

MAY 1993 • \$1.95

PRINTED IN U.S.A.

Popular Mechanics

WILL YOUR CELLULAR PHONE KILL YOU?
The Real Threat From Mobile Communications, Power Lines And Home Appliances

DREAM CARS YOU CAN DRIVE

29 Futuristic Cars And Trucks That Will Go From Show To Showroom In The Coming Months



Ford's 450-horsepower, 32-valve, supercharged, fuel-injected, intercooled, flex-fuel Mustang Mach III

DON'T DRINK THE WATER!

First Make Sure It's Safe. Here's How

BE A FIGHTER PILOT FOR A DAY

Air Combat School Can Make You A Top-Gun Dogfighter

SPECIAL SECTION

CAR CARE Guide

TUNE UP AND PRESERVE YOUR WHOLE CAR

• Engine • Chassis • Body • Interior



0893-7754

0 754744 1



"Visibility is about as good as it gets."

-Car and Driver

"The seats are comfortable, controls are easy to find and the tactile feel is superb."

-Motor Trend

Buckle up for safety.

We started by changing everything...even the placement of Intrepid's windshield.

We found that by moving the leading edge of the windshield six inches forward and three inches lower, we could



improve Intrepid's aerodynamics while significantly reducing wind noise. A larger windshield meant enhanced visibility as well.

Of course, there were other benefits to Intrepid's revolutionary cab-forward design, like a roomier backseat and wider rear doors. All in all, cab-forward means less room for machinery and more room for people.

And now that we've seen what's possible in a four-door sedan, we can't see building one any other way.

- Standard driver & front passenger airbags
- Available integrated child seat
- Standard rear seat heat & air ducts
- Available automatic temperature control system
- Standard four-wheel independent suspension
- Available anti-lock brakes & traction control
- Available 3.5 liter, 214 horsepower, 24-valve overhead cam V-6
- Choice of warranties: 7/70 powertrain or 5/56 bumper-to-bumper. See these limited warranties & restrictions at dealer. Excludes normal maintenance, adjustments & wear items.
- For still more information, call 1-800-4-A-DODGE

Select
Features

INTREPID  THE NEW DODGE

"Intrepid revolutionizes the architecture of the automobile with cab-forward design."

-Popular Science

"Legroom and headroom are generous."

-Automobile Magazine

A DIVISION OF THE CHRYSLER CORPORATION

YOU WON'T
FIND THE
NEW INTREPID'S
WINDSHIELD
IN THE
USUAL PLACE.



Popular Mechanics®

MAY 1993
VOLUME 170
NO. 5



51



41



60



79

AUTOMOBILES

27 Cars Of The Future—Here Now!

Here are the newest dream machines that may be at your local dealership in a couple of years.

38 Long-Term Test Cars

The new Mercury Villager LS joins our fleet.

79 SPECIAL SECTION: Car Care Guide

Keep your car running and looking great. Here's how to tune up your:

- Engine
- Chassis
- Interior
- Exterior

Plus, the best new products to help make it easier.

104 Detroit Spy Report Ford's newest compact,

Lincoln's longer and wider Continental, a Saturn/Olds hookup, a Chrysler V8, and more.

109 New Cars Dodge's redesigned full-size Ram pickup,

Callaway's latest superspeedster, Chrysler's new LHS and New Yorker, the ultimate BMW 3-series, Infiniti's restyled Q45 for '94, and more.

SCIENCE/TECHNOLOGY

15 Tech Update

- Giant Russian space mirror turns night into day
- New rocket gets turbo boost from jet engines
- Laser scanners help to see the deep sea, and more

114 Science President Clinton counts on science and technology as America's hope for economic growth.

HOME IMPROVEMENT

51 Home And Shop Journal

- **Shop Project:** Redwood table and bench set
- **Consumer Guide:** Water treatment basics
- **New Products:** Lawn and garden gear
- **Home Improvement:** Post-hole footings, Retrofit wiring, and more

64 Homeowners Clinic Home maintenance Q&A.

ELECTRONICS

33 Invisible Rays, Hidden Hazards

Are you receiving harmful radiation from your cellular phone, hairdryer, shaver, TV, computer or microwave oven?

47 Showstoppers The hottest, most innovative

and entertaining new gear from this year's Consumer Electronics Show.

118 Electronics Cable radio is on the air.

122 Photography A new Polaroid for instant photos.

AVIATION

41 Dogfighter In A Day An air combat school for civilians offers the thrill of a lifetime.

OUTDOORS

116 Outdoors Environment-friendly off-roading.

DEPARTMENTS

2 Editor's Notes

6 Letters

10 Time Machine

26 Hotlines

106 D&E Awards

140 Coming Next Month

EDITOR'S NOTES

● As you can see from the cover, this is a heavy car issue. First up, take a peek into the future with us as we show you 29 cars and light trucks that point the way to the automotive future for all of us, starting on page 27. These are the dream cars you'll soon be seeing at a car show near you. But more importantly, several of them are called "concept" cars by their manufacturers, but are actually '94 and '95 production vehicles. (The Dodge T-300 pickup and the Oldsmobile Aurora, for example.) So you'll actually be driving some of these dream cars very soon. And as for the ones that will not go into production, you'll certainly see elements of them in future production vehicles. So consider this issue your car show in print, but be sure to go to the real thing when it comes to your area. . . .



Sky Warrior Bill Garvey gets ready to embark on his dream mission—becoming a "Dogfighter in A Day."

Aside from cars of the future, you have your car of the present. Every May for the past umpteen years, we've been telling you how to keep it running longer, looking sharper and getting better fuel mileage in our annual Car Care Guide. This year's Guide presents the "Whole Car Tune-up," beginning on page 79, and we can't think of a better reason than this special section to blow the winter cobwebs out of your car and get it sparkling for the rest of the year. . . . Speaking of cars, we slipped a new column into the magazine last month called Import Spy Report. Did you see it? For now, it will run four or five times a year, and it'll do for imported cars what Jim Dunne's Detroit Spy Report does for domestics. That is, it will keep you years ahead in what's coming from, now, the world's carmakers. Look for Import Spy Report again soon. . . . **Fighter pilot. Top Gun. Ace.** It's a dream some of us have lived, some of us dream of living. Now, all of us can live the dream—at least for a day, anyway—thanks to a new dogfighter school called Sky Warriors. When we heard about it, we immediately dispatched our in-house flying ace, Contributor Bill Garvey, to live the dream for all of us. His dream report begins on page 41. Till next time.


Joe Oldham

Popular Mechanics

Editor-In-Chief Joe Oldham

Home Improvement

Editor Steven Willson
Associate Editor Thomas Klenc
Assistant Editor Roy Berendsohn
Contributing Editors Norman Becker
Rosario Capotosto
Steve Toth

Boating/Outdoors

Editor Joe Skorupa

Automotive

Editor Tony Swan
Detroit Editor Jim Dunne
Associate Editor Mike Allen
Contributing Editors Don Chaikin
Michael Lamm
Rich Taylor
Rick Titus

Science/Technology

Editor Abe Dane

Electronics/Photography

Editor Frank Vizard
Contributing Editor Stephen A. Booth

Art Department

Graphics Director Bryan Canniff
Sr. Assoc. Art Director Alan Andresen
Associate Art Directors Tom Kane
Suzanne McCreight

Editorial Production

Managing Editor Deborah Frank
Art Editor John Bostonian Jr.
Production Editor Robin LaSalle
Art Assistant Nancy Coggins
Asst. Production Editor Kim Cheney

Editorial Administration

Administrative Asst. Josephine Caronia
Asst. to the Editor Barbara A. Novak

Reader Service Department

Manager Norah I. Golad

Editorial Offices

224 West 57 St.,
New York, NY 10019

We cannot be responsible for loss of unsolicited queries, manuscripts, or photos. For return, they must be accompanied by adequate postage.

SUBSCRIPTION SERVICE: Popular Mechanics Magazine will, upon receipt from its reader of a complete new or renewal subscription order, undertake fulfillment of that order so as to provide the first-copy delivery either to the Postal Service or alternate carriers within six to twelve weeks. If for some reason this cannot be done, you will be promptly notified of the issue date that will begin your subscription, with a request for any further instructions you may have concerning your order. Please address all such orders to us at Popular Mechanics, P.O. Box 7170, Red Oak, IA 51591. • Should you have any problem with your subscription, please write Joan Harris, Customer Service Department, Popular Mechanics, P.O. Box 7170, Red Oak, IA 51591 or call toll-free 1-800-333-4948. Please enclose your mailing label when writing to us or renewing your subscription. • Subscription prices: United States and possessions, \$15.94 for one year; \$29.94 for two years. Canada and all other countries add \$16.00 for each year.

Use this address for subscription orders & inquiries: POPULAR MECHANICS, P.O. Box 7170, Red Oak, IA 51591.

MAILING LISTS: From time to time we make our subscriber list available to companies who sell goods and services by mail that we believe would interest our readers. If you would rather not receive such mailings, please send your current mailing label or exact copy to: POPULAR MECHANICS, Mail Preference Service, P.O. Box 7024, Red Oak, IA 51591-0024.

AS A SERVICE TO READERS, Popular Mechanics publishes newsworthy products, techniques and scientific and technological developments. Due to possible variance in the quality and condition of materials and workmanship, Popular Mechanics cannot assume responsibility for proper application of techniques or proper and safe functioning of manufactured products or reader-built projects resulting from information published in this magazine.



© 1992 Carter-Wallace, Inc.

"WHEN
I'M
CLOSE
TO A
GUY,
THE WAY
HE
SMELLS
IS
IMPORTANT.
IT
REALLY
IS."



**GET XTRA XTRA PROTECTION AGAINST ODOR
WITH NEW ARRID XX CLEAR DEODORANT.
GET A LITTLE CLOSER™**

Материал защищен авторскими правами



Performance.
Protection.
Quality.™

AND



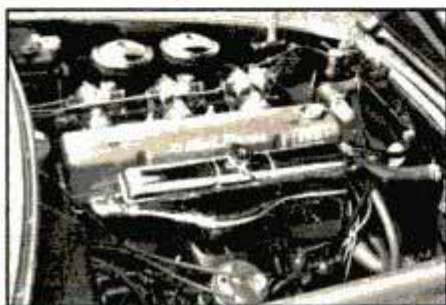
Ever since America learned to drive.™

Solutions to Engine Problems.™

PRESENT

THE NATIONAL AUTO QUIZ

1. The triple sidecraft-carbureted Blue Flame Six was the standard engine on what car?



A) 1953-55 Corvette. B) 1952-54 Jaguar. C) 1949-52 Pontiac. D) 1950-54 Bentley.

2. Which Detroit carmaker was first to offer an overhead valve V8 engine?

A) Chrysler. B) Ford. C) Chevrolet. D) Oldsmobile.

3. If your car runs well on 87 octane gasoline, switching to 92 octane will:

A) Increase horsepower. B) Improve gas mileage. C) Both A and B. D) Neither A nor B.

4. The earliest autos had what type of ignition?

A) Kettering. B) Magneto. C) 6-volt. D) Direct coil.

5. Which manufacturer was the first with a car named "Falcon"?

A) Chrysler. B) Buick. C) Ford. D) Mercury.

6. To make the shortest stop on a slick road surface in a car equipped with antilock brakes (ABS) you should:

A) Depress the brake pedal gradually and evenly. B) Stand on the brake pedal. C) Pump the brake pedal rapidly. D) Pump the brake pedal slowly.

7. Ray Harroun won the first Indianapolis 500 in 1911. What car was he driving?

A) Stutz. B) Ford. C) Mercedes. D) Marmon Wasp.

8. Which of these 1993 models has the highest rated horsepower?

A) Mercedes-Benz 600 SEL. B) Corvette LT-1. C) Nissan 300 ZX Twin Turbo. D) Ferrari 348.

9. If you smell antifreeze/coolant when driving and, after removing the radiator cap, find coolant rapidly overflowing from the filler neck, but it is not boiling or excessively hot, what's wrong?

A) Clogged radiator. B) Stuck thermostat. C) Blown head gasket. D) Bad water pump.

10. What forms of motorsports can you enter with your totally stock daily driver and still be competitive?

A) Bracket (drag) racing. B) Autocrossing. C) Rallying. D) All of the preceding.

WIN A FREE VIDEO

Send us your auto-related questions. If we use one of them in a future quiz, we'll send you a free car care video. In case of duplicate questions, the one with the earliest postmark will win.

Send your entries to:
National Auto Quiz
POPULAR MECHANICS
224 W. 57th St.
New York, NY 10019

ANSWERS
1. A 2. D (1949 "Rocket") 3. D 4. B 5. A (it was a 1955 show car)
6. B 7. D 8. A (368 HP) 9. C 10. D

We owe you one.

Buy a case of
Pennzoil® Motor Oil
and get up to \$4.00 back
on any other automotive
products in the store.

The people at Pennzoil feel they owe you one. Because it's thanks to you that Pennzoil is the #1 selling motor oil in America. And we don't want to lose any time showing you our appreciation. So this is what you do.

Go to your store any time between April 12 and May 31. Buy a case of Pennzoil Motor Oil, plus any other automotive products in the store. Then, send us the receipt, together with the special proof-of-purchase coupon you'll find on the case* and we'll mail you a special check, signed by me, for up to \$4.00 in return.

It's Pennzoil's way of saying thank you America for keeping us #1.

*Look for the specially-marked cases at stores for details. Coupon expires 8/31/93.



Performance.
Protection.
Quality.™

Ever since America learned to drive.™

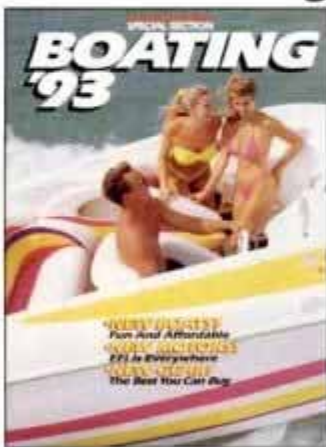
This One



H1QU-LWF-C2KA

LETTERS

Here We Go Again



You predicted receiving hate mail for showing people in swimsuits in your Boating '93 section. Not from me! I immediately turned to that section, and admired the people in it. Wow! Keep it up!

ROBERT D. SMITH
OLDS, IA

You've done it again. At issue originally was sexism and the use of sex as a marketing tool in your boating articles. It's not a marketing tool, you say? Then why don't you have *real* people on the boats? You know, the slightly overweight, unattractive average people who are the majority rather than the anorexic, binge-and-puke teeny-boppers you pick?

At issue now is Joe Oldham's blatant disrespect for the views of readers and his flip, taunting and antagonistic comments. Oldham's contemptuous treatment of his readership makes the handling of the issue understandable—PM has an ass for an editor.

LARRY HEINONEN
UNION CITY, MI

Me? Flip? —Ed.

Letters are subject to editing for length, style and format.

I don't find anything wrong with your Boating Guide whatsoever. In fact, it takes the edge off of winter, seeing people who aren't Sorrel deep in a snowbank.

ROBB L. SWENSON
CHANHASSEN, MN

I realize that "those libidinous PM editors" have a constitutional right to print pretty much whatever they want. However, you shouldn't make it so hard for us to remove the offensive pages from boating issues. I'm hoping the next time you find it necessary to print those unpopular, nonmechanical photos, you'll at least make it a little easier for me by perforating certain sections. I dislike wasting time cutting out all those pages before I can settle down to enjoy the rest—most of which is terrific. Thanks for the good parts.

ANDREW WEAVER
BEDFORD, PA

I see my favorite magazine has once again inflicted upon its readers some shapely, scantily clad young women in its annual Boating Guide. These excursions into voyeurism are not politically correct in this day and age, and are nothing more than a blatant attempt to titillate and pander to your readers' most carnal instincts. Keep up the good work!

DICK ERLIN
SANTA CRUZ, CA

A Corvette Commemorative

As part of an overall fundraising effort for the National Corvette Museum, to be located in Bowling Green, Kentucky, home of the Corvette production

plant, two limited-edition print lithographs are being offered to Corvette fans everywhere.

Each print is hand signed by either Zora Arkus-Duntov or Larry Shinoda, then countersigned and numbered by the noted motorsports artist Lee Self. There's a story behind each car shown in the prints. For example, the Grand Sport shown in the Duntov print (below) depicts No. 003 of only five original Grand Sports that were built.

All print sets from No. 6 through No. 1952 sell for \$950, plus \$25 shipping and handling. Sets No. 1953 through No. 1992 are priced at \$1500 per set. Numbers are sold as available and requested. Prints may be purchased individually for \$475, plus \$25 shipping and handling. A Corvette Museum "Official Framing Package" is also available at \$1145 for the base price framed sets, plus shipping costs.

For more information and to place an order, contact Chenault & Co., Corvette Prints, 608 W. Main St., Lexington, KY 40508; (606) 281-0003.

TODD STRECKER
CHENAULT & CO.
LEXINGTON, KY

Train Brain

Give me a break! I have to agree with Chris McGinn's comment as to why we need Corvette historians. We need them about as much as we need good old Billy Willy taking all the credit for the good things that happen in the U.S.A. The historians we really need are the brains who know everything about electric trains. You say once a year 50,000 people meet to worship Corvettes, yet every weekend all over the United States, millions are visiting the model train conventions. I would bet anything that you have more readers suffering from train fever than

(Please turn to page 8)



Print I (above) is signed by the legendary Corvette Chief Engineer Zora Arkus-Duntov. Print II (right) is signed by auto designer Larry Shinoda and features his Rick Mears Special Edition Corvette.





It may be ahead of its time, but it's still in touch with your needs.

Tomorrow's passenger van is ready today.

Ford Club Wagon's bold, aerodynamic shape lets you know

it's the most advanced full-size passenger van

built today. A spacious, tastefully appointed interior holds



Only Full-Size Van With A Driver Air Bag.*

everything from an ergonomically designed instrument panel to an available AM-FM stereo system. "Out front" engine placement means more room up front. And Twin I-Beam front suspension provides ride smoothness and control.

The Regular Club Wagon is the only full-size passenger van with a standard driver air bag to supplement

**Ford Trucks.
The Best Never Rest.**

safety belts.* All outer seats have 3-point safety belts. And rear anti-lock brakes also come standard.

The Ford Club Wagon. Designed and built to standards of quality that are the highest we have ever established for a full-size Ford passenger van.

CLUB WAGON



THE BEST-BUILT, BEST-SELLING AMERICAN TRUCKS ARE BUILT FORD TOUGH.

*Air bag effectiveness depends on wearing your safety belt, so always buckle up. "Best-Built" claim based on an average of consumer-reported problems in a series of surveys of all '81-'92 models designed and built in North America. Sales by Division.



GROWING OPPORTUNITIES IN TOMORROW'S MILITARY

For years we have said, "The Armed Forces are a great place to start." Today's Armed Forces are still a smart option for young men and women to consider as they earn a high school diploma.

Tomorrow's military recruits will benefit from excellent training, increased educational opportunities, and greater responsibility.

Our Armed Forces may be smaller, but they must be every bit as good tomorrow as they are today. We must continue to have the kind of competent and thoroughly dedicated Armed Forces you have seen proudly at work...from the deserts of Iraq to the storm-stricken suburbs of Southern Florida and famine-devastated Somalia.

With the continued support of the American public, I believe they will be.

COLIN L. POWELL
CHAIRMAN, JOINT CHIEFS OF STAFF

Corvette fever. Let's have more pictures and stories on model and real railroading. It's the only way to control this fever in most of us.

B.J. UBAUSEE
GIZMO, ID

Okay. Read our March '93 and July '93 cover stories. —Ed.

Think Tank

For many years I have enjoyed POPULAR MECHANICS, but never more than while reading Letters in the February '93 issue. Obviously, there are many who do not have their feet planted firmly in midair. And will resist having what they "think" overwhelmed by the media.

DEAN D. ALMQUIST
FUNK, NE

Auto Safe

In a recent Car Care section, you featured a new product called Auto Safe. According to your writeup, the device is a spring-loaded, solenoid-operated storage drawer that permits the motorist quick access to his valuables. A picture of the Auto Safe shows a handgun readily accessible in the storage drawer. Who exactly is supposed to take advantage of this mechanical marvel? Is it John Q. Citizen, terrified at the recent spate of car jackings? Police statistics say that individuals not properly trained in the use of firearms are much more likely to be killed if they attempt to resist armed robbery or car jacking with a deadly weapon. Or is it to be used by the streetwise drug runner when stopped by police? Given all the dangers law-enforcement officers face on the streets today, we don't need to give the crooks any more clever devices where they can hide the tools of their trade. POPULAR MECHANICS used poor judgment in portraying the Auto Safe as a useful device for concealing a weapon, given the wide variety of other admittedly legitimate uses it might offer.

DANIEL L. MIHALKO
PUBLIC AFFAIRS MGR.
U.S. POSTAL SERVICE

Presidential Times

How times and security have changed for presidential limousines! At 3 o'clock one morning in 1943, I sat in the Sunshine Special, stood on the Secret Service platforms and marveled at the inch-thick glass partition between driver and passenger seats. My younger brother also searched for guns supposedly hidden throughout the automobile. The car was being shuttled through Kansas to F.D.R.'s next appearance in Dallas

when it developed problems. There were no replacement parts available as it was custom made. My father, a Ford mechanic with a reputation for improvisation, was called (from 40 miles away) to restore it to running order. When finished, he came home, awakened us and we returned to the garage to examine it. No security personnel were there. Being Republicans, we could have sabotaged it. There was no mention of it in our local paper and our claim to fame was fleeting to say the least.

JOYCE (STALEY) COOK
OWENSVILLE, MO

Jumpin' Jimmy

Recently, GM did a commercial depicting a Jimmy bungee-jumping from a bridge. I thought the commercial was really pointless. What does it really prove? It was a waste of money that could have gone to better develop GM's product. PM did itself and its readers an injustice by publishing such nonsense when there is a wealth of more interesting topics to write about.

RICHARD VAN DYKE
McMINNVILLE, OR

The Jumpin' Jimmy ad on television had no impact on me. Any company that would try to sell me a vehicle based on such a stupid and absurd ad, which proved nothing, would be the last vehicle I would buy. I would venture to say that there is not a vehicle made that would not pass this test. A crate of eggs would pass this test. I'm surprised that POPULAR MECHANICS would honor such a scam. Is this truth in advertising?

ROY J. FERRARI
SEATTLE, WA

Possible Dreams

The "Possible Dreams" exhibit at Henry Ford Museum brought back many memories. As a child, I dreamed about all the things that could be made with the proper tools and plans. I especially enjoyed the useful tips for organizing workshops. This exhibit is a must for young students so that they may appreciate and further understand the ingenuity of the people in this country.

HECTOR PEREZ
BERKLEY, MI

I enjoyed the exhibit very much. I can't wait to get home and browse through some of the old POPULAR MECHANICS magazines I found when my grandfather passed away. Many are from the 1940s. I can see now that they will be quite interesting.

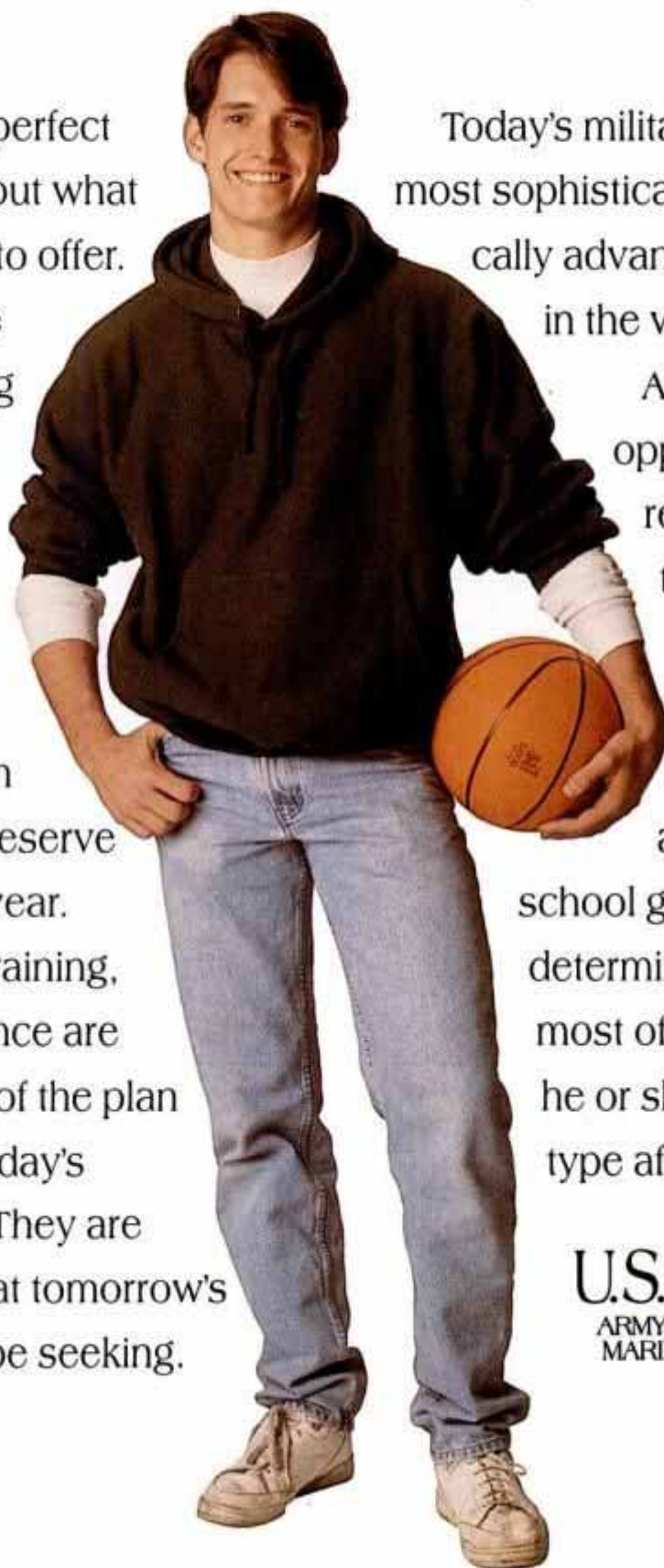
KIMBERLY A. FERGAN
DETROIT, MI

IF YOU NEVER THOUGHT OF YOUR CHILD AS THE MILITARY TYPE, THINK AGAIN.

Now is the perfect time to think about what the military has to offer.

Although the military is getting smaller, the Armed Forces still need to recruit almost 400,000 young men and women for Active and Reserve positions each year.

Education, training, and job experience are important parts of the plan to restructure today's Armed Forces. They are also exactly what tomorrow's employers will be seeking.



Today's military is one of the most sophisticated and technologically advanced organizations in the world.

As in the past, the opportunities and rewards for joining the military will continue.

So, if you know a smart, ambitious high school graduate who's determined to make the most of the future, maybe he or she is the military type after all.

U.S. ARMED FORCES
ARMY ★ NAVY ★ AIR FORCE ★
MARINES ★ COAST GUARD ★

TIME MACHINE

90 YEARS AGO: MAY 1903



Circuit Riders

Two San Francisco daredevils put a new twist on the old loop-de-loop with a gravity-flouting bicycle trick. Their track was a 14-ft.-wide hoop that began the routine lying on its side. The cyclists started by riding in tight circles inside the hoop, then climbed onto the hoop itself to do high-speed horizontal doughnuts. Motors then hoisted the hoop 7 ft. in the air and turned it vertically, the cyclists still looping away.

Big Shot

Thousands of onlookers gathered at Sandy Hook, New Jersey. There, 20 men rammed a 2400-pound shell into a 16-in. gun, then loaded the biggest charge of smokeless powder ever fired—more than 600 pounds. The huge piece wheeled seaward at an elevation of 1½° and fired. A

tongue of flame spat 100 ft. from the muzzle. The monstrous shell skipped twice over the waves before sinking beneath a column of spray. Watching gunnery officers quickly calculated that the shell would have traveled 20 miles at a gun elevation of more than 40°. A new age of naval artillery had arrived.



60 YEARS AGO: MAY 1933



Flying Bridge

Engineers were already billing the "Sky-Ride"—a million-dollar attraction at the Chicago World's Fair—as a bridge to the future. At 200 ft. above the ground, cables pulled the ferry cars along a trackway suspended between two steel towers—one on the mainland and one on an island dredged from Lake Michigan. Why not adapt it, the designers argued, to span islands where traffic didn't warrant the expense of a suspension bridge?

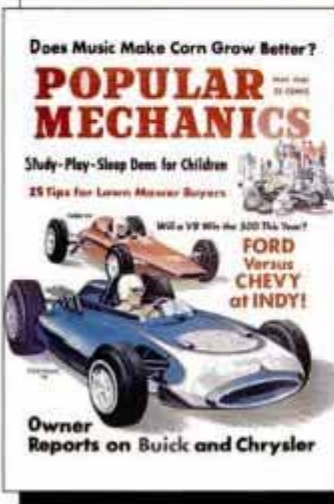
Air FDR

President Roosevelt could now wing his way from Washington on a new Douglas-built amphibious monoplane. Outfitted as a flying Oval Office, the Navy plane featured the presidential essentials of the day—desk, radio,

telephone and stenographer, along with sleeping quarters and seats for four other passengers. High-mounted engines kept their din from the presidential ears. And an arrangement of bulkheads kept the president's quarters waterproof.



30 YEARS AGO: MAY 1963



Gasoline Alley

The Brickyard had been given an asphalt facelift, which was supposed to smooth out the differences between the beefy Offenhauser-powered roadsters and the new lighter Grand-Prix-style Indycars inspired by Jack Brabham's showing in the '61 race. The new cars still hadn't won, however. But Jim Clark's rear-engined Lotus-Ford would come close, finishing second in one of the most exciting races in years.

Squirt Gun

Tiptoeing across Lake Washington, Boeing's Little Squirt left a 30-ft. jet of water in its wake. The 20-ft. craft combined hydrofoils with a waterjet, the latter built from an indus-

trial pump mated with a 475-hp turbine. Spewing water like a firehose, the engine kicked the 2½-ton boat to 45 knots. Boeing spawned a whole series of high-speed watercraft from this prototype.



Don't lose another hair without getting the medical facts:

Take 2 minutes to learn about your best chance to regrow hair.

ROGAINE® Topical Solution (minoxidil 2%) is the only product ever proven to regrow hair. So isn't it worth your time to find out about it — even if it gets a little technical?

How hair grows:

Hair grows in cycles. There's a growth phase, then a resting and shedding phase. Usually, everyone loses some hair during the shedding phase. But male pattern baldness (androgenetic alopecia), the most common form of hair loss in men, is different. It shortens the hair's growth phase. So hair grows less and rests longer, resulting in thin hairs that are barely visible. Eventually there is no growth at all.

How Rogaine regrows hair:

ROGAINE works in part by prolonging the growth phase. With more hairs growing longer and thicker at the same time, you may see improved scalp coverage.

No one can predict how well ROGAINE will work for you. But research suggests that patients having a large number of growing hairs (at least 3/8 inch or longer) seem to have a better response.

Dermatologists conducted 12-month clinical tests. After 4 months, 26% of patients using ROGAINE reported moderate to dense hair regrowth,

compared with 11% of those using a placebo (a similar solution without minoxidil — the active ingredient in ROGAINE). After 1 year, 48% of the men who continued in the study using ROGAINE rated their regrowth as moderate to dense. Thirty-six percent reported minimal regrowth. The rest (16%) had no regrowth.

Side effects were minimal: 7% of those who used ROGAINE had itching of the scalp. ROGAINE should only be applied to a normal, healthy scalp (not sunburned or irritated).

Make a 4 to 6 month commitment to see results:

Studies indicate that *at least 4 months of twice-daily treatment* with ROGAINE are usually necessary before there is evidence of regrowth.

As you'd expect, if you are older, balding longer, or have a larger area of baldness, you may do less well.

ROGAINE is a treatment, not a cure. So further progress is possible only by using it continuously. Some anecdotal reports indicate that if you stop using ROGAINE, you will probably shed the newly regrown hair within a few months.

Here's what you should do:

Individual results vary widely. So discuss your hair loss with your doctor to understand what you can realistically expect. Only a doctor can prescribe ROGAINE. So see a *dermatologist or another doctor experienced in treating hair loss* today. Why just accept what nature has handed you when you can fight back?

For more information, a list of doctors near you, and a \$10 certificate as an incentive to visit your doctor, call this toll-free number: 1 800-759-4073.

Upjohn | DERMATOLOGY DIVISION

© 1993 The Upjohn Company USJ8415.00 May 1993

Fight back with Rogaine®

TOPICAL SOLUTION minoxidil 2%





The only product ever proven to regrow hair.

What is ROGAINE?

ROGAINE Topical Solution is a prescription medicine for use on the scalp that is used to treat a type of hair loss in men and women known as androgenetic alopecia: hair loss of the scalp vertex (top or crown of the head) in men and diffuse hair loss or thinning of the front and top of the scalp in women. ROGAINE is a topical form of minoxidil, for use on the scalp.

How effective is ROGAINE?

In men: Clinical studies with ROGAINE of over 2,300 men with male pattern baldness involving the top (vertex) of the head were conducted by physicians in 27 US medical centers. Based on patient evaluations of regrowth at the end of 4 months, 26% of the patients using ROGAINE had moderate to dense hair regrowth compared with 11% who used a placebo treatment (no active ingredient). No regrowth was reported by 41% of those using ROGAINE and 60% of those using a placebo. By the end of 1 year, 48% of those who continued to use ROGAINE rated their hair growth as moderate or better.

In women: Clinical studies with ROGAINE were conducted by physicians in 11 US medical centers involving 256 women with hair loss. Based on patient evaluations of regrowth after 32 weeks (8 months), 19% of the women using ROGAINE had at least moderate regrowth compared with 7% of those using a placebo. No regrowth was reported by 41% of the group using ROGAINE and 50% of the group using placebo.

How soon can I expect results from using ROGAINE?

Studies show that the response time to ROGAINE may differ greatly from one person to another. Some people using ROGAINE may see results faster than others; others may respond with a slower rate of hair regrowth. You should not expect visible regrowth in less than 4 months.

How long do I need to use ROGAINE?

ROGAINE is a hair-loss treatment, not a cure. If you have new hair growth, you will need to continue using ROGAINE to keep or increase hair regrowth. If you do not begin to show new hair growth with ROGAINE after a reasonable period of time (at least 4 months), your doctor may advise you to discontinue using ROGAINE.

What happens if I stop using ROGAINE? Will I keep the new hair?

Probably not. People have reported that new hair growth was shed after they stopped using ROGAINE.

How much ROGAINE should I use?

You should apply a 1-mL dose of ROGAINE twice a day to your clean dry scalp, once in the morning and once at night before bedtime. Wash your hands after use if your fingers are used to apply ROGAINE. ROGAINE must remain on the scalp for at least 4 hours to ensure penetration into the scalp. Do not wash your hair for at least 4 hours after applying it. If you wash your hair before applying ROGAINE, be sure your scalp and hair are dry when you apply it. Please refer to the instructions for use in the package.

What if I miss a dose or forget to use ROGAINE?

Do not try to make up for missed applications of ROGAINE. You should restart your twice-daily doses and return to your usual schedule.

What are the most common side effects reported in clinical studies with ROGAINE?

Itching and other skin irritations of the treated scalp area were the most common side effects directly linked to ROGAINE in clinical studies. About 7 of every 100 people who used ROGAINE (7%) had these complaints.

Other side effects, including light-headedness, dizziness, and headaches, were reported both by people using ROGAINE and by those using the placebo solution with no minoxidil. You should ask your doctor to discuss side effects of ROGAINE with you.

People who are extra sensitive or allergic to minoxidil, propylene glycol, or ethanol should not use ROGAINE.

ROGAINE Topical Solution contains alcohol, which could cause burning or irritation of the eyes or sensitive skin areas. If ROGAINE accidentally gets into these areas, rinse the area with large amounts of cool tap water. Contact your doctor if the irritation does not go away. If the spray applicator is used, avoid inhaling the spray.

What are some of the side effects people have reported?

ROGAINE was used by 3,857 patients (347 females) in placebo-controlled clinical trials. Except for dermatologic events (involving the skin), no individual reaction or reactions grouped by body systems appeared to be more common in the minoxidil-treated patients than in placebo-treated patients.

Dermatologic: irritant or allergic contact dermatitis—7.36%; **Respiratory:** bronchitis, upper respiratory infection, sinusitis—7.16%; **Gastrointestinal:** diarrhea, nausea, vomiting—4.33%; **Neurologic:** headache, dizziness, faintness, light-headedness—3.42%; **Musculoskeletal:** fractures, back pain, tendinitis—2.59%; **Cardiovascular:** edema, chest pain, blood pressure increases/decreases, palpitations, pulse rate increases/decreases—1.53%; **Allergic:** nonspecific allergic reactions, hives, allergic rhinitis, facial swelling, and sensitivity—1.27%; **Metabolic-Nutritional:** edema, weight gain—1.24%; **Special Senses:** conjunctivitis, ear infections, vertigo—1.17%; **Genital Tract:** prostaticitis, epididymitis, vaginitis, vulvitis, vaginal discharge/itching—0.91%; **Urinary Tract:** urinary tract infections, renal calculi, urethritis—0.93%; **Endocrine:** 0.47%; **Psychiatric:** anxiety, depression, fatigue—0.36%; **Hematologic:** lymphadenopathy, thrombocytopenia—0.31%.

ROGAINE use has been monitored for up to 5 years, and there has been no change in incidence or severity of reported adverse reactions. Additional adverse events have been reported since marketing ROGAINE and include eczema, hypertrichosis (excessive hair growth), local erythema (redness), pruritus (itching), dry skin/scalp flaking, sexual dysfunction, visual disturbances, including decreased visual acuity (clarity), increase in hair loss, and alopecia (hair loss).

What are the possible side effects that could affect the heart and circulation when using ROGAINE?

Serious side effects have not been linked to ROGAINE in clinical studies. However, it is possible that they could occur if more than the recommended dose of ROGAINE was applied, because the active ingredient in ROGAINE is the same as that in minoxidil tablets. These effects appear to be dose related, that is, more effects are seen with higher doses.

Because very small amounts of minoxidil reach the blood when the recommended dose of ROGAINE is applied to the scalp, you should know about certain effects that may occur when the tablet form of minoxidil is used to treat high blood pressure. Minoxidil tablets lower blood pressure by relaxing the arteries, an effect called vasodilation. Vasodilation leads to fluid retention and faster heart rate. The following effects have occurred in some patients taking minoxidil tablets for high blood pressure:

Increased heart rate: some patients have reported that their resting heart rate increased by more than 20 beats per minute.

Salt and water retention: weight gain of more than 5 pounds in a short period of time or swelling of the face, hands, ankles, or stomach area.

Problems breathing: especially when lying down; a result of a buildup of body fluids or fluid around the heart.

Worsening or new attack of angina pectoris: brief, sudden chest pain.

When you apply ROGAINE to normal skin, very little minoxidil is absorbed. You probably will not have the possible effects caused by minoxidil tablets when you use ROGAINE. If, however, you experience any of the possible side effects listed above, stop using ROGAINE and consult your doctor. Any such effects would be most likely if ROGAINE was used on damaged or inflamed skin or in greater than recommended amounts.

In animal studies, minoxidil, in much larger amounts than would be absorbed from topical use (on skin) in people, has caused important heart-structure damage. This kind of damage has not been seen in humans given minoxidil tablets for high blood pressure at effective doses.

