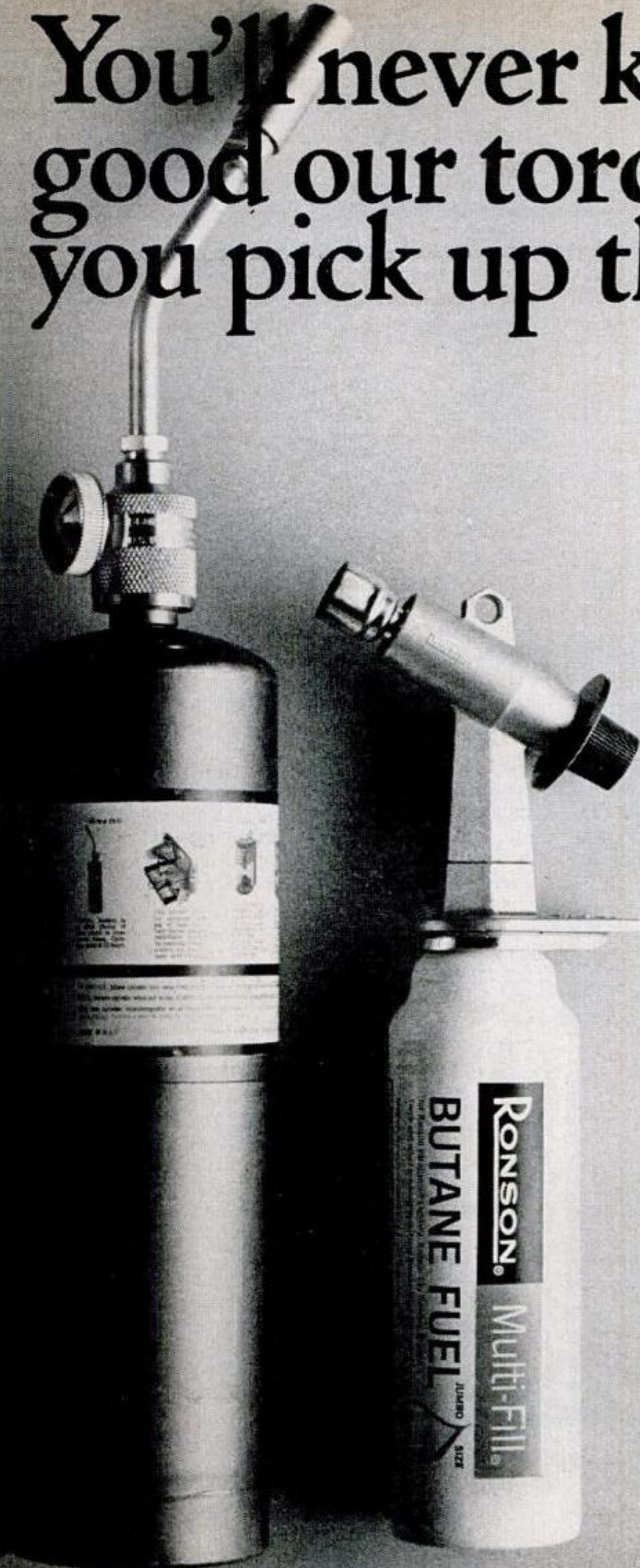
Our torch uses half as much fuel as theirs when you turn it up to a 1½" flame. (That's a commonly used flame setting.) We borrowed a trick or two from our butane pocket lighter experience to give you this economy.

Our dial for adjusting the flame is simple. We put in some "give" like car-makers put in their steering wheels. When you turn the flame down to pin-point size, it doesn't go off.

Our fuel supply is available everywhere. You can buy a Ronson Multi-Fill® Butane injector in candy stores, drug stores, tobacco stores, even department stores. It's easy to find when you need a new fuel supply. Suggested retail price. **\$4.95**

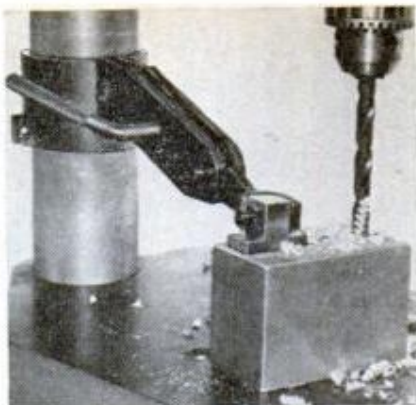
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**INTERMEDIATES**

(Continued from page 236)

Road Runner (see cover), a comparatively lost-cost performance car featuring a high-winding 383-cu.-in. V8 as standard power, the mighty 426-cu.-in. Hemi as an option. Otherwise, the model lineup remains essentially the same as it was the previous year.

The new car, tied-in for promotion purposes and pure fun with the TV cartoon character of the same name, also features special dress-up, handling and braking packages. Hopefully, from Plymouth's point of view, it will prove a wow with youngsters. The horn even goes "beep-beeps."

Styling changes throughout the line are relatively minor. Body lines have been slightly modified, as have the front grille and rear-end arrangements. Here, too, there are the usual all-go dress-up options, coupled with special ornamentation to distinguish various models. The GTX remains the all-out "muscle" car with the new Road Runner presumably running a close second. Both are marchers, I promise you.

The 1968 model year marks Plymouth's 40th. Happy birthday!

**PONTIAC:** (Tempest and Custom, LeMans, GTO) Here, as with other GM divisions, intermediate two-door coupes and convertibles are on a 112-inch wheelbase, the other cars in the line being 116. The famed "wide track" has been made two inches wider in front, one inch wider in the rear.

New grilles and bumper highlight the rather mild styling changes, the emphasis being on the split grille by which Pontiac must now be known by all who drive. Overall, the styling effect is long, low and racy.

A unique and useful feature on GTOs this year is a plasticlike, energy-absorbing front bumper. In both design and color, it is blended into the front-end styling as an integral part.

The effect is handsome, and try as hard as I did, I couldn't so much as dent it with a 12-pound shot. I think you're going to like this one.

Not much new elsewhere. The universal safety stuff, of course, and the usual interior and trim "refinements." Pontiac's overhead-cam six-cylinder engine has been upped from 230 to 250 cu. in., the result being an added dash of performance. Again, you can get just about any type of "package" your heart desires.

I like these cars. They have a well-thought-out look and feel about them.