What factors may increase the risk of serious side effects with ROGAINE?

People with a known or suspected heart condition or a tendency for heart failure would be at particular risk if increased heart rate or fluid retention were to occur. People with these kinds of heart problems should discuss the possible risks of treatment with their doctor if they choose to use ROGAINE.

ROGAINE should be used only on the balding scalp. Using ROGAINE on other parts of the body may increase minoxidil absorption, which may increase the chances of having side effects. You should not use ROGAINE if your scalp is irritated or sunburned, and you should not use it if you are using other skin treatments on your scalp.

Can people with high blood pressure use ROGAINE?

Most people with high blood pressure, including those taking high blood pressure medicine, can use ROGAINE but should be monitored closely by their doctor. Patients taking a blood pressure medicine called guanethidine should not use ROGAINE.

Should any precautions be followed?

People who use ROGAINE should see their doctor 1 month after starting ROGAINE and at least every 6 months thereafter. Stop using ROGAINE if any of the following occur: salt and water retention, problems breathing, faster heart rate, or chest pains.

Do not use ROGAINE if you are using other drugs applied to the scalp such as corticosteroids, retinoids, petrolatum, or agents that might increase absorption through the skin. ROGAINE is for use on the scalp only. Each 1 mL of solution contains 20 mg minoxidil, and accidental ingestion could cause unwanted effects.

Are there special precautions for women?

Pregnant women and nursing mothers should not use ROGAINE. Also, its effects on women during labor and delivery are not known. Efficacy in postmenopausal women has not been studied. Studies show the use of ROGAINE will not affect menstrual cycle length, amount of flow, or duration of the menstrual period. Discontinue using ROGAINE and consult your doctor as soon as possible if your menstrual period does not occur at the expected time.

Can ROGAINE be used by children?

No. The safety and effectiveness of ROGAINE has not been tested in people under age 18.

Caution: Federal law prohibits dispensing without a prescription. You must see a doctor to receive a prescription.

Upjohn DERMATOLOGY DIVISION

© 1992 The Upjohn Company
Kalamazoo, MI 49001, USA
CB-3-S

Popular Mechanics

Publisher Robert B. Dillingham

Business Manager Agnes P. Maillaro

ADVERTISING

Director John A. Pagliaro

New York

224 West 57 St., New York, NY 10019

Michael T. Campbell

(212) 649-3142

Robert G. Mattone

(212) 649-3141

Thomas D. Schreckinger

(212) 649-3143

Chicago

1 South Wacker Dr., Chicago, IL 60606

(312) 984-5190

Manager Richard T. Weithas

Rocco A. Smeriglio, Jr.

Detroit

Hearst Magazines Sales, Inc.

2301 West Big Beaver Rd., Troy, MI 48064

(313) 649-2981

Manager D. Craig Rebold

Laurence E. Lantzy

Los Angeles

3000 Ocean Park Blvd., Suite 2008,

Santa Monica, CA 90405

(310) 450-8881

Manager Jim D. Smith

Atlanta

Collinson and Company, Inc.

4315 Cowan Rd., Tucker, GA 30084

(404) 939-8391

Manager Newton B. Collinson, III

Jonathan M. Kiger

Dallas

Ingersoll, Redding, Kellner & Zeko

16990 Dallas Pkwy., Suite 220, Dallas, TX 75248

(214) 380-0416

Manager Daniel F. Kellner

Dean Zeko

Mail Order

Manager Barbara Jones

(212) 649-3136

Classified

Manager Dorothy Nolan

(212) 649-3167

MARKETING

Director William E. Congdon

(212) 649-3088

PROMOTION

Manager Erin M. Overend

(212) 649-3085

PRODUCTION

Manager Carole L. Hartman

Adv. Prod. Mgr. Patricia A. Woods

(212) 649-3164

Published by The Hearst Corporation

FRANK A. BENNAK JR.

President & Chief Executive Officer

RANDOLPH A. HEARST

Chairman

GILBERT C. MAURER

Executive Vice President

& Chief Operating Officer

Hearst Magazines Division

D. CLAEYS BAHRENBURG

President

K. ROBERT BRINK

MARK F. MILLER

Executive Vice Presidents

DANIEL E. ZUCCHI

Senior Vice President

ROBERT B. DILLINGHAM

Vice President for Popular Mechanics

RICHARD E. DEEMS

Publishing Consultant

POPULAR MECHANICS is published monthly by the Hearst Corporation, 809 Eighth Avenue, New York, NY 10019, U.S.A. Frank A. Bennack Jr., President; Randolph A. Hearst, Chairman; Gilbert C. Maurer, Executive Vice President; Victor F. Gann, Senior Vice President, Chief Financial and Legal Officer and Secretary; Edwin A. Lewis, Vice President and Treasurer, Hearst Magazines Division; D. Claeys Bahrenburg, President; K. Robert Brink, Executive Vice President; Mark F. Miller, Executive Vice President; Daniel E. Zucchi, Senior Vice President; George J. Green, Executive Vice President; Raymond J. Petersen, Executive Vice President; John A. Robar, Jr., Vice President & Resident Controller; Robert B. Dillingham, Vice President for Popular Mechanics.

20% Off!

...when you buy two or more Escort detectors*:

For the first time ever, our entire line of radar and laser detectors is available in a "mix or match" sale for savings of nearly \$80. If you've been waiting for the perfect moment to buy a radar or laser detector, this is it. Just take a look at the potential savings when you buy two. All detectors are backed with a 30-day money back guarantee and one-year limited warranty.



Passport 1000 Laser \$99

Total Radar and Laser Protection

Combine Passport 3200 WideBand with Passport 1000 Laser for complete radar and laser coverage and take nearly \$60 off the regular price.

Was: ~~\$298~~ Now: **\$238.40**

You save: **\$59.60**



Passport 3200 WideBand \$199

Complete Radar Protection...For Each Car

Have two cars? Buy the most advanced radar detector available today for each and you'll save almost \$80 on this package.

Was: ~~\$398~~ Now: **\$318.40**

You save: **\$79.60**



Passport 2200 \$99

Two-Band Radar And Laser Protection

Ka isn't used in your area? Then why buy a wide-band detector? Combine two-band Passport 2200 with a Passport 1000 Laser and save nearly \$40.

Was: ~~\$198~~ Now: **\$158.40**

You save: **\$39.60**



Passport 2000 \$49

A "Free" Detector

Buy both Passport 3200 WideBand and Passport 2000 and you'll save \$49 — the cost of Passport 2000! Keep Passport 3200 for yourself and give Passport 2000 to a friend as a gift.

Was: ~~\$248~~ Now: **\$198.40**

You save: **\$49.60**

ESCORT.
The Innovative Edge™

Call toll-free 24 hours,
7 days a week:

1-800-433-3487

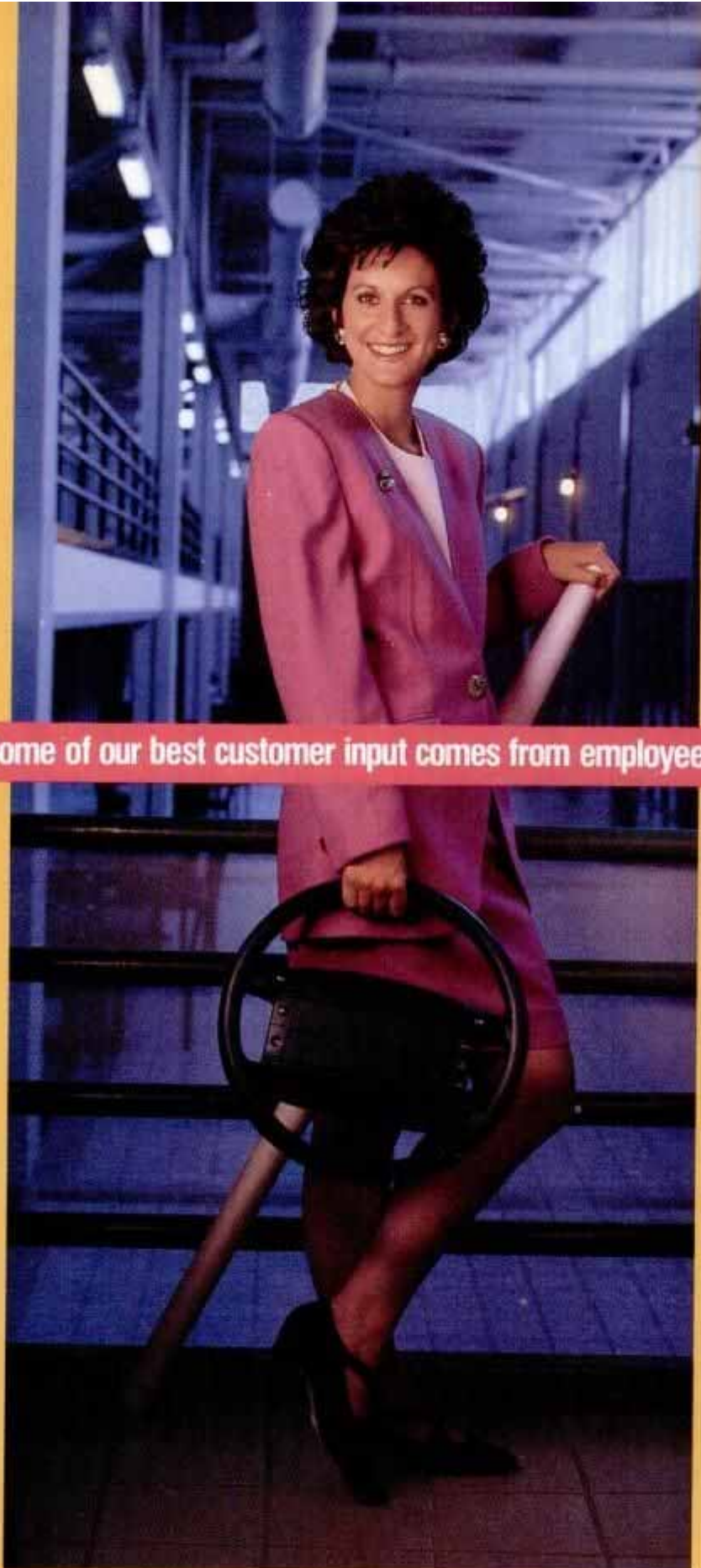
Shipping & handling extra. OH res. add 6% tax.

ESCORT

► Department 506853
5200 Fields-Ertel Road
Cincinnati, Ohio 45249

© 1995 GM

*The 20% discount applies only to new purchases of two detectors on the same order. Return of either detector will result in the loss of the 20% discount. Offer extended through April 30, 1995.



Susan Pacheco-Baker,
Ford Mechanical Engineer

"Some of our best customer input comes from employees."

Because our employees are customers too, they want the same thing in a car or truck as you do. So at Ford Motor Company we encourage everyone, in every area of the company, to share their ideas. And it's this kind of thinking that has resulted in vehicles like our Ford Explorer having one of the highest customer satisfaction ratings in the industry. People know a good idea when they see it.



Ford • Lincoln • Mercury • Ford Trucks

QUALITY IS JOB 1. IT'S WORKING.

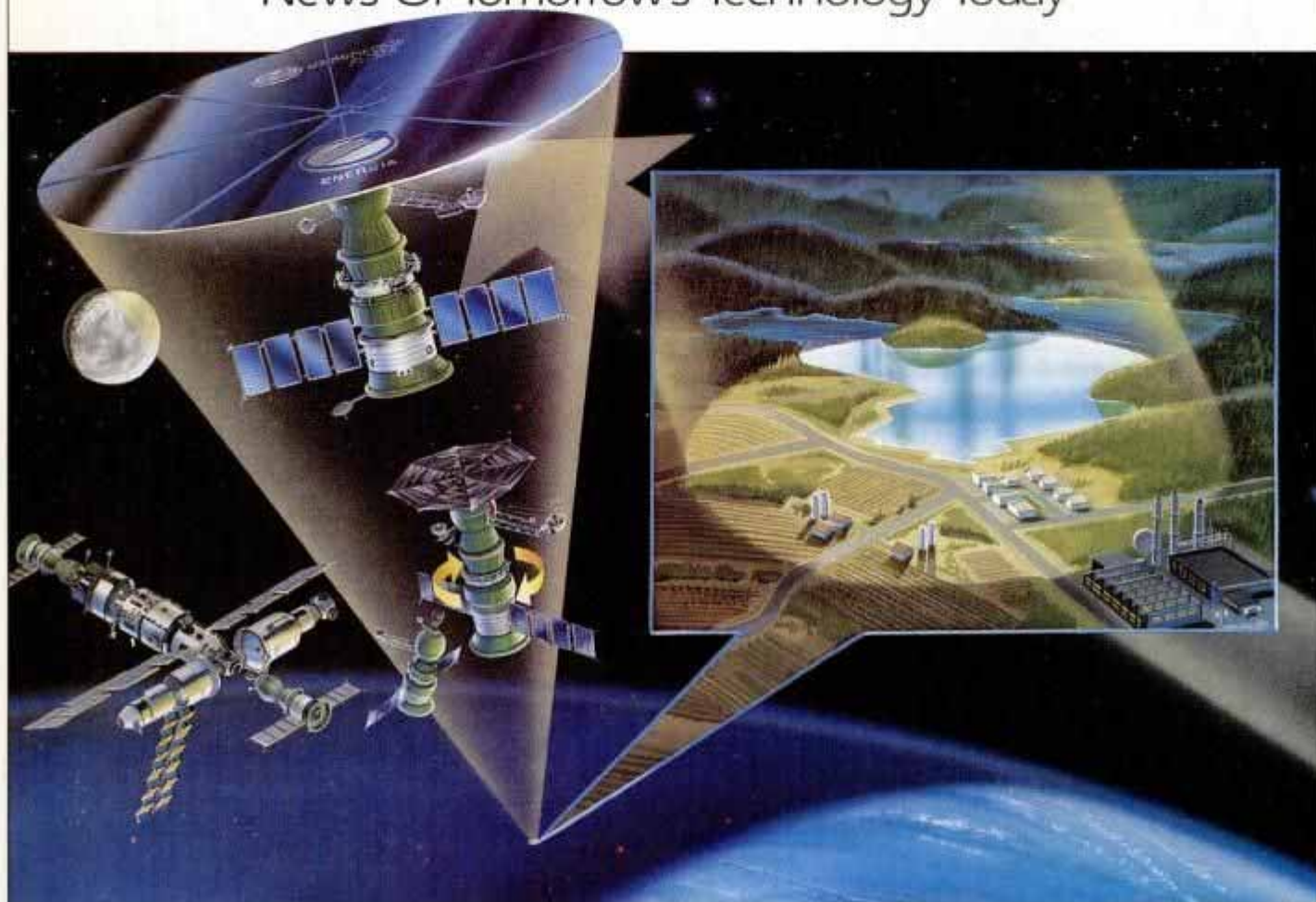
Buckle up—Together we can save lives.

Always insist on genuine Ford Motor Company collision repair parts.

© 1997 Ford Motor Company. All rights reserved.

TECH UPDATE

News Of Tomorrow's Technology Today



Gigantic Russian Space Mirror Turns Night Into Day

KALININGRAD, RUSSIA—The Russians seized the spotlight last February with the most imaginative space experiment in years. Cosmonauts aboard the space station *Mir* turned loose a huge orbiting reflector that lit up night landscapes by bouncing sunlight beyond the edge of darkness.

Dubbed Znamya (Russian for "banner"), the 65-ft.-wide sheet of aluminized plastic umbrellaed out from one of the *Progress* unmanned cargo craft used to resupply *Mir*. An electric motor pinwheeled the reflector to keep it flat.

As the *Progress* orbited, its maneuvering thrusters

cocked the spacecraft at the right angle for Znamya to catch a sunbeam and ricochet it Earthward. The reflected beam whipped across Earth's surface, creating a 2.5-mile-wide spot that traveled at orbital speed. Observers said the split-second illumination was like the light of a full moon tripled.

The space enterprise NPO Energia, which runs *Mir*, assembled a Russian consortium to pull off the project. Planners would like to loft a constellation of 100 orbiting reflectors that would prolong day-

light in high latitudes, aiding farmers, search-and-rescue teams and construction crews.

Znamya solar reflector bounced sunlight into darkened landscape during 5-hour experiment last February.

Editor: Abe Dane
Writer: Greg Pope
Reporters: Philip Chien, Mike Fillon

Highlights This Month

- **Get Up And Go**—More maglev proposals from American industry.
- **To See The Sea**—Laser scanners cut through the fathoms.
- **Diamonds From The Rough**—Modern alchemists turn graphite into gems.
- **Turbo Booster**—New *Pegasus* rocket gains giddy-up from jet engines.
- **World's Most Boring Machine**—Megamole digs tunnel for Super Collider.
- **Parking Lights**—Lasers to usher in night-flying naval pilots.



BECHTEL SYSTEM

FOSTER-MILLER SYSTEM

MAGNEPLANE SYSTEM

Three More Ways To Float

WASHINGTON, DC—Details of three more designs funded by the National Maglev Initiative have now come to light.

Unlike the maglev concept outlined by a Grumman-led consortium (see *Tech Update*, page 26, Dec. '92), these three designs feature electrodynamic suspension, in which track

magnets repulse and lift magnets on the vehicles.

A Bechtel-led team has addressed the key drawback of a brand-new transportation system—the price tag of the infrastructure. The solution: a narrow, flexible box-beam track around which the train's undercarriage will wrap.

Meanwhile, a group

headed by Foster-Miller has lined opposite walls of an open-bottomed guideway with a double row of magnetic coils. The idea is to allow track switching with no moving parts. At a switch point, the guideways would fork off vertically, and the vehicle would follow whichever row of coils is powered.

Finally, a Magneplane International-led consor-

Track magnets (red) and train magnets (purple) interact for lift and propulsion.

tium is proposing Henry Kolm's self-banking vehicles on a semicircular guideway (see "Supertrain," page 78, June '88).

Federal Railroad Administration officials are hoping to hold the Clinton Administration to its promise to keep the Maglev Initiative on track.

Escape From Freedom

HOUSTON, TX—No matter how the Space Station finally looks, planners still must factor in the unplanned—a gravely ill crew member, say, or a meteor impact. To abandon ship if a Shuttle rescue is impossible, astronauts will climb into one of two Assured Crew Return Ve-

ACRV slams on the brakes to de-orbit. Mockup (inset) verified sea-rescue techniques.

hicles (ACRV), *Freedom's* lifeboats.

Johnson Space Center has settled on a simple ballistic return vehicle for the ACRV. After firing retro-rockets to slow down, the 4-man personnel module will plummet like an Apollo capsule, protected by a heat shield.

NASA recently tested a full-size mockup of the vehicle at a wave tank.



NASA PHOTO AND ILLUSTRATION

Mighty-Mite Two-Stroke

ARUNDEL, AUSTRALIA—Following the success of the Sarich Orbital engine, another innovative 2-stroker has come up from Down Under.

Split Cycle Technology Ltd. maintains that its engine is $\frac{1}{2}$ the size and a quarter the weight of a conventional engine of equivalent power.

The system dispenses with crankshaft and connecting rods. The pistons are arranged radially about

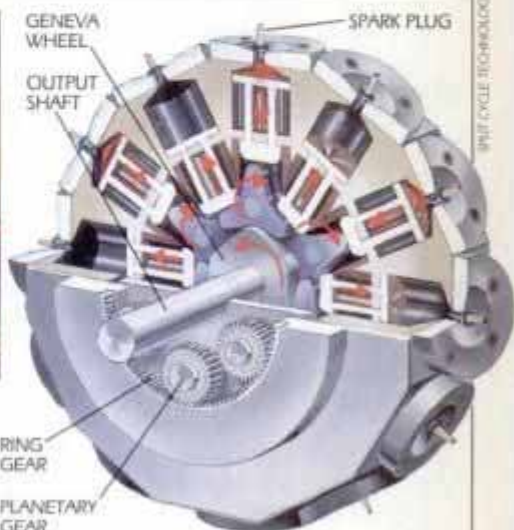
an output shaft. Half of the pistons fire simultaneously, turning multi-lobed cams called Geneva wheels. These not only transmit power, but also raise the remaining pistons for the next firing stroke.

The high firing rate per revolution accounts for the engine's prodigious output. Yet, because each piston travels at $\frac{1}{2}$ the speed of a piston in a conventional 4-stroke, wear and friction are greatly reduced.

Automakers and the Pentagon are interested in the technology.



Split Cycle director and Formula One legend Sir Jack Brabham with 500cc 2-stroke engine.



SPLIT CYCLE TECHNOLOGY PHOTO; ILLUSTRATION BY ADOLPH E. BROTHMAN

When we started making truck tires,
most trucks had 2-horsepower engines.

Of course, cars only had 1-horsepower engines back then. But that didn't stop us from making America's first successful rubber carriage tire. The year was 1894.



America would soon develop another kind of horsepower, and cars and trucks would get bigger and faster and better. And so would Kelly-Springfield tires.

In fact, today we make more high-mileage after-market tires for cars, trucks, and tractors than anyone else in America.

But back in the 1890s, there was only horsepower. And tires made by Kelly-Springfield. We all had to start somewhere. And someone had to be first.

The Kelly-Springfield Tire Company



America's
Oldest
Tire Company
Quality since 1894





Jet-Packing Rocket

FAIRFAX, VA—*Pegasus*, the delta-winged rocket that launches from a high-flying aircraft, is about to get some extra horsepower. Engineers at Orbital Sciences Corp. are designing a *TurboPegasus* fea-

turing two drop-away jet engines.

The turbojets kick in as soon as the vehicle clears its mothership. *TurboPegasus* noses up at a 3.5° angle, and the air-breathing engines boost its speed

above Mach 4, its altitude to 90,000 ft.

There the jets and fuel-tank jettison, and the first rocket stage ignites. *TurboPegasus* then follows a classic S-shaped rocket trajectory to plant its payload in orbit.

The turbo configuration

Jet engines kick in as *TurboPegasus* begins 3.5° climb to 90,000 ft., lifted by its delta wing.

will more than double *Pegasus*'s lifting power—2250 pounds versus 1000 pounds for the stretched *Pegasus XL*. The first *TurboPegasus* could fly in 1995.

Collider's Supermole

WAXAHACHIE, TX—Now that the English Channel tunnel is completed, the world's premiere tunnel-boring project is the 54-mile racetrack course being carved out for the Superconducting Super Collider. Four huge mole machines are already chewing away soft rock 70 ft. below the surface.

Tunnelers decided to start off by tackling the worst geology—a tricky patch of shale through which the tunnel must pass. Because this rock crumbles when exposed to air, a tunnel-boring machine (TBM) must burrow as fast as possible, drilling away and lining its wake with pre-cast concrete sections before the shale deteriorates.

The job called for the Inchworm, a tunnel-boring machine custom-built by Robbins Corp. of Kent, Washington. The 250-ton machine is the first of its kind to operate continuously.



Typically the big moles lunge forward, propelled in part by elbowing off the sides of the tunnel with

gripper shoes, then they stop while the shoes are repositioned. By contrast, the Inchworm has two sets of shoes, which can grip and release the tunnel walls in a computer-coordinated rhythm, enabling it to tear through 150 ft. a day.

Mighty Inchworm bores continuously through rock and leaves concrete-lined Super Collider tunnel in its wake.



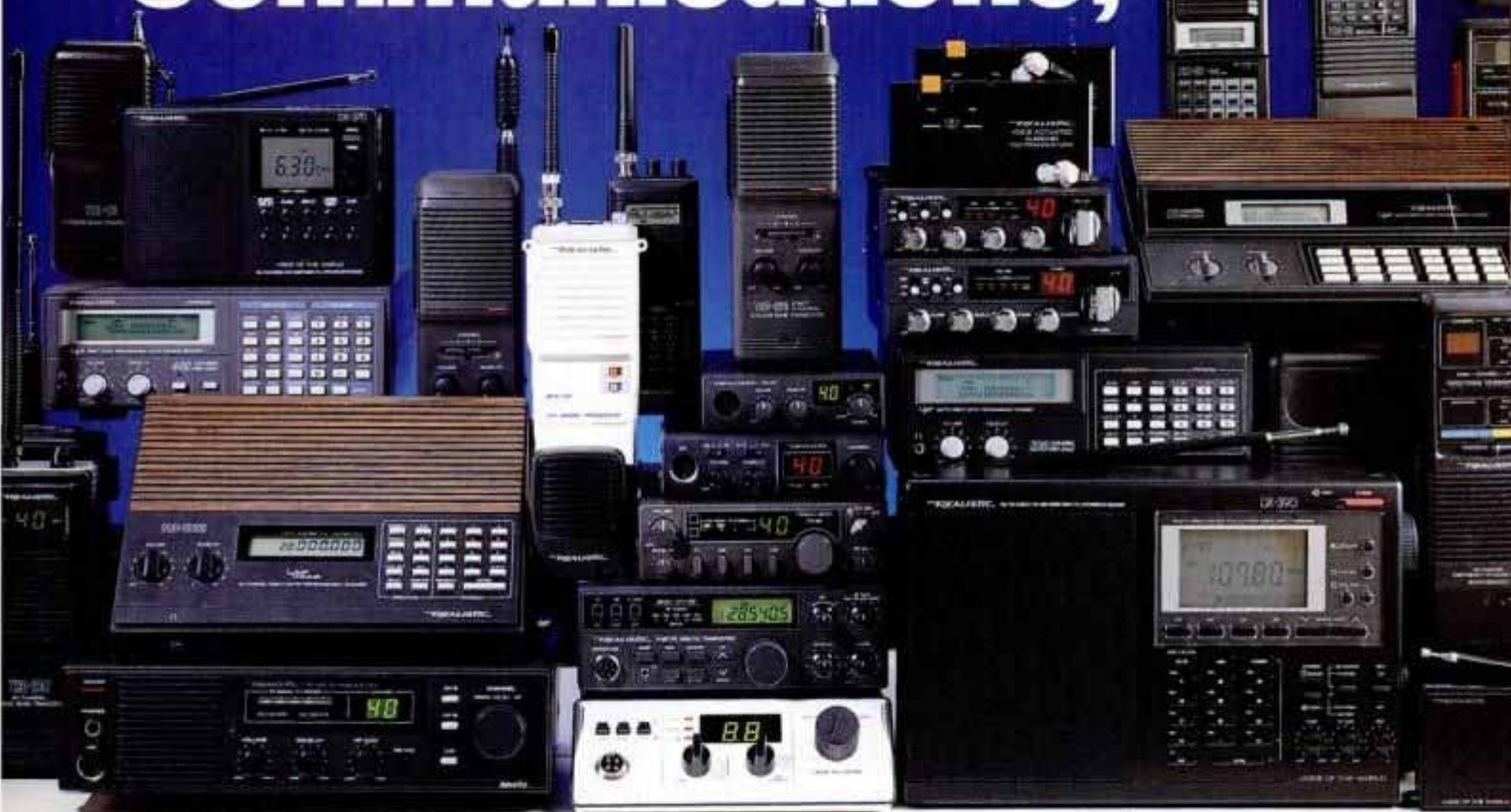
Charge Up That Bike

LONDON, ENGLAND—From the fertile mind of Sir Clive Sinclair comes the Zike electric bicycle. The NiCad batteries boost your pedaling for up to 3 hours. If you let the rare-earth magnet motor do all the work, it's more like an hour. Top speed is 15 mph. Regenerative brakes recharge the batteries when you decelerate. The British are already Ziking. Americans will get a second-generation version.



Aluminum-plastic frame chops Zike's weight down to 26 pounds.

When America thinks Communications,



America comes to Radio Shack

Our name says it all. We have over 50 specialty radios to keep you in touch and informed. Let our knowledgeable, friendly staff help you choose from CB and Ham 2-way radios . . . shortwave receivers to tune in world "hotspots" . . . business-band transceivers . . . scanners to monitor local action . . . and Weatheradio® receivers for 24-hour facts and forecasts. Come in and discover why 50 million satisfied customers shop our more than 6600 nationwide stores every year—we've been America's radio headquarters since 1921. *Nobody Compares!*

Radio Shack®
AMERICA'S
TECHNOLOGY
STORE™

Lumina's anti-lock brakes are so advanced, they can even help you avoid higher insurance premiums.

CHEVROLET LUMINA EURO SEDAN

These days, a lot of carmakers are asking you to pay a high price for technology. Chevy Lumina Euro, on the other hand, offers technology that could end up actually saving you.

Steer clear of trouble.

The heart of Lumina Euro's standard anti-lock braking system (ABS) is a computer that can sense when your wheels start to lose traction during braking. It then pumps the brakes up to 15 times per second. That's faster than even the most

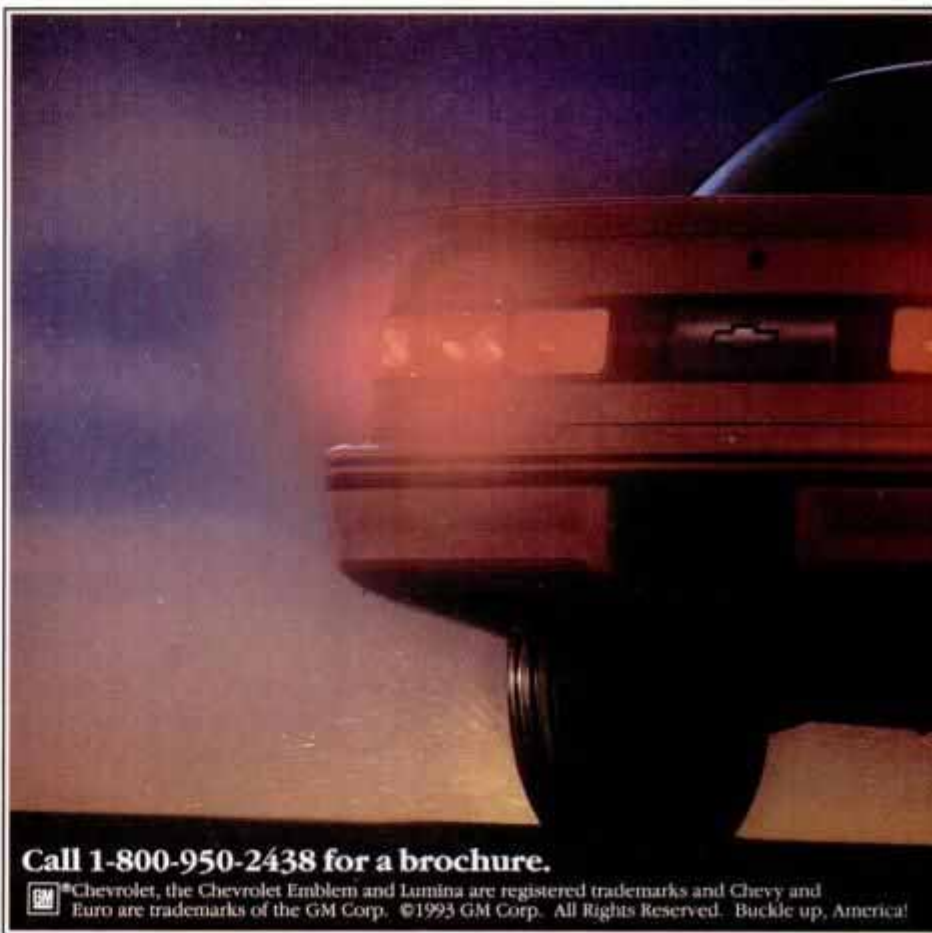


accomplished professional driver can.


ABS can help you steer and stop on wet or icy pavements, and maintain control to avoid obstacles while braking.

Get a handle on the situation.

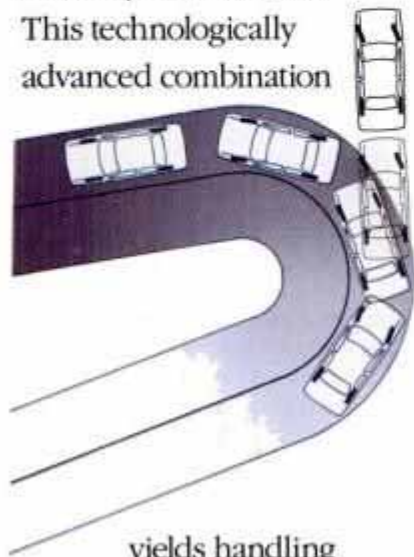
ABS is just one way Lumina Euro is engineered to give you greater driving control. The four-wheel, fully independent suspension



Call 1-800-950-2438 for a brochure.

 Chevrolet, the Chevrolet Emblem and Lumina are registered trademarks and Chevy and Euro are trademarks of the GM Corp. ©1993 GM Corp. All Rights Reserved. Buckle up, America!

is another. It's specially tuned to work in harmony with Lumina Euro's rigid unibody construction. This technologically advanced combination



yields handling to help you tame the most rambunctious country

road, the most treacherous city street.

Lumina Euro's ABS can also help keep your expenses under control.

When you buy a Chevy Lumina Euro with its standard anti-lock brakes, you may qualify for more favorable rates from your insurance company. But driving a car equipped with anti-lock brakes doesn't just help you steer clear of higher premiums.



Far more importantly, ABS can help you avoid an accident that could cost you more than just money. And that's the kind of rate reduction we'd really like to see. But then, what else would you expect from the Heartbeat of America?



**THE HEARTBEAT
OF AMERICA™**



Alchemy 2000: High-Tech Ice Makers

ATLANTA, GA—The cutting edge of synthetic-diamond research is sharper than ever, thanks to some newly polished manufacturing tricks.

A technique that has raised eyebrows lately comes from Penn State's



Tungsten-carbide filament heats methane and hydrogen in Oak Ridge diamond-making process.

Materials Research Laboratory. The unorthodox process takes place in a low-pressure reactor—but begins with a solid source of carbon. In conventional low-pressure diamond synthesis, the carbon comes from gaseous methane and re-emerges from the process as a thin film.

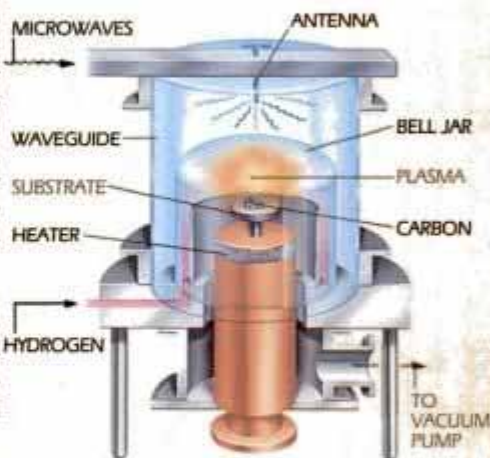
The Penn State approach mixes the solid carbon with a catalyst, such as nickel powder, which acts as a seedbed for the formation of diamond crystals. The reaction requires temperatures around 1800° F and the presence of hydrogen zapped into a plasma by microwaves.

Penn State materials

scientists claim their method can rearrange carbon atoms from any solid source—even peanut butter—into the highly ordered structure of diamond.

Furthermore, it can yield partial or total diamonds in a variety of sizes and shapes.

Meanwhile, conventional low-pressure diamond-film synthesis continues to yield impressive results. At Oak Ridge National Laboratories, for example, researchers have



Penn State method combines solid-state carbon source with low pressure and microwaves.

laid down diamond films a foot square and a millimeter thick. The technique promises widespread industrial applications.

Thrust And Parry

WEST PALM BEACH, FL—Pratt & Whitney's latest thrust-vectoring nozzle incorporates the ability to completely reverse thrust as well.

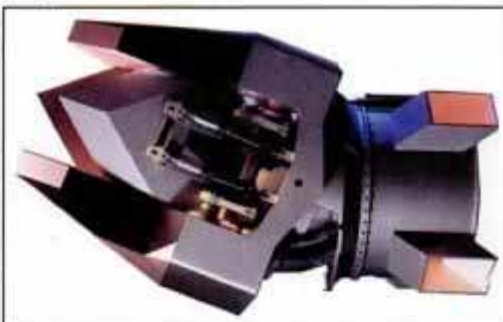
Developed for the next-generation Lockheed F-22 fighter's engine, the nozzle is built around a pair of eyelid-like doors, called

spherical convergent flaps. These can shut completely, redirecting exhaust flow through exit ports canted forward at a 45° angle.

Meanwhile, the entire rear part of the nozzle can swivel left and right 20°. Separate flaps can pitch the exhaust flow up and down 20°.

It's stealthy, too.

The nozzle sculpts the exhaust flow into an elusive



thin sheet with a much fainter infrared signature rather than the usual broad cylinder.

Pratt & Whitney will ground-test the nozzle on its Joint Technology Demonstrator Engine in 1994.

Model of spherical convergent-flap nozzle shows thrust-reversal exhaust ports.

Laser-Guided Robots

BELLEVILLE, MI—Factory robots tend to bog down if you ask them to pick an irregular object out of a random background. But a new 3D vision system is so effective that Ford Motor Co. has in-

stalled one in an exhaust-manifold factory.

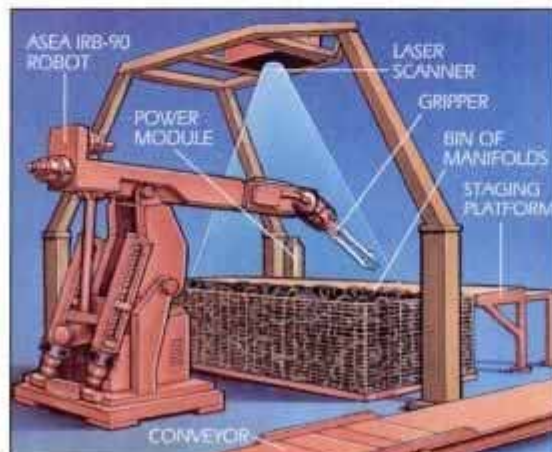
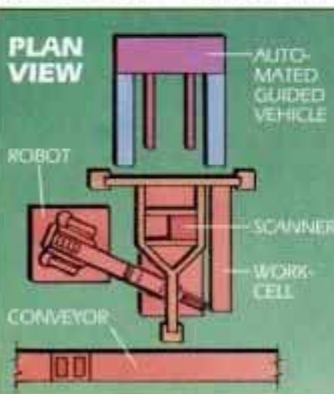
The Perception scanning-laser camera known as LASAR sweeps a modulated infrared beam across

a bin full of exhaust manifolds. Some of the beam bounces back to the camera, which measures the scene's reflectivity and how far the beam has shifted out of phase.

That phase shift reveals

how far away an object is, while the reflectivity provides a flat image. Combined, the data guides the robot's gripper to a manifold.

LASAR-sighted robots can seize four manifolds per minute.



Laser camera illuminates jumble of exhaust manifolds, sending 3D image information to bin-picker robot.

Good news for people on Cardizem[®] (diltiazem HCl)

“Cardizem CD Should Save You Money”

If you are taking Cardizem (diltiazem HCl) tablets or Cardizem[®] SR (diltiazem HCl) capsules, ask your doctor about **Cardizem CD**.

Cardizem CD should be more economical.*

Only your doctor can change your prescription. So ask your doctor if **Cardizem CD** is right for you.

For a FREE quarterly issue of *CardiSense*[®], a newsletter on healthy living, please call this toll-free number: 1-800-424-6911.

* Based on an equivalent daily dose using the average price Marion Merrell Dow charges wholesalers. Please remember, retail prices will vary.



CARDIZEM CD

(diltiazem HCl)

Please see additional important information on adjacent page.
©1993, Marion Merrell Dow Inc.



Brief Summary of Prescribing Information as of October 1992 (2)

CARDIZEM[®] CD
(diltiazem hydrochloride)
Capsules

Brief Summary of Prescribing Information as of April 1992

CARDIZEM[®] SR
(diltiazem hydrochloride)
Sustained Release Capsules

Brief Summary of Prescribing Information as of January 1991

CARDIZEM[®]
(diltiazem hydrochloride)
Tablets

CONTRAINDICATIONS

CARDIZEM is contraindicated in (1) patients with sick sinus syndrome except in the presence of a functioning ventricular pacemaker, (2) patients with second- or third-degree AV block except in the presence of a functioning ventricular pacemaker, (3) patients with hypotension (less than 90 mm Hg systolic), (4) patients who have demonstrated hypersensitivity to the drug, and (5) patients with acute myocardial infarction and pulmonary congestion documented by x-ray on admission.

WARNINGS

- Cardiac Conduction.** CARDIZEM prolongs AV node refractory periods without significantly prolonging sinus node recovery time, except in patients with sick sinus syndrome. This effect may rarely result in abnormally slow heart rates (particularly in patients with sick sinus syndrome) or second- or third-degree AV block (13 of 3,290 patients or 0.40%). Concomitant use of diltiazem with beta-blockers or digitalis may result in additive effects on cardiac conduction. A patient with Prinzmetal's angina developed periods of asystole (2 to 5 seconds) after a single dose of 60 mg of diltiazem.
- Congestive Heart Failure.** Although diltiazem has a negative inotropic effect in isolated animal tissue preparations, hemodynamic studies in humans with normal ventricular function have not shown a reduction in cardiac index nor consistent negative effects on contractility (dP/dt). An acute study of oral diltiazem in patients with impaired ventricular function (ejection fraction 24% ± 6%) showed improvement in indices of ventricular function without significant decrease in contractile function (dP/dt). Worsening of congestive heart failure has been reported in patients with preexisting impairment of ventricular function. Experience with the use of CARDIZEM (diltiazem hydrochloride) in combination with beta-blockers in patients with impaired ventricular function is limited. Caution should be exercised when using this combination.
- Hypotension.** Decreases in blood pressure associated with CARDIZEM therapy may occasionally result in symptomatic hypotension.
- Acute Hepatic Injury.** Mild elevations of transaminases with and without concomitant elevation in alkaline phosphatase and bilirubin have been observed in clinical studies. Such elevations were usually transient and frequently resolved even with continued diltiazem treatment. In rare instances, significant elevations in enzymes such as alkaline phosphatase, LDH, SGOT, SGPT, and other phenomena consistent with acute hepatic injury have been noted. These reactions tended to occur early after therapy initiation (1 to 8 weeks) and have been reversible upon discontinuation of drug therapy. The relationship to CARDIZEM is uncertain in some cases, but probable in some. (See PRECAUTIONS.)

PRECAUTIONS

General

CARDIZEM (diltiazem hydrochloride) is extensively metabolized by the liver and excreted by the kidneys and in bile. As with any drug given over prolonged periods, laboratory parameters of renal and hepatic function should be monitored at regular intervals. The drug should be used with caution in patients with impaired renal or hepatic function. In subacute and chronic dog and rat studies designed to produce toxicity, high doses of diltiazem were associated with hepatic damage. In special subacute hepatic studies, oral doses of 125 mg/kg and higher in rats were associated with histological changes in the liver which were reversible when the drug was discontinued. In dogs, doses of 20 mg/kg were also associated with hepatic changes; however, these changes were reversible with continued dosing. Dermatological events (see ADVERSE REACTIONS section) may be transient and may disappear despite continued use of CARDIZEM. However, skin eruptions progressing to erythema multiforme and/or exfoliative dermatitis have also been infrequently reported. Should a dermatologic reaction persist, the drug should be discontinued.

Drug Interactions

Due to the potential for additive effects, caution and careful titration are warranted in patients receiving CARDIZEM concomitantly with other agents known to affect cardiac contractility and/or conduction. (See WARNINGS.) Pharmacologic studies indicate that there may be additive effects in prolonging AV conduction when using beta-blockers or digitalis concomitantly with CARDIZEM. (See WARNINGS.)

As with all drugs, care should be exercised when treating patients with multiple medications. CARDIZEM undergoes biotransformation by cytochrome P-450 mixed function oxidase. Coadministration of CARDIZEM with other agents which follow the same route of biotransformation may result in the competitive inhibition of metabolism. Doses of similarly metabolized drugs such as cyclosporin, particularly those of low therapeutic ratio or in patients with renal and/or hepatic impairment, may require adjustment when starting or stopping concomitantly administered CARDIZEM to maintain optimum therapeutic blood levels.

Beta-blockers: Controlled and uncontrolled domestic studies suggest that concomitant use of CARDIZEM and beta-blockers is usually well tolerated, but available data are not sufficient to predict the effects of concomitant treatment in patients with left ventricular dysfunction or cardiac conduction abnormalities.

Administration of CARDIZEM (diltiazem hydrochloride) concomitantly with propranolol in five normal volunteers resulted in increased propranolol levels in all subjects and bioavailability of propranolol was increased approximately 50%. If combination therapy is initiated or withdrawn in conjunction with propranolol, an adjustment in the propranolol dose may be warranted. (See WARNINGS.)

Cimetidine: A study in six healthy volunteers has shown a significant increase in peak diltiazem plasma levels (58%) and area-under-the-curve (53%) after a 1-week course of cimetidine at 1,200 mg per day and a single dose of diltiazem 60 mg. Ranitidine produced smaller, nonsignificant increases. The effect may be mediated by cimetidine's known inhibition of hepatic cytochrome P-450, the enzyme system responsible for the first-pass metabolism of diltiazem. Patients currently receiving diltiazem therapy should be carefully monitored for a change in pharmacological effect when initiating and discontinuing therapy with cimetidine. An adjustment in the diltiazem dose may be warranted.

Digoxin: Administration of CARDIZEM with digoxin in 24 healthy male subjects increased plasma digoxin concentrations approximately 20%. Another investigator found no increase in digoxin levels in 12 patients with coronary artery disease. Since there have been conflicting results regarding the effect of digoxin levels, it is recommended that digoxin levels be monitored when initiating, adjusting, and discontinuing CARDIZEM therapy to avoid possible over- or under-digitalization. (See WARNINGS.)

Anesthetics: The depression of cardiac contractility, conductivity, and automaticity as well as the vasodilation associated with anesthetics may be potentiated by calcium channel blockers. When used concomitantly, anesthetics and calcium blockers should be titrated carefully.

Carcinogenesis, Mutagenesis, Impairment of Fertility

A 24-month study in rats at oral dosage levels of up to 100 mg/kg/day, and a 21-month study in mice at oral dosage levels of up to 30 mg/kg/day showed no evidence of carcinogenicity. There was also no mutagenic response in vitro or in vivo in mammalian cell assays or in vitro in bacteria. No evidence of impaired fertility was observed in a study performed in male and female rats at oral dosages of up to 100 mg/kg/day.

Pregnancy

Category C. Reproduction studies have been conducted in mice, rats, and rabbits. Administration of doses ranging from five to ten times greater (on a mg/kg basis) than the daily recommended therapeutic dose has resulted in embryo and fetal lethality. These doses, in some studies, have been reported to cause skeletal abnormalities. In the perinatal/postnatal studies, there was an increased incidence of stillbirths at doses of 20 times the human dose or greater.

There are no well-controlled studies in pregnant women; therefore, use CARDIZEM in pregnant women only if the potential benefit justifies the potential risk to the fetus.

Nursing Mothers

Diltiazem is excreted in human milk. One report suggests that concentrations in breast milk may approximate serum levels. If use of CARDIZEM is deemed essential, an alternative method of infant feeding should be instituted.

Pediatric Use

Safety and effectiveness in children have not been established.

ADVERSE REACTIONS

Serious adverse reactions have been rare in studies carried out to date, but it should be recognized that patients with impaired ventricular function and cardiac conduction abnormalities have usually been excluded from these studies.

In domestic placebo-controlled angina trials, the incidence of adverse reactions reported during CARDIZEM therapy was not greater than that reported during placebo therapy.

The adverse events described below represent events observed in clinical studies of hypertensive patients receiving either CARDIZEM Tablets or CARDIZEM SR Capsules as well as experiences observed in studies of angina and during marketing. The most common events in hypertension studies are shown in a table with rates in placebo patients shown for comparison. Less common events are listed by body system; these include any adverse reactions seen in angina studies that were not observed in hypertension studies. In all hypertensive patients taking CARDIZEM Tablets or CARDIZEM SR Capsules studied (over 900), the most common adverse events were edema (9%), headache (8%), dizziness (6%), asthenia (5%), sinus bradycardia (3%), flushing (3%), and first-degree AV block (3%). Only edema and perhaps bradycardia and dizziness were dose related.

| Adverse | Diltiazem N = 315 # pts (%) | Placebo N = 211 # pts (%) |
|------------------------|-----------------------------------|---------------------------------|
| Headache | 38 (12%) | 17 (8%) |
| AV Block First Degree | 24 (7.5%) | 4 (1.9%) |
| Dizziness | 22 (7%) | 6 (2.8%) |
| Edema | 19 (6%) | 2 (0.9%) |
| Bradycardia | 19 (6%) | 3 (1.4%) |
| ECG Abnormality | 13 (4.1%) | 3 (1.4%) |
| Asthenia | 10 (3.2%) | 1 (0.5%) |
| Constipation | 5 (1.6%) | 2 (0.9%) |
| Dyspepsia | 4 (1.3%) | 1 (0.5%) |
| Nausea | 4 (1.3%) | 2 (0.9%) |
| Palpitations | 4 (1.3%) | 2 (0.9%) |
| Polyuria | 4 (1.3%) | 2 (0.9%) |
| Somnolence | 4 (1.3%) | — |
| AK Plus Increase | 3 (1%) | 1 (0.5%) |
| Hypotension | 3 (1%) | 1 (0.5%) |
| Insomnia | 3 (1%) | 1 (0.5%) |
| Rash | 3 (1%) | 1 (0.5%) |
| AV Block Second Degree | 2 (0.6%) | — |

The following table presents the most common adverse reactions reported in placebo-controlled angina and hypertension trials in patients receiving CARDIZEM CD up to 360 mg with rates in placebo patients shown for comparison.

| Adverse Reaction | CARDIZEM CD N = 607 | Placebo N = 301 |
|-----------------------|------------------------|--------------------|
| Headache | 5.4% | 5.0% |
| Dizziness | 3.0% | 3.0% |
| Bradycardia | 3.3% | 1.3% |
| AV Block First Degree | 3.3% | 0.0% |
| Edema | 2.6% | 1.3% |
| ECG Abnormality | 1.6% | 2.3% |
| Asthenia | 1.8% | 1.7% |

In clinical trials of CARDIZEM CD Capsules, CARDIZEM Tablets, and CARDIZEM SR Capsules involving over 3200 patients, the most common events (i.e. greater than 1%) were edema (4.6%), headache (4.6%), dizziness (3.5%), asthenia (2.6%), first-degree AV block (2.4%), bradycardia (1.7%), flushing (1.4%), nausea (1.4%), and rash (1.2%). In addition, the following events were reported infrequently (less than 1%) in angina or hypertension trials:

Cardiovascular: Angina, arrhythmia, AV block (second- or third-degree), bundle branch block, congestive heart failure, ECG abnormalities, hypotension, palpitations, syncope, tachycardia, ventricular extrasystoles.

Nervous System: Abnormal dreams, amnesia, depression, gait abnormality, hallucinations, insomnia, nervousness, paresthesia, personality change, somnolence, tremor, tic.

Gastrointestinal: Anorexia, constipation, diarrhea, dry mouth, dysgeusia, dyspepsia, mild elevations of SGOT, SGPT, LDH, and alkaline phosphatase (see hepatic warnings), thirst, vomiting, weight increase.

Dermatological: Petechiae, photosensitivity, pruritus, urticaria.

Other: Amblyopia, CPK increase, dyspnea, epistaxis, eye irritation, hyperglycemia, hypernatremia, impotence, muscle cramps, nasal congestion, nocturia, osteoarthritis, pain, polyuria, sexual difficulties.

The following postmarketing events have been reported infrequently in patients receiving CARDIZEM: alopecia, erythema multiforme, exfoliative dermatitis, extrapyramidal symptoms, gingival hyperplasia, hemolytic anemia, increased bleeding time, leukopenia, purpura, retinopathy, and thrombocytopenia. In addition, events such as myocardial infarction have been observed which are not readily distinguishable from the natural history of the disease in these patients. A number of well-documented cases of generalized rash, characterized as leukocytoclastic vasculitis, have been reported. However, a definitive cause and effect relationship between these events and CARDIZEM therapy is yet to be established.

CARDIZEM[®] CD
Prescribing Information as of October 1992 (2)

CARDIZEM[®] SR
Prescribing Information as of April 1992

CARDIZEM[®]
Prescribing Information as of January 1991



circle 19/04/91

PM HOTLINES

COMMUNICATE WITH US

We're trying our best to make it easier for you to communicate with us. Here are four ways you can do it.

LETTERS

Your written letters are always welcome. If we think your letter would be interesting to other readers, we might even print it in our Letters column (unless you request that it not be printed). Our editors are listed by department on the masthead printed in the front of the magazine next to Editor's Notes. Our address is 224 W. 57th Street, New York, NY 10019.

FAX MACHINE

You can fax written mail to us if you have access to a fax machine. Our fax number is (212) 586-5562, and is available 24 hours a day.

ELECTRONIC MAIL

You can call the PM computer any day between 6 pm and 8 am (only) Eastern time. The number is (212) 582-8369. Once you're on line, you can leave messages for specific editors, or direct inquiries and comments to a specific department. The department bulletin board also allows you to share your thoughts with other readers who call in.

New users get an identification number and password that allow you to access the system. Simply set your communications software to 8 bits, no parity and one stop bit (8-N-1), and set the baud at 300 or 1200. Please remember that we are not a professionally staffed, fully operational bulletin board. We're simply trying to make it easier for you to communicate with us. So please bear with us if it takes awhile to answer your message.

READER SERVICE BUREAU

Our Reader Service Bureau is operational five days a week during regular business hours. The phone number is (212) 649-3127. Please call our Reader Service Bureau, *not our editors*, for information on back issues, reprints of articles, subscription inquiries and so on. It will save us all time.

HOTLINE PHONE NUMBERS

Unfortunately, our Hotline Phone Service is temporarily discontinued.

CARS OF THE FUTURE— HERE NOW!

Dream machines with a difference: Your next car—or truck—could very well be in today's crop of concepts.

BY JIM DUNNE, Detroit Editor

• You catch different kinds of cars at an auto show. Mostly, you see production models you can buy at the dealer right now. For a look at the deep future, you see dream vehicles with far-out shapes. They inspire the imagination but are impractical for today's roads. A third group consists of high-visibility concept vehicles. They are exciting, and you might see them in dealer showrooms in the next couple of years.

Concept cars attract the most notice among automotive insiders—folks who design, build or write about cars. The insiders know that concepts are on trial at auto shows. Auto executives check the reaction of showgoers to new designs as a guide in making production decisions. A lukewarm response could crash a whole multimillion-dollar project. The big auto shows like Detroit, New York, Los Angeles and Chicago are the most important. And because lifestyles differ, public reaction in Los Angeles may be different from that in eastern cities. Reaction in the press also influences Detroit's decisions. If the vehicle is a hit in the shows—and with the car magazines—chances are you will see its features quickly copied in production.

CHRYSLER THUNDERBOLT

Look back to the year 1941 and you will find another show car with the Thunderbolt nameplate. That was a Chrysler product too. Today's Thunderbolt is just as dramatic in appearance. More importantly, the new Thunderbolt is designed for production now—with a few conditions. Its 4.0-liter 270-horsepower V8 engine is not in Chrysler's immediate plans. The rear-drive chassis is unique, not a knockoff from current sedans.

FUTURE CARS



DODGE VIPER GTS

GTS is the civilized version of the dramatic Dodge performance 2-seat roadster—civilized in driver and passenger comforts. The plastic hardtop and roll-up windows are just what driving in the colder, wetter climates demands. Still, the GTS looks like a concept car that could go into production within a year.



PHOTO BY MIKE GASPMI

FORD MUSTANG MACH III

Mach III is the inspiration for the Mustang of the late '90s. Among the features that must go are its 500-hp supercharged V8 and carbon-fiber body panels. Future Mustangs will have cat-eye headlights, scooped-out side body panels and an open grille around the galloping Mustang.



PORSCHE BOXSTER

The sub-\$40,000 Miata-like convertible—called "best in show" by one auto-buff magazine—jumps Porsche into the future with a "doable now" design. Its midship engine chassis is a no-compromise blueprint of the future. Inside, the instruments are housed in a single gold gauge pack of startling shapes. Outside, the headlights are grouped together with washers, foglights and turn signals inside an eccentric lens.



PHOTO BY G PHOTO

TOYOTA AXV-III

A new lean-burn engine with continuous valve timing is used to improve fuel economy and reduce NO_x emissions. Outer body panels are made of recyclable aluminum.



CHEVROLET IMPALA SS

If the enthusiastic reactions of showgoers to this customized Caprice mean anything, you'll see the Impala SS concept car in showrooms soon. Besides the custom exterior, you'll find buckets inside and an LT1 Corvette 350 under the hood.

PLYMOUTH PROWLER

A 3.5-liter 240-horsepower V6 engine drives through a rear-mounted 4-speed transaxle that imparts balance and traction. You may think "dream car," but Prowler is designed to meet all current safety regulations.



JEEP ECCO

Ecco as in ecology is the theme as well as the name. Its aluminum and plastic chassis and body are almost totally recyclable. An 85-hp 1.5-liter 3-cylinder 2-cycle engine just ahead of the rear wheels drives all four of ECCO's 16-in. wheels.



GMC SANTA FE

GMC's idea of what a "Western Theme" 1/2-ton full-size pickup might look like. The one-piece fiberglass tonneau cover is hinged for quick access. Novel side mirrors have built-in turn signals. You need no spare or jack with its Goodyear extended mobility tires.



ASC SATURN COUPE + ROADSTER CONVERTIBLE

A hardtop cover over the driver and passenger folds down with the softtop and forms a custom cap. With the top up, the vehicle seats four. Put the top down for fresh-air driving and you seat only a driver and passenger.



ASC FORD RANGER OPEN-AIR FLARE

Wraparound glass in this extended cab goes all the way to the backlite. And the backlite has a vent that pivots open for added airflow. This ASC concept has a complete ground-effects package, including new front and rear fascias.

CHEVROLET BASS SPORT

This revised Suburban is equipped to tow boat trailers weighing up to 10,000 pounds. The Bass Sport has a built-in tackle storage box, truck-top storage carrier, ground effects on the body and a custom paint scheme.



FUTURE CARS



OLDSMOBILE AURORA

Skip the concept stage here. Olds will produce this \$32,000 sport sedan as a 1995 model. Aurora is the flagship Oldsmobile of the future, and, according to reports, a car that will eventually replace the Ninety Eight series. Under the hood is a special 4.1-liter version of GM's multivalve aluminum Northstar V8.



HYUNDAI HCD-II

Exterior styling is dramatic, as you'd expect an attention-getter to be. And the interior is unique—unlike anything else on the show floor. Built on a production-car chassis, and styled in California, the HCD-II has a 2.0-liter 150-hp 4-cylinder engine, front-wheel drive—and seating for three.



ASC CADILLAC SEVILLE COUPE

What would Seville look like as a 2-door? The concept, by one of America's premier factory customizers, includes "midnight emerald" paint and chromed alloy factory wheels. The other side still has four doors.



HYUNDAI SUNCOUPE

A convertible version of Hyundai's little Scoupe model was unveiled earlier this year. The variant probably will be produced by Hyundai and offered for sale as early as 1995.



FORD JUKEBOX

Flashing neon lights, a giant 2500-watt stereo system and a dance floor in the cargo bed put your own MTV on the road.



VOLVO ECC

The ECC—Environmental Concept Car—is a hybrid electric compromise aimed at California's impending zero-emissions regulations. An on-board gas-turbine generator gives the car about four times the range of conventional electrics.



MAZDA CUBIST

Turn some young artists loose on a small sports-car body—the MX-3—and you get Mazda's ArtCar Competition. The winner, "Cubist Car," was designed by art student Maria Casalena, and finished under the direction of Mazda designers in California.



PHOTO BY G. PHOTO

DODGE RAM SPORT V10

Look for this muscular option to show up on the production Dodge Ram T-300 pickup line next fall. The show car is really the vehicle that Dodge will build as a 1994 model. Dodge says the extended hood is needed to house a new V10 gasoline engine that's planned for the Ram. But you can get other engines, including the Cummins turbocharged diesel, as well.



PHOTO BY G. PHOTO

BUGATTI EB 110

Bugatti unveiled its first new car in 40 years at auto shows last year. The Italian automaker plans to sell about 150 samples each year. The chassis is made of carbon-fiber material. Performance details include all-wheel drive and a V12 of 500-plus horsepower. Price: "Around \$1 million." A sedan, the EB 112, is also in the works.



PHOTO BY G. PHOTO

FORD GHIA FOCUS

Ford of Europe sent us this concept based on a shortened 4-wheel-drive Escort RS Cosworth chassis. Eighteen-inch wheels sit under the carbon-fiber (for strength and light weight) exterior body panels.

MERCURY VILLAGER NAUTICA

Headlights of the future reflect like mirrors when the lights are off. Turn the lights on and you get full illumination. Nautica's rearview mirrors give the driver a check of safety lights such as brakes, turn signals, backup lights and emergency flashers.

PHOTO BY G. PHOTO



CHEVROLET HIGHLANDER

Take a close look at the basic lines and you see Chevy's 1994 S-10 pickup styling. Or, inspect the sliding "third door" that opens up the rear of the extended cab. That design has competitors alerted to what might be appealing to compact-truck buyers of the near future. You can also power the rear window down and fold the lower panel to the cab floor. That opens a wide passage directly from the cab to the cargo deck.

FUTURE CARS



PHOTO BY JIM FREYER

TOYOTA SIDEWINDER

First displayed at the Chicago Auto Show earlier this year, this one-of-a-kind idea vehicle features 4-wheel drive and 16-in. tires. Toyota makes no bones about its purpose: You can look for a production version of the Sidewinder in showrooms within the next two years.



PONTIAC GRAND PRIX GTP

Pontiac almost snuck this one by us. Look closely and you will notice a different shape to the grille opening and a heavier appearance in all of the cladding below the beltline. Pontiac insiders tell us that we'll see this same styling on the production '94 Grand Prix.



ASC CHEVROLET CORVETTE SPYDER

Colorful is an apt way to describe this product of GM Advanced Engineering, ASC Inc. and the Corvette assembly plant. Eighteen-inch aluminum wheels expose polished brake calipers. Inside, the console is body colored, while safety belts contrast sharply in color with the seat cushions.



PONTIAC GRAND AM GT

Pontiac changed the grille and lower body cladding and painted the exterior a pumpkin-orange. The result is a peek at what Pontiac has planned for 1994 model changes. "Everything you see below the beltline will be on the 1994 car," reports one Pontiac executive. Under the hood is a 3.4-liter overhead-valve V6 engine that develops 205 horsepower.

FORD SPLASH

You won't have long to wait for this concept. Ford's Ranger Splash is already in production. Ford has Splash's buyers picked out—young folks under 30 years old, 40% women and about one-third college graduates. **FM**



INVISIBLE RAYS, HIDDEN HAZARDS

Do power lines, cellular phones, video monitors and other electronic devices emit harmful radiation? Here's the evidence.

● Man's dread of the unseen once evoked notions of the supernatural. In our era of scientific and material progress, the psyche is preoccupied with natural phenomena that are no more apparent and no less fearsome. Call them invisible rays—bundles of energy traveling on waves too fast or too vast for the eye to see.

These riders-on-the-storm are not the death-rays of science-fiction-past, though science still ponders their potential for menace. Ironically, the new subject of our apprehension is the very electrification that has tamed night's terrors over the past century. Its unseen force is emitted by devices as commonplace as the hairdryer and electric shaver. Other sources are as ubiquitous as household wiring, television sets and pocket-size cellular phones.

BY STEPHEN A. BOOTH,
Contributing Editor

It was the latter that pushed what's usually out-of-sight and out-of-mind to the forefront of public attention. Headlines and soundbites abounded this winter when a Florida man charged that his wife had died from brain cancer after extensive use of a portable cellular telephone. Although cellular phones work on radio frequencies in the microwave region, the incident renewed concerns about all forms of electromagnetic radiation—especially the fields generated at the lower end of the spectrum by overhead power lines.

The fright stuff

Fascination and fear, attraction and repulsion: These opposites describe man's fairly recent relationship with electromagnetism and are perfect metaphors for

INVISIBLE RAYS

that push-pull engine of progress, the ghost in the machine. Fact is, electricity is present at every level of life. It's no coincidence that the word cell is used in connection with both electrical batteries and units of living tissue, as the latter can generate a

small voltage. (More exactly, the cell's membrane can maintain a voltage difference between its inside and outside.)

Electric motors in appliances produce magnetism as a byproduct of their operation. Oscillating compo-

nents in communications and video gear act much like electric motors in terms of the electromagnetic fields they generate.

Electromagnetic radiation can be visualized as a pattern of waves exerted by an electric field and a complementary magnetic field. The magnetic field is caused by the motion of the electric field, and they vibrate perpendicular to one another and to the direction of travel. Electromagnetic waves travel at the speed of light, some 186,000 miles per second, but the lengths of the waves differ according to their frequency—the number of complete cycles the waves make in 1 second.

Frequency is a key concept in electromagnetic radiation. It's expressed as cycles per second (cps) or simply Hertz (Hz). The range of frequencies making up the electromagnetic spectrum is broad, from DC to light and well beyond. Along the way are the familiar wavelengths that carry radio, TV and communications. The longer the wave, the lower its frequency, and vice versa.








For example, household electricity has a low frequency of 60 cps. The waves carrying AM radio broadcasts begin at around 500,000 cps—a higher frequency but one with waves still measuring a long 600 meters, or $\frac{3}{8}$ ths of a mile. FM radio, located between TV channels 6 and 7, operates in a range from 88-million to 108-million cps. Cellular telephones transmit at 840- to 880-million cps. This is the low end of the microwave region. Microwave ovens typically cook at a brisker rate of 2.8-billion cps. Satellite microwave communications operate at even higher "giga-hertz" frequencies.

After the microwave region of the electromagnetic spectrum come the frequencies of light—infrared, visible and ultraviolet. And beyond these reside the invisible rays science long has recognized as deadly: X-rays, gamma rays, nuclear and other forms of so-called ionizing radiation, including the mysterious cosmic rays that bombard Earth's atmosphere from uncharted regions of space.

Ionizing radiation is hazardous because these incredibly high-frequency waves have sufficient energy to alter the structure of atoms and molecules, thereby causing mutation. The lower frequencies, called non-ionizing radiation, have been thought to produce only enough energy to agitate molecules or heat them.

Now science isn't so sure. The recent worries about cellular telephones and electrical power lines concern electromagnetic fields (EMFs) from

Charting EMF Exposures

| TYPE | FREQUENCY | COMMENTS |
|---|------------------------|---|
| Electricity  | 60 cps | Field strength below a high-voltage overhead power line can hit 100 to 200 milligauss. Readings on a city street corner can hit 100 from underground cables. AC wiring in a home registers 1 to 2m/G. |
| Hairdryer/ Shaver   | 60 cps | These will vary by model and make, but can measure 100 milligauss at their point of use. For most people, though, exposure is brief. Until more is known, keep it that way. If you must blow-dry your hair, start with a towel. |
| Electric Blanket  | 60 cps | Used to be like sleeping under a power line. Wiring on newer blankets cancels most EMFs—and is so advertised. It may be better to just warm the bed and not the body. That is, turn the blanket off before you tune out. This is especially advised for kids or expectant moms. Ditto for heating pads. |
| TV/ Computers  | 60/20,000 cps | For home TV, view from no closer than 4 to 5 ft. For computer VDTs, sit as far from the screen as practical, but remember—as with TV—the radiation is emitted from the rear and sides. So, as in any office, watch your back. |
| Cellular Phones  | 840-million cps | Only the pocket-size and hand-held portables are considered risky because of the electromagnetic field's proximity to your head. The cellular phone industry believes any fears are unwarranted because emissions are very low. |
| Microwave Ovens  | 2.8-billion cps | Like TV, emissions are from the rear. And don't confuse microwave leakage with EMF radiation, says Frank Barr, president of the lab that conducts PM testing. Today's ovens only leak microwaves if their seals have been broken by dropping, fire or other abuse. The grub will get you first. |

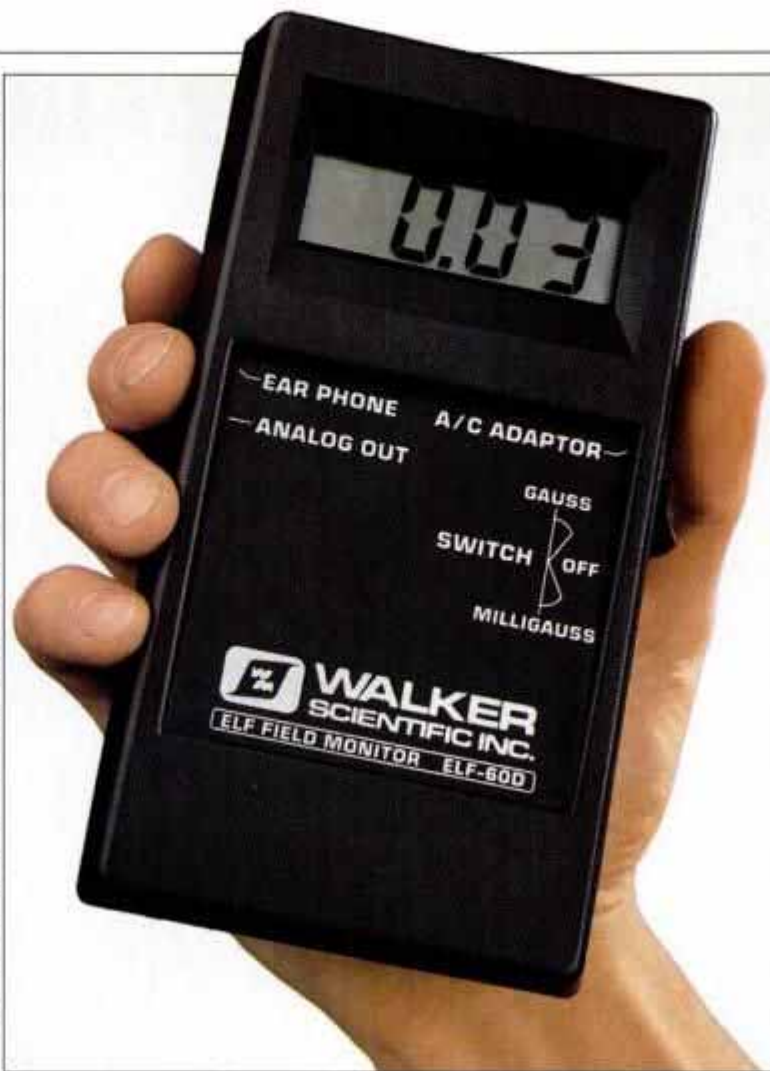
relatively low-frequency sources—so low that the EMFs from electrical lines and household appliances are designated extra-low frequency (ELF), while TVs and video displays rate at the very-low frequency (VLF) designation. In terms of numbers, ELF measures from 5 to 2000 cps, while VLF measures from 2000 to 400,000 cps. There is no conclusive evidence that these EMFs cause cancer or other cellular mutation—or that they don't. But because low-frequency EMF is so pervasive in the daily environment, it's getting a closer look—from government, private industry and academia.

If you take a magnetic field meter around the home, you'll find evidence of EMF radiation everywhere. Typically, these meters read out in gauss and milligauss—which are measures of intensity. Readings of 1 or 2 milligauss found in the average home can be attributed to house-

hold wiring. The ELF field directly under a high-voltage transmission line can register 100 to 200 milligauss. Dr. Louis Slesin, editor of *Microwave News* who has been monitoring the EMF issue for 13 years, recently gave a dramatic twist to a TV news spot when he measured a 15-milligauss field from in-wall wiring at the head of a bed in a New York City apartment.

Slesin's tour around that residence turned up readings of 100 milligauss from an electric shaver and a hair blowdryer, 25 clicks from an electric stove and 10 from the dial of an electric clock. A visit to an office found 10 milligauss at the screen of a computer's video display terminal—and 200 milligauss around the VDT's sides and rear. But before you spend \$200 to \$1000 on a meter, understand that there are no standards on what levels of radiation or lengths of exposure might constitute a danger—and certainly no agreement.

For example, a widely quoted Swedish study of 500,000 people living near high-voltage power lines found four times the normal incidence of childhood leukemia where there was long-term exposure to 3



Magnetic field meters measure the intensity of a field in either gauss or milligauss. What constitutes a dangerous exposure is debatable.

milligauss of ELF radiation. Double the normal childhood cancer rate was found where the level was even 1 milligauss. Studies in the United States have established no such connection so far, although numerous incidents of cancer are reported in the proximity of power lines, especially among children.

Research into electrical appliances and microwave devices is similarly inconclusive. The Environmental Protection Agency goes so far as to call weak electromagnetic fields "a possible, but not proven" cause of cancer. Meanwhile, research continues. Extra-low and very-low frequency EMFs might not have the punch to blow an atom of tissue off track, but scientists are looking into more subtle relationships between waves and matter—centering on the cell membrane.

• **Utilities**—For nearly two years now, the electric utility industry has been studying the effects of power lines and household wiring in a model village built just for this purpose in Massachusetts. More recently, in February, the Attorney General in New York ordered the state's electricity providers to begin gathering

data on EMF levels near schools.

• **Video**—Over the generation and a half that it's been around, the boob tube has been suspected of undermining the nation's welfare, but TV programming probably will destroy intelligent life long before the scary-sounding "cathode ray" does. In the past decade, 8 hours of daily exposure to video display terminals (VDT) on the job has become a greater concern than recreational viewing in the home. As a result, most key marketers of VDTs—IBM, Panasonic and the like—now meet a strict Swedish standard for ELF and VHF radiation.

This double-threat stems from the fact that TVs and VDTs emit dual radiation. There's the 60-cps variety from power transformers, and the higher (15,000-plus cps) frequency radiation attributable to the deflection coils in the rear-mounted yoke of the electron gun. (For the record, LCD screens don't radiate.)

"Contrary to popular belief, the exposure to radiation isn't from the front of a TV, from the viewing screen, it's from the rear," Dr. Slesin tells PM. Ditto for computer VDTs—which means the worker seated behind or beside a VDT is subject to more exposure than the person working at the screen.

Dr. Slesin points out that the tough guidelines issued by Sweden's National Board for Measurement and Testing measure ELF and VLF radiation at 48 points around the front, sides and rear of a VDT and from varying distances. The guidelines for ELF and VLF magnetic fields are 2.5 and 0.25 milligauss, respectively, at 20 in. all around the VDT. For electric fields, the ELF radiation guideline is 25 volts per meter at 20 in. from the screen. The same is true for VLF radiation, but at 20 in. from all sides.

• **Communications**—The nation's communications industry is putting its money where its mouth is. Heavyweights such as Motorola, McCaw and AT&T say that more than 40

(Please turn to page 120)

Some People Have Better Things

Some people are out
there exploring
mountains, deserts,
coastlines and small
New England towns.

While others settle for
a life of soft chairs, home
theater, surround- sound
and year-round
climate control.



For a free product brochure call 1-800-950-2438.

*Based on full-line truck company registration data 1982-1991. Chevrolet, the Chevrolet Emblem and Blazer are registered trademarks and Chevy is a trademark of the GM Corp. ©1993 GM Corp. All Rights Reserved. Buckle up, America!

To Do Than Read This Magazine.

Fortunately, the big,
incredibly tough
V8-powered Blazer gives
you all the same luxuries.

Plus a show no home
theater can match.

It's called The World.

Brought to you
by Chevrolet, the
most dependable,
longest-lasting trucks
on the road.*

**Chevy Blazer
LIKE A ROCK**





JEEP GRAND CHEROKEE LAREDO

LONG-TERM

We upgrade our fleet with some daily drivers.

● As the rest of our 1993 long-term test fleet settles in to its varied routine, we welcome a new minivan to the family.

Mercury Villager LS

Introduced in mid-1992, the Villager is Mercury's first-ever van. Overall dimensions and interior room are nearly identical to the segment-leading Chrysler minivans. And of course they are identical to the Nissan Quest, which is essentially the same vehicle built on the same assembly line.

Villager's appeal is its upscale trim and equipment. A 151-hp 3.0-liter Nissan V6 engine and 4-speed automatic transmission are standard, as is a driver's airbag.

Our Villager is equipped with big, comfortable seats that perch passengers a generous 13 in. above the flat floor. We ordered leather seating for seven, set in a 2+2+3 arrangement. You can fold, slide or remove the rear seats in several groupings to get more load space.

Standard features on the LS include cruise control, power windows and locks, a leather-wrapped steer-

ing wheel, a luggage rack and front air conditioning. We also ordered a power-adjustable driver's seat, plus a/c and remote sound system controls for rear-seat passengers.

Our impressions so far are favorable. Close your eyes (briefly, please) and you can believe you're in a roomy sedan. From the driver's seat, the van is definitely carlike. The engine is responsive, the transmission smooth, the steering precise. It's easy to conclude that the Villager ranks with the best of the minivans in driver comfort and ease of control.

Fuel economy improves steadily. We recorded 15.5 mpg with the first tankful of gas. That jumped all the way to 23.7 mpg by the fourth refill. Overall economy to date averages about 20 mpg.

The price of the Villager LS is \$21,798. With its extra equipment, plus destination charges, our Villager stickered out at \$25,252.

So far, no glitches or problems have shown up in the logbook. This van seems to measure up well against the high standards and traits of the Chrysler minivans. —Jim Dunne

Jeep Grand Cherokee Laredo

When Associate Auto Editor Mike Allen handed over the Jeep Grand Cherokee, it had accumulated about 2500 miles. The odometer is now approaching 6500 miles and we feel like saying (as in the ads), "There's only one Jeep." We think the Grand Cherokee is now the benchmark for all the compact sport/utilities.

The 318 V8 engine makes all the difference. The Grand Cherokee is the only vehicle in its class available with a V8, and it truly sets this vehicle apart. No matter what anyone says, nothing beats the torque of a V8 engine, and this Jeep proves it again. Move your right foot and something happens. No sluggish feeling. No feeling of being underpowered.

We like the ride, too. It's very carlike, with no harshness or truck feel, unlike some other sport/utilities.

Remember reading about the nor'easter that blew through New York in January? Our Grand Cherokee did yeoman duty during the storm, serving as a rescue vehicle for several staffers who could not get



MERCURY VILLAGER LS

TEST CARS

home after the storm shut down all public transportation. A 300-mile loop in high winds, torrential rain and falling branches proved the worth of the Jeep's full-time 4-wheel-drive system. And through storms and all, we're averaging 18.7 mpg.