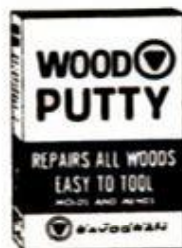
—Bill Kilpatrick





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(Continued from page 195)

microswitch S2, keeping the relay energized. The other set of contacts breaks the circuit to the motor, stopping the machine. The motor will stop running, even though the machine itself is still turned on with both relays still actuated and drawing current. To reset the machine, simply remove the tape cartridge. This automatically turns off the built-in main power switch. The entire relay circuit will close down, the relays will release, and the machine is ready for the next cartridge.

### Continuous-play switch

If there are times when you would like to override the automatic shutoff to provide continuous play, a simple single-pole, single-throw on-off toggle switch installed in the line supply to the relays will do it.

This optional switch is shown outlined in dashed lines in the schematic diagram. This switch will deactivate the automatic shutoff, providing optional continuous play when desired.

The switches used in this design are subminiature types manufactured by the Micro Switch Div. of Honeywell. The lever actuators are sold separately. If you have trouble finding a supplier, look up "Micro-switch" under "Switches, Electrical" in your classified phone directory. If all else fails, they can be ordered by mail from: Micro Specialties, 1896 Walton Ave., Bronx, N.Y. The switches are type 11SM1 (two required), and the actuators are type JS221 (two required). Total price is \$3.60 plus postage.

The relays are Potter and Brumfield KA series, available from most radio parts distributors such as Allied Radio (100 North Western Ave., Chicago, Ill. 60680) or Lafayette Radio (111 Jericho Turnpike, Syosset, N.Y., 11791).

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One relay has single-pole double-throw (s.p.d.t.) contacts; the other has double-pole double-throw (d.p.d.t.) contacts. If your tape player operates from a car's 12-v. electrical system, use KA5DY, s.p.d.t., 12-v.d.c. coil (\$3.20) and KA11DY, d.p.d.t., 12-v.d.c. coil (\$3.55). For a 115-v. a.c. home unit, use KA5AY, s.p.d.t., 115-v.a.c. coil (\$3.35) and KA11AY, d.p.d.t., 115-v.a.c. coil (\$4.05).

A note of caution: When wiring a.c. home players, use heavy (No. 18) wire and remember that 115-v. house current is live on the switch and relay terminals when the unit is plugged in. ★ ★ ★



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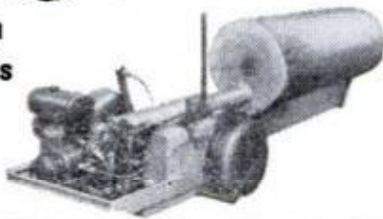


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## 1968: YEAR OF THE BIG IF

(Continued from page 97)

in for a banner year when the '68s get rolling.

New on all General Motors cars as the model year begins (other manufacturers will be along later) are a couple of interesting innovations, both devised as anti-theft measures. With one, vehicle-identification numbers will be inscribed on the instrument panel, engine and transmission housing. For the other, a buzzer will sound when the driver's door is opened while the ignition key is still in place.

I don't know exactly how they'll do it, but I'm certain professional car thieves will figure out a way around the identification-number idea, and I'm almost positive the buzzer—which sounds with an insistent, nagging whine—will drive car-owners up the wall. If you discover that you can't stand the pesky thing, you'll find it located on the engine compartment firewall.

Also new on all cars this year are a number of so-called "safety" provisions, covered in a separate article beginning on page 98.

And that's about it. The new entries mentioned earlier, the innovations described above—plus a new 472-cu.-in. engine for Cadillac—are about all Detroit has to offer that's new or different for '68. From top to bottom, it's pretty much a rehash year—and an "iffy" one, at that.

If this rehashing can sell nine million cars, Detroit obviously has us—its potential customers—precisely pegged, a thought my sense of American ingenuity and buyer discernment finds somewhat disquieting. ★★★

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## AMAZING NEW KIND OF GUN

(Continued from page 122)

valve. It's movable. First the ball moves forward to let in the compressed air. Then, once the air from the cylinder has ignited the propellant, the burning process generates large amounts of gas that force the ball back. This closes the cylinder opening. The amount of propellant determines the amount of gas pressure which in turn determines muzzle velocity.

So that's how it works. But what are the advantages to the V-L system?

### Less weight and bulk

First, less weight and bulk for ammunition. Elimination of brass cartridge cases and of primers reduces not only weight, but size of rounds. This has obvious applications to military usage, where shipping and storage space is always at a premium. This is especially true in fighter planes where ammunition capacity and weight have always been problems. On the ground, a soldier might be able to carry more ammo.

Second, reduced ammunition cost. With "brass" and primers gone, the cost comes down, considerably.

Third, design advantages. Gun designers may have much greater freedom with V-L. For example, simpler feed and magazine systems may be used with smaller and lighter cartridges. Since there's no fired case to dispose of, there's no need for a large hole in the mechanism to toss empties through. Nor is there need for complicated and expensive extractor and ejector mechanisms. Hammers and firing pins can be eliminated since their functions are performed by a simple air jet.

Fourth, reduced gun cost. With none of the intricate mechanisms needed in guns today, the cost comes down.

Fifth, little kick. There's little recoil because there's no explosion of primer or gunpowder.

Sixth, no jamming. At Daisy, an amazing 50,000 rounds have been fired through one gun without jamming and without cleaning.

What's Daisy's new rifle like?

It's a single-shot .22 of sleek, appealing lines without any of the protrusions we're accustomed to seeing. Its appearance belies its BB-gun ancestry and innards.

During the final three years of development, I've shot both prototypes and production models extensively at Daisy's Arkansas plant. The gun and ammunition do work—and work well.

Weighing in at 4 pounds, 12 ounces, and being 37 $\frac{3}{4}$  inches long, this gun handles nicely. It compares very favorably with

most light, medium-priced .22 rimfire rifles. But it will feel light if you're accustomed to heavier high-powered rifles.

The American walnut stock on this .22 is man-sized, not made for midgets as is so often the case with BB guns and cheaper .22 rimfires. It carries conventional open sights. With them, I was able to shoot some pretty nice one-hole groups at 50 feet. While V-L ammunition in this particular gun won't win any high-level competitive matches, it does compare very favorably with regular .22 rimfire rifles and ammunition in the low-to-medium-price range.

Presently available in only several states, Daisy's new V-L .22 costs \$39.95. Ammunition runs \$1.40 per hundred—slightly more than a hundred .22 shorts. But increased production will no doubt bring gun and ammo prices way down. This rifle is intended to be the neophyte shooter's next step up from his BB gun, and the price isn't too high for that.

### Daisy's feeling its way

There are two reasons why Daisy's going slow with the new V-L system. First, Daisy developers have gone as far as they can in extensive testing and debugging. Now they want to see what happens to it on the market. Second, they want to see how the shooting public will take to the new system.

So what is the potential of the V-L? Is it just good for plinking as the .22 rimfire class—or can it fit into the high-power field for big-game and target shooting? Commercial development of the system has been in the low-to-medium-velocity ranges. But Daisy has tested V-L bullets that have attained speeds of 3000 f.p.s.—speeds used in high-powered sporting and military rifles. Experimental guns have been built that use automatic-loading mechanisms. There seems no reason why such systems could not be adapted to military use. Such guns would be simpler, lighter, shorter, more efficient and just about jam proof.

Another amazing military feature, is that V-L ammunition also can be fired electrically or chemically. The nitrocellulose propellant can be ignited when exposed to hot air, chemicals or electrical charge.

And the sportsman stands to gain. He too can have air-system, V-L guns that are simpler, lighter, cheaper, easy to maintain and more streamlined. He'll have ammunition that's smaller, lighter and cheaper, too.

The applications of V-L are vast. The principle is with us. Now we have to see if it will hold up. I think it will. ★★





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## LUXURY CARS

(Continued from page 119)

brought out only after heavy pressure was exerted by General Motors corporate brass, anxious to spread around some of the Oldsmobile Toronado's high development costs (the Toronado wasn't and isn't quite the booming success GM had anticipated). As it turned out, 1967 Eldorado production couldn't meet demand and—presumably—everyone lived happily ever after. Yet despite the Eldorado's singular success, caution remains the byword throughout the high-ticket field.

So, in summary, even if changes are few, 1968's luxury cars continue to fill the role for which they are intended; they're expensive, prestigious, powerful, comfortable, and they remain mobile hymns in praise of gadgetry.

**BUICK:** (Wildcat, Electra "225," Riviera). Riviera features a very different looking grille, new and rearranged trim, and a restyled rear end, the emphasis being on creating a more massive appearance. It works; the car *does* look different. Not so with the Electra "225" and the Wildcat, however. They've been changed—and the changes are fairly pronounced—but Buick seems to have somehow missed setting them off from their immediate predecessors.

**CADILLAC:** (Eldorado, Brougham, Sixty Special, Seventy-five sedan and limousine, De Ville, Calais). Very few changes here. The grille is new and easily distinguishes the '68s. All hoods are longer to handle the recessed windshield wipers. With the exception of the Eldorado, all models are seven-tenths-of-an-inch longer, which may be important, for all I know. Real news is the 375-hp, 472-cu.-in. V8, largest in the industry and the first designed with

antismog gadgetry incorporated there-in. **CHRYSLER:** (Imperial). A slight grille change, stepped-up engine performance and new interior fabrics and trim are the news in this luxury offering by Chrysler. Imperials are available in five models—a four-door sedan, a Crown four-door hardtop, a Crown two-door hardtop and convertible, and a LeBaron four-door hardtop. Too bad more luxury-car buyers pass this one by; it's a lovely car.

**FORD:** (Thunderbird). Ford says this car is "unique in all the world," and they're right. So are the people who own it. I made a snide comment about the car in these pages last year and got several letters that burned to the touch. I haven't changed my opinion; I still say steering and stopping the Thunderbird is of itself "unique in all the world." This year the grille has been changed. Hub caps are different (but not much). The car is available in a two-door hardtop and landau, a four-door landau, and—toward the first of the year—a four-door "Town Sedan."

**LINCOLN:** (Continental). A new roof line, altered grille, rearranged taillights, some new instrumentation and some highly styled interiors add up to the Continental for '68. But don't look for too much—the idea is to serve *tradition*, don'tcha know. Car is available as a four-door sedan or two-door coupe. The convertible has been dropped.

**OLDSMOBILE:** (Ninety-eight, Toronado). Most obvious for '68 on these high-ticket Oldsmobiles are Toronado's new grille, bumpers and head and taillights. Things on the Ninety-eight remain pretty much as is. Brakes have been improved all around and engine capacity for both cars has been upped from 425 to 455 cu. in.

—Bill Kilpatrick

LUXURY CARS—HOW THEY COMPARE

Car	Wheel-base (in.)	Track (f/r, in.)	Overall Length (in.)	Overall Width (in.)	Engines in Model(s) Series (Displacement, cu. in.—carburetion)
Buick (Riviera)	119	63.4/63.0	215.2	78.8	
(Wildcat)	126	63.4/63.0	220.46	80.0	430-4bbl.
(Electra "225")	126	63.4/63.0	224.88	80.0	
Cadillac (Eldorado)	120	63.5/63.0	221.0	79.9	472-4bbl.
(Brougham, Sixty Spec.)	133	62.5/62.5	228.2		
(Seventy-five)	149.8		245.2		
(DeVille, Calais)	129.5		224.7		
Chrysler (Imperial)	127.0	62.4/61.1	224.5	79.6	440-4bbl.
Ford (Thunderbird) (2 dr.)	114.7	62.0/62.0	206.9	77.3	390-4bbl., 429-4bbl.
(4 dr.)	117.2	62.0/62.0	209.4	77.3	
Lincoln (Continental)	126.0	62.1/61.0	221.0	79.7	462-4bbl.
Oldsmobile (Toronado)	119.0	63.5/63.0	211.4	76.4	455-4bbl.
(98)	126.0	62.5/63.0	223.7	79.7	455-4bbl.



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## FAMILY CARS

*(Continued from page 117)*

type of speedometer, hardtops and four-doors have new roof lines, grilles have been altered a bit here and there, rear ends have a few changes (none of which are startling) and that's about it for the Dodge Boys and their full-size offerings for '68. The Polara and Polara 500 are out with a less expensive 318-cu. in. engine, while the 383-cu.-in. engine is carried over from last year as standard on all Monacos and Monaco 500s.

The usual safety provisions are featured, as is the almost-industry-wide list of "comfort and convenience" options.