But we do have some nits to pick. One is the Overdrive lockout button. Putting it on the dash was silly. It should be on the transmission selec-

tor lever for handy use. Also, there is no provision for keeping the transmission in Second gear. The selector lever reads 1-3-D. Sometimes you need Second gear. Lastly, we find that the heater takes too long to heat up on really cold mornings, although once going it will fry fajitas.

But like we said, these are nits compared with the overall driving pleasure thus far. —Joe Oldham

GMC Suburban SLE

We fully expected our '93 Suburban to be good at heavy hauling. That's why Suburbans have long been favored by the horsey set.

But even after several press preview drives, we were still surprised by how comfortable this big brute is for hauling over long distances. The improvements in ride quality and comfort between this generation of



GMC SUBURBAN SLE

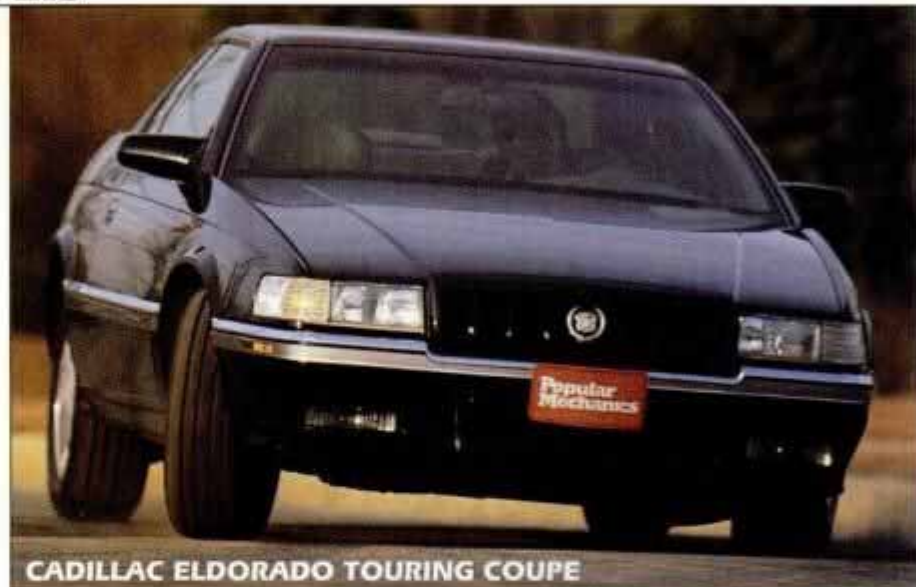
LONG-TERM TEST CARS

Suburbans (new last year) and the past are extraordinary.

After one cross-country trip to pick up a new car trailer, our Suburban has been on towing duty almost exclusively. While the new trailer is a pleasure to tow, we think the Suburban would make this job easy even if the trailer had skids instead of wheels. We're talking grunt here, folks. Lots of grunt. Even with some 6000 pounds of trailer, race car, tools, tires and various spares, the Suburban whistles up mountain grades on cruise control without a hiccup.

As you'd expect, there's a tradeoff for big-time torque. When it's propelling only the vehicle—a mere 5656 pounds—the Suburban's 454-cu.-in. V8 consumes 1 gallon of fuel every 13.1 miles. With the whole racing equipe added in, mpg drops to 9.7. However, this is a little better than the last GM 454 we tested, and we attribute much of the improvement to GM's new heavy-duty electronically controlled 4-speed automatic. Also, even at full-load consumption, the 40-gallon tank provides excellent range.

So far—7135 miles—the logbook shows no problems and only three negative comments. One concerns the vertical rear doors. They're handy for loading/unloading, but the



CADILLAC ELDORADO TOURING COUPE

Cadillac Eldorado Touring Coupe

Since our last report, we've put nearly 6000 miles on our Northstar V8-powered Eldorado Touring Coupe. This mileage included two snowstorms, lots of Northeast rain and even some sunny days. Funny thing about inclement weather, it helps you get to know a car real quick.

Thus far, we can say that Cadillac's traction-control system is among the best we've tried. It effec-

gives you a smooth ride at slower speeds and a firmer ride for more control as speed increases. It's a great system, and it makes the ride and handling nearly perfect no matter what the conditions.

What isn't so great is the torque steer generated by the Northstar V8. The traction-control system keeps the wheels from actually spinning out of control. But on hard acceleration, the torque going through the front-drive system makes the front wheels very twitchy, and this is transmitted back through the steering wheel. As such, high-speed lane changes under full throttle can be an adventure.

Despite all the complicated systems, we have had no problems thus far. The car has been totally reliable, and we're averaging 15.3 mpg for all types of driving. We'll keep you informed. —J.O.

Toyota Corolla LE

We admit that we're not at our happiest pattering around in a compact car. Yet, when we first drove the Toyota Corolla last fall, we were impressed. Now after more than 3000 miles in our long-term Corolla, we're still impressed.

Somehow, Toyota has managed to make the Corolla feel roomier than its size indicates. You feel like you're driving a Camry, and a lot of people ask us about our new "Camry," because there's so much resemblance.

In commuter duty, which blends high-speed interstates with New York City stop-and-go, the Corolla is a very comfortable car to be in for 50 miles each way. The engine is lively and responsive, and the suspension is not too soft, not too taut.

The Corolla has grown on us as the miles have piled up. We'll let you know if this opinion changes. —J.O.



TOYOTA COROLLA LE

window framing restricts rearward vision. However, with a race car filling the inside rearview mirror, this is pretty much academic.

We've noticed a cruise control surge at 65 mph—and 65 mph only—during unloaded travel. And several drivers have commented on the peculiar climate controls, which are well marked but difficult to set for blends.

With the racing season getting into high gear, there's lots more towing ahead for our Suburban. We look forward to it. Give us a wave if you see us out there. —Tony Swan

tively tames the 295 horses under the hood to the point where the front-drive Eldorado becomes a very able car in a snowstorm. You can't say that for very many 295-hp cars.

And it loves interstate. Two 500-mile trips in two days proved that to us. We said in our last report that this Eldo must surely be one of the most technologically advanced cars on the road. Part of that sophistication is the computerized speed-sensitive suspension that adjusts each wheel individually to its road conditions several times per second. This

DOGFIGHTER IN A DAY

The Navy has Top Gun. The Air Force has Red Flag. Now the rest of us have Sky Warriors.

BY WILLIAM GARVEY
PM Photos by Glen Davis

• “There he is!” Low, going right to left and turning. He’s moving in! I’ve got to move in fast, but the closure’s wrong. I’m too hot. If I hold the angle, I’ll overshoot and the bogie will blast me in a heartbeat. Time for a yo-yo.

I haul back hard on the stick and the Mentor spills speed for

100 MILS

View to a kill: Deadeye shot through the Mark 8 gunsight’s pipper yields a plume of Corvis-oll smoke.

altitude—and angle. My body compresses as the g-forces rise—legs, butt and arms turn leaden. A glance ahead reveals only clouds, sunglare and gray. I look left and down. Bandit again, but the equation has changed in my favor. I stab the rudder pedal and hard-over the stick. Now level and pull. He’s edging into the pipper. Pull a little more. A little more. Now hold it. Hold it. *Hooold* it.

“Shoot! Shoot!”

I squeeze the trigger and loose one burst, then another. Nothing. Cripes, he’s mine and I’m missing! Panic begins to nibble. I pull back again to keep him in the pipper, mash the trigger into the stick and fire without stopping. The guns staccato in my ears and suddenly white smoke pours



DOGFIGHTER

T-34 mimics a death plunge after being peppered with laser cannon fire.

at 6, 15 miles closing," and then turn to meet him. One on one. How would I do? How would it feel?

The answers reside at Atlanta's Fulton County-Brown Field. There, in a hangar office on the southern edge of the field is the headquarters for Sky Warriors. This is as close as an ordinary person gets to being a member of the fighter fraternity.

Real warriors

Top dog, Father Goose and soul of Sky Warriors is Earl Arrowood, arguably the South's most affable son. He is also a pilot's pilot, having accumulated over 17,000 hours of flight time in everything

from C-47s to F-100s to 727s. He happily makes his living as an airline captain, but when he's not bossing a Boeing, he's taking charge of things at Fulton County field.

There are 42 pilots on Sky Warriors' roster and every one of them is or was a fighter pilot. They've flown almost everything in the Pentagon's attack and fighter inventory over the past 25 years and won every award available in fighter competition. "I wanted the best," says Arrowood. "I believe we could take over any fighter unit in the world in a couple of days."

Hmmm. Exactly what is the intent

of these aerial sharpshooters?

It traces back to a day five years ago, when Mike Brady, a commuter airline owner, asked Arrowood to teach him to fly aerobatics. Rather than put Brady through an aimless series of barrel rolls and vertical snaps, Arrowood gave him a dose of Air Combat Maneuvering.

Brady was hooked. And soon the two hatched a scheme to buy a couple of refurbished T-34 trainers and establish a school where air combat would be taught, not simply demonstrated, to anyone with the interest and the money (\$595 per 1-day session as we went to press).

Total immersion

There's nothing fancy about the place. What sets Sky Warriors apart is its absolute focus on air combat, and the enthusiasm about flight that permeates the crowded quarters.

Pictures of fighters fill the walls. There's a closet full of government green flightsuits, complete with Velcro-backed patches and flags you can switch to your liking. Helmets are over there—grab "Jester," "Hollywood" or "Maverick" for your own. Just beyond is the briefing room, a simple affair with a long table and chairs facing a blackboard above which is printed: "Lose Sight, Lose the Fight!"

My briefing was conducted by Arrowood and Craig Morrison, another Vietnam War veteran-turned-airline captain.

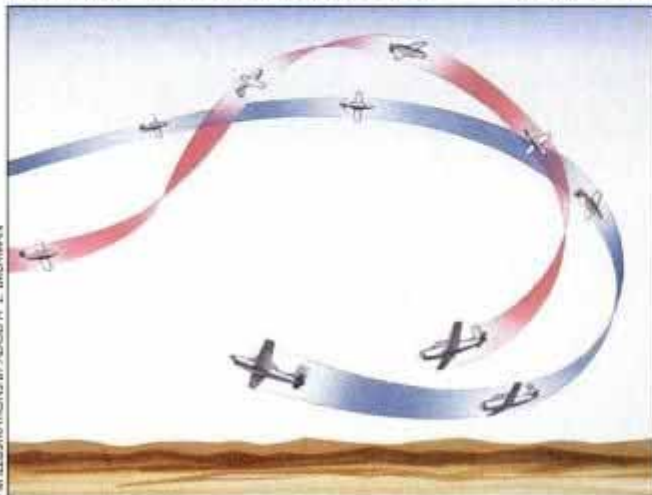
We began with introductions and flight housekeeping—company frequency, hand signals, jargon, formation position, speeds, power setting, flight plan, etc. And then into the meat—the theory and execution of dogfighting. Here was talk never spoken to me before. "Go vertical at a merge, 'cause if you go horizontal, you can't win;" and "All you've got is altitude, energy and position. You

from the winged silhouette centered in my yellow glass sight.

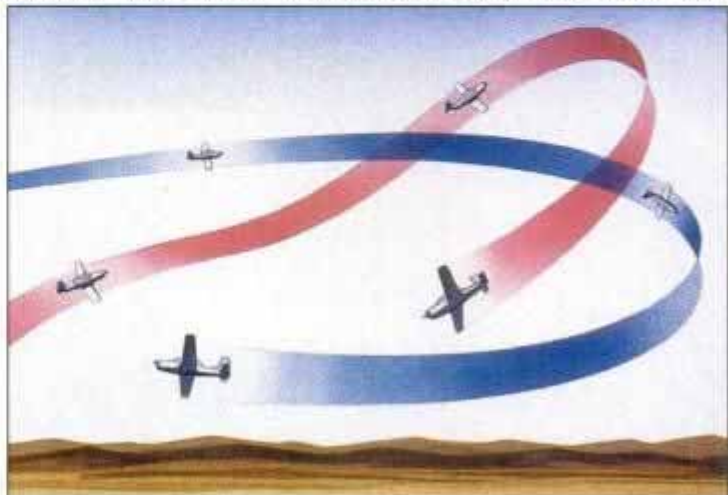
"Whoopee! We've got ourselves a killer here! Good shooting. Excellent."

Ah, shucks. It was nuthin'. But the 800-megawatt smile on my face exposes the absurdity of that lie. This was exhilarating.

There was a time when I thought my name would be stenciled on the side of an F-4, but I never won military wings so almost all my flying consists of piloting general aviation machines or riding in the back of Boeings. But I've always wondered what it would be like to hear "Bandit



Barrel Roll Attack lines up target without increasing separation.



High Yo-Yo burns off energy to prevent the attacker from overshooting.

ART ILLUSTRATIONS BY ADOLPH E. BROTHMAN



can give up one, but never more than one. Do that and you're gone."

The game is to expend your resources in such a way as to place you behind your target at an angle that will permit you to blast it to smithereens. Speed, height, attitude, g's are meaningful only as they relate to the bad guy—your concentration revolves around where he is and where he's going.

As Arrowood and Morrison got deeper into the briefing, they became more and more animated. Hands began to move up, back and over. Morrison grabbed a fighter-on-a-stick to demonstrate a maneuver. Arrowood cautioned about g-loc—blackout induced by high gravitational forces—and told how the world got dark and weird on him one day in a vertical climb. Morrison countered with a "There I was . . ." of his own, prompting Arrowood to observe, "He's a real fighter pilot. You can tell when he's lying—his lips are moving." A laugh, and the war stories began to roll. Boisterously. Egotisticaly. Wonderfully.

I began to be drawn closer and closer. These guys weren't acting. They really had been there. They

knew how lucky they were, and they enjoyed sharing the good fortune of their flying lives.

By the time the briefing ended, not only did I have a passable knowledge of what we were about to attempt, but I was imbued with the spirit, the style and the fraternity of fighter piloting.

I hiked on my chute, grabbed my "Iceman" helmet, and swaggered, just a little, to the flight line. And I didn't feel silly at all.

Mean Mentor

The airplane Sky Warriors wanted for their mount had to be durable, affordable, aerobatic and tandem-seat, with the handling, look and performance of a military aircraft. The T-34 Mentor, a derivative of the Bonanza, has all that in spades. And that's why it became the primary trainer for the U.S. Air Force, U.S. Navy and 15 other nations.

Sky Warriors' three Mentors were built in the mid-1950s. But the refurbishment by Nogle and Black Aviation, in Tuscola, Illinois, was so complete and painstaking, they look and feel as though they came off the Wichita, Kansas, production line last month. While military details are ad-

Trips to and from the battle area are flown in tight formation.

hered to, right down to a paint scheme off the Red Flag aggressor aircraft at Nellis AFB, these T-34s do vary from their original makeup in some significant ways.

First, the Warriors' birds are powered by fuel-injected Continental IO-550s rated at 300 hp. The original Mentors had normally carbureted 225-hp Continentals. "Fighter pilots never have enough power, but this sure helps," says Arrowood.

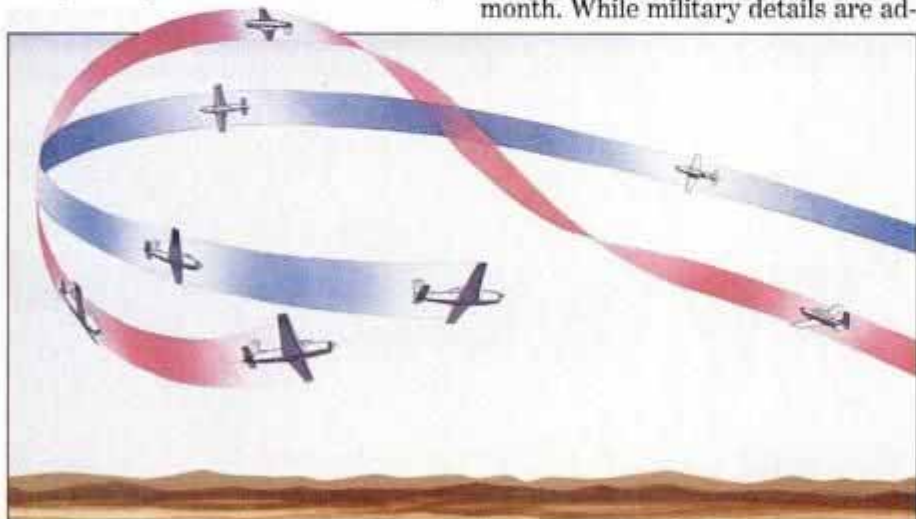
Second, mounted on the glare shield directly in front of the front-seat pilot is a Mark 8 gunsight, identical to the kind used on the A-1 Skyraider. The concentric yellow circles with their hash marks pointing to the center have an obvious, deadly purpose.

Third, since actually blasting an opponent with 50mm shells might cause some liability problems, Sky Warriors outfitted the planes with a laser gun, and with laser sensors that surround them with an electronic cocoon of vulnerability. If the line of laser fire from pursuit aircraft (which is accompanied by a simulated "rat-ta-ta-ta" in the shooter's headphones) enters the cone, the victim pilot gets an audio signal that he's been hit, and white Corvis-oil smoke pours from his exhaust.

Lastly, all of this is captured on videotape so the customers can relive their dogfighting glories again and again. Each plane is equipped with forward-facing cameras in the vertical fin and wing leading edge, and with an in-cockpit camera trained on the front-seat pilot. This last one is called, unabashedly, the "Hero camera."

Fun fight

For the visiting sky warrior, the pleasure begins the moment you climb into the cockpit. The customer sits all alone up front and gets an



Lag Roll increases range while improving alignment with the target.



DOGFIGHTER



Clockwise from top left: Arrowood's briefing preps author and adversary. Laser detectors score hits. Wing-mounted laser cannon makes them. Mark 8 gunsight shows when to shoot.



F-14 pilot's view of the proceedings. For nonpilots—that's one out of four Sky Warriors customers—this is probably when the pulse starts to quicken since it is probably the first time they've been at the pointy end of an airplane.

The forward cockpit is complete—full instrumentation, flight and power controls, plus the gunsight and stick trigger. The safety pilot—mine was Arrowood—sits in the instructor's seat in back and is virtually invisible—the only connection is via intercom.

The takeoff, climb-out and cruise are all conducted in close formation with about 6 ft. of air between the lead's tail and wingman's prop. Every procedure is carried out in crisp synchronization with the other plane, lending further weight to the military feel of the experience.

Upon arriving at the battle area northwest of the city, Arrowood demonstrated some aileron and barrel rolls and some high-g turns. The view was spectacular. Next, Jay Newell, a Sky Warriors mainstay and my loathsome enemy, played the role of "the grape," and Arrowood sent him smoking with a well-placed round of electronic grapeshot. Then the Mentor was mine.

After some brief maneuvering to get a feel for the airplane, a now-familiar Southern voice announced "Fight's on." Newell was low and making a dash to the left. I rolled left to attack, but it became obvious I'd overtake him before I could shoot, and thus the High Yo-Yo. The consequent and most satisfying smoke trail confirmed my judgment and keen eye.

Reflecting momentarily on what

had occurred, it struck me that during the fight I had abandoned all familiar pilot references of up, down, right, left and even altitude and air-speed. I had learned what matters most in a dogfight is finding and chasing the bad guy.

Both Arrowood and Morrison had said nonpilots often make the best Sky Warriors because they simply attack, blissfully ignorant of the details that concern everyday pilots.

Time for role reversal. Now I was the grape and Newell was on the attack. As he neared, Arrowood urged me to pull tight in a hard bank. I did, and Newell followed. He was trying to get a shooting angle on me, but since our airplanes were identical, he had no aerodynamic advantage. If I could maintain the tightest turn possible without stalling and falling out

of the circle, he could only trail—he'd never get a shooting angle.

And so round and round and round we went. We became locked in a high-g pas de deux with me straining to peer over my shoulder at my attacker, the wings trembling as we neared high-speed stall again and again, and with Arrowood howling with laughter. "Keep pulling. Watch out! Don't stall! Ha! He'll never get us. Yeehaw!"

Finally, thankfully, he announced, "Fight's off. Break it off."

By then I was charged. The absolute king of the hill and ready for anything. Or so I thought.

Next on the agenda was a merge attack followed by a vertical turn back into the opponent. Tally ho, let's go. Hubba hubba.

It was somewhere after the 4-g pull-up, but before we actually acquired the bad guy that it happened. My head quite suddenly became much lighter, vision narrowed and the clouds turned to mud. I knew about gray-outs, but this was my first real encounter, and it came as a complete surprise. I had failed to tighten my gut and thus slow the sudden retreat of blood from my upper extremities. I was a goner, merely along for the ride. Arrowood completed the maneuver, and then leveled out. He knew. I tried to redeem myself with some rolls left and right, but they were half-hearted and sloppy—the game was up. I was drenched with sweat, and about a half-minute be-

(Please turn to page 120)



Beautifully restored T-34As look as spry as the day they were built.

IF SILENCE IS GOLDEN,
THIS IS FORT KNOX.



Buckle up — together we can save lives.

FORD CROWN VICTORIA

You can't deny the quiet authority of its streamlined shape. Or the subtle drama of its V-8 performance. And there's no mistaking the understated elegance of its interior. But the quiet environment inside a running 1993 Ford Crown Victoria remains unmatched. A silence of the 24 karat variety.

Quality engineering and a bit of untraditional thinking have created a vehicle that marries contemporary style and refined handling with the customary full-size requirements of room and comfort. And the Crown Victoria adds safety features like a standard driver and avail-

able right-front passenger air bag supplemental restraint system.



Air bags, in conjunction with properly worn safety belts, are one of the most effective restraint systems available.

The 1993 Ford Crown Victoria. When it comes to luxury and quiet, think of this as the sedan with the golden touch.

HAVE YOU DRIVEN A FORD LATELY?



Материал, защищенный авторскими правами

REVOLUTIONARY ANTI-AGING LIQUIDS

America's Best Kept Secret

Today the Liquid Glass® Total Appearance System remains America's best kept secret even with 75,000 retail stores and tens of millions of thrilled, ardent users. They refer to the system as "The Fountain of Youth" for their vehicles. Formulated with revolutionary chemicals which retard the aging process for paints, brightwork, rubber and upholstery.

LIQUID GLASS® THE ORIGINAL.

For additional information along with a FREE Sample Pack Kit, contact:

LIQUID GLASS ENTERPRISES, INC., P.O. BOX 1170, TEANECK, NJ 07666
OR CALL TOLL-FREE 1 800/548-5307. IN NEW JERSEY CALL 201/387-6755.

© Copyright 1993, Liquid Glass Enterprises, Inc. All Rights Reserved.

Liquid Glass and Connoisseur's Choice are registered trademarks of Liquid Glass Enterprises, Inc.



Consumer electronics gear for the home, for the road and for the office takes an entertaining new direction.

SHOWSTOPPERS

BY FRANK VIZARD,
Electronics Editor

• Every Consumer Electronics Show has its share of new, nifty devices, but this year's event in Las Vegas is especially memorable for its vision of the future.

Nearly every category of electronics offers some new innovation. Wide-screen televisions, new digital audio formats and new videogame cartridges and accessories open new entertainment vistas. On the business front, personal communicators, high-tech telephones and other devices promise to make work easier.

Most of the products featured here are available now. In the near future, look for a high-powered multimedia system called 3DO, a personal digital assistant called Zoomer (see Electronics, page 132, Apr. '93) and a home satellite TV system that uses a receiving dish only 18 in. in diameter. Here's a look at some of the electronic gear that will soon affect our lives.



Wide-Screen Television

TVs with a wide 16:9 aspect ratio are due in stores this year from Philips, Panasonic, JVC and others. The 34-in. Philips model pictured here is expected midyear and carries a list price of \$5995. It displays standard TV signals and letterbox movies, can be used as a computer display and can be upgraded to comply with future high-definition TV standards. Panasonic is offering a 50-in. wide-screen rear-projection TV for a list price of \$5500. JVC is debuting a 55-in. version for \$4495. Obviously, these new TVs are intended for well-heeled couch potatoes.



Personal Singer

Karaoke is the Japanese term for one of their favorite pastimes—singing along to recorded music. Karaoke, which is becoming increasingly popular in the U.S., gets small and portable thanks to Nakkodo, a long-time manufacturer of karaoke singing machines. The Karaoke Ninja is smaller than a VHS videotape. The machine plugs into a stereo receiver or TV, using the built-in amplifiers in these devices to amplify your voice. The Ninja (\$199) has two microphone inputs, an 11-step key controller and an echo processor.



CD Sound On Tape—To Go

The Digital Compact Cassette (DCC) offers CD-quality sound on tape but unlike with CDs, you can record your own material. One of the first DCC portables will be available this August from Panasonic. A scrolling LCD screen lets you see information relating to the music—track title, for example. DCC players are also able to play existing analog tapes so your cassette library isn't obsolete. The RQ-DP7 can play for up to 2 hours with power supplied by a built-in rechargeable battery.



A Small Player For Tiny CDs

This little portable music machine plays the new 2.5-in. MiniDiscs invented by Sony. MiniDiscs hold 74 minutes of music and you can record your own music on them. This Sanyo MDX-P1 portable (\$600), however, is a play-only model. This MiniDisc player is aimed at joggers and other activists with its small size and light weight (0.8 ounces). An LCD screen displays textual information so you can check track titles and other information. There's also an antishock mechanism inside the player so the MiniDisc won't mistrack while your body is in motion.

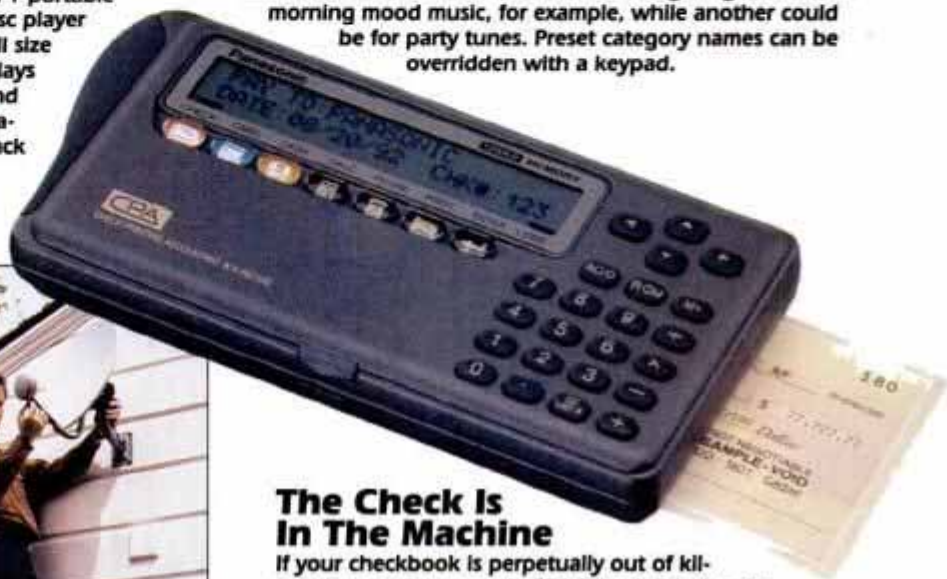
Satellite Television

DirecTV is a new satellite TV system, which begins operation in March '94. The service, based in Los Angeles, offers 150 channels. The receiving system, listing for \$700, comprises an 18-in. receiving dish and a tabletop tuner. Video signal quality is said to be near that of a laserdisc, while the sound reportedly rivals CDs. Hughes Communications and RCA are backing the project. A "smart card" inserted into the player lets you see an unscrambled picture.



A Jukebox For Compact Discs

Don't know where to put your compact discs? Stick them all inside Fisher's Studio 24 CD player. This \$500 machine holds up to 24 CDs and will categorize them for easy playback. You can categorize CDs by musical genre, mood, owner, occasion or disc name. One selection of songs might be called morning mood music, for example, while another could be for party tunes. Preset category names can be overridden with a keypad.



The Check Is In The Machine

If your checkbook is perpetually out of kilter, then try Panasonic's CPA (Check Printing Accountant). This device holds 25 checks upon which the amount and the payee can be printed. The CPA also keeps track of balances for two accounts. The internal memory stores the names of regular payees, credit card numbers, telephone numbers and other financial data. An optional interface lets the machine communicate with a computer. List price is \$350.



Personal Communicator

You use a pen to write on this portable computer. The purpose of the EO communicator, though, is to keep mobile people in touch with one another. These devices, weighing less than 4 pounds, can handle electronic mail, send faxes, interface with cellular phones and perform computing chores. The EO machines (\$2000 to \$3300) use AT&T's new Hobbit microprocessor, noted for its high performance and low power consumption. AT&T also will market the machines.



Become A Videogame Character

Sega blurs the distinction between real-life and videogame play with a new product called The Activator. Step inside The Activator ring and on-screen characters will mimic your kicks, chops and jumps. Eight interlocking modules use infrared beams to create 16 motion-sensitive areas that respond to foot and hand movements. Available in September for about \$80, The Activator will come with a 2-games-in-1 cartridge. One game is for fighting, the other is for dancing.



Windsor® Canadian Supreme, Blended Canadian Whisky, 40% Alc./Vol.
The Windsor Distillery Co., Deerfield, IL © 1993 The Windsor Distillery Co.

DOGS MUST
BE CARRIED

Fortunately, every day comes with an evening.



MAKE RESPONSIBILITY PART OF YOUR ENJOYMENT

Материал, защищенный авторскими правами

SOME WHISKEYS
ARE SMOOTHER
THAN OTHERS.



K E S S L E R
AMERICAN WHISKEY.
SMOOTH AS SILK
SINCE 1888.



MAKE RESPONSIBILITY PART OF YOUR ENJOYMENT.
KESSLER AMERICAN BLENDED WHISKEY 40% ALC/VOL 70-75 GRAIN NEUTRAL SPIRITS.
© 2010 KESSLER COMPANY, DEERFIELD, ILLINOIS. *SEE LABEL FOR FULL DISCLOSURE.

Матеріал, захищений авторським правом



Telephones With Screens

The telephone of the near future will look something like this model built by Northern Telecom. The phone has a screen that is able to display textual information. This phone will help support a variety of home information services, including home banking and home shopping. You would, for instance, call the pizza shop and then scroll through a menu of possible choices: large pie, small pie, plain or with an extra topping. You use a keypad to make your choices.



The Computer Calls Checkmate

Want to travel the world playing in big-money chess tournaments like Bobby Fischer? Practice your skills with the Kasparov RISC 2500 chess computer from Saitek Industries of Torrance, California. This \$700 antagonist features a 32-bit RISC (Reduced Instruction Set Computer) processor. RISC technology allows the machine to do very specific calculations very quickly, something every chess player wishes he could do.

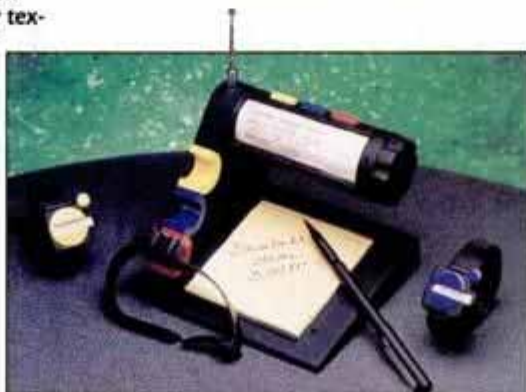
Credit Card Pager

Pagers used to be rather bulky items that would clip onto belts or be stored in pockets. Not so any more. Motorola has shrunk down the pager to the size of a credit card. The Confidant (\$300), while small, isn't short of features. Eight messages can be stored in memory. Important numbers can be "locked in" for safekeeping, and it works as a clock. In the "silent" mode, a musical alert lets the user know a message is being received.



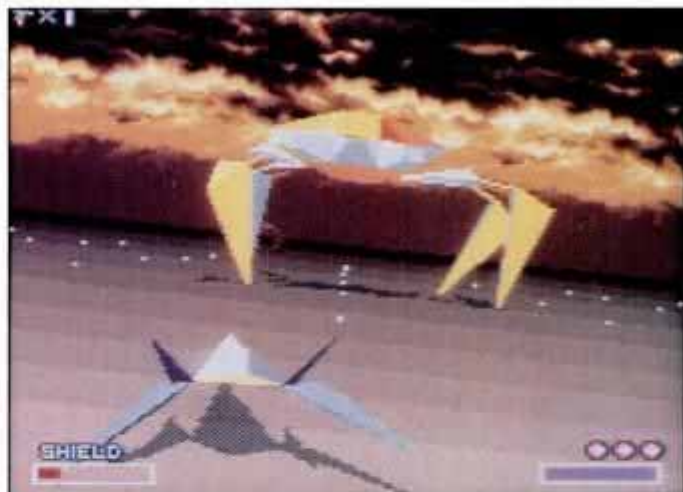
Flight Simulator

Virtual Pilot from CH Products in Vista, California, is an airplane yoke that plugs into IBM-compatible computers. Abe Dane, PM's staff pilot, took off using Microsoft's Flight Simulator program. "The yoke has a realistic amount of travel and the tension from the return springs is not blatantly unrealistic," notes Dane. "Using it in concert with the pitch trim knob and throttle gives you some very worthwhile practice in many aspects of flight." List price is \$110.



Call The Child Home Without Yelling

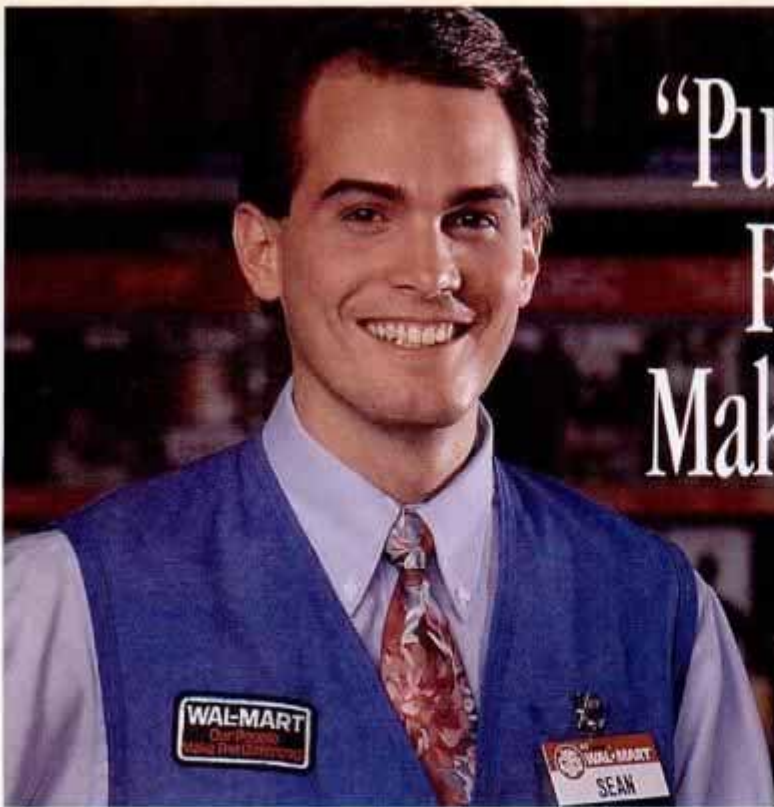
Word Watch is a paging system for children. The child wears the pager like a wristwatch. At home the base station transmits one of four simple messages, including, "Come home now." The base station can be programmed to signal a child at a predetermined time. The system, made by KBA Inc., has a range of 1.5 miles. List price is \$80 for the base station and \$40 for each pager.



Super Chip To The Rescue

Nintendo's Star Fox game cartridge is the first of a new breed of souped-up games for Super Nintendo. The Star Fox cartridge employs a proprietary Super FX chip that adds to the system's capabilities. The scaling and rotating of objects is better. Graphic transitions are smoother. The texture mapping of images onto objects and the light source shading effects add to the adventure. The Super FX chip also lets players manipulate objects with greater speed. List price for Star Fox is \$60. Three other Super FX games are expected this year.

PM



“Putting The Customer First. That’s What Makes The Difference.”

Sean,
Sales Associate



Popular Mechanics™
Washerless Bathroom
Faucet with Pop-Up
Drain

Was 41.84

3984
Every Day

ROLLBACK
American

MADE IN THE
USA!

Popular Mechanics™
Washerless Kitchen Faucet
with Spray

Was 46.88

ROLLBACK
American

4488
Every Day



Popular
Mechanics

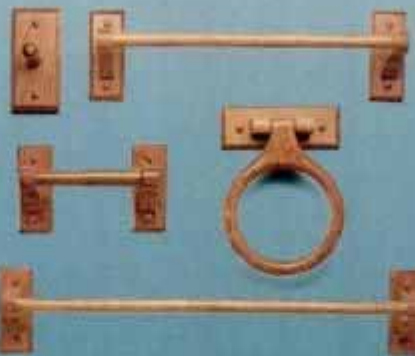


Popular
Mechanics™
Servo
Flush Toilet
Repair Kit

Was 8.44

ROLLBACK
American

694
Every Day



Test-Rite 5 piece
Oak Bath
Accessory Set

1496
Every Day

Shop Vac®
with Tools
& Filter

5496
Every Day



Selfix® Portable
Shower

Was 10.48

ROLLBACK
American

848
Every Day
Selfix



WAL★MART

ALWAYS THE LOW PRICE.

Always™

© 1993 WAL-MART



SHOP PROJECT

THE GREAT OUTDOORS

A classic redwood table and bench set.

BY NEAL BARRETT

● One of life's simple pleasures is to dine outdoors on a beautiful warm day, and whether your tastes run to hot dogs on the grill or chilled strawberry soup, it is always nice to have a pleasant place to sit and enjoy your repast. To that end, we offer this redwood table and bench set.

The set is very functional and ex-

tremely attractive, while not being that difficult to build. It's a good project for moderately experienced woodworkers. Its construction is straightforward and requires mostly mortise-and-tenon joints. Because the project requires so many joints and slats, however, it does require that you prepare your stock uniformly and accurately.

The table is large enough to seat six to eight adults, and the benches can be used either in combination with the table, or as casual seating on their own.

Color photo: J. R. Rost
Black-and-white photos: Neal Barrett
Technical artist: Eugene Thompson
Photo stylist: Gabe Herrick

Materials

We chose heart redwood as the material for this furniture because of its natural resistance to rot and insect damage (other grades of redwood are not rot and insect resistant). Although redwood is generally available from lumberyards around the country, should you have trouble locating suitable stock, there are suppliers that will ship nationwide. One such supplier is M.L. Condon Co. Inc., 250 Ferris Ave., White Plains, NY 10603.

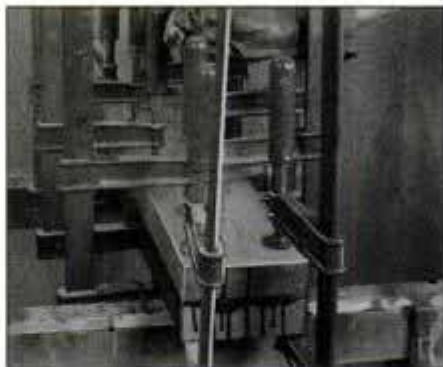
We used 5/4 stock for the table and bench tops, aprons and center rails, and 8/4 stock for the table and bench legs. If you can get rough 8/4 stock, cut the bench legs from a single piece—however, if you can only buy surfaced lumber (normally 1½ in. thick), you will have to glue up the leg stock from two pieces.

Throughout the construction of these pieces, use glue that has a waterproof rating. We used West System Epoxy for gluing up the leg stock and Titebond II, a new waterproof glue by Franklin, for the remainder of the joint assembly. Titebond II is suitable for any application that will not be left submerged in water. This adhesive offers good weather resistance in combination with low toxicity and a relatively fast setup. The epoxy seemed a better choice for the legs because the table and bench legs may often be standing in water long after the rest of the pieces have dried off.

Legs And Aprons

Begin by gluing up stock for the table legs and bench legs. You can save time by gluing up blanks that are wide enough to provide two legs each. Mix the resin and hardener for the leg blanks in the proportions suggested by the manufacturer, then spread liberally on both mating surfaces. Clamp the pieces together, then let set overnight (Photo 1). Be sure to wear gloves when working with the epoxy, as the hardener can be irritating to your skin. Also, ensure good ventilation when using epoxy, and place some old newspapers under where you are gluing up the legs.

Since the table and benches have many similar parts, cut out all the parts at one time. First rip and crosscut the leg stock for both table and benches. Next, rip and crosscut all the slats for the table and bench tops. Then rip and crosscut the pieces for the top frames. Finally, rip and cross-



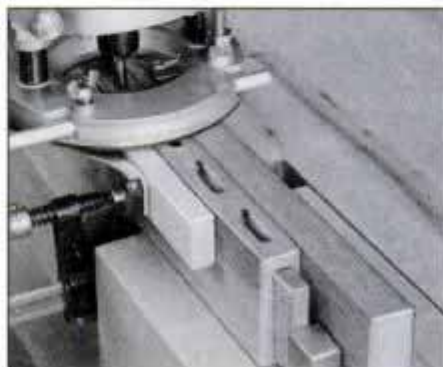
1 Unless you can get very thick redwood stock, use epoxy and clamp up the leg blanks from two pieces.



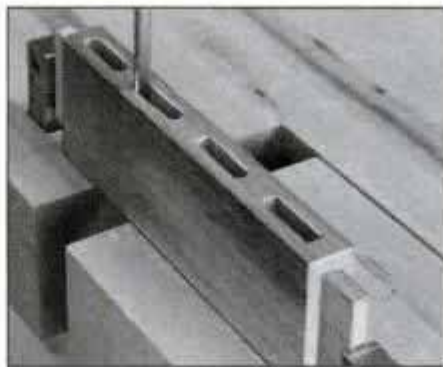
2 Clamp a stopblock to the saw table. Butt each workpiece that will have a tenon to the block and cut the tenon.



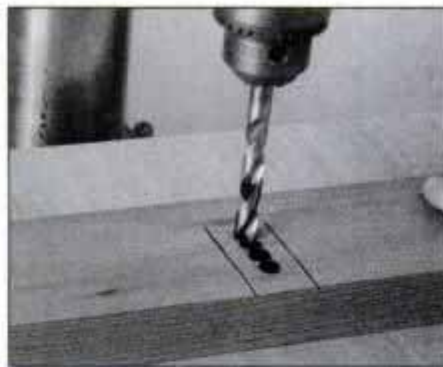
3 Tip the workpiece on edge, butt it to the stopblock and move the piece over the dado head to finish the tenon.



4 Clamp a rail to the bench top with a scrap block next to it, and cut the mortises in the rail with a router.



5 Finish each mortise by chopping its ends square with a chisel. Be sure to clear out waste chips before assembly.



6 Mark out the apron mortises with pencil lines, and remove the bulk of the mortise by boring on the drill press.



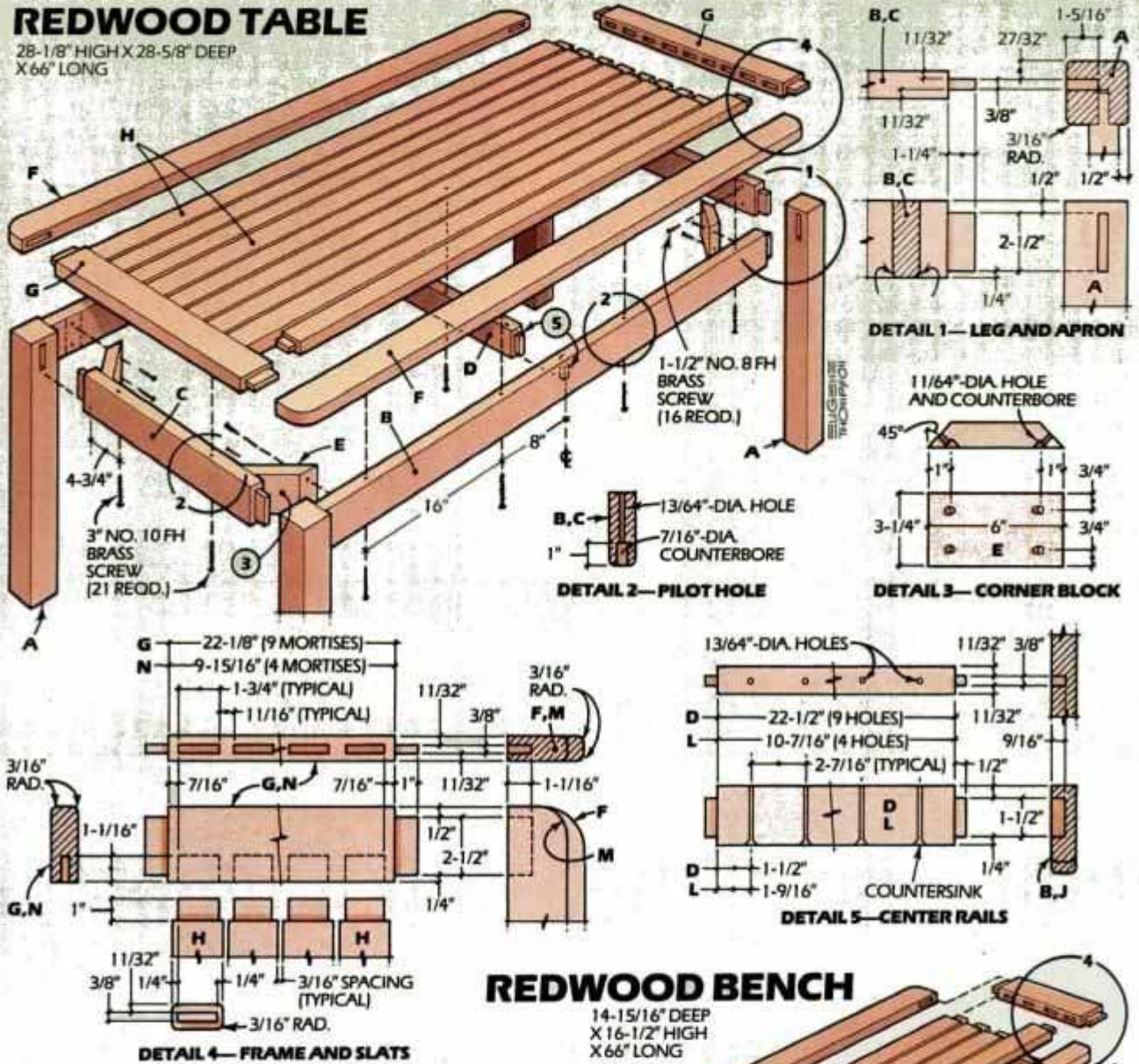
7 Finish the apron mortises with a sharp chisel. Pare down to flatten the mortise sides and square the mortise ends.



8 Bore the pilot holes through the width of the aprons using a long bit chucked into the drill press.

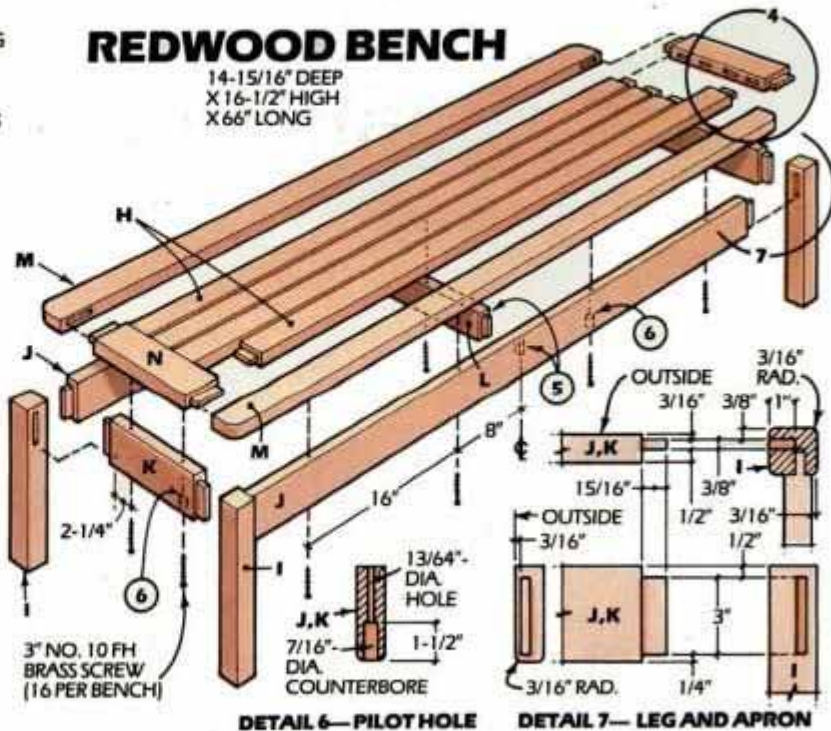
REDWOOD TABLE

28-1/8" HIGH X 28-5/8" DEEP
X 66" LONG



REDWOOD BENCH

14-15/16" DEEP
X 16-1/2" HIGH
X 66" LONG



MATERIALS LIST—REDWOOD TABLE AND BENCH

| Key | No. | Size description (use) |
|-----|-----|---|
| A | 4 | 2 3/4 x 2 3/4 x 27 1/2" redwood (leg) |
| B | 2 | 1 1/2 x 3 3/4 x 60" redwood (apron) |
| C | 2 | 1 1/2 x 3 3/4 x 22 5/8" redwood (apron) |
| D | 1 | 1 1/2 x 2 1/4 x 23 1/2" redwood (support) |
| E | 4 | 1 1/2 x 3 3/4 x 6" redwood (corner block) |
| F | 2 | 1 1/2 x 3 3/4 x 66" redwood (stile) |
| G | 2 | 1 1/2 x 3 3/4 x 24 1/2" redwood (rail) |
| H | 13 | 1 1/2 x 2 1/4 x 61 1/2" redwood (slat) |
| I | 4 | 1 3/4 x 1 3/4 x 15 3/8" redwood (leg) |
| J | 2 | 1 1/2 x 3 3/4 x 62 5/8" redwood (apron) |
| K | 2 | 1 1/2 x 3 3/4 x 11 3/8" redwood (apron) |
| L | 1 | 1 1/2 x 2 1/4 x 11 3/8" redwood (support) |
| M | 2 | 1 1/2 x 2 1/2 x 66" redwood (stile) |
| N | 2 | 1 1/2 x 3 3/4 x 11 3/8" redwood (rail) |

Misc.: 53 3" No. 10 fh brass screws (enough screws for two benches); 16 1 1/2" No. 8 fh brass screws; West System Epoxy (available from Gougeon Brothers Inc., P.O. Box 908, Bay City, MI 48707); Cabot's Decking Stain No. 1400.

cut the aprons and crossrails. To keep from confusing the groups of workpieces, identify them with a masking-tape label or write on them with a piece of white chalk.

Install dado blades in the table saw to cut the tenons on aprons, slats, top end rails and cross support rails. Study the plans carefully, noting how the tenons differ on the various parts. Even though all tenons in this project are $\frac{3}{8}$ in. wide, the length, shoulders and offsets change from piece to piece. Cut all like parts with a single setup on the table saw, using a stopblock clamped to the saw table for repeat cuts (Photos 2 and 3).

Readjust the saw and block as necessary for each different part. As usual, since the dado blades leave small ridges on the surface of the cuts, it is good practice to cut the tenons just a bit oversize and pare them to fit with a sharp chisel.

Next, lay out the mortises, bench legs and top frame pieces. Since there are quite a few mortises required, the most expedient method of cutting these joints is to use a plunge router with a straight bit and edge guide.

Use a scrap block to test the router setup for each different joint, then clamp the workpiece between

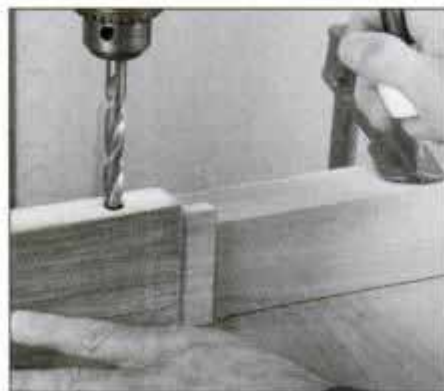
bench dogs to cut the mortises. When working on the narrow top frame members, clamp a scrap block to the side of the workpiece to help support the router base (Photo 4). Complete each mortise by squaring the ends with a sharp chisel (Photo 5).

Lay out the mortises in the aprons to house the center support rails. Use the drill press to remove waste from these mortises and finish them with a chisel (Photos 6 and 7).

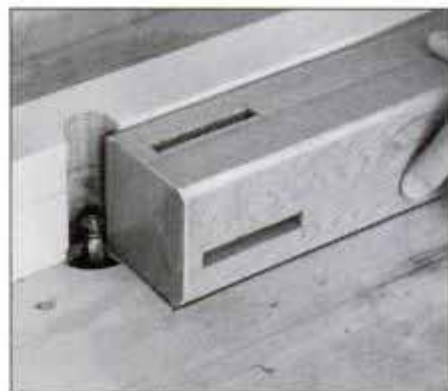
The table and bench tops are fastened to the base by driving long screws up through the aprons into

the tops. Use the drill press and a long $\frac{13}{64}$ -in.-dia. bit to bore the pilot holes through the aprons. Then counterbore the holes from the bottom with a $\frac{7}{16}$ -in.-dia. bit (Photos 8 and 9).

Note in the plans that all exposed edges are rounded to a $\frac{3}{16}$ -in. radius. Use the router table and rounding-over bit to cut this radius on all legs, slats and apron bottom edges (Photo 10). The inside edges of the long sides of the table and bench top frames can also be rounded over, although you must stop just short of the joint with the end rails.



9 Counterbore the apron pilot holes. The counterbored hole will hide the screw heads from view.



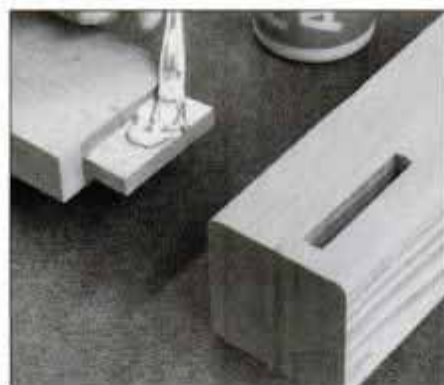
10 Cut a radius on the leg, slat and lower apron corners using a rounding-over bit in the router table.

Base Assembly

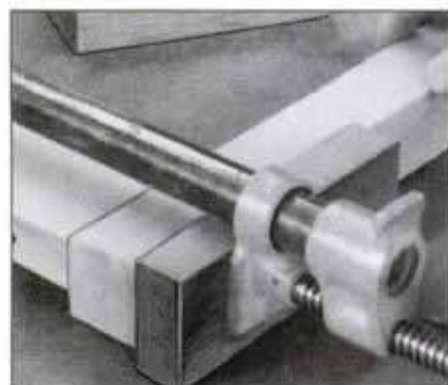
Start assembling the base for both the table and the bench by joining a long apron to a pair of legs. Apply glue to the tenons and mortises with a small brush, then use a long clamp to pull the joints tight (Photos 11 and 12). Use scrap blocks between the clamp jaws and the work because redwood is a soft material and can be easily dented or scratched. Compare opposite diagonal measurements of the leg-apron assembly to be sure that it is square before leaving the glue to set (Photo 13). If the diagonal measurements differ slightly, shift the clamps and remeasure.

Complete the bases by joining the short aprons and center support rails to the long side assemblies (Photo 14). Apply glue to the joints, slide the pieces together and clamp firmly. Be sure to assemble the bases on a flat, even surface, checking that all legs sit firmly and that the base does not rock. Readjust the clamps if required to eliminate any twist in the base. Check the assembly for square as before, then let the glue set.

Rip, crosscut and miter the table's corner blocks. Bore and counterbore pilot holes and screw the blocks to the aprons.



11 Use a small brush to apply glue to the apron tenons. Also apply a little glue to the mortise walls.



12 Redwood dents easily. Protect work-surfaces during assembly by positioning a scrap block under the clamp jaws.



13 Compare diagonal measurements of each leg-apron assembly to check it for square. Adjust the clamps if necessary.



14 Glue and clamp together the leg-apron assemblies spanned by the short aprons and center support rails.

Top Assembly

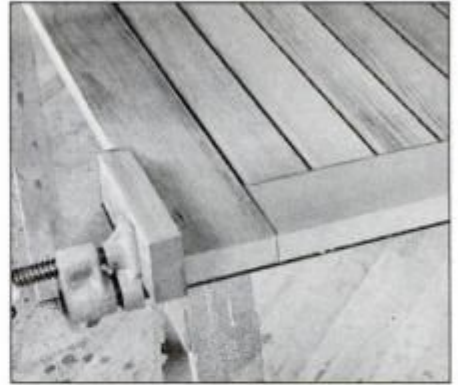
Begin assembling the tops by joining the slats to the end rails. In order to glue and clamp the many pieces together before the glue sets up, you must have all the parts ready. Position the glue, scrap blocks and clamps within easy reach of each other. Begin by applying glue to the mortises in the end rails and the slat tenons. Slide the parts together. If the joints have been cut accurately, the proper spacing between slats will be automatic.

Place a scrap block across the ends of the rails to distribute the clamping pressure then pull the joints tight with long clamps (Photo 15). After the glue has set, apply glue to the end rail tenons and the mortises on the long side, and complete the top assembly (Photo 16). Glue will squeeze out of the joints, but don't wipe it off. Wait until the glue gets rubbery, then cut it off with a chisel.

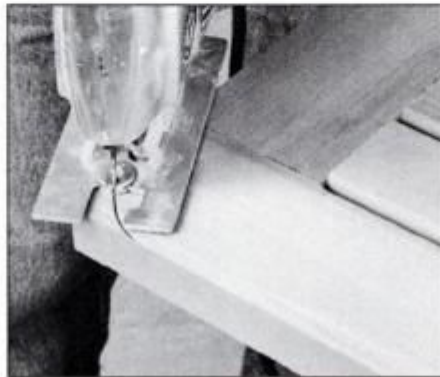
Trace the radius on the corners of the tops and use a sabre saw to make the cuts (Photo 17). Remove saw marks with a file or a belt sander. Next, use the $\frac{3}{16}$ -in.-rad. rounding-over bit in the router to shape the curved top and bottom edges of each top (Photo 18).



15 Place a long scrap block against the top frame rail while gluing and clamping the slats to the rails.



16 Glue and clamp the stiles to the rails to complete the top assembly. Again, use a block under the clamp jaws.



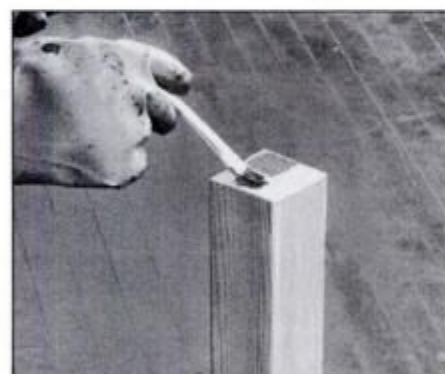
17 Cut the radius on each top corner using a sabre saw, staying just to the waste side of the line.



18 Use a rounding-over bit in the router to put a curved edge along the top and bottom edges of each top.

Finishing

Since it is likely that these pieces will be exposed to wet grass or a wet patio or deck surface, it's a good idea to seal the bottom ends of the table and bench legs. If left unsealed, these end-grain surfaces will readily absorb water, with stains, mildew and rot all as possible consequences. To seal the legs, we painted on two coats of West System Epoxy, letting the first coat harden completely before applying the second (Photo 19). The epoxy actually absorbs into the end grain of the wood, effectively sealing the surface from moisture penetration.



19 To prevent water penetration and the resultant staining, apply two coats of epoxy on the bottom of each leg.

Sand the tops and bases with 120- and 150-grit paper, then dust off thoroughly.

Although heart redwood is naturally resistant to rot, if it is left untreated, the wood weathers and changes color. In addition, the glue in the joints—as well as the epoxy—degrades with exposure to the sun's ultraviolet rays. To protect the pieces, yet preserve their natural appearance, we applied a penetrating finish, Cabot's Decking Stain No. 1400 Clear (Photo 20).

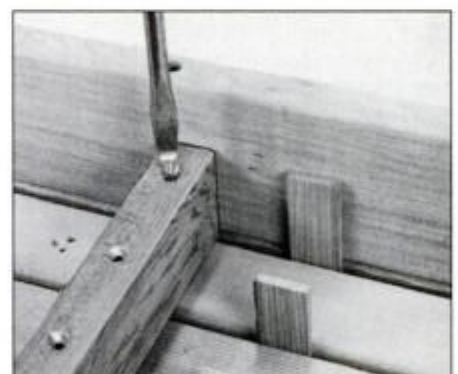
Complete assembly of the pieces by joining the tops to the bases. In-



20 Protect the table and benches by applying a penetrating finish stain. We used Cabot Decking Stain No. 1400 Clear.

vert a top on a padded surface and place the appropriate base over it. Adjust the base for equal overhang on all sides and attach the top by driving screws through the apron holes into the top frame.

Next, cut $\frac{3}{16}$ -in.-thick spacers from scrap stock and place them between the slats—near the center of their span—to maintain proper spacing. Bore pilot holes and screw through the center support rail into each slat, again using 3-in. No. 10 fh screws (Photo 21). Remove the spacer blocks and the pieces are now complete. **PM**



21 Insert small thin blocks between the slats, and drive screws through the rails and into the slats.

HOW IT WORKS

SPRAY GUN

BY THOMAS KLENCK, Associate Home Improvement Editor
PM Illustrations by George Retseck

• There's no question that the ordinary paintbrush is one of the most simple and reliable tools on hand. However, the next time you dip your brush into paint to brighten up those wicker chairs, put a fresh coat on your backyard fence or refinish the dining room set, you may want to opt for the tool many pros would pick—a spray gun.

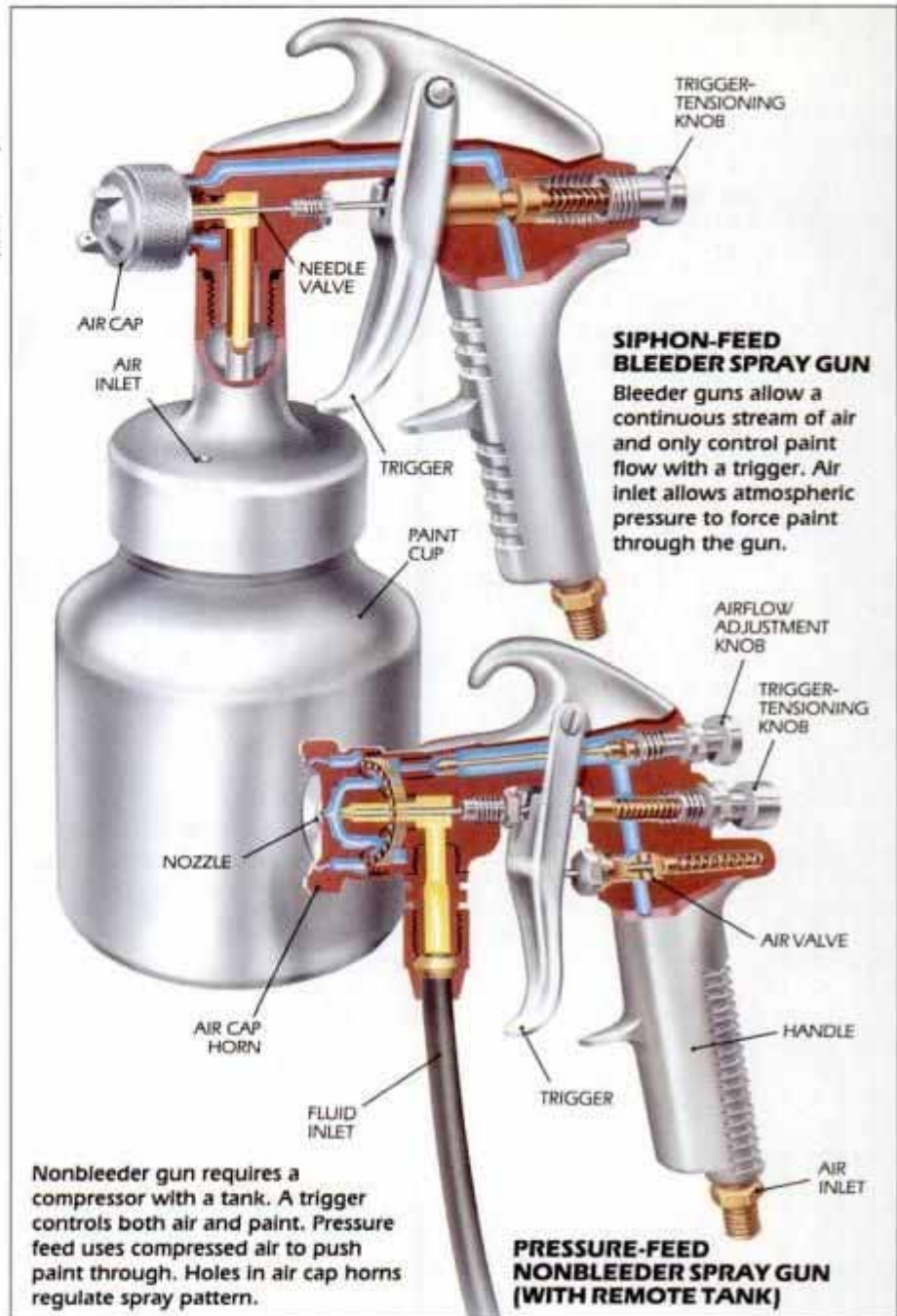
Spray guns have two advantages over brush painting. First of all, spray painting is significantly faster. If you have a lot of work and your time is valuable, this makes spray painting the more efficient choice. Secondly, spray guns can be more effective at producing a quality, uniform coating with very little effort. Spray guns don't guarantee flawless finishes. But, with a little practice, you'll probably find the results superior to ordinary brush finishes.

For this increased efficiency and effectiveness, however, you'll sacrifice economy. Although it varies from one type to another, spray guns are notoriously wasteful. Where a paintbrush distributes nearly all of the paint it holds on a surface, spray guns distribute the paint in the air and only some of it reaches your work. The rest, called overspray, is lost—as much as 75% of the finish never lands on your work. In addition to wasted paint, complete spray outfits compare in price to other typical workshop power tools. While you can pick up scaled-down systems for less than \$200, a larger setup with compressor, gun and accessories constitutes a serious investment.

Spray systems are designed to do two things: atomize paint and get it moving toward the work. To move the paint through the gun, a force is applied to it—either through compressed air in air-driven systems or a pump in airless spray guns. The size of the paint particles and their velocity have an effect on the quality of the finish and on how much paint reaches the surface.

Air-driven spraying

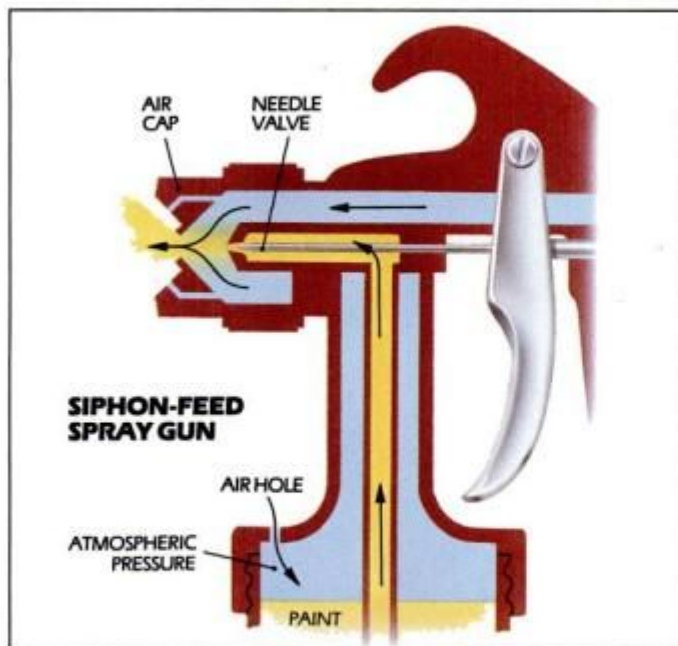
In a sense, the actual paint applicator in spray painting isn't the gun at all,



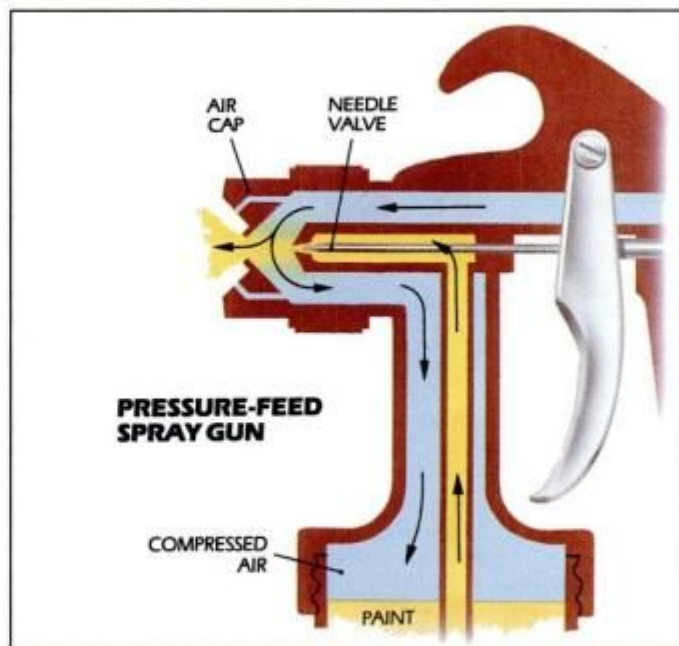
but air—the air is analogous to the bristles of a paintbrush. The gun's job is to disperse the paint into the air so the air can carry it to the work. While there are a few different types of air-driven guns, they all have some common features—in fact, some guns are convertible from one type to another. In air-driven guns, the paint moves up through a tube where it reaches a needle valve. The needle valve starts or stops the paint flow and is controlled by the trigger. A regulator at the opposite end of the needle valve adjusts trigger tension and is generally set to open the valve completely when the trigger is pulled. After the needle valve, the paint enters a stream of compressed

air and is carried through the spray tip where it's atomized. Changing the size of the spray tip or the viscosity of the material controls the rate of dispersal. There are two types of air-driven guns: siphon feed and pressure feed.

In a siphon-feed gun, the paint is drawn up to the needle valve through suction. As compressed air flows past the needle valve orifice and out the spray tip, it creates a partial vacuum in the paint tube. A small hole in the top of the paint container allows atmospheric pressure to push the paint up to the needle valve. Pressure-feed guns, on the other hand, use the direct force of compressed air to push the paint up into the needle valve.



SIPHON-FEED SPRAY GUN
Siphon-feed, air-driven gun uses atmospheric pressure to push paint up from container. Siphon guns handle extra-fine finishes.



PRESSURE-FEED SPRAY GUN
In pressure-feed gun, compressed air pushes paint through needle valve. Paint container may be remote or attached to gun.

Once past the valve, the compressed air atomizes the paint.

Choosing one system over the other depends on your needs. Pressure-feed guns may have self-contained paint cups, or may draw paint from a remote pressure tank. Siphon-feed guns, because of the weaker suction force, always have attached paint cups. Siphon-feed guns are best for extra-fine work, while pressure-feed guns handle thicker materials and move paint faster and farther.

Spray guns are also designated as bleeder or nonbleeder types. In a bleeder gun, the compressed air is continually moving through the gun—only the paint flow can be turned on and off. This is the type of gun to use with a compressor that doesn't have a tank and is continuously running. Compressors with tanks store the compressed air at a pressure set by a regulator. Because you're accessing a steady supply of air from a tank, you can use a nonbleeder gun where the trigger controls both the air and paint flow.

Both siphon- and pressure-feed models use air compressors that generate a relatively low volume of air at high pressure. The high pressure produces the fine atom-

ization necessary for quality finishes and also generates a high degree of overspray. One solution to the overspray problem is HVLP (high volume, low pressure) spray painting. These air-driven guns function much like typical guns but are driven by a turbine instead of a compressor.

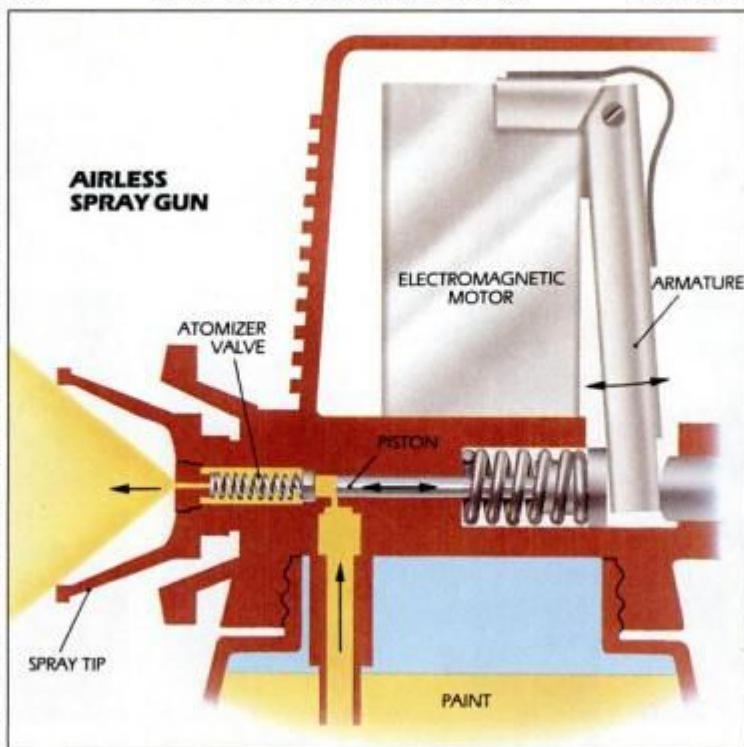
HVLP systems reduce overspray to about 20%, with only a slight loss of finish quality. In addition to simply saving paint, HVLP systems are more environmentally friendly.

Airless sprayers

If you're looking for minimal overspray and want the job done fast, an airless gun may be your solution. Here, the paint is pumped through a very small orifice at high pressure to create atomization. Because only paint leaves the tip instead of a cloud of paint and air, there's less diffusion. Airless paint sprayers can deposit up to 60% of the paint on the surface. In addition, the larger, heavier paint particles move forward with more force

to increase the speed of application as well. The downside is that it also reduces finish quality. Airless sprayers are generally confined to less demanding applications, but are ideal for handling fences, garden furniture and buildings.

Inside a typical airless gun is an electromagnetic motor that drives a piston forward and backward at a rapid rate. With each return stroke, paint is drawn up into a small chamber. On the forward stroke, it's pushed out to the spray tip. An atomizer valve keeps the fluid at the tip from being drawn back into the chamber on the next return stroke. The spray quality is controlled by the size of the spray tip orifice and finish pressure.



AIRLESS SPRAY GUN
Airless gun combines motor, pump and paint container. Motor drives piston, pumping fluid up to paint chamber. Orifice at tip atomizes paint.

**HOME
 IMPROVEMENT**

**POST-HOLE
 FOOTINGS**

TEXT AND PHOTOS BY
 MERLE HENKENIUS

● Whether you're constructing a deck, adding a porch or building a gazebo, the job begins with footings that penetrate your climate's frost line. In many cases, a simple post-hole footing is ideal. This type of footing is quick, easy and relatively inexpensive. If you plan an enclosed addition, of course, you'll want a continuous footing that surrounds a crawlspace beneath the floor. However, anything short of a major structural addition will rest firmly on simple posts and spot footings.

Check your building codes

Before you begin digging, visit your local building codes office to find out what the requirements are for your area. Local codes may vary, but generally, spot footings will need to be 8 in. in diameter and at least 36 in. deep. Don't be tempted to get by with shallower holes. If you don't dig below the frost line, you run the risk of seasonal shifting and structural damage.

Warmer climates will often allow shallower footings, and some codes may stipulate a square hole. Some areas require a galvanized bracket to secure the post to the footing, and others require an anchor bolt. Most codes will specify the spacing of the footings, as well. Regardless of your area's requirements, it's always bet-



A concrete footing set below the frost line provides a stable base for deck and porch construction. Premixed concrete is the easiest solution for small jobs.

ter to have accurate information on hand before you begin.

Tools and materials

Pouring a post-hole footing requires very little in the way of tools and materials. At the start, you'll need a post-hole digger—either the scissors type that we show or an auger type. You'll also need a tape measure, level, shovel, galvanized post brackets and concrete.

Use a mortar box or wheelbarrow to mix the concrete. If you plan to pour a series of footings in a row, stretch a string between two stakes placed beyond the first and last post-hole locations. With this in place, the holes can be aligned and each bracket can be positioned accurately.

If you plan to pour only a few footings, it's easiest to buy bags of premixed concrete—you simply add the water. Each 60-pound bag will make



1 A scissors-type post-hole digger works well in digging deep narrow holes and squaring the hole bottoms.



2 Use a tape measure to check that the hole extends below the frost line. Codes vary, but a 36-in.-deep hole is common.



3 Mix premixed concrete in a wheelbarrow and shovel it into the hole. Two bags should handle one 36-in. hole.



4 A post bracket has tabs that penetrate the concrete. Press brackets in place so the tabs are fully embedded in surface.

1 cu. ft. of concrete. An 8-in.-dia. x 36-in.-deep footing will take about two bags.

Digging and pouring

After laying out and marking the footing locations, rough out each hole with the post-hole digger (Photo 1). There's nothing complicated about digging a hole, but make sure it doesn't taper. Make the bottom of the hole the same diameter as the top and keep the sides consistent. When you've reached the required depth (Photo 2), trim the bottom of the hole flat, and then clean out all loose dirt.

With the holes ready, mix the pre-mixed concrete one or two bags at a time. As a drier mix is always



5 Use a tape measure or taut string to determine the exact bracket position. Then, level the bracket in both directions.

stronger than a wet mix, add only enough water to make the concrete workable. Then, shovel it into each hole until it reaches the grade level (Photo 3). Finally, float the tops of each footing so that the concrete is level and relatively smooth.

Keep in mind that this isn't a finished surface and you needn't spend a lot of time with a trowel. If you don't have a trowel, a small piece of lumber will do the job as well.

Setting brackets and posts

Setting a bracket in wet concrete is easy enough, as long as you position it exactly where you need it. Again, a taut string helps in positioning a row of brackets. Lacking the string, you



6 When fastening support posts to the footing bracket, use approved bracket nails for maximum joint strength.

can simply measure from a common point such as a foundation wall. With the brackets settled into the concrete, use a level in both directions to level the units (Photos 4 and 5).