**FORD:** (Ford Custom and 500, Galaxie 500, XL, LTD) Three new models have been added for '68—a Galaxie 500 two-door hardtop featuring a "formal" roof line, and two Custom 500 wagons, one a six-passenger, the other a nine-passenger with dual facing rear seats. Grilles have been changed and headlights are now horizontal rather than vertical. Hardtop "greenhouses" are all new. The XL, LTD and Country Squire Wagon have concealed headlights. There are minor ornamentation and trim changes, some engine refinements (most of which are covered elsewhere in this issue), but that's about all.

Ford, as a corporation, seems to be going easy on changes this year.

**MERCURY:** (Monterey, Montclair, Park Lane, Brougham, Marquis) There's a new low-crown two-door hardtop roof line for the "fastbacks" in the Monterey, Montclair and Park Lane series, overall length is up almost three inches, the grilles and bumpers have been given minor restyling touches, the instrument panel has been redone, and the range of available interior fabric materials and colors has been increased. Otherwise, things are pretty much of a carryover.

Mercury wants you to know that this year its "shifts" are "crisper." How about "crunchier?" One auto executive (a big shaker, too) somewhat sheepishly admitted to me that the industry had "an adjective problem." Oh, boy! "Crisper shifts?"

**OLDSMOBILE:** (Delmont 88, Delta 88, Delta Custom) All these cars have minor front and rear styling changes. There are new grilles, new side molding treatment and a revised rear-end arrangement. Luggage capacity in the 88 sedans has been upped almost two cubic feet.

Power for the Delmont 88 has been increased. Used this year is a 350-cu.-in. engine as opposed to last year's 330. Bigger engines are also in the Delta 88s

and Delta Customs—cu. in. being upped from 425 to 455.

Here, again, I didn't see or drive these cars personally (Olds had no preview this year for magazines), but knowing the outfit, I would imagine the usual nicely done touches prevail. The entire Olds line always has a well-put-together look, I think.

**PLYMOUTH:** (Fury—I, II, III, Sport, VIP) As mentioned elsewhere, this is Plymouth's 40th anniversary. The late Walter Chrysler would probably be pleased to see what has happened in 40 years to the little car he launched to battle the Ford and Chevy giants. It's a cinch he wouldn't recognize it. My, how it has grown.

The main appearance changes for '68 are in a new grille, designed around thin-line horizontal bars, and a new tail-light arrangement. The horizontal theme of the new grille is carried through to the rear end, resulting in a low, rather wide appearance for the entire car.

Interior appointments have been "refined" (there's that word again!) and the "comfort and convenience" options increased in number. There are the universal Chrysler Corp. engine modifications, a new axle ratio and a new speed control unit.

Transmissions number three—a three-speed manual, a four-speed manual and an automatic.

**PONTIAC:** (Catalina, Executive, Bonneville, Grand Prix) Don't look for too many changes here; the cars are as they always are—handsome, well-appointed, comfortable to drive and ride in. The traditional split-grille theme is carried over, of course, but this year the center section has been made a bit more bold.

The Catalina comes as a two and four-door sedan, a four-door hardtop, a hardtop coupe and as a two or three-seat wagon. The Executive is available as a four-door sedan or hardtop, a hardtop coupe, and the same wagons as the Catalina. The Bonneville comes as a hardtop coupe and four-door, a convertible, a three-seat wagon. The Grand Prix can be had only in a hardtop coupe, the convertible having been discontinued.—*Bill Kilpatrick*

## Radar 'shrinks' the moon

Scientists at the Naval Research Laboratory have found, through the use of highly sensitive radar, that the moon's diameter is actually 2.4 miles smaller than had previously been thought. They calculated that the average diameter is 2157.6 miles.



## COMPACTS

(Continued from page 105)

GTS powered with the larger 383-cu.-in. four-bbl. V8. The result is a real snarler.

Transmissions include manual three and four-speeds and an automatic.

**FALCON:** Not much new here. Even Ford refers to its styling changes as a "subtle refinement." There's an altered grille and new front bumper, plus a minor change in rear sheet metal and in the taillights. As a basic Falcon, the car comes in a two-door coupe, a four-door sedan and a station wagon. As a Futura, the lineup is the same, but adds a dressed-up coupe that can be ordered with bucket seats. Inside, there's a new instrument panel and some new upholstery and trim coverings.

The 179-cu.-in. Six is standard on the Falcon, the 200-cu.-in. Six on the Futura. Transmissions include the usual three and four-speed manuals and an automatic.

I like the Falcon basically, but I wish Ford would try a little harder with it, perhaps grace it with a few "better ideas."

**RAMBLER:** No secret by now are AMC's plans to carry over "as is" its "\$1839 Special," thus doing away with annual model changes. Beneficiaries of this scheme are AMC, which hopes to sell a lot of cars, and the public, which won't have to absorb changeover costs. Even so, both the American and the Rogue have been "refined."

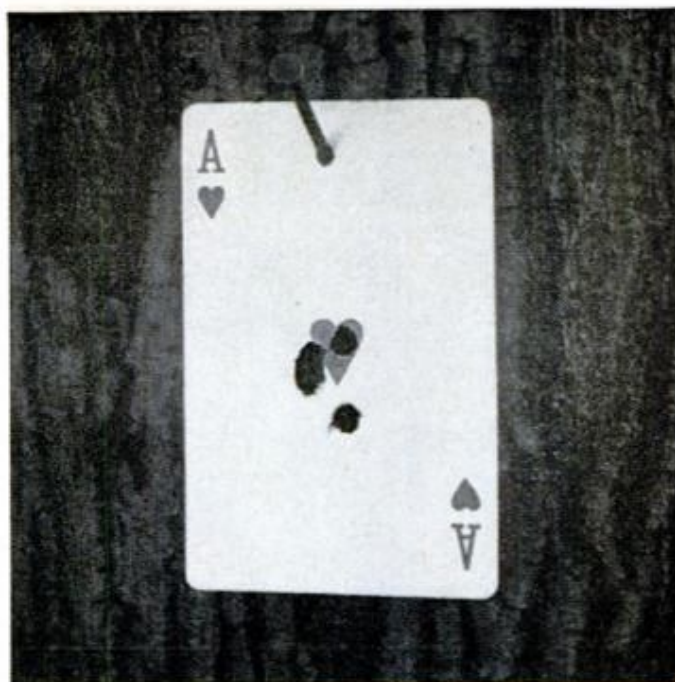
The grille has been slightly changed, sedan roof lines are lower, and there's a new rear-window configuration. There are new center side moldings for the 440 and Rogue. Otherwise, styling's much the same.

The 145-hp Six is the new standard engine for all Rogue hardtops (it's an option on other Americans). Additional engines include the 199-cu.-in. V8s. Transmissions include a column-mounted three-speed manual and a column automatic.

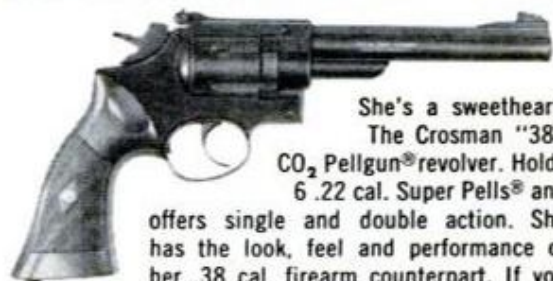
**VALIANT:** "The world's smallest limousine" is how a Plymouth engineer described the Valiant Signet. He's right; the car is sort of plush.

The basic 100 series, for example, can be dressed up just shy of Signet standards by taking advantage of something called the "200 Decor Group." This includes special side moldings and nameplates, a more plush interior, dual horns and a "deluxe" steering wheel. Up front in all '68 Valiants is an altered grille. In back, the tail and backup lights have been stacked vertically.

New this year as an option is a lightweight version of Plymouth's 318-cu.-in. V8, making the car something of a performer. Transmissions are three and four-speed manuals and an automatic. If you're in the compact market, check this one. You'll like it.—Bill Kilpatrick



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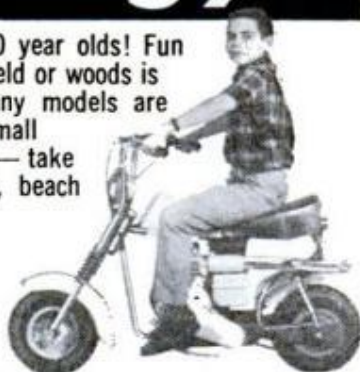
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## THE REALLY NEW ONES

(Continued from page 102)

panels for open-air driving. In addition, the rear window of the coupe can be removed and stowed. The hood is long, slopes down gracefully to a neatly styled grille. The fenders, front and rear, are high-rise. Aft is a slight "spoiler."

Power ranges from a 300-hp, 327-cu.-in. V8 to a 435-hp, 427-cu.-in. V8. In between are V8s cranking out 350, 390, and 400 hp. Transmissions are three or four-speed manuals and an automatic. Suspension is fully independent.

A real plus on the car is a built-in roll bar on the coupe, something Chevy considered doing on the Corvette several years ago, but chickened out because it was felt the presence of such a rig would "scare off" potential buyers. That sort of nonsense has apparently gone west, and I would hope we could soon look for roll bars in all cars.

If this kind of car is your meat, you're going to like the new Corvette.

**CYCLONE:** Being less than four and one-half feet top to bottom, Mercury's new fastback brings to the intermediate Montego line a decidedly sporty flavor. The Cyclone and the peppier, beefier Cyclone GT may prove just the ticket for the man who wants a bit of flash in what is—essentially—a small, "family" car.

The "greenhouse" slopes all the way to the rear, where it is squared off in a style reminiscent of Ford's LeMans-winning GT cars. Side glass windows are ventless, rear glass tinted. The Cyclone has its own grille and special wheel covers, and trim options enable a buyer to "muscle it up" all he wants to for an all-out performance appearance.

Inside, things aren't too different from the rest of the Montego line, and these aren't radically changed over last year's Comets. Bucket seats are available as an option, as is a console. If you want 'em, you can get headrests.

Standard engine in the Cyclone is a 302-cu.-in. V8 equipped with a two-bbl. carburetor. Options include a four-bbl. version of same, plus a 390-cu.-in. two and four-bbl., and the snarling 427-cu.-in. four-bbl. Transmissions offered are a three-speed, column-mounted manual, and a column-mounted or console manual, and a column-mounted or console automatic.

I'd be lying if I said I found this car as exciting as the Corvette or as uniquely satisfying as the Charger. Although new in body style, it somehow strikes me as an add-on gimmick rather than a fully realized car. Still, many buyers may find



that the Cyclone is right up their alley. **JAVELIN:** Here's Detroit's newest car, and a nice job it is, too. Aimed squarely at the "personal" car market, the Javelin should have wide appeal, if only because it's the first car of its type to offer at least respectable leg and headroom aft. A six-footer can sit back there in some degree of comfort.

In styling, the car offers a pleasing combination of fastback and notchback in both regular and SST versions. The rear deck drops off to a neat, well-styled rear end that combines tasteful design with function. Up front, the grille features what AMC calls a "twin-venturi" look; i.e., the grille's honeycomb is rather deeply recessed. The windshield is canted back at 59° angle, and the hood features twin scoop moldings, all of which add considerably to the car's sporty overall appearance. Also adding sporty flavor to the SST are standard "mag-type" wheel discs and full-length, dual wide paint stripes.

In addition to rear-seat room, Javelin interiors feature deep-set, well-located instruments in a heavily padded dash panel. In the SST, reclining bucket seats are standard. Also standard in the SST are wood-grain trim for the door panels and a sports-type steering wheel. I've been in a lot of cars in my day and I think the interior of this one is both comfortable and handsome.

Power for the basic Javelin is the 232-cu.-in. Six. However, depending upon what you order, you can get a 290-cu.-in. V8 in both two and four-bbl. versions, and a 280-hp 343-cu.-in., four-bbl. V8. With this latter engine, the Javelin will really march; so much so, in fact, that AMC plans to go racing with it. Transmissions are a three-speed, column-mounted manual, a four-on-the-floor manual, and a column-mounted or console automatic.

AMC brass say they hope to sell at least 35,000 Javelins this year, maybe more. I hope they do; the car deserves to be a whopping success.

**TORINO:** As mentioned earlier, I didn't get to drive this car. However, I got to pore over one at Ford's Dearborn test track. In general, I liked what I saw.