After the concrete has set for several days, you can begin building on your footings. The mix will not reach full strength for several weeks, however, so avoid side stress on the brackets while building. When nailing lumber to a bracket, remember to use approved bracket nails (Photo 6). These nails are short and thick and designed for optimum shear strength. While a standard galvanized nail may seem an acceptable substitute, many building code authorities won't agree. **PM**

BOOK REVIEW

THE COMPLETE BOOK OF HOME INSPECTION

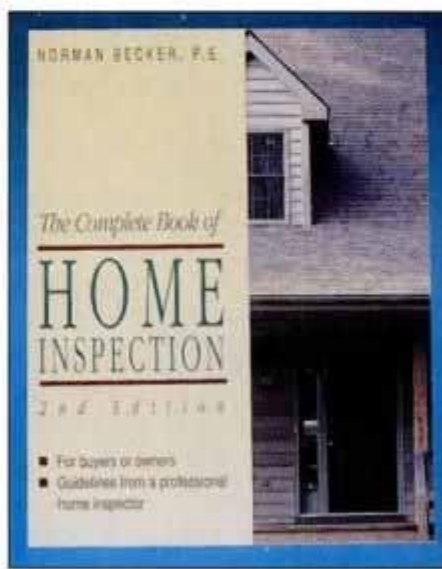
● How do you buy a house? You determine what you want, where you want it and how much you can pay. Then, you call the real-estate agent and, with any luck, you're shown the home of your dreams. However, before you sign on the dotted line, keep this in mind: You may be making the biggest investment in your life with less information than you'd have when buying a car, computer, dishwasher or any other consumer product. The solution is to get informed, and one of the best places to start is *The Complete Book Of Home Inspection* by Norman Becker.

Regular PM readers are already familiar with Becker's expertise as he diagnoses and demystifies household structural and mechanical prob-

lems each month in his Homeowners Clinic column.

In this book, Becker offers information that a home inspector uses to evaluate the condition of a house. The 269-page book is divided into sections concerning exterior and interior inspection and electromechanicals, and concludes with discussions on energy and environmental concerns. As well as guiding you through your own inspection, Becker explains how to hire a pro to do the job.

This updated edition is a great technical source—not only for home buyers, but for those who simply wish to understand their own home. It's published by Tab Books, Blue Ridge Summit, PA 17294, and retails for \$12.95. —Tom Klenck



TOOL TEST

**SKIL
 RANDOM-ORBIT
 SANDER**

TEXT AND PHOTOS BY
 ROSARIO CAPOTOSTO,
 Contributing Editor

● If you're in the market for one of the new random-orbit sanders, you'll be interested in Skil's latest entry. We recently tried out the 5-in. model No. 7484 and found it to be a reliable and effective finishing tool at a reasonable price.

The sander is solidly built and features a powerful 6-amp motor that delivers a 10,000-rpm, no-load pad speed. It has a sliding ON/OFF switch that's spring loaded to quickly turn off the tool. When pushed forward, the switch locks on—a light tap instantly pops it off.

The sander's pad accepts pressure-sensitive adhesive sanding discs, but a hook-and-loop (Velcro-style) pad is available. While both systems sand with equal effectiveness, we prefer the hook-and-loop type because the discs are reusable.

Dust collection is handled by a through-the-pad suction system. The dustbag is sensibly located under the housing, where it's out of the way when working in tight spaces. The sander weighs a relatively hefty 5 pounds, but the bail-type handle along with the motor-housing grip provide good control.

We tested the sander in a variety of situations including crossgrain sanding, sanding between varnish coats, heavy stock removal and sanding in close quarters. We found that both light and aggressive sanding left smooth, swirl-free surfaces, and the tool performed well in all tests. We were especially impressed that the rpm couldn't be appreciably reduced under heavy load and that aggressive sanding with 60-grit discs produced a remarkably smooth finish.

Although Skil advises starting the tool before contacting the pad with the work, we found that this caused gouging. However, no gouging occurred when the pad was resting on the work surface.



The Skil model No. 7484 5-in. random-orbit sander features a 6-amp motor and 10,000-rpm disc speed. It combines swirl-free sanding with rapid stock removal.

The Skil random-orbit sander is a substantial tool that fares well with the competition. The suggested list price is \$153, although you'll find the tool sold for less at hardware stores,

home centers and through mail-order catalogs. The hook-and-loop sanding pad accessory sells for about \$23. Write to Skil Corp., 4300 W. Peterson Ave., Chicago, IL 60646. **PM**



Sander comes with pressure-sensitive pad, but hook-and-loop pad is available. Disc holes are for dust collection.



Unique sliding switch locks on when pushed forward. A light tap at the back of the switch turns off the tool.



Skil sander produces swirl-free surfaces and is especially useful when sanding work that has different grain directions.



Coarse-grit disc makes fast work of heavy stock removal. The model No. 7484 is well balanced and easy to handle.

CONSUMER GUIDE

**WATER
 TREATMENT
 BASICS**

BY FRAN DONEGAN
 PM Illustrations by George Retseck

● You can always tell where water has been because it contains a little bit of whatever it has touched. The minerals, chemicals and bacteria water picks up from both nature and man give it its taste and color. Some of the things that find their way into our drinking water are beneficial to our health. Others are dangerous and can lead to serious illnesses.

Last year, Americans spent more than \$700 million on in-home filters and devices designed to rid water of impurities. Add to that more than \$2 billion spent on bottled water, and it's apparent that clean water is big business.

It isn't just people with private wells who are buying water treatment devices. A survey of water equipment dealers conducted by the Water Quality Association showed that about 65% of their customers were from urban and suburban areas—places usually served by municipal water systems.

Testing

So who needs in-home water treatment equipment? The only way to know is to find out what's in the water. About 85% of the population gets its water from a public water company that is regulated by the Environmental Protection Agency. Currently, the EPA regulates the presence of more than 100 contaminants in water, including lead, arsenic, radon, viruses and bacteria. The agency has also identified a number of agents that are not health hazards, but do affect the taste, color, odor and general quality of water.

Usually, the larger the water supplier, the more likely that it is in compliance with EPA standards. Even so, there may be periods when the contaminant level rises until corrective action is taken. If you want to check your water, call your water company and ask for its latest water quality report and compare it with the EPA regulations. To get a copy of the regulations, call the Safe Drink-



A complete point-of-use water treatment system may include several filters. This example shows an initial sediment filter to screen large particles. The water then passes through a carbon filter followed by reverse osmosis. Clean water is held in the storage tank.

ing Water Hotline at (800) 426-4791.

A clean bill of health at the treatment plant, however, may not tell the whole story. Water can pick up contaminants as it travels from the utility, and can even become tainted while sitting in the pipes in your home. And, if you're one of the more than 40 million people who get water from private wells, it's your job alone to monitor and control water quality.

Here are some other reasons to get your water tested:

- Private wells need to be checked at least once a year for traces of bacteria, nitrates and byproducts of fertilizers and sewage.
- Some people in your home may be unusually sensitive to contaminated water. These include the very young, the elderly, pregnant women and people with chronic health conditions.
- Wells located near industrial facili-

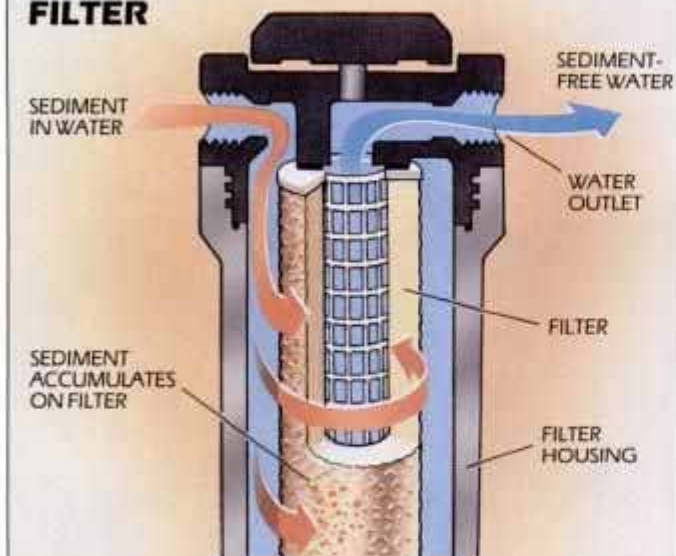
ties, chemical processing plants, hazardous waste dumps and even farms can be contaminated.

- You notice a change in the taste, color or odor of your water.
- Your home is serviced by lead supply lines or lead solder was used on your pipes.
- Tests show your house contains high levels of radon in the air.

If you suspect the presence of lead, bacteria or nitrates, contact your local health department first. Sometimes it will test your water for these contaminants free or for a nominal charge. If the health department can't help, check your *Yellow Pages* for an independent, state-certified testing laboratory. Problems such as hard water or turbidity (particles and sediment) can be checked by a local water equipment dealer.

The dealer or lab should be famil-

SEDIMENT FILTER



Sediment filters are used to remove particles and partially dissolved solids. They're often used in conjunction with a larger system to remove particles before they reach other filters.

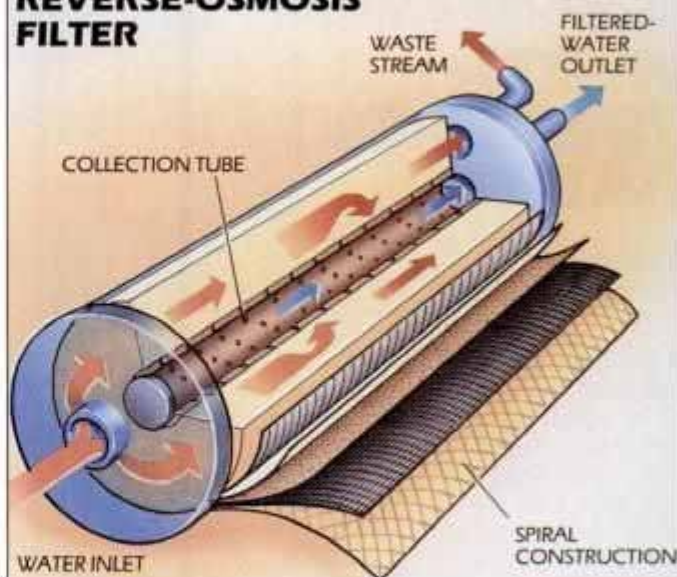
lar with local water conditions and be able to offer advice on what to test for. This is important because tests target specific problems and labs charge by the number of tests they perform. Expect to pay from \$20 for a single test to more than \$100 for a full range of tests.

The right treatment

There are two ways to treat water in your home: where the water enters your house, called a point-of-entry system, and at the tap used for cooking and drinking, called point of use. The trend in home water treatment is toward point-of-use systems. One reason is that of the 80 to 100 gallons of water each of us uses every day, only about 0.5% is actually used for cooking or drinking. Since maintenance on treatment equipment depends on the amount of water passing through the system, it makes sense to treat only the water that will be consumed. Problems that require whole-house solutions are odors, radon contamination or other impurities that can be inhaled or absorbed. The type of system you select depends on the contaminants in the water. Here are some of the most commonly used systems.

Sediment filters—If you're plagued by cloudy water, suspended particles or partially dissolved solids, you can often solve the problem with a simple filter that screens out these large impurities. Sediment filters are graded as to the size of particle allowed to pass through, and are often used as prefilters in a combined system.

REVERSE-OSMOSIS FILTER



Reverse-osmosis filter uses a membrane to screen contaminants. A percentage of the water is cleaned and collected in a storage tank. Remainder flushes away impurities.

Distillation—These units use a heating coil to turn water into vapor, leaving the impurities behind. The vapor is trapped in a condensing coil where it turns back into water and flows to a tap. Distillation units remove bacteria, radium and a number of organic and inorganic contaminants. Prices range from about \$100 to \$1000 for countertop models, to \$600 to \$1000 for under-the-sink units. Whole-house distillers can cost as much as \$4500.

Disinfecting units—These systems

are targeted at bacteria problems. In one type, an ultraviolet light kills the bacteria as it passes by the light. The transparent sleeve that holds the light must be kept clean, and particles in the water can actually shield the bacteria from the light. Other ways to disinfect water include chlorination and ozonation, which is a system for generating surplus oxygen in the water. Disinfecting units cost about \$500 to \$900.

Carbon filters—There are a variety of carbon filters designed to screen

Public Hazard No. 1

● Of all the things that can get into our water, lead is one of the most insidious and dangerous. Tiny amounts can lead to everything from learning disabilities to nervous system disorders in small children. The Centers for Disease Control in Atlanta says, "Lead poisoning is one of the most common and preventable pediatric health problems today." In adults, lead exposure increases blood pressure and can cause anemia and kidney damage.

The EPA estimates that lead in drinking water accounts for between 10 and 20% of the lead exposure cases in young children. Most of the lead found in drinking water is caused by lead leaching from pipes, as well as lead solder and plumbing fixtures found in the home.

Researchers are continually finding out just how dangerous lead can be. As of March '91, the Centers for Disease Control revised its lead-level guidelines. Now, a level of 15 or more micrograms per deciliter should receive repeat screening, and if the levels persist, the cause of the lead exposure should be removed.

The EPA is also lowering the acceptable amount of lead in public systems from 50 parts per billion to 15 parts per billion. As of July '93, all water companies will be required to test a number of homes in their areas. Suppliers must also begin to replace all of their lead service lines. There are an estimated 8000 water companies with lead lines, mostly located in the Northeast and Midwest.

If testing shows high lead levels, the suppliers must begin an anticorrosion program to stop lead leaching. The EPA expects about 40,000 of the 79,000 registered water companies to register higher than allowable levels and begin programs.

Of course, your water company isn't responsible for lead picked up from your pipes and fixtures. To find out if you have a problem, have the water tested. In the meantime, use only cold water for cooking and drinking because heat speeds up the leaching process. And, flush water that has been standing in the pipes for several hours by letting the water run until cold before using.

—F.J.D.

Finding The Right Treatment

| PROBLEM | SOURCES | SOLUTIONS |
|---------------------|--|---|
| Arsenic | Pesticide residues and industrial wastes | Reverse osmosis (RO), Distillation, Activated alumina |
| Atrazine | Pesticides and herbicides | RO, Carbon filters |
| Benzene | Fuels and solvents used in industrial chemicals, paints and plastics | Carbon and Solid-block filters |
| Lead | Lead water pipes, solder used on copper pipes | Carbon filters, RO, Distillation |
| Nitrates | Fertilizers, sewage and landfills | RO, Distillation |
| Coliform bacteria | Human and animal wastes | Distillation, Disinfection |
| Radon/Radium | Radioactive wastes, geological formations | RO, Distillation, Carbon filters |
| Metallic taste | Iron or manganese in water | RO, Water softeners, Distillation |
| Objectionable taste | Various causes | Carbon filters, RO, Distillation |
| Turbidity | Partially dissolved solids, sediment | Sediment filters |
| Soap residue | Hard water | Water softeners |
| Objectionable odor | Hydrogen sulfide or too much chlorine | Carbon filters |
| Strange color | Metals in water | Sediment filters, RO, Distillation |

Chart indicates some of the hazardous contaminants found in water and common aesthetic complaints. Combined systems may be required for certain conditions.

out certain contaminants. For example, an activated carbon filter that mounts right on the faucet may be able to remove unpleasant odors and improve the taste of water, but it takes solid-block filters to remove heavy metals such as lead or mercury. Filters designed to reduce the level of fluoride may contain activated alumina. All filters need to be replaced periodically to prevent the growth of bacteria. Carbon filters start at less than \$20 for devices

that treat water in refrigerator ice-makers. Large countertop models range from \$90 to \$200. Expect to pay \$75 to \$600 for under-the-sink units and up to \$1300 for whole-house filters.

Reverse osmosis—These systems use pressure to force water through a semipermeable membrane. The membrane is very effective at screening out most of the contaminants found in water. Once the water is clean, it goes to a 5-to-

8-gallon holding tank where it's stored until it's needed. The main drawback of reverse-osmosis systems is that for every 5 gallons used, only one or two are potable—the rest flush the membrane and carry away the contaminants. Costs range from about \$150 to \$250 for countertop models to \$500 to \$1000 for under-the-sink units.

Water softeners—These units don't improve the quality of drinking water, but they do help solve another problem. About 85% of the country has hard water—water that contains large amounts of calcium and magnesium. These minerals leave a film on clothes, dishes and even skin, and they can create scale deposits inside pipes. Water softeners work by exchanging the ions in the minerals with sodium. Units cost between \$1000 and \$3000.

Don't be surprised if you need more than one technique to take care of your drinking water. In fact, it's common for all of the techniques to be accompanied by carbon filters. A few manufacturers offer systems for do-it-yourself installation that are sold at hardware stores and home centers. But whether you're hiring a professional installer or doing the job yourself, be sure to check what each system is designed to do before buying. To obtain a list of devices that meet water industry standards, contact the Water Quality Assn., 4151 Naperville Rd., Lisle, IL 60532; (708) 505-0160, or the National Sanitation Foundation, Box 130140, Ann Arbor, MI 48113; (313) 769-8010. **FM**



Carbon filters collect impurities through adsorption. They're used both in conjunction with other systems and alone on the countertop or mounted directly on the faucet.



Distillation purifies water by first converting it to vapor, leaving impurities behind. Then, vapor is condensed for use. Countertop (above) and large-capacity units are available.

HOMEOWNERS CLINIC

BY NORMAN BECKER, P.E., Contributing Editor

Electrical Safety

Occasionally while inspecting homes for prospective buyers I find GFCI (ground fault circuit interrupter) outlets that are installed incorrectly, posing a risk to homeowners. A GFCI outlet is intended to provide ground fault protection to devices that plug into it. An added benefit of a GFCI is that it can extend that protection to outlets that follow it on the same circuit.

If it is wired incorrectly, however, the GFCI outlet itself will not have ground fault protection, but those that follow it will.

Some background is useful in understanding GFCI protection. A ground fault occurs if electricity accidentally finds its way out of its circuit and takes a path to ground through a person or a piece of metal (or often both). The GFCI will sense this and shut off current in a fraction of a second. In most cases, a GFCI can halt the current flow before injury or damage occurs.

GFCI outlets are typically installed in bathrooms, kitchens and garages because the presence of water in these areas increases the possibility for electric shock.

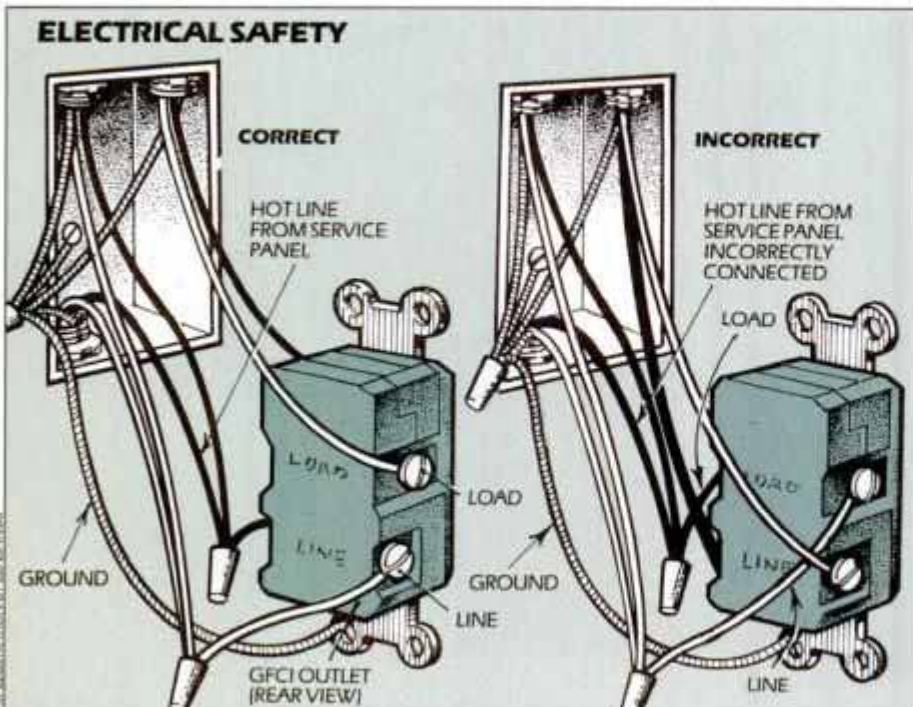
The way to find out if your GFCI

is wired correctly is to press the TEST button on its face. This should shut off power to the GFCI outlet and to those outlets connected to it.

If pressing the test button does not cause the GFCI to shut off (but those that follow it do shut off), then it may be wired incorrectly. The wiring may have been installed on the wrong side of the receptacle. The black (hot) wire from the service panel should enter the GFCI on the LINE side. The black wire that feeds power to outlets that follow on the same circuit should exit the GFCI on the LOAD side.

If pressing the TEST button shuts off power to the GFCI and the outlets that follow it on the circuit, then it has been wired correctly. In which case you must press the RESET button to close the circuit again and restore power to the outlet and those outlets on the same circuit.

The drawing shows two GFCI outlets. The outlet on the left is the correct installation. The outlet on the right shows the LINE and LOAD wiring mixed up. To correct the problem, you must cut the power to the circuit at the service panel and switch the wires, or contact a licensed electrician.



A GFCI outlet that does not trip when tested should be checked for faulty wiring. The hot black wire from the service panel should enter the outlet on the LINE side.

Latex Over Oil

Please advise me on the problem with a building that has two coats of oil-based paint and needs painting. I would like to change to a water-based paint. Would this idea be possible? I plan to perform the work myself.

CHARLES LAWRENCE
BELLE, WV

I spoke with some people at Benjamin Moore Paint's technical service department, and they said you can spread latex over oil-based paint. In fact, you can go back and forth between latex and oil. However, the wall surfaces must be properly prepared before painting.

The surfaces must be clean and free of dirt and grease spots. The paint should not be excessively chalked. A good way to ensure that the surface is clean is to have the walls power washed. Also, the wash water usually contains additives to kill mildew.

It's not necessary to prime all painted surfaces. Spot prime those areas that have been scraped to remove peeling and blistered paint.

Next, you can apply one coat of a good quality house paint, although two coats are better. A good quality paint, applied correctly, should last six to seven years.

Siding Installation

I have a cottage that I would like to install siding on this summer. Can you supply me with any information regarding the installation of aluminum and vinyl siding?

GORDON PEARCE
MONTEBELLO, CA

There are two booklets available that will answer your questions. One booklet, published by the Vinyl Siding Institute, is titled Rigid Vinyl Siding Application Instructions. The institute is making a special offer of the manual available to PM readers for \$2 (it normally costs \$4). Write to the Vinyl Siding Institute, 355 Lexington Ave., Dept. PM, New York, NY 10017.

The other booklet is the Aluminum Installation Manual. It costs \$2 from Alcoa Building Products, P.O. Box 2527, Dept. AIM, Grand Rapids, MI 49502.

DO YOU HAVE A HOME-MAINTENANCE OR REPAIR PROBLEM?

Just ask Norman about it. Send your question to Homeowners Clinic, Popular Mechanics, 224 West 57th St., New York, NY 10019. While letters cannot be answered individually, problems of general interest will be discussed in the column.

NRI training includes all the tools you need to get started.

THREE BUSINESSES YOU CAN START YOURSELF.

AIR CONDITIONING



Big Profits

Earn Big Profits as an HVAC Technician

NRI trains you to land a good-paying job, pick up extra income, even start a business of your own servicing central air conditioning systems, window units, heat pumps, commercial refrigeration systems, and more.

Training Includes Professional Tools

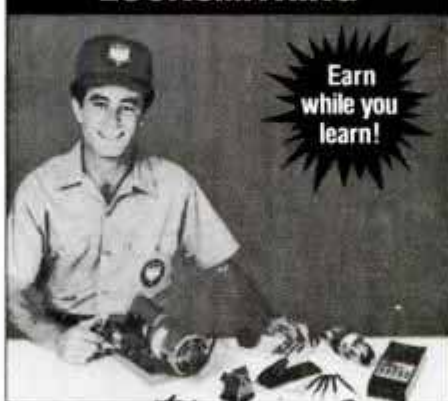
Only NRI gives you hands-on training with tools and equipment you'll use every day on the job. You reinforce the theory in your lessons with practical, real-world experience as you train with and keep a system analyzer, leak detector, tubing and joint tools, even a top-quality vacuum pump for purging systems.

Optional Postgraduate Training at York Institute

NRI course graduates are also eligible for a concentrated week of resident training at the famous York Institute at no extra charge for tuition or training materials. Here, you'll work on advanced commercial equipment under the guidance of expert industry instructors. It's a one-of-a-kind opportunity you won't want to pass up.

See for yourself how NRI prepares you for career advancement, part-time income, or a successful business of your own. Send for your free catalog today!

LOCKSMITHING



Earn while you learn!

A Fast Way to Independence

Make good money making keys, even more repairing and replacing locks, top dollar servicing safes and vaults. NRI trains you for all three in one complete course.

Income While You Learn

Includes professional key making machine and all the tools you need to start earning profits of up to 800%, even while learning. There is plenty of opportunity for the trained locksmith in replacing automotive keys, changing locks in apartment houses and office buildings, servicing business safes and vaults. NRI training and equipment can get you started today!

Be a locksmith... full-time, part-time, or as the owner of your own profitable business. Find out more by sending for your free NRI catalog now.

SMALL ENGINE REPAIR



Now includes power generator!

New Opportunities ABOUND

Equipment from lawn mowers to motorcycles is powered by small, air-cooled engines. NRI can give you the training and tools you need to start your own business in this big-demand field.

5-HP Engine, Generator Included

Your training includes a 5-HP Tecumseh engine with electronic start and a power generator you build while training. You learn to service mowers, tractors, chainsaws, weed whips, snowmobiles, ATVs, outboards, even motorcycles. Get all the tools you need for tuneups, engine diagnosis, and engine rebuilding. NRI gives you the skills and equipment you need to succeed in your own profitable engine repair business.

SEND COUPON TODAY FOR FREE NRI CATALOG!

NRI Schools

McGraw-Hill Continuing Education Center
4401 Connecticut Avenue, Washington, DC 20008

CHECK ONE FREE CATALOG ONLY

- | | |
|---|--|
| <input type="checkbox"/> Air Conditioning, Heating, & Refrigeration | <input type="checkbox"/> Automotive Servicing |
| <input type="checkbox"/> Locksmithing | <input type="checkbox"/> Microcomputer Servicing |
| <input type="checkbox"/> Small Engine Repair | <input type="checkbox"/> Security Electronics |
| <input type="checkbox"/> Building Construction | <input type="checkbox"/> Telecommunications |
| <input type="checkbox"/> Gunsmithing | <input type="checkbox"/> Electrician |
| <input type="checkbox"/> Home Inspection | <input type="checkbox"/> Electronic Music Technology |
| | <input type="checkbox"/> Basic Electronics |

We'll give you tomorrow.

For Career courses approved under GI bill
 check for details.

- | |
|--|
| <input type="checkbox"/> Computer Programming |
| <input type="checkbox"/> PC Applications Specialist |
| <input type="checkbox"/> Programming in C++ with Windows |
| <input type="checkbox"/> Desktop Publishing and Design |
| <input type="checkbox"/> Paralegal |
| <input type="checkbox"/> Bookkeeping & Accounting |

Name (Please print) _____

Age _____

Street _____

City/State/Zip _____

Accredited Member, National Home Study Council

433-0593

NEW PRODUCTS

LAWN AND GARDEN GEAR

BY ROY BERENDSOHN, Assistant Home Improvement Editor



On Hand

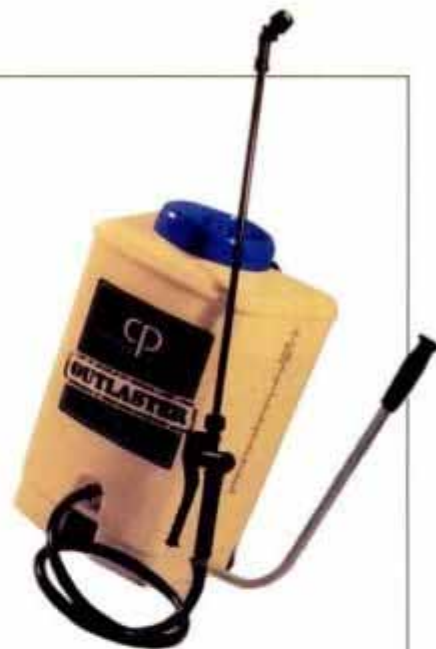
The GardenMaster line of work accessories is ruggedly constructed but lightweight, according to the manufacturer. The various belts, pouches and carriers are built from water-resistant DuPont Cordura and nylon mesh that are sewn and riveted together. Shown are the 9-pocket tote bag (about \$30) and the 11-pocket tote bag (about \$48). Also available are a waist apron, tool carriers, kneepads and a utility bag. They are sold at garden-supply and hardware stores. For more information, write Custom Leather Craft Mfg. Co. Inc., 811 W. 58th St., Los Angeles, CA 90037.

Bugs Hate It

The seeds of the Neem tree, which is found in Africa, Southeast Asia and Australia, provide the active ingredient in this insecticide that works against 30 common lawn and garden

pests, ranging from whiteflies and leafy miners to gypsy moths. Its manufacturer says it acts as a repellent, interrupts the insect's growth and stops its ability to feed. The company says that insects don't build up

a resistance to the insecticide, even after years of use. The product is also said to be less harmful to beneficial insects. An application lasts for 14 days and is supposed to be effective on trees, ornamentals and shrubs. It comes in 8-ounce, 16-ounce and 32-ounce sizes (about \$10, \$20 and \$34, respectively) and is sold at lawn and garden centers, hardware stores and home centers. Write to the Ringer Corp., 9959 Valley View Rd., Minneapolis, MN 55344.



Toss It Out

The Outlaster backpack sprayer is so rugged, its manufacturer says, it tested one by tossing it out of a truck at 60 mph and found that it still worked. The backpack sprayer holds 5.3 gallons and features padded shoulder straps. The pump handle, a piece of aluminum bar stock, is adjustable for left- or righthand operation. Spray pressure can be switched between 15 psi and 45 psi. The tank is polypropylene with ultraviolet inhibitors, and the spray hose is reinforced PVC plastic. These chemically resistant materials allow the Outlaster to spray liquids ranging from concrete sealant to herbicide. It is sold in nursery supply catalogs or from Cooper Pegler (about \$85, plus shipping), Suite D1, Carr Mill, Carboro, NC 27510.

Child's Play

Planting the seed is what this gardening starter kit is all about. It contains a reusable 36-cell planting tray with a clear-plastic adjustably vented cover, a 24-page gardening booklet, seed-starter soil, plastic row markers with stickers and two packets of playfully named seeds, such as Maxi Marigold and Harry Carrot. It costs about \$9 at lawn and garden stores and home centers. For more information, write NK Lawn and Garden Co., P.O. Box 5982 Golden Valley, Minneapolis, MN 55459.



It's Real

The UnReel holds up to 100 ft. of garden hose—or electrical cord—without kinking it, says its manufacturer. Screw the device to your house or a post and coil your hose onto it. Just flip down the bracket that holds the hose and uncoil as much as you need. The UnReel is made from a plastic with an ultraviolet inhibitor, so it will stand up to years of outdoor use, and it comes with a 2-year unconditional guarantee. It costs about \$10, postpaid. Write Ultimate Tool Group, P.O. Box 26617, San Jose, CA 95159.



Make It Easy

This polypropylene hose reel has convenient features like snap-together construction and a swinging hose port underneath that prevents kinking. The reel accepts 150 ft. of 3/8-in. hose and 200 ft. of 1/2-in. hose, and mounts to the hosebib with a 3-ft.-long reinforced leader hose. A leak-proof seal at the leader is provided by two O rings. You can remove it from its wall bracket at the end of the season. It costs about \$40 at hardware stores and lawn and garden centers. For more information, write to Melnor, 1 Carol Pl., Moonachie, NJ 07074.



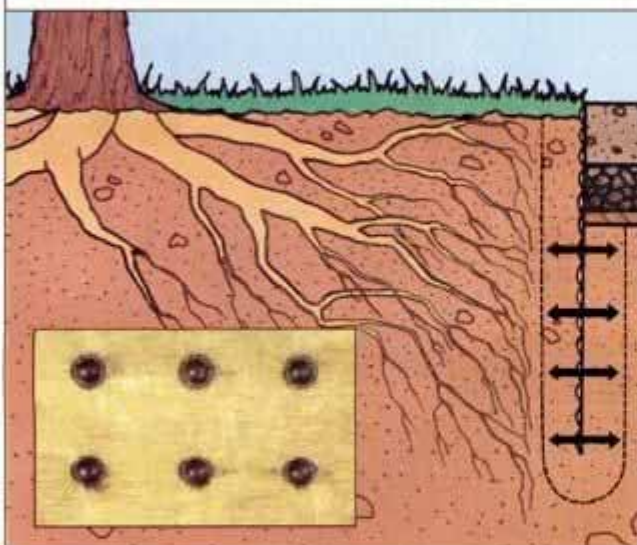
Rakish Angle

The AceleRake has bicycle handlebars that the manufacturer says help take the back strain out of raking. The polycarbonate plastic rakehead rotates through three positions: facing to the left, to the right and toward the handgrips. The AceleRake costs about \$25 at hardware stores and lawn and garden centers. It is also sold by Garden Weasel Division, Faultless Starch/Bon Ami Co., 1025 W. 8th St., Kansas City, MO 64101; (800) 892-8022.



The Not-So-Good Earth

Chemfree's Insectigone line uses diatomaceous earth and a protein lure to kill insects. Diatomaceous earth is powdered fossils of marine life (diatoms). While it feels like talc to humans, the earth contains microscopically sharp surfaces that scrape off an insect's protective wax coating. Insects walk over the earth and later dehydrate and die. The manufacturer says it works on a range of crawling insects. A 7-ounce bottle of Insectigone costs about \$7 and a 2.2-pound jug, about \$20. They are sold at hardware stores and lawn and garden centers. For more information, write Chemfree Environment Inc., 116 W. Service Rd., Suite 129, Champlain, NY 12919.



Rooting Around

This odd-looking fabric is a means to keep tree roots from growing under, and destroying sidewalks, patios and other types of ground-level construc-

tion. The fabric is Ty-par, a polypropylene material often used in landscaping. Embedded in the Ty-par are nodules consisting of Trifluralin, a root-control herbicide, which is mixed with carbon black and polyethylene. This results in a slowly released herbicide that will not leach into ground water and is only absorbed into the tree root tips, not the main body of the root. Just drape the material at the edge of the construction ditch.

A 6-in.-wide x 100-ft.-long roll of Bio-barrier fabric costs about \$20 at garden supply stores. Write Reemay, 70 Old Hickory Blvd., P.O. Box 511, Old Hickory, TN 37138.



Round And Round It Goes

Composting enters the age of high technology with this solar-powered rotating composter from Swisher Mower and Machine Co. The 12-volt composter makes five turns a day, in 2 minutes, and reduces 23 bushels of yard waste to compost in two weeks, according to the company. The device also stores enough electricity to operate 28 consecutive days under cloudy skies. It has two compartments, one for storage and one for making compost. The composter is built from 1/16-in. galvanized steel. It costs about \$500 (plus \$50 for UPS shipping) from Swisher at P.O. Box 67, Warrensburg, MO 64093.



Trash Master

The Trash Funnel is a trash-bag holder that makes loading trash bags with yard debris easier. It works with 33- and 39-gallon bags. You can use it standing up, or you can lay it on its side and sweep or rake into it. To set it up, unfold the steel-tubing legs and swing open the hinged plastic funnel. Then, attach a trash bag around the rim, beneath the funnel. To secure the bag, swing the funnel down and lock it into the snap-in brackets. The device costs about \$40. For more information, write Trash Funnel Inc., 6025 Stage Rd., Suite 42-220, Bartlett, TN 38134.



Weed 'Em Out

The Bensinger Weeder pulls weeds out by the roots, instead of slicing off the growth and leaving the root behind, according to its manufacturer. It's available in two models, a 14-in. and a 34-in. version. The shorter one has a stainless-steel shaft, and the larger version has a combination carbon-steel and stainless shaft. Both have a forged hook on the end and hardwood handles. The 14-in. model costs about \$11 and the 34-in., \$17 at hardware stores and lawn and garden centers. Write Timber Creek Mfg. Corp., 6800 S. Dawson Circle, Englewood, CO 80112.

Electric Power

The 5-gallon Troy-Bilt sprayer is powered by a 12-volt battery and gives you about 1 hour of spraying (enough time to spread about 15 to 20 gallons of fertilizer, herbicide or pesticide). The battery is recharged in about 12 hours. Its other nice features include a translucent and chemical-resistant plastic spray tank, which is removable. The tank is fastened with a bungee cord, so it's quick to swap it for an accessory tank with different chemicals. It also has an adjustable nozzle that sprays patterns from a mist to a pencil-point stream that reaches 20 ft. It costs about \$325 from Garden Way Inc., 102nd St., Ninth Ave., Troy, NY 12180.



Tools Of Their Own

One way to get kids interested in gardening is to give them their own tools. Plastic shovels, spades, a leaf rake, a garden rake and a hoe are included in this tool line for children at least 3 years old. Another slightly larger and heavier line is available for children at least 7 years old. These tools are made from carbon steel, polypropylene plastic and have hardwood handles that are sealed for moisture protection. A gift set of a shovel, garden rake and hoe costs about \$28 for the older kids. (The same set for 3-year-olds costs about \$22.) The tools are also sold individually. Both types of tools are sold at hardware stores and home centers. Write Ames Lawn and Garden Tools, P.O. Box 1774, Parkersburg, WV 26102. **PM**

We have seen
the future and are
prepared to meet it,
side on.

The 1993 Buick Roadmaster Sedan meets the 1997 federal side-impact standard — four years in advance.

By 1997, all automobiles will be required to meet a new federal safety standard for side-impact collisions. But you don't have to wait four years to have the assurance of a safer automobile. You can have it now.

Safety

The 1993 Buick Roadmaster Sedan meets the 1997 federal

safety standard today, four years in advance. With a standard driver air bag, anti-lock brakes and a full-perimeter frame, the Roadmaster Sedan is a very safe car to drive.

Luxury

Safety isn't the only impressive feature on this luxury automobile. With its patented DynaRide® suspension system, the Roadmaster Sedan can handle

the road with comfort, style and elegance.

Commitment

Buick is committed to producing a safer luxury automobile. So to see what the future has to offer, take a test drive at your local Buick dealer today.



Freeze frame of actual side-impact safety test

Or call 1-800-4A-Buick for more details and information. The future is only a test drive away.




BUICK

The New Symbol For Quality
In America.



1993 Roadmaster Limited Sedan

 ©1993 GM Corp. All rights reserved.
Roadmaster is a registered trademark of GM Corp.
Buckle up, America!

**HOME
 IMPROVEMENT**

**RETROFIT
 WIRING**

BY MERLE HENKENIUS
 PM Illustrations by
 George Retseck

● Have you wondered how you might add a switch, light or receptacle to your home with all those finished walls, ceilings and floors concealing the wiring? Well, take heart. With a little careful measuring and a complement of luck, you can easily run cable through ceiling and wall cavities and with little or no drywall repair.

Fishing cable, as it's known, is not new. Electricians have been upgrading electrical systems in this manner for years, and you can do it too. Although the job is time consuming, it's not that difficult.

Circuit size

To find the code-legal capacity for an existing circuit, count how many receptacles are on each circuit. To do this, shut off one circuit breaker at a time (at the service panel) and count the de-energized outlets.

Just move around the house with a voltage tester, desk lamp or power tool, and plug it into every receptacle. Assign each de-energized receptacle on a circuit a value of 1.5 amps.

At that rate, a 15-amp circuit will, according to the National Electrical Code, accommodate 10 receptacles, and a 20-amp circuit, 13 receptacles. The amperage ratings are found on the breaker switches. You can add additional outlets and fixtures to any circuit that does not have its full allotment of outlets or fixtures (the addition must not exceed the current capacity of the circuit). Also, if you find a free space in your service panel, you can add a new circuit.

A few cautionary words are in order here. Circuits dedicated to appliances, such as a clothes washer, are best left alone. Don't tap into an appliance circuit to add a ceiling fixture. Instead, tap into an existing lighting circuit or one for a bedroom. Similarly, don't tap into the circuit that runs power to outlets above the kitchen counter.

Remember to match existing wire sizes. A 15-amp circuit will generally contain 14-gauge wires, while a 20-amp circuit will require 12-gauge



wires. If the existing circuit is grounded, then the cable you install should contain a grounding conductor as well. If the electrical system in your house is old, or you are unsure of how to ground the new wiring or circuit, consult an electrician.

Of course, always flip the circuit breaker or pull the fuse on any circuit you are working on.

The right equipment

In many cases, all you need to fish electrical wire are a cut-in box, sheathed cable, a screwdriver, utility knife and drywall saw. In some cases, a length of sash chain is handy.

For a short run, a piece of coat hanger wire will serve as a fish tape. For longer reaches, a factory-made fish tape will save you hours of frustration. This costs about \$20.

Fish tape is a thin, coiled steel ribbon that has a hook on one end. It's rigid enough to push through a wall

cavity, yet flexible enough to make tight radius bends.

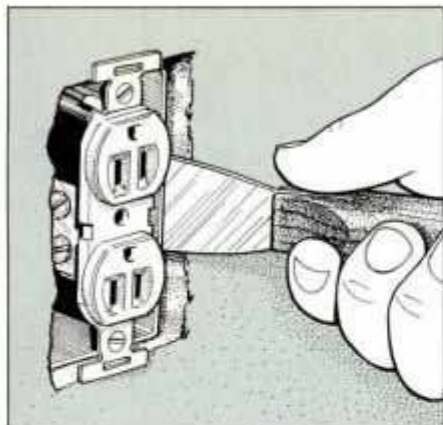
In cases where locating wall and ceiling framing is difficult, or where you might have reservations about using steel fish tape in the presence of old wiring, we have included two helpful products on page 77.

A back-to-back route of access

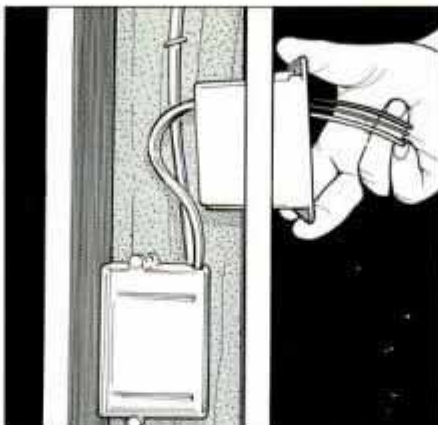
Some circuits are easy to expand. If you want to add an outlet on a living room wall, check the wall's back first. In many cases, you can pull power from a bedroom receptacle on the wall's opposite side.

To do this, start by measuring carefully from a common feature on the wall, such as a door. The existing receptacle box will be mounted on a stud. The new box, known as a cut-in box, will not be mounted on a stud.

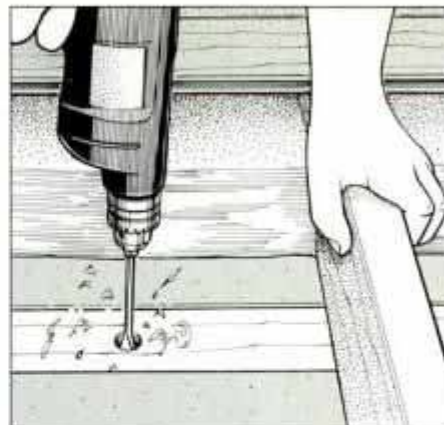
To determine where to put the cut-in box, poke a putty knife between



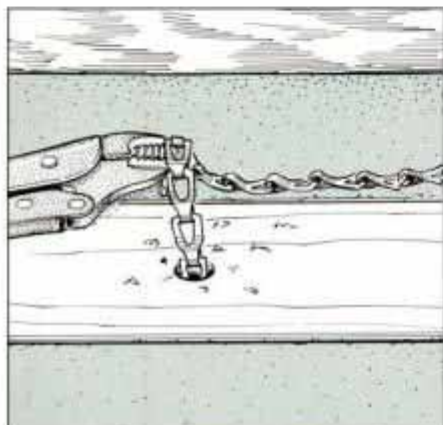
1 To determine which side of a stud holds an electrical box, slide a putty knife between the drywall and the box.



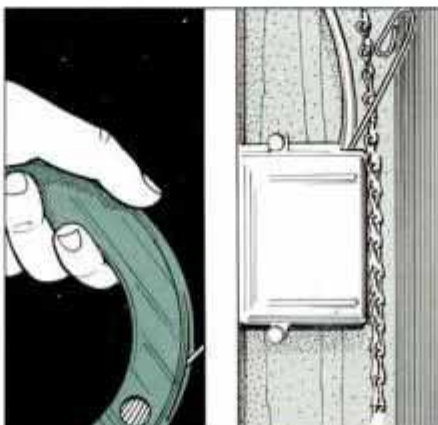
2 Mount the cut-in box a few inches away from the box that's nailed to the stud. The cut-in box mounts to the drywall.



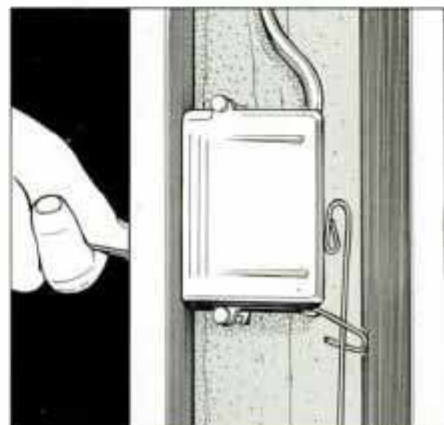
3 To gain access to the wall cavity from the attic, bore through the 2 x 4 (or rafter) that forms the top of the wall.



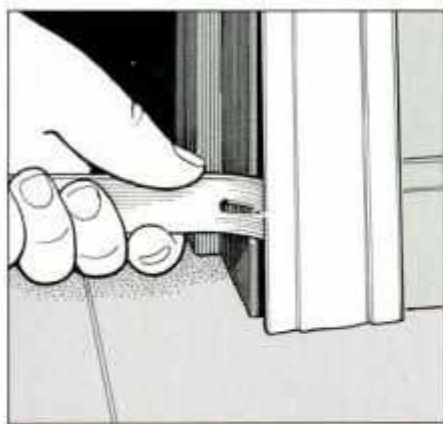
4 Drop a sash chain through the hole bored in the 2 x 4. Hold the sash chain in place with locking pliers.



5 Poke the fish tape through the electrical box and snag the sash chain. Bring the sash chain into the box.



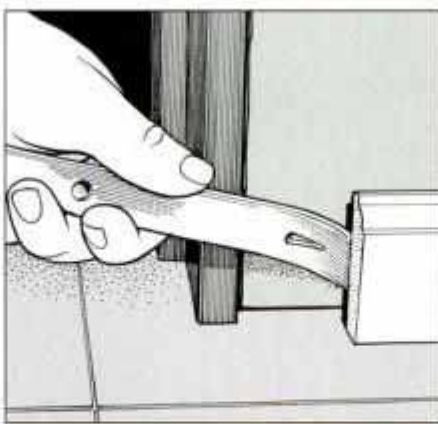
6 When working from the basement, feed the fish tape up to the electrical box. Snag the tape with a piece of wire.



7 Some retrofit wiring jobs require hiding cable behind the trim. Begin by prying off the door casing.

the outside of the receptacle box and the edge of the drywall (Fig. 1). Do this on both sides of the box. The putty knife will go in up to the stud on one side, but on the other side it will not hit the stud. This is the side on which you install the cut-in box.

On the opposite side of the wall, mark and cut the opening for the cut-in box a few inches from the existing



8 Remove the baseboard molding. Begin prying at the end nearest the door, and work toward the molding's other end.

box. Run wire from the existing box to the opening. Push the wires through the cut-in box and install the box in its opening (Fig. 2). Now install the new receptacle in the cut-in box.

Moving laterally along a wall

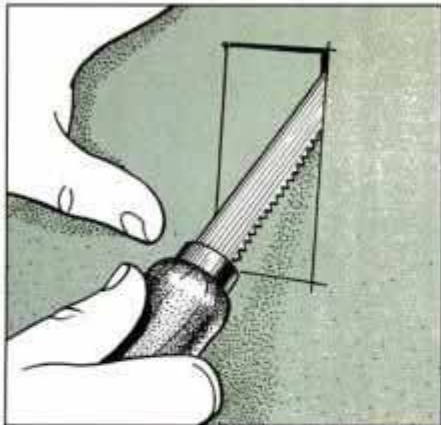
When extending cable along a wall, in most cases, you will have to run cable

from the basement or the attic. Which way you run the cable depends on which is unfinished. If both are unfinished, it's generally easier to work from the basement.

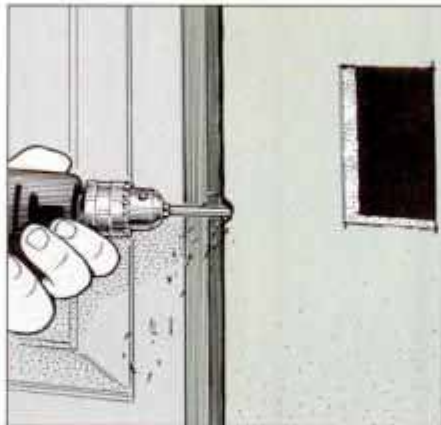
If you work in the attic, you'll need to move the insulation aside to find the top of the walls through which you will bore holes to run cable. The wall will run parallel to the ceiling joists or perpendicular to them. If it runs parallel to the joists, look for a drywall nailer (two 2 x 4s or one 2 x 8) that appears to lay on top of the drywall (which is the back of the ceiling below). A wall perpendicular to the joists is evident by the horizontal 2 x 4 that forms the top of the wall.

After measuring carefully from a reference point, bore one hole to tap into the circuit and another to run the cable (Fig. 3). Next, lower an 8-ft.-long sash chain into the stud space from above. Secure the chain with a pair of locking pliers (Fig. 4).

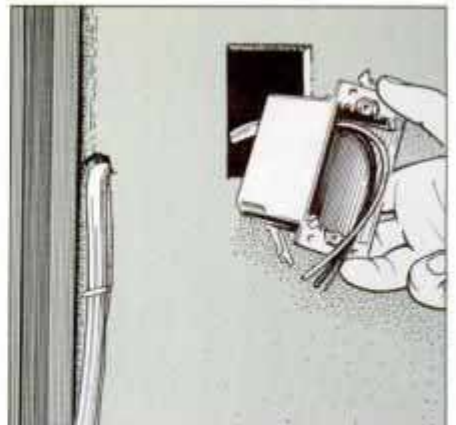
Poke the fish tape through the box opening (the one you are pulling power from) and snag the dangling sash



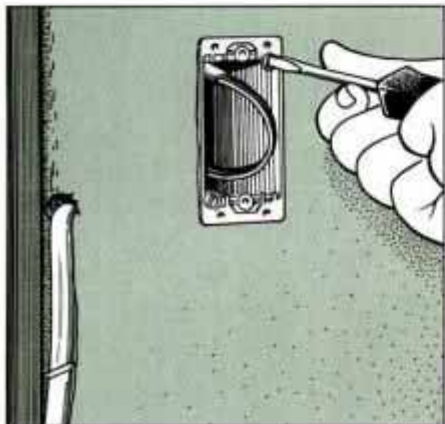
9 Mark the outline of the wall-switch cut-in box. Center the box 46 in. from the floor, and cut out the opening.



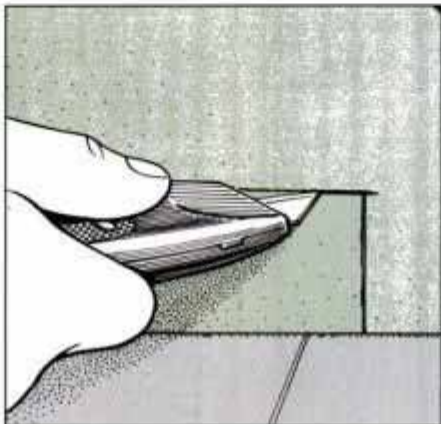
10 Bore into the stud space to provide a path for the cable. Cable will run from the switch and along the doorjamb.



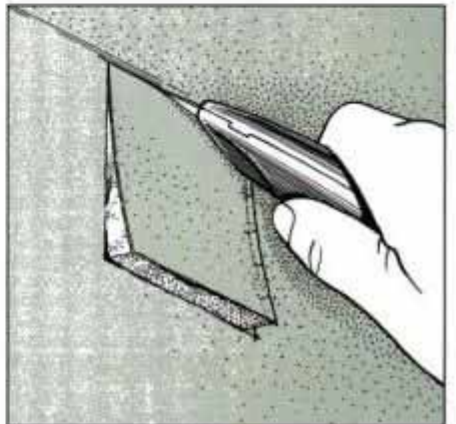
11 Run the cable into the cut-in box. Fold down the wing fasteners on the box's back and install the box.



12 Tighten the cut-in box's screws. Wing fasteners bear down against the drywall, holding the box in place.



13 Cut out a section of drywall from where the trim was removed. The opening should be about 2½ in. high.



14 Directly above the opening at the floor cut out another opening where the wall and the ceiling meet.

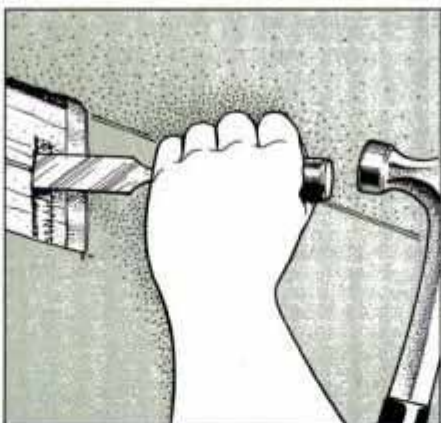
chain (Fig. 5). Pull the chain into the box, and attach the new cable to it. Pull the chain and cable into the attic. From the attic, feed the cable into the next hole and push it down to the new opening.

Do not lay cable on top of the ceiling joists. If the cable runs across a joist, bore a hole through the joist and run the cable through the hole. If the cable runs parallel to a joist, staple the cable to the joist's side. Space staples 4 ft. apart.

When working from the basement, instead of using a chain to gain access to the existing box, push the fish tape into the stud space from the basement and snag it through the box with a coat hanger (Fig. 6). Then use the fish tape to pull the cable through the box and into the basement.

Fishing cable through a completely finished home

It's difficult to fish cable in homes built on concrete slabs and those where both the basement and second floor are finished. If your electrical

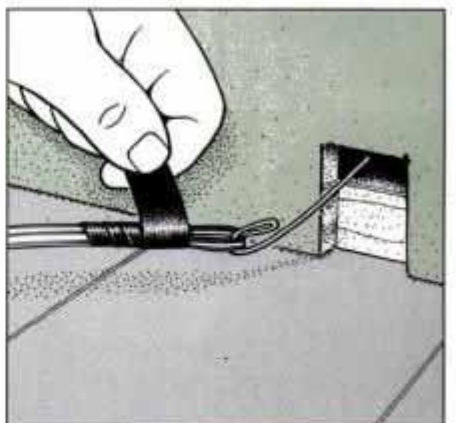


15 Chisel a path for the cable through the wall framing. This is done most quickly by making a V-shaped cut.

work is on the first floor, you won't be able to work from the attic or basement.

Let's say, for example, you want to replace a pull-chain ceiling light with a newer fixture, and you want to control the new fixture from a wall switch near the door.

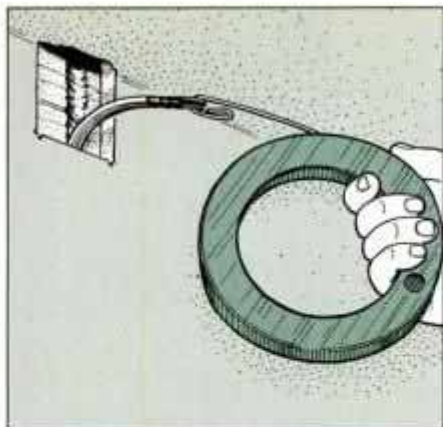
This procedure requires that you fish the wire along the joists, and not



16 Poke the fish tape down through the wall. Bend the cable around the fish tape and tape the two together.

across them. You must first determine the direction of the joists relative to the wall on which you will mount the switch.

Joists generally run in the same direction that the roof slopes. If the wall switch will be mounted perpendicular to the joists, then you can fish the cable straight from the wall to the ceiling fixture.



17 Pull the cable through the wall with the fish tape. Pull up some excess cable and leave it dangling.

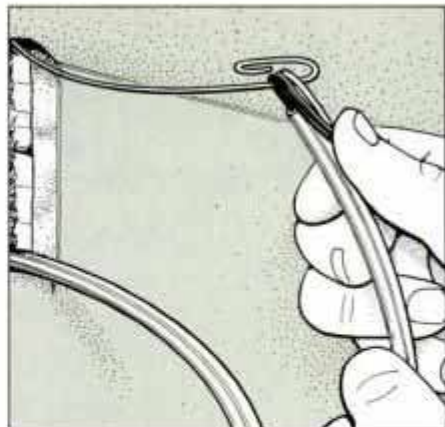
If the wall the switch is to be mounted on is parallel to the joists, you will have to fish the cable to one wall and around the corner to the wall that is parallel to the joists.

Begin the installation by carefully prying off the door trim and baseboard using a flat pry bar (Figs. 7 and 8). Mark for the cut-in box and cut its opening (Fig. 9). Center the box 46 in. from the floor.



18 Feed the fish tape through the ceiling fixture and push it through the ceiling cavity to the cable.

Next, bore at an angle from the doorjamb into the stud space (Fig. 10). Feed the switch cable into the stud space and the cut-in box opening. Leave yourself enough excess cable to install the receptacle. Then press the cable near the box into the space between the drywall and the doorjamb. Hold the cable in place with a staple, and install the box (Figs. 11 and 12). Run the cable to



19 Hook the cable around the fish tape. Pull the cable through the ceiling cavity and out through the fixture.

the floor, stapling it as you go.

Next, cut a hole in the wall at floor level and across from the fixture (Fig. 13). The hole must be at least 2½ in. high, but not so high that it will show above the reinstalled baseboard. Next, directly above this hole, cut another hole at the corner where the wall and ceiling meet (Fig. 14). This opening must be about 3 in. wide x 4 in. high.

Generac 3500XL* and 2500XL* Portable Generators

Contractor
Quality.
SMALLER.
quieter.

LESS FUEL
CONSUMPTION.
*Emergency Power
for your home.
Recreational Power
for your campsite.*

Generac's New
GN-190 OHV engine
delivers 3 to 5 times
the operating life of
conventional portable
generator engines.



GENERAC

*EXTENDED LIFE GENERATORS 2 Year Limited Warranty

HARDER
WORKING
AND MORE
RELIABLE
THAN THE BEST
KNOWN IMPORTS
AT ABOUT
HALF THE
PRICE

Available at your
local retailer.
Buy now and receive
a FREE wheel kit,
valued at
\$49.99

Offer expires
June 30, 1993.

Call 1-800-333-1322 for the participating store nearest you.

ARROW®

Quality Tools Even Your Teenager Can't Destroy!



ARROW... Built To Last.

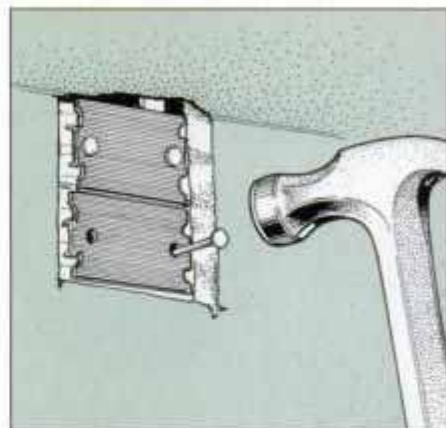
For the teenage hobbyist, the serious home craftsman or the professional, only ARROW has the quality and rugged reliability to make every job go smoother and easier...for better results.



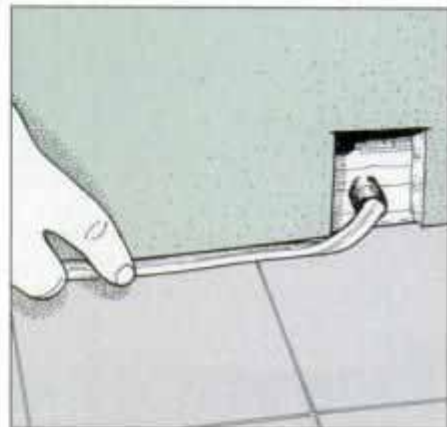
See the complete assortment of ARROW FASTENING TOOLS, STAPLES, FASTENERS, GLUE STIX and RIVETS at leading Home Center, Hardware, Department and Discount Stores.

In U.S.A.: Arrow Fastener Company, Inc., 271 Mayhill Street, Saddle Brook, N.J. 07662

In Canada: Jardel Distributors, Inc., 6505 Metropolitan Blvd. East, Montreal HIP 1X9 Quebec



20 Before patching the hole, nail metal protection plates over where the cable crosses the wall framing.



21 Tuck the cable neatly into the space below the drywall. Be careful later not to nail through the cable.

With the drywall cut away, use a chisel to cut a V-shaped channel in the wall framing for the new cable (Fig. 15).

Next, push the fish tape down from the corner hole to the hole at floor level. Tape the cable to the fish tape and pull the cable up to the ceiling (Figs. 16 and 17).

Next, push the fish tape through one of the cable openings in the existing ceiling box (Fig. 18). Feed the fish tape through the joist space to the corner hole and pull it through. Connect the cable to the tape and pull both back to the ceiling box (Fig. 19). Install the new fixture and wire the switch loop.

To complete the job, nail metal protection plates over the cable to keep drywall nails from piercing it and tuck the cable neatly under the drywall (Figs. 20 and 21). As for replacing the trimwork, remember where the cable runs and nail accordingly. And, of course, if you live in a code-enforced area, be sure to call for an inspection before you conceal your work.

PM

As Seen in

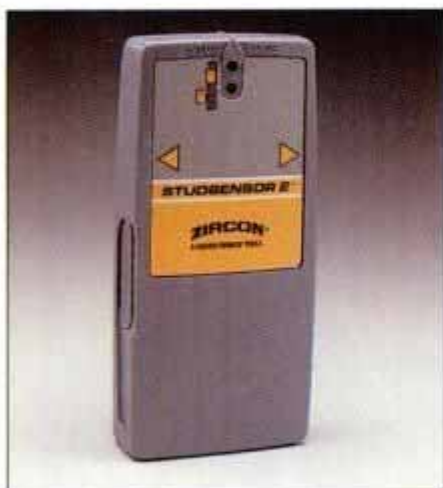
PM

Popular
Mechanics

This product feature mark is available for advertiser use.
Contact your PM sales representative for details.

NEW PRODUCTS

NEW WIRING PRODUCTS



● Zircon's Studsensor 2 is a device that helps you quickly locate ceiling joists and wall studs. To use it, first press its calibration button to adjust for wall or ceiling density. One LED (light-emitting diode) indicates when the tool is drawing near a framing member, and the other LED blinks on when the sensor reaches the edge of the stud or joist. It costs about \$16 at hardware stores and home centers. Write Zircon Corp., 1580 Dell Ave., Campbell, CA 95008.

If you're a serious home mechanic, or a full-time contractor, and you have a lot of cable fishing to do—in the presence of old wiring with faulty insulation—this professional-quality plastic fish tape may help. Since it is plastic, it's less likely to cause a problem if you accidentally bump into poorly insulated live wiring. And, according to its manufacturer, it's flexible enough to make tight turns easier to negotiate. It comes in six models from 25 to 100 ft., and prices range from about \$90 to \$170. It's sold at Klein tool distributors. Write Klein Tools, 7200 McCormick Blvd., Chicago, IL 60645.

—Roy Berendsohn



Does Your Garage Door Opener Have A Weak Link?

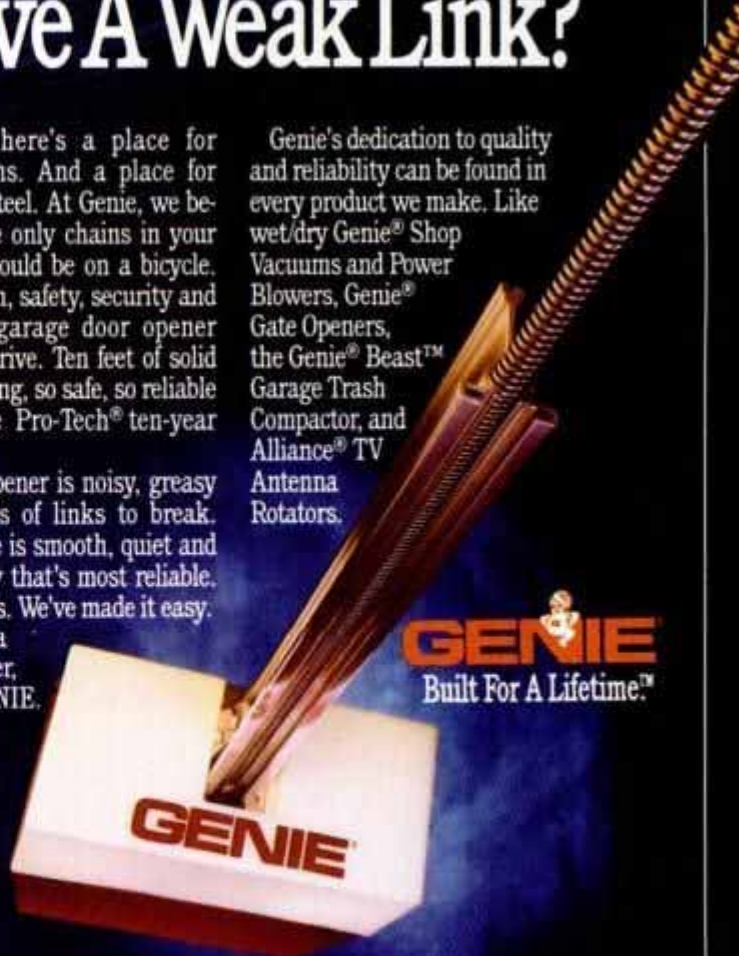


There's a place for chains. And a place for solid steel. At Genie, we believe the only chains in your garage should be on a bicycle. For strength, safety, security and reliability your garage door opener should be screw drive. Ten feet of solid steel that's so strong, so safe, so reliable we can offer the Pro-Tech® ten-year warranty.

A chain drive opener is noisy, greasy and has hundreds of links to break. Genie Screw Drive is smooth, quiet and made the one way that's most reliable. The choice is yours. We've made it easy.

For the name of a nearby Genie dealer, call 1-800-OK-GENIE. In Canada, call 1-800-363-0955.

Genie's dedication to quality and reliability can be found in every product we make. Like wet/dry Genie® Shop Vacuums and Power Blowers, Genie® Gate Openers, the Genie® Beast™ Garage Trash Compactor, and Alliance® TV Antenna Rotators.



GENIE
Built For A Lifetime.™



If You Don't Use Genuine Toyota Parts, You May Not Be Such A Popular Mechanic.

The wife says, "Let a professional fix it." You prefer to do it yourself. And if you don't use Genuine Toyota Parts, you may find yourself in a rather awkward situation.

The truth is, unlike wanna-be aftermarket parts, only Genuine Toyota Parts are made to official Toyota factory specifications and workmanship. So not only

do they fit right, but reliability is built right in.

Take our oil filters, for example. They have an anti-drainback valve which doesn't allow oil to drain back once the engine's been stopped. This permits instant lubrication when you restart your engine.

You'll also know exactly where to go for the right part. Right away. For a price that's

right on the money. And that's your Toyota dealer.

So insist on Genuine Toyota Parts. It could possibly be the best thing you can do for her Toyota. And your popularity.

**PARTS &
SERVICE**

"I love what you do for me."

 **TOYOTA**

SPECIAL SECTION

CAR CARE *Guide*

**Keep
Your Car
Running
And
Looking
Great**

**HOW TO
TUNE UP
YOUR**

- ENGINE
- CHASSIS
- INTERIOR
- EXTERIOR

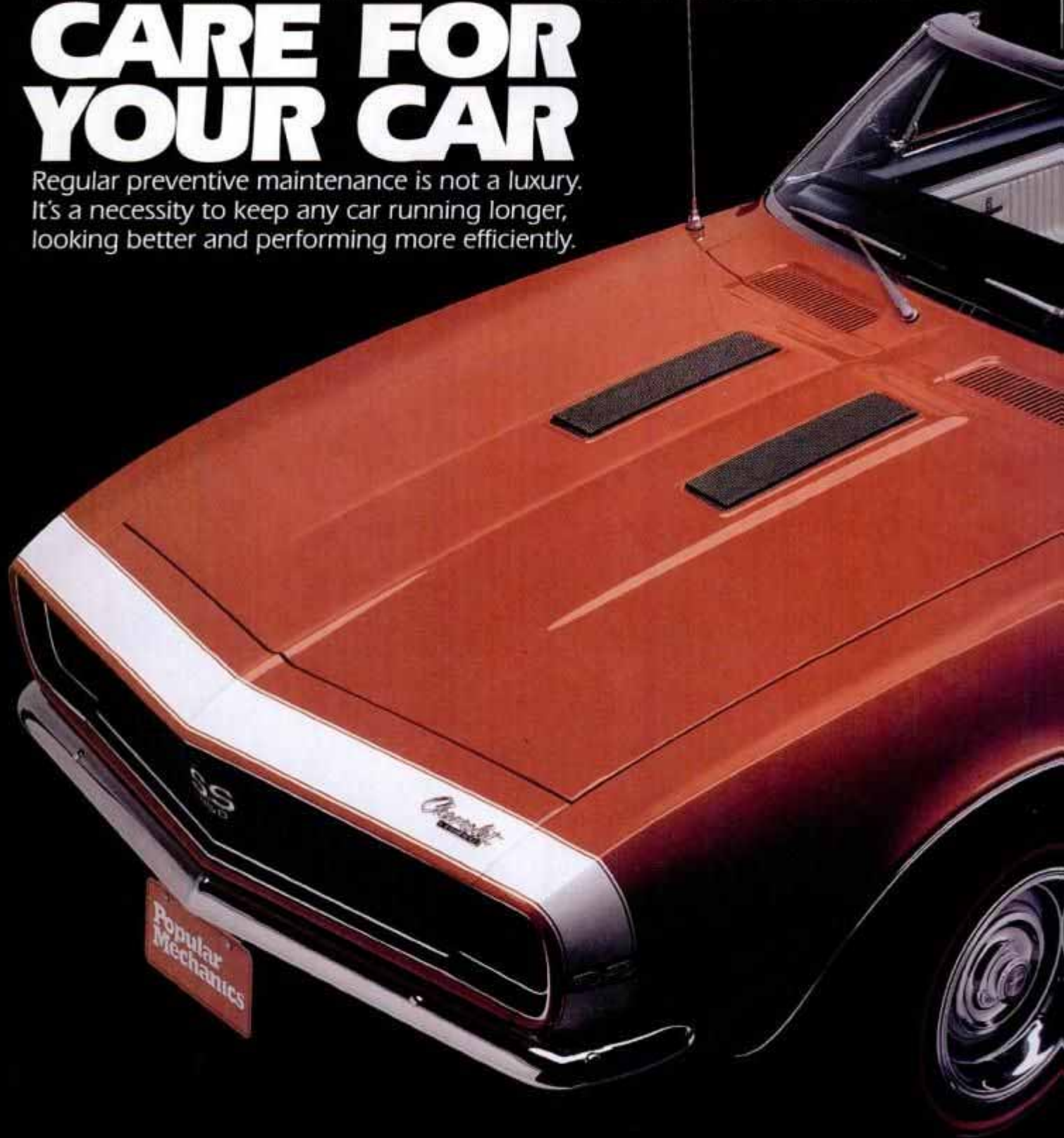
**5.0L
VALVE**

PM PHOTO BY BILL ASHE



WHY YOU SHOULD CARE FOR YOUR CAR

Regular preventive maintenance is not a luxury. It's a necessity to keep any car running longer, looking better and performing more efficiently.





• No two ways about it, there have been fundamental changes in how and why we driveway mechanics maintain and repair our cars.

Modern cars depend heavily on sophisticated computers and electronics for normal operation. Conventional wisdom says this leaves shade-tree mechanics walking because the thing is beyond the ken of any normal human.

Conventional wisdom is, as is often the case, wrong. For openers, 95% of your car is unchanged from the simple mechanical beast it always has been. Sure, struts are replacing A-arms, and most cars have disc brakes rather than drums. You still need little more than mechanical savvy, patience and a set of sockets.

The computer will require two additions to your toolbox. One is the factory emissions-control manual and the other is a realization that the average factory service technician went to the same high school you did. The only difference is his training.

With sticker prices looking like real-estate listings, 48- or 60-month financing has become the norm. This means that you'll be living with your new car for longer than the duration of the average marriage.

Whether it's a commuter special or a shiny red muscle car, it better last the distance—and have enough residual value to cover the down payment on your next rolling mortgage.

Fleet managers all know that preventive maintenance is cheaper in the long run than finger-in-the-dike repair. With repair shops charging nearly the same hourly rates as lawyers, any maintenance you can handle on your own goes a long way toward keeping an expensive necessity of life on the road.

Add to this the satisfaction of doing it yourself. Aside from knowing what to do in the eventuality of a roadside breakdown, there's the added satisfaction of avoiding potentially unscrupulous, or at least money-hungry, tow-truck highwaymen.

Another downside to keeping a car around longer is that it can start to look as if you've been delivering goats in it. Even though cruddy carpets and paint chips won't affect the ability of your ride to get you to work, keeping up appearances will make your old car seem less old and enhance its resale value.

Finally, at the risk of sounding politically correct, there is the added attraction of keeping a well-tuned vehicle—one that uses the minimum amount of fuel and emits the smallest amount of pollutants into the atmosphere.

—Mike Allen

THE WHOLE CAR TUNEUP TUNE UP YOUR ENGINE



Replace spark plugs periodically for optimum performance and clean exhaust. Match your original plug type, heat range and electrode reach. Gap the replacement to specs.

● For most of us, the days of tuning our car's engine by adjusting the distributor breaker points and the carburetor's idle mixture are long gone. However, despite the demise of these former staples, engines still need to be regularly tuned and maintained. And despite the daunting presence of sophisticated and sealed electronic components, the competent do-it-yourselfer can still affect major improvements in the performance, fuel efficiency, exhaust emissions and longevity of a vehicle by looking past the old concept of a tuneup.

Staying with the basics

For one thing, internal combustion engines still run on a combination of fuel, air and ignition—just as they did a hundred years ago. So a logical place to start your engine's tuneup still is by replacing its spark plugs at the manufacturer's recommended interval.

Carefully examine each spark plug as you remove it. The electrodes should be a light golden-brown or grayish-tan. Anything else indicates a problem in that cylinder.

If a plug is choked with carbon,

that cylinder has been running on an overly rich fuel/air mixture. If the problem is specific to only one cylinder, it can be due to a faulty fuel injector. If all the plugs are carbon rich, look for a clogged air cleaner. In all likelihood, with even one spark plug carbon fouled, your car would fail a state emissions control test by having an excessively high level of hydrocarbons (HC).

If the white ceramic insulator tip around the center electrode is blistered, the cylinder has been running too hot, or with an overly lean fuel/air

mixture. An overheated cylinder can be due to carbon deposits in the combustion chamber causing some detonation or due to a restriction in the coolant passages around the combustion chamber. A lean fuel mixture in one cylinder can be due to a fuel-injector problem or a vacuum leak.

If all the plugs are overheated, the ignition timing may be too advanced or there may be a larger, more general cooling-system problem. In this case, there is a good chance that the exhaust may have contained a too-high level of oxides of nitrogen (NO_x) to pass an emissions test.

If one or more of the spark plugs comes up oily or sooty, it may be oil soaked from defective piston rings or leaking valve guides. If two adjacent plugs are fouled, it may be due to a blown head gasket between the cylinders. If only the plug at the end of the cylinder head (or cylinder heads on V-type engines) is fouled, it may be due to blocked oil drain holes in the cylinder head, creating a large pool of excess—and dripping—oil around the valve stems. Sooty plugs are bound to peg the needle of the HC meter at an emissions test.

Make sure that the replacement spark plugs are of the same size, heat range and electrode reach as the ones you're replacing. Plugs that burn too hot or have electrodes which are too long can cause detonation. In addition, an incorrectly installed, long-reach electrode plug can damage the piston crown by actually coming into contact with the piston.

Plugs that run too cool or have too short of an electrode reach can burn inefficiently, hurting performance and emissions.

Make sure that the threads in the cylinder head in the spark-plug hole are clear, free of carbon and deposits, before installing the new plugs. If not, use a thread-chasing tool to clean the threads. Put a dab of grease on the cutters of the thread chaser to hold the debris as it cleans, preventing the pieces of carbon from falling into the combustion chamber.

Adjust the gap of the new spark plugs to factory specifications and put a dab of antiseize compound on the threads of each plug.

It's also a good idea to coat the inside of the spark-plug wire boot with some silicone spray or dielectric grease to seal out moisture and make it easier to remove the wire on the next spark-plug change. When you remove the spark plug's wire before changing the plug, grasp and pull only on the wire's heavy boot, either with your fingers or a special spark-plug boot puller. If you yank on the wire itself, you could damage it.

As a matter of fact, it's good practice to replace the spark-plug wires every three or four spark-plug changes. Heat and underhood contaminants can degrade the insulation of the plug wires, allowing the 20,000-40,000 volts needed to create the plug's spark to leak out of the plug wire. This causes misfire, killing performance and emissions.