The "Torino" name is new for the top models in Ford's Fairlane intermediate line, replacing last year's 500 XL series. Within this series, we're concerned here with the all-new GT two-door fastback. If I read my notes correctly, there's a similar new fastback available as a plain Fairlane 500, but to avoid confusion, we'll stick to the Torino GT model.

(Please turn to page 256)

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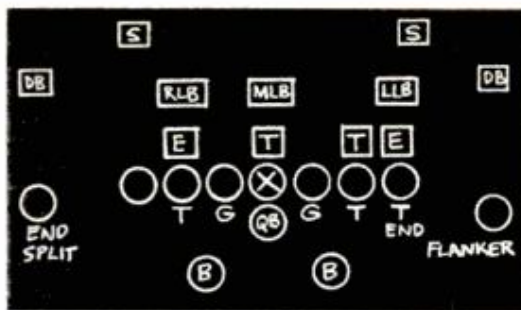
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**KANSAS CITY TRIPLE-STACK DEFENSE.** The Chiefs' triple stack is designed to protect the linebackers from quick-thrust blocking of offensive line. That frees linebackers to roam laterally along line of scrimmage or retreat to help on pass defense. Though it looks like standard 4-3 defense, rushmen overshift one position to left. This puts defensive tackle opposite center instead of offensive guard. He protects middle linebacker. (At Kansas City, defensive tackle Buck Buchanan weighs 287 pounds—a little large for a center to crash through to get at a linebacker.) Corner linebackers are protected by defensive ends

## WATCHING FOOTBALL ON TV

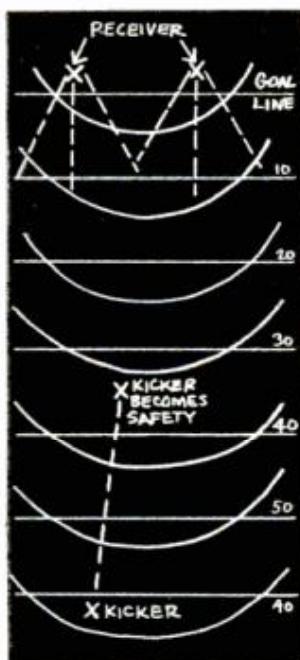
(Continued from page 89)

Joe Schmidt, who long played linebacker for—and now coaches—the Detroit Lions, used to crowd a half step deeper into the line when he intended to “red-dog” or “blitz” the passer. And that Bill Forester, who played right linebacker for the Green Bay Packers, had a habit of turning his head to watch the snap of the ball so that he could time his drive exactly when he was going to red-dog.

Actually, the work of thoroughly understanding a game starts long before the opening kickoff. It starts with the background that a scout—or a fan—brings to the particular game. Here is a checklist of matters that will help deepen your understanding of a game:

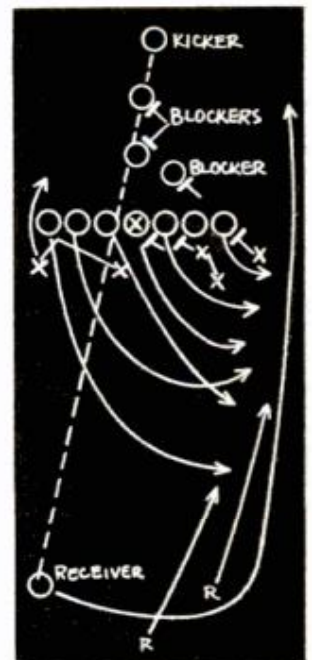
*What's the trend of the league that these teams are playing in?*

In college football, there'll be a lot more passing in the Southwest than, say, in the Ivy League. In professional football, the American Football League uses the long pass a good deal more than does the National Football League. “The AFL designed the game for the long score,” says one scout. “Their football is thinner so that it can be passed more easily.”



**KICKOFF PURSUIT.** The idea on kicking off is to envelop receiver. Kicking team puts fastest men on ends and slower, heavier men in the middle. Ends shoot upfield to tackle receiver or turn him in towards the middle of field where traffic is heaviest and others can tackle him. If receiver gets outside fast ends, it's difficult for slower men in middle to wheel and overtake him. Watch for raggedness in enveloping line for weakness receiver might exploit. Bears once noticed it on left side of Minnesota line, sent Gale Sayers through the gap for 96 yards and a touchdown

**PUNT RETURN.** Fan can tell which way punt will be returned faster than kicking team simply by watching which way blockers peel off as ball is kicked. Usually they'll all peel off in same direction in an effort to set up a “corridor” down a sideline with blockers acting as “human wall.” No matter which receiver takes the punt, he must then head for the corridor and take refuge behind the human wall. He doesn't worry about sideline. “Nobody can come at him from that side,” says a pro scout. Team to watch: the Detroit Lions, who led NFL in punt returns last year



All this has an impact on the game. The first question that Coach Vince Lombardi of the Green Bay Packers asked his scouts as he was preparing for the Super Bowl game against the Kansas City Chiefs last January was: “How deep do their defensive backs play?”

The answer: “Very deep—three to five yards deeper than in the NFL.”

The reason: AFL defensive backs must be more prepared to retreat to protect against the long pass than their NFL counterparts.

That, in turn, places a greater burden on AFL linebackers. They must not only guard against runs but also cover the territory opened behind them by the retreat of the deep defensive backs.

The Green Bay scouts discovered one very important habit of the Kansas City linebackers: They committed themselves very quickly to protecting against a run. That meant they were leaving open a great deal of territory between themselves and the deep defensive backs. The scouts recommended that the Packers fake a plunge into the line to suck the KC linebackers in. “Then if you put your pass-receivers into that watermelon-shaped area just behind the linebackers, you'll be

(Please turn to page 254)



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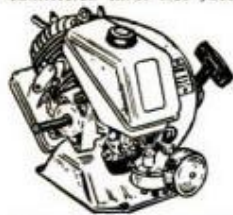
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253



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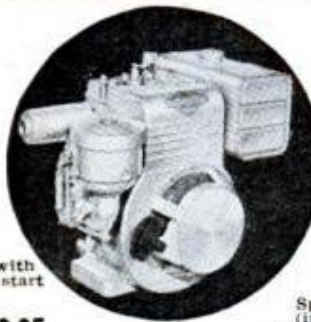
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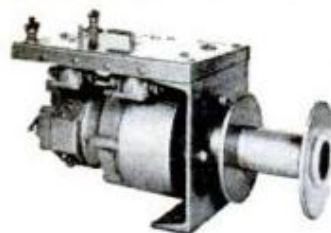
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## WATCHING FOOTBALL ON TV

(Continued from page 252)

completing passes all day," reported a Packer scout. That's exactly what Green Bay did; split end Max McGee kept hooking and slanting through that territory. The result: He caught seven passes for 138 yards and two touchdowns as the Packers beat Kansas City, 35-10.

What are the trends and preferences of the teams in the game?

Every team has its own personality. For many years—until injuries forced a change—the Chicago Bears were predominantly a "right-handed" passing team. They preferred to pass to the right. Their receivers on the right set records for catching passes while those on the left were completely ignored. So defensive safety men tended to shift over to the defensive left—the offensive right—when they expected a Bear pass. In the 1963 NFL title game, the Bears spotted one New York Giant safety man "cheating" so much to the Bear right that they decided to send a pass receiver, the Bear fullback, into the area vacated by the Giant safety man. The result: The Bear fullback gained more yardage on pass receptions through that safety man's territory than all the other receivers working the right side of the field.

How do injuries affect the teams in the game?

Last year quarterback Johnny Unitas of the Baltimore Colts was bothered by an inflammation of the tendons in his right shoulder. He could throw the long, soft pass but not the short, hard one. "When he tried it, he 'hung' it," says one scout. That meant the ball floated instead of moving like a rifle bullet. "The Packers knew it and were waiting for him on the short ones," says the scout. The first three times Unitas tried to throw short hard passes to end Raymond Berry, he "hung" the ball. The packers' defenders reached up and picked off two of them and returned them for touchdowns, once on a 46-yard return and the other on a 52-yard return. Thus the Packers virtually eliminated their toughest competition for the Western Division title in the opening moments of the season. They won the game, 24-3.

Once you've finished pregame preparation, you might follow the scouts' techniques for focusing their concentration during the game. (See illustration, page 87.)

Some of them—such as George J. Halas—suggest using the "expanding box" theory as a method of bringing the game into focus.

(Please turn to page 256)



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## WATCHING FOOTBALL ON TV

*(Continued from page 254)*

Others use other techniques—from watching the interplay and group combat between certain positions to watching particular zones such as the linebacker area and the passing zone on the side where both the tight and flanker back line up.

"I like to look at individual players, particularly the linemen," says Gene Cronin. "If it's a defensive tackle, I'll want to see how well he escapes from the block to go after the ball carrier. If it's an offensive lineman, I'll watch to see how good his initial quickness is. Then I'll watch his balance—how well he keeps his feet after making contact and driving for his block. You can be big and fast, but if you don't have good balance—good foot movement—you won't make it in professional football."

By watching individual players, the onlooker can pick up hints about a specific performance in a specific game. Is the quarterback retreating to pass with the ball held cocked and ready to throw? If not, he may be late in getting off the pass and miss his receiver, simply because he'll have to wind up to pass the ball. Or is the buttonhook pass coming in low so that the receiver can fold himself over the ball? If it comes in high and the receiver has to stretch for it, he may be all but cut in half by a savage tackle from behind.

As you study individual players, you'll learn their strengths and weaknesses. Right guard Jerry Kramer of the Green Bay Packers is superb at pulling out of the line to lead the sweep around end. His sidekick at left guard, Fred Thurston, is not so quick at pulling out but is stronger at straight-ahead blocking and protecting the passer.

By focusing your concentration on defensemen, you'll learn a good deal about how various teams handle certain individuals. Merlin Olsen, the defensive tackle of the Los Angeles Rams, is faster than the other defensive tackle, Roosevelt Grier. "So we figure on trapping Olsen after he crosses the line and blocking Grier before he crosses it," says one scout. Or perhaps you'll see an elaborate ploy designed to catch off-balance the superb defensive tackles of the Detroit Lions, Alex Karras and Roger Brown. "About the only thing you can really do, when they're playing well, is to shoot the ball carrier sharp against the grain"—have him fake a run to his right, then pivot and cut sharply across the middle of the line—"and hope they don't wheel well enough to meet him."

The important thing is not only to perceive a detail but to probe for its impor-

tance. In one game in 1962, quarterback Jack Kemp, then with the San Diego Chargers, was always working at his hands as a play ended. The reason: The middle finger on his right hand was broken and he was knocking it out of joint every time he took a hard snap from center. Then he'd pull it back into place as he regrouped the huddle. Last year, the St. Louis Cardinal secondary zoomed in like vultures on virtually every pass that Rudy Bukich of the Chicago Bears threw in the opening quarter of their game. The reason: Bukich was "eyeballing" his pass receiver—looking at him as soon as the ball was snapped and never taking his eyes from him. The Cardinal defensemen had only to watch Rudy's eyes to know where the pass was going.

But at the heart of it all—at the heart of understanding any football game—is the mastery of a simple art: the focusing of your concentration to see what you're looking at. It's as simple as studying a road map—and far more exciting. ★★

## THE REALLY NEW ONES

*(Continued from page 251)*

Most prominent on the car are dual tapered stripes that run rearward from the leading edge of the front fenders. Around the very front vertical edge of the front fenders, the stripe is continued and flows downward and back through the wheel well, tapering off just short of the rear wheel well. It may sound a bit baffling in print, but it's handsome on the car.

Chrome moldings outline the wheel cutouts, the wheels themselves are of a bright finish with what auto stylists call "cutout spiders" and the hubs bear a snazzy "GT" insignia, all of which results in a singularly sporty-looking package. Tinted rear-window glass, by the way, is standard.

Inside, and on first impression, things look about the same as last year's 500 XL. Bucket seats are standard up front, a bench seat being optional (a switch). The seats feature quilted pleats, as do door panels. A padded center console is an option with the bucket seats.

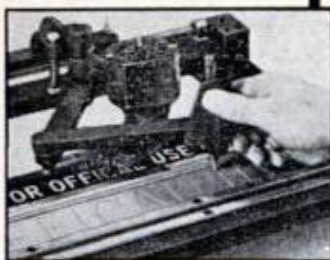
Standard power is Ford's new 302-cu.-in. V8, with two and four-bbl. 390-cu.-in. V8s and the 427-cu.-in. V8 being optional. Transmissions include a three and four-speed manual and an automatic.

There are some special touches here and there, but although I liked what I saw, the car—like its sister Montego Cyclone—just isn't as unique as I had hoped. Maybe next year.—*Bill Kilpatrick*



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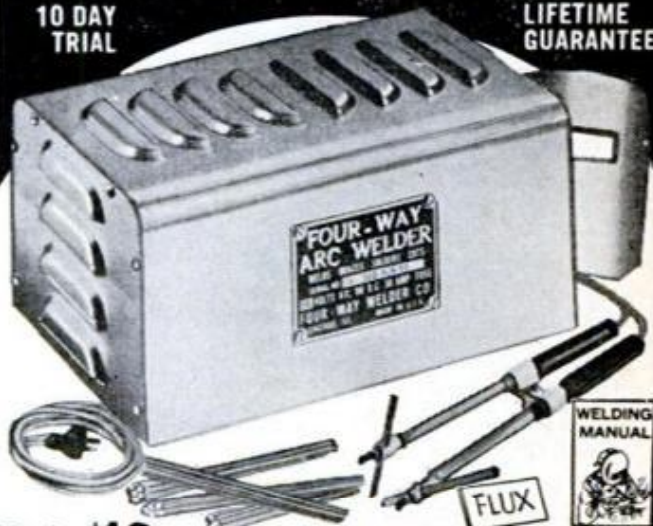
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½ hp GE Motor }  \$14.80 (purchased with other item)  
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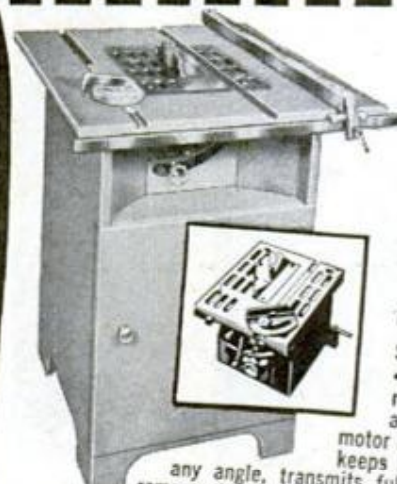
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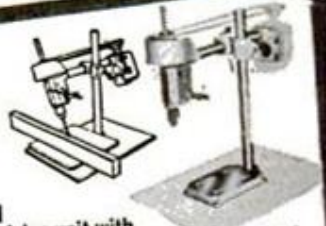
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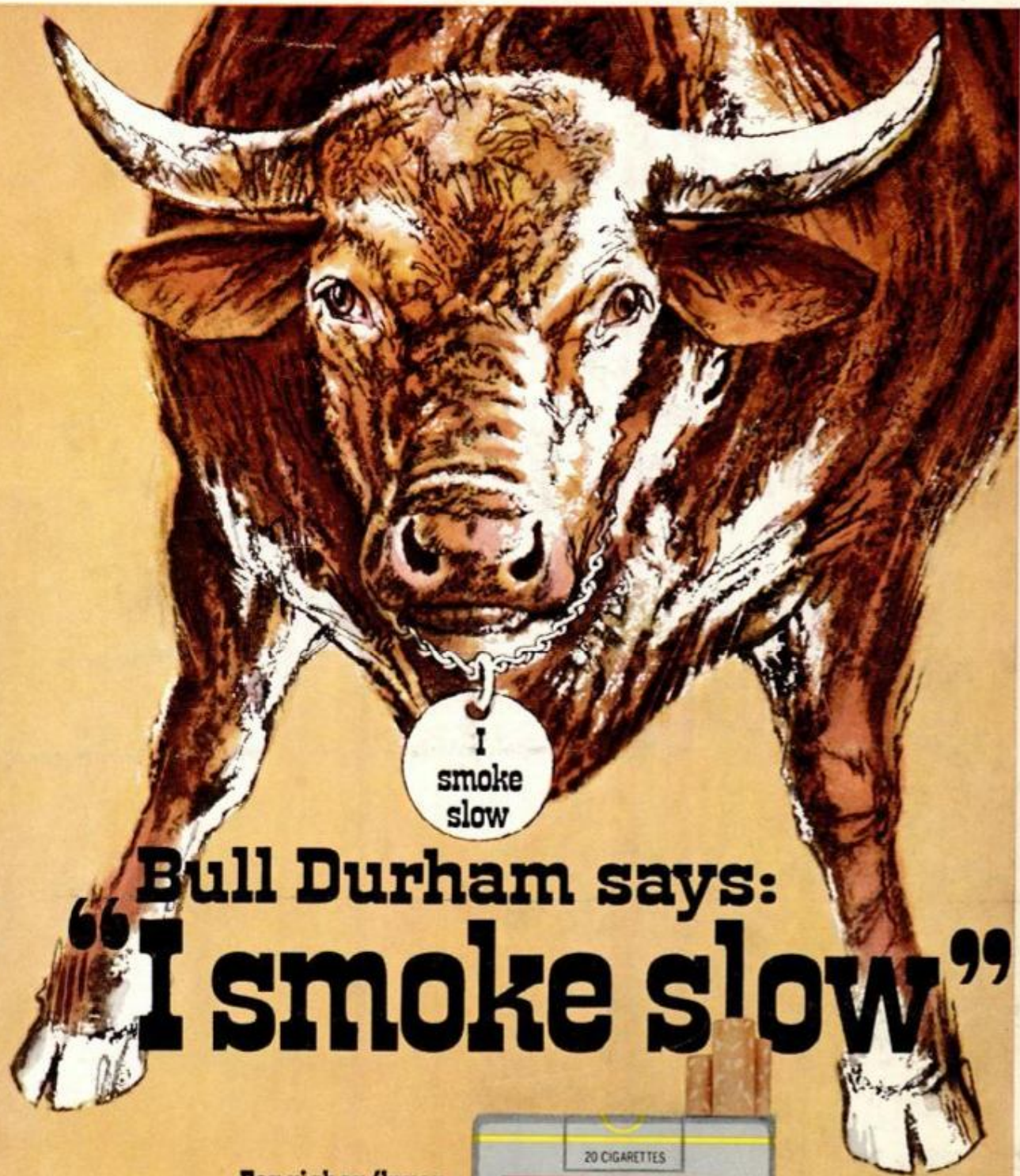
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