Install replacement plug wires one

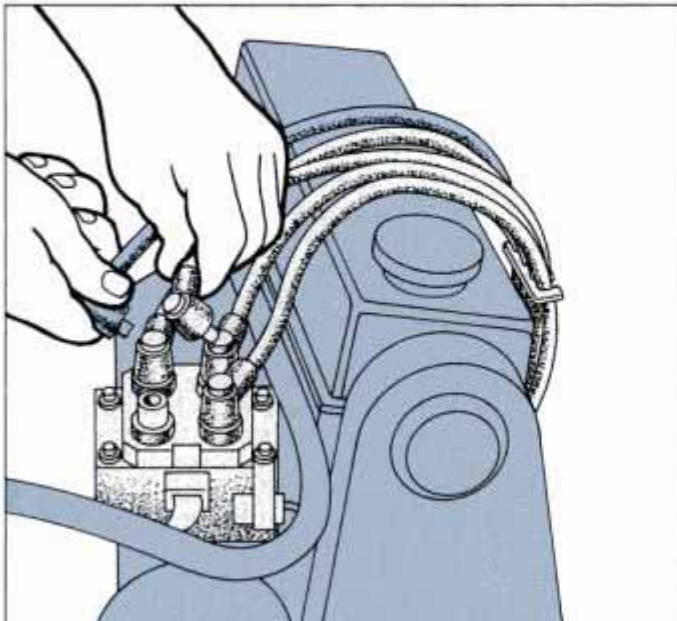
at a time, working your way around the engine. Follow the routing of the old wire with the new one, being sure that the wire does not foul against accessories or the exhaust manifold.

To help prevent magnetic-field induced cross-fire, it's a good idea to have the wires of consecutively firing spark plugs (check the engine's firing order) cross each other infrequently, if at all, and at right angles. Just follow the original factory lead dress and you'll be fine. And remember to coat the insides of both working ends of each spark-plug wire with silicone or dielectric grease.

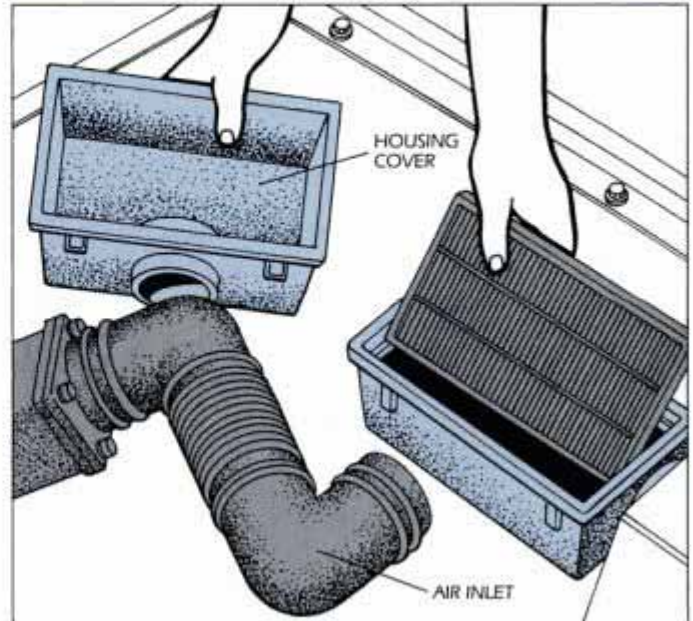
After the plugs and their wires are reinstalled, check the ignition timing. Even though the engine computer controls timing on most new engines, it's not a bad idea to verify that the computer is right. And there are still many vehicles on which there is room for some adjustment to the ignition timing. Follow the timing procedure for your engine as outlined on the underhood tuneup decal.

Timing checks may involve disconnecting and plugging one or more vacuum hoses, undoing some wiring connections and possibly temporarily altering idle speed. Then use your trusty timing light to check the position of the timing marks on the front crankshaft damper or, depending on your car, flywheel. Before starting the engine, however, you may want to clean and highlight the timing marks using white chalk, shoe polish or typing correction fluid.

If the timing is correct, reconnect



To prevent firing-order problems, replace spark-plug wires one at a time. Coat connections with silicone lubricant.



When replacing the air-filter element, check the housing and the air-inlet ductwork for holes, cracks and other damage.

everything you undid. If it's off and there is room for adjustment at the distributor, make the adjustment and recheck. Be sure to snug the retaining bolt and recheck the timing.

If the timing is incorrect and it is computer controlled, bring the car to your dealership. If the vehicle is less than 5 years old and has less than 50,000 miles, the engine computer is covered by the federally mandated emissions system warranty.

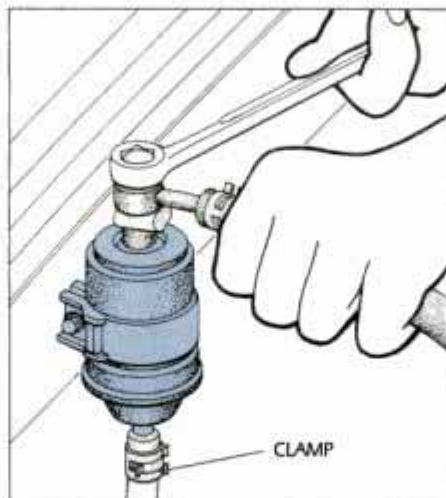
Cam time

Besides the computer-controlled timing of electronic pulses for ignition spark and fuel-injector firing, your engine relies on precise timing of valve openings and closings for optimum performance. While camshaft timing is not something that's readily adjustable—other than by replacing the camshaft—you do not want cam timing to wander from where it should be—as when the timing belt jumps a couple of teeth on its sprocket. To prevent that from happening—which could result in bent valves and broken pistons—you should replace the camshaft timing belt at least as frequently as your carmaker recommends.

Replacing the camshaft belt usually involves aligning timing marks on the camshaft drive sprocket and crankshaft sprocket (check your manual for specifics), removing a belt tensioner and slipping off the old belt. However, access to the timing belt can be limited on the typical transverse-engine front-driver—the type of car most likely to need a belt replacement. You may have to remove the alternator, power-steering pump and air-conditioning compressor in order to get the belt cover off. It's good practice to replace the drivebelts for those accessories twice as frequently as you replace the camshaft belt.

Clean in, clean out

Given the close machining tolerances of the modern fuel-injection system, it is more critical than ever that you change the fuel filter with each tuneup. However, since many vehicles have the fuel filter mounted away from the engine—often in a



Use the proper wrench when loosening and tightening fuel fittings. Relieve fuel pressure before cracking the fitting.

rear wheel well or under a frame rail—it is often neglected. However, before removing the old fuel filter, relieve pressure in the fuel system.

Fuel-injection systems are pressurized to ensure that gasoline at the injectors will spray when the injector fires—including when starting. Therefore the fuel between the pump (typically in the fuel tank) and the injectors can be at 35-40 psi, even when the engine is off. To prevent a dangerous spray of gasoline when you

remove the fuel filter, pull the fuel pump's fuse from the fuse panel and crank the engine for several seconds.

Drain the fuel from the old filter into a clean container. Pour it back into the fuel tank, through a cheese cloth to remove large impurities. Install the new filter, noting inlet and outlet. Check the fuel hose ends near the filter, if they are cracked, hardened or mushy, replace the fuel hose. Use new clamps. Check steel fuel lines for kinks, cracks and corrosion. Also check all fuel connections for signs of leaks. Try tightening leaking connections. Otherwise replace the fuel lines and connectors.

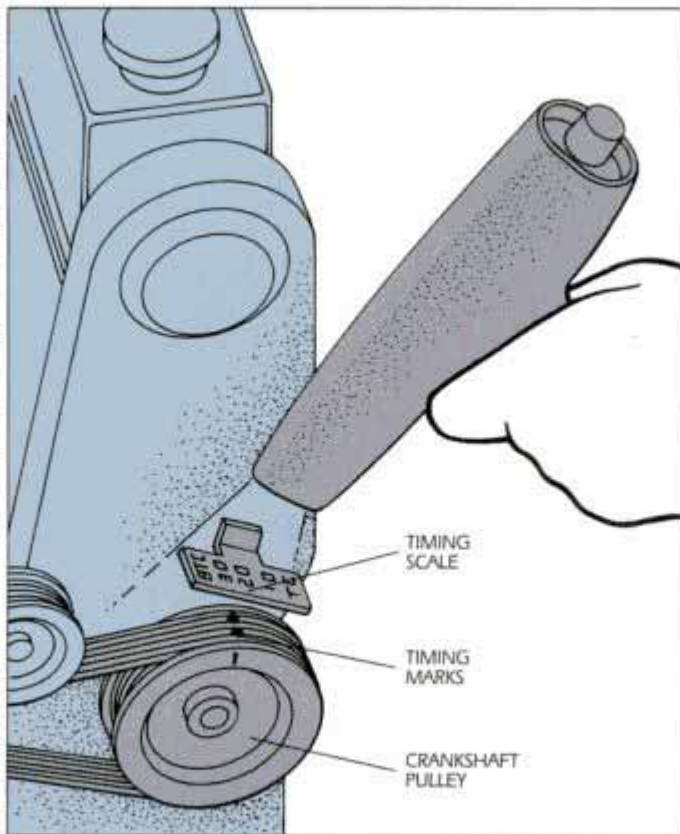
Given the remote mounting of most air filters, some people also tend to neglect servicing it as well. With the ubiquitous O₂ sensor compensating for a dirty air filter's inadequacies, many cars have clean exhausts, even though they are receiving much less air than they need. However, while the exhaust emissions are acceptable, performance is suffering.

Most air-filter elements are mounted near a front corner of the engine compartment. Remove the filter's cover—usually held by spring clips or screws—and lift the cover out of the way. You may have to loosen or remove the duct that connects the filter housing with the air inlet and throttle housing.

Clean and inspect the filter housing, its cover and the ductwork to the throttle. Carefully inspect the entire length of the ductwork for cracks, pinholes or other possible sources of leaks. A leak in the ductwork means unfiltered air is entering the throttle housing and the engine. Patch small cracks or holes with RTV silicone. Be sure all clamps are solid. If the ductwork is seriously damaged, replace it.

Stay cool

Also carefully inspect the other underhood hoses—the coolant hoses. Feel each hose. They should all be firm yet pliable. Hardened, cracked or mushy hoses must be replaced. Check all clamps and connections for corrosion and coolant leaks. Replace suspect clamps with quality worm-drive clamps.



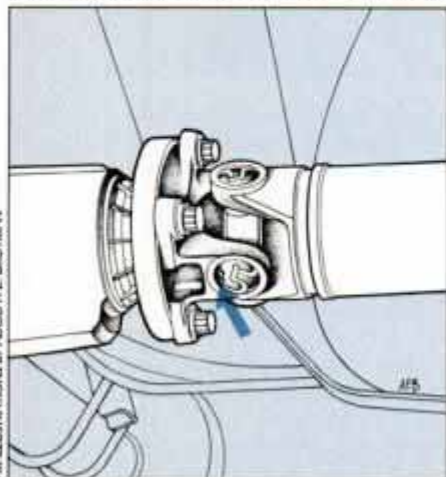
Check ignition timing. Clean and highlight timing marks for easy visibility. Keep hands and timing light clear of moving belts.

Inspect the rest of the cooling system. If you have not flushed the cooling system in two years, do so. An inexpensive reverse-flushing kit makes the job simple and does an effective job of removing old coolant and scale from the system. Splice the kit's flushing T into the heater-inlet hose and remove the radiator cap from a downflow radiator or the upper hose from a crossflow radiator. Move the heater control valve to full HEAT and attach a garden hose to the flushing T. Then start the engine and turn on the water flow to the hose. The system is clean when the flushed water is running clear.

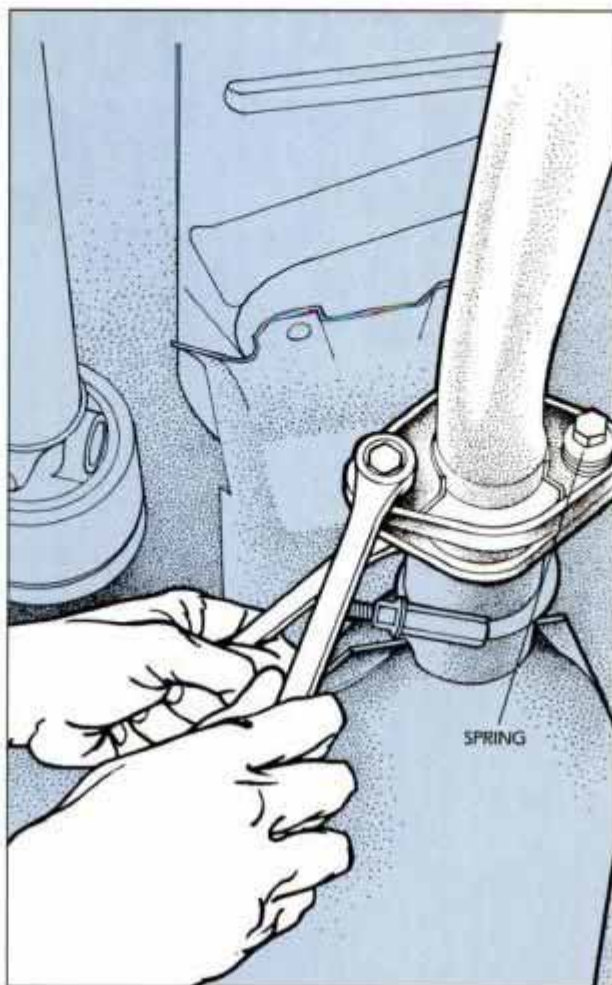
Catch the flushed coolant in a large basin. Remember, although antifreeze is biodegradable, it is poisonous. Thoroughly wash away any spillage. Also, bear in mind that the contaminants (mostly lead from the solder used to assemble brass radiators) in used coolant are not biodegradable. Take the old coolant to a repair shop that is able to recycle it.

Disconnect the garden hose and drain the water from the cooling system. Fill with a fresh mixture that is at least 50% but not totally new coolant and the rest water. Cap the flushing T, reconnect any radiator hose and install a new radiator cap.

Of course, unless you've changed the engine oil and filter within the past 3000 miles, now is the time to do it. Let the oil drain from the old filter for 24 hours. Take the old oil to a recycling station and the filter to a shop



Try twisting against the U-joint. There should be no free-play in the joint and no leaking grease in the yoke.



Leaks ahead of the catalytic converter allow dirty exhaust to escape. Tighten the joint at the exhaust pipe outlet.

that crushes and recycles its oil filters. Don't throw the old filter out with the trash.

Check and correct any oil leaks. Inspect the area around the valve-cover gasket(s), timing-belt cover, main oil seals, oil filter and oil-pressure sender. If necessary, thoroughly clean and degrease the engine to pinpoint the source of a hard-to-trace leak. Spraying some talcum powder around the leaking area can help track the source of a leak.

Besides wasting oil and fouling the land, leaking oil can deteriorate underhood hoses and components.

Clean power output

Also check the exhaust system for leaks. Besides being dangerous, an exhaust leak before the catalytic converter spews untreated exhaust into the atmosphere. Check at gaskets between the exhaust manifold(s) and engine. Also check the flexible connection at the exhaust pipe outlet flange—replace broken springs or bolts. Replace any defective gaskets or seals.

Also inspect around the O₂ sensor in the exhaust manifold, as well as the connections to the EGR valve—if your engine is equipped with one. In fact, you should check the condition and operation of all emissions-system components.

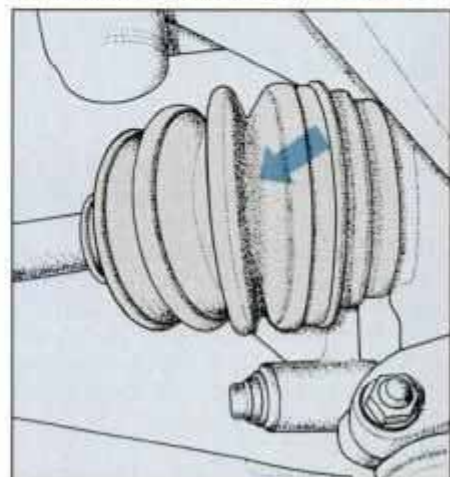
Check that the EGR valve is clean of carbon deposits and that the valve stem moves at idle and full throttle. Replace the PCV valve if you have not done so in 12,000 miles. Inspect all system hoses. Replace any that are heat hardened or cracked.

Continue your thorough inspection through the rest of the powertrain.

If you have not replaced the automatic transmission fluid and filter (or cleaned the filter screen) in 24,000 miles, do so. On vehicles with manual transmissions, check and adjust clutch-pedal free-play.

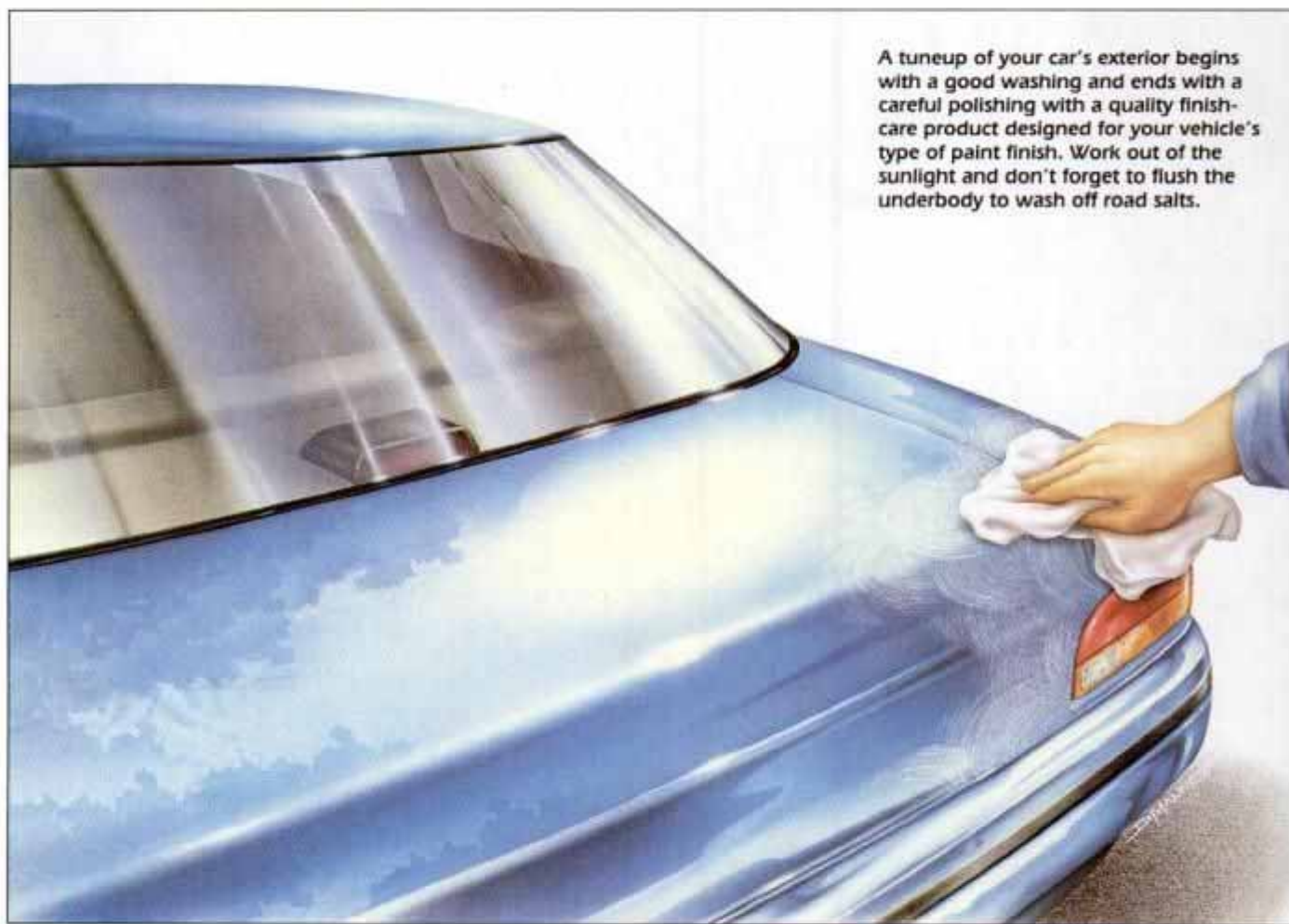
Inspect the driveshaft on rear-drive and 4-wheel-drive vehicles. Check the shaft's universal joints to be sure that there is no free-play in the joints. On vehicles with grease fittings at the U-joints and slip yoke, add grease as needed.

Check the constant-velocity joints of front-drivers. Inspect each pleat in the CV joint's boots for tears, cracks and signs of leaking grease. If you catch a tear in the boot early enough, you can replace the boot without removing the axle shaft. However, if the joint has been losing grease for even a few hundred miles, the CV joint will have to be replaced, which is an expensive proposition. **FM**



Inspect each pleat of the CV-joint rubber boot. Look for holes, cracks and tears. Replace a damaged boot immediately.

THE WHOLE CAR TUNEUP TUNE UP YOUR EXTERIOR



A tuneup of your car's exterior begins with a good washing and ends with a careful polishing with a quality finish-care product designed for your vehicle's type of paint finish. Work out of the sunlight and don't forget to flush the underbody to wash off road salts.

● It does not matter how quick, sure-footed or fast your car or truck is—if it looks like hell no one is going to care. Not too many people, outside of your family, are going to want to ride in it and fewer still are going to want to buy it if you offer it for sale. How your car looks should be important. Its exterior projects your persona to all who see it. So when you've finished caring for the drivetrain and chassis, tune the exterior.

A clean body

The obvious place to start is by washing the car. In fact, you should have

gotten into the car-washing and thorough cleaning regimen when the car was new—it's easier to maintain a showroom finish than it is to restore one. Regardless, this time of year it is ultra critical that you clean the car's exterior to thoroughly wash away the corrosive salt residue left by a harsh, snowy winter. Road salt does more than merely strip ice from roads—it also dulls finishes and promotes rust and corrosion.

So before you wash the vehicle's body, wash its underbody. Begin by shooting a steady, heavy stream of water into wheel wells and up against

as much of the chassis as you can reach with the water. The object is to soak the suspension components, exhaust and entire underbody. An alternate—or additional—method is to park the car or truck over an oscillating garden sprinkler and let the sprinkler run for several minutes. Be sure to watch that the water runs out of drain holes and openings at the ends of boxed sections of the underbody. If not, clear the drain holes using a long, stiff probe—like a welding rod or wire coat hanger. After you've cleaned out all the muck, make sure these drain openings are totally clear

by spraying water into them.

After the underbody has been cleaned of salt and muck, you can wash the body. Again, a good soaking is the way to start. Lots of water floats the dirt off the finish without scratching the paint. Soak the car from the top down. After you've flooded the finish, soap up the car. Soap and rinse in smaller sections, starting at the top since the dirty water will run down. Use one of the many available car wash solutions with warm water to wash the car. Change the wash water as it dirties to keep from rubbing grit into the sections you're cleaning, and rinse your sponge frequently.

Do not rub tough stains. Scrubbing also rubs grit into the finish while rubbing off polish. If a stubborn stain does not come off easily, treat it with a special stain solvent, like bug and tar remover, then rewash the spot with soap and water. Wash the wheels and tires last, since they are apt to have the most dirt. You should clean alloy wheels of brake dust using a special alloy-wheel cleaner.

Dry the car using a chamois or an old terry-cloth towel.

After the car has been washed and dried, shine it by waxing or polishing. This protects the paint as well as gives the finish some additional luster.

But before you polish the car, inspect the clean paint for damage. Small chips, scratches and minor dings should be repaired before you polish.

Use a quality finish-care product to shine your car. If your car has a clearcoat finish, do not use an abrasive product—use one that is labeled as safe for clearcoat finishes. These products remove the layer of oxidized clearcoat chemically, without scratching or dulling the finish. If your car does not have a clearcoat, a product with a fine abrasive will polish the paint and remove the layer of dull-looking oxidized paint in the process. Your rag will turn the color of the car as it removes the dead paint.

For a concours finish,

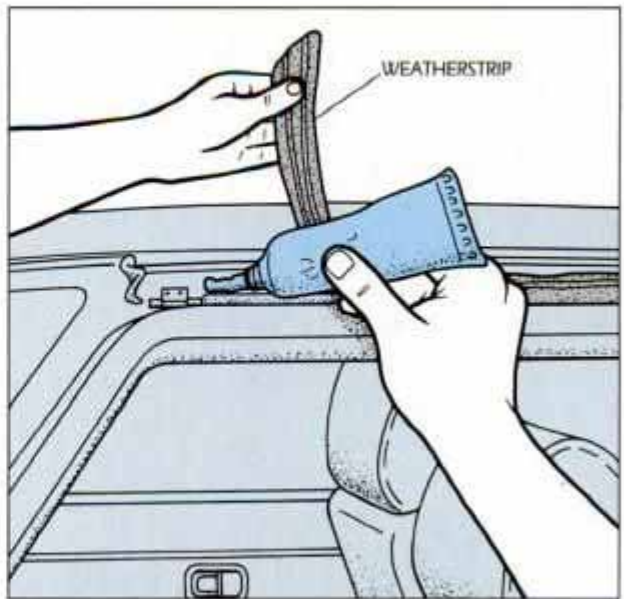
buff the polish off the paint using a clean, damp polishing cloth or small sponge. And move the cloth or sponge in a linear motion—moving it in the same direction all around the car—not circularly, to obtain a uniformity of light reflection. Remember, it's the reflected light that makes the car shine.

As you apply the wax or polish to the painted surfaces, take care not to let the polish or wax spill onto rubber or vinyl trim—it will leave white stains. Clean and shine the trim with special products made for them. Also shine the sidewalls of tires after washing them with one of the products made specifically for tires.

Damage control

Regardless of how clean and shiny your car or truck is, it won't look close to new if that clean, shiny body is marred with dings, chips and scratches.

Fine scratches in the paint can be buffed out using an abrasive-type



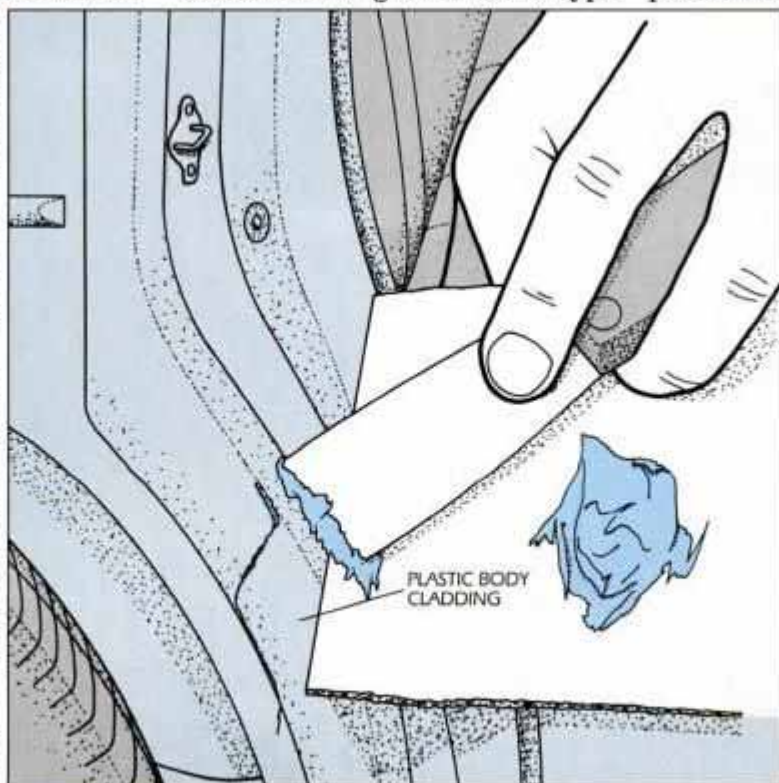
Loose weatherstripping can be secured with special adhesive. Take care to keep glue off exposed painted areas.

polish. Special products are available to restore and remove scratches from clearcoat finishes.

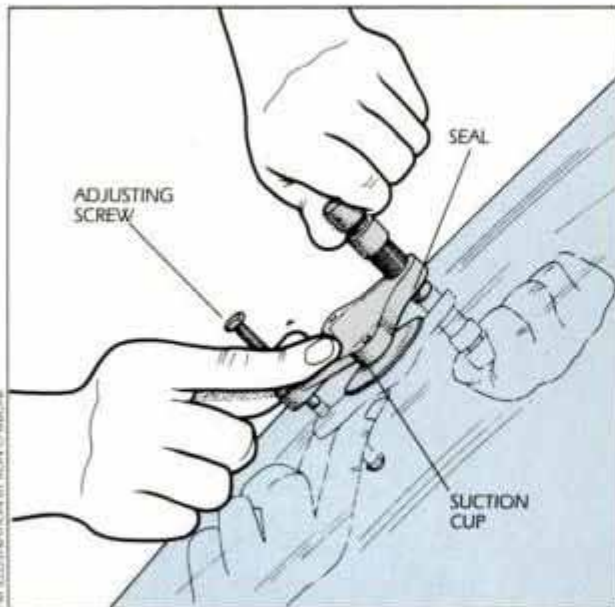
Deeper scratches and chips in the paint should be filled with touchup paint. You can use a piece of cardboard with a small hole in it as a template for touching up tiny chips using an aerosol paint, otherwise mask off the area surrounding the damage to protect it before painting.

After the paint has cured, buff out the repair. First drench the repaired area with clean water and then sand it lightly with ultrafine sandpaper. Finally, use polish to shine the repair and blend it into the surrounding area.

If the chip or scratch bares the metal beneath the paint, first clean the area thoroughly and treat the bare metal with a rust neutralizer. Then treat the bare metal with some primer. Wet-sand the primer after it dries and apply the touchup paint. It may require repeated applications of the touchup paint to bring the level of the repair flush with the surrounding finish. Repeat the sanding between each paint application and finish by polishing.



Use a putty knife to apply special body filler made for plastic body cladding. Sand the repair after it cures. Add more putty as needed.



Repair windshield stone chips with a special resin. Suction cup holds jig, and screw ensures it's at the right height.

If a plastic body panel—such as a spoiler or lower body cladding—is cracked or chipped, repair it using special repair compounds and paints. Follow the directions of the repair product for specifics. Usually, howev-

er, you apply putty to the damaged area, allow the putty to cure and sand and shape it to the surrounding area, much as you would with regular body filler. Prime the repair using a flexible-when-dry acrylic paint and finish with a special touchup paint. Some plastic body parts require you to match the color of the plastic composite with the repair filler, much as with a vinyl dashboard-type repair.

Use flexible touchup paints to repair minor scratches in the surface of soft bumpers and fascias and to recover the bare, black plastic revealed by peeled or missing paint.

See and be seen

While checking your car or truck's body for damage, also check all of its lights and lenses. Replace any

burned-out bulbs. Moisture inside a lens indicates its seal is missing or broken—repair or replace the seal.

If one of the lenses for a taillamp, brake light or marker light is chipped or cracked, you may be able to repair the lens rather than replace it. Various repair kits are available for lenses. Simply add the appropriate color dye to the repair resin, inject the resin into the damaged area, which is closed off with a specially patterned mold to duplicate the light-diffusing pattern of the lens.

Also inspect all of the vehicle's glass areas as you clean them. Use a quality glass cleaner and lint-free paper towel or old newspaper to clean the glass. Stubborn glass stains, as from a winter's worth of road grime, may need repeated cleanings, possibly with a solution of warm water, soap and household vinegar.

As you clean the glass, inspect it for chips and scratches. You can buff fine scratches—as from windblown sand and other airborne grit—from the windshield. Use a glass-polishing compound on a special buffing-wheel attachment. Put the attachment in a



Lots of plugs can This one started a

CAR CARE Guide

slow-speed buffing tool or variable-speed electric drill. Run the drill at about 1500 rpm and move it in a circular pattern around the windshield.

Stone chips can be repaired using a kit which injects a resin into the chip. A special jig holds the resin applicator over the chip and seals the damaged area so the resin fills it. A similar kit can be used to repair minor chips to headlamp lenses.

Dry and tight

Finish the exterior tuneup by replacing the windshield wiper-blade inserts. If the wiper blades themselves are severely corroded from a harsh winter, replace the blade as well.

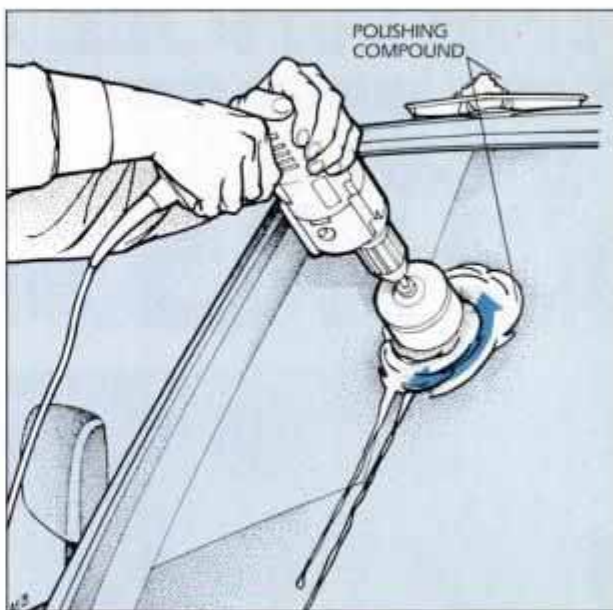
Then walk around the car and reattach any loose or missing trim pieces. Auto parts stores sell universal trim molding, while your new-car dealership can supply you with the exact molding your car came with. Body side molding trim is attached using special adhesive.

Open and close all doors and the trunklid or hatch. Check all weatherstripping and the smooth operation of the hinges, latches and locks.

If the weatherstripping is damaged, you can patch it using black RTV silicone. Use a razor or utility knife to trim the repair to match the surrounding area after it has cured. Use the RTV to build up any crushed or deformed sections of weatherstripping that might not be sealing effectively. Try to slip a dollar bill between the molding and closed door—it should not slide through easily.

Auto parts stores sell weatherstripping in various lengths so you can repair or replace whole sections. Special weatherstripping cement ensures that the seal will stay in place after you've installed it. Also use this adhesive to reattach loose pieces of otherwise solid weatherstripping.

Clean and lubricate hinges, latches, striker plates and locks. White



Fine scratches in the windshield can be removed by polishing the glass. Run drill at about 1500 rpm.

grease is fine for hinges, latches and strikers. Use graphite for locks.

Finally, check and tighten as necessary all exterior pieces, like luggage racks, license-plate brackets, radio antenna and headlight bezels. **PM**

start a car. revolution.



Bosch Platinum is the only plug with a 99.9% pure platinum center electrode, not just the tip like some other spark plugs. We guarantee you'll feel the difference.

When Bosch Platinum was first introduced, it revolutionized the entire spark plug industry.

It's still the only spark plug of its kind with a 99.9% pure platinum center electrode engineered into a unique extended insulator design.

The results are quicker starts, smoother acceleration and improved fuel efficiency. That's why we say if you don't feel the difference Bosch Platinum makes in your car, we'll pay for the plugs.

And right now when you buy a set of Bosch Platinums at a participating retailer, you can get a 25¢ rebate per plug and a chance to win one of ten free trips to the Bob Bondurant School of High Performance Driving. See store for complete details. So get a set of Bosch Platinum Spark Plugs. It could revolutionize the way your car performs.

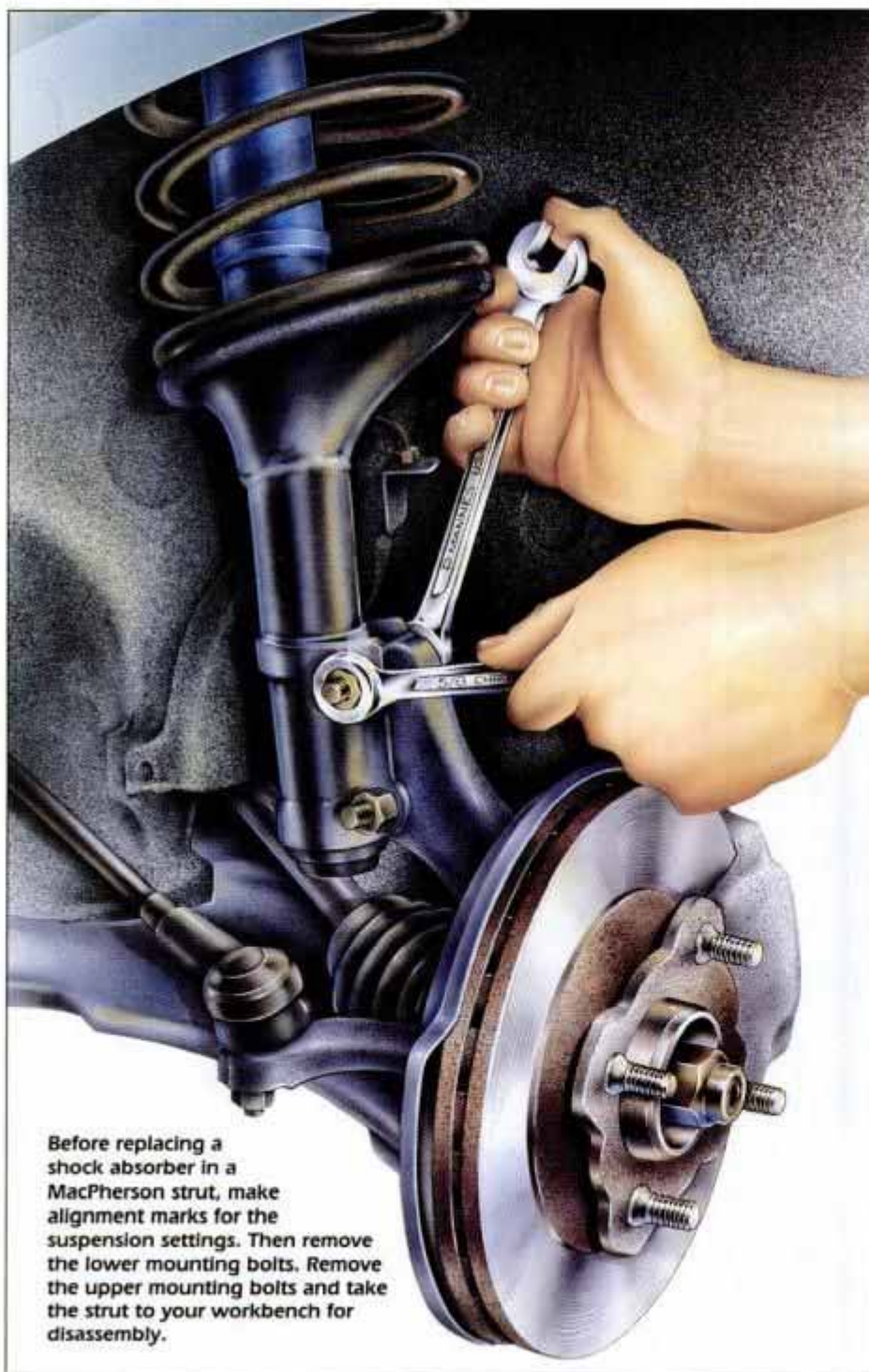


For the Bosch retailer nearest you,
call 1-800-882-8101.



BOSCH
The Ultimate Spark Plug

THE WHOLE CAR TUNEUP TUNE UP YOUR CHASSIS



Before replacing a shock absorber in a MacPherson strut, make alignment marks for the suspension settings. Then remove the lower mounting bolts. Remove the upper mounting bolts and take the strut to your workbench for disassembly.

● Peak automotive performance and razor-sharp efficiency encompass more than the ability of the engine to make power and the drivetrain to get that power to the wheels.

A truly tuned vehicle is one that also rides, handles, steers and stops with like-new crispness and response. Therefore, you should inspect, clean, adjust and replace the components of your car's suspension, steering and brake systems annually.

Bouncy, bouncy, bouncy

Regardless of the vintage of your vehicle, whether it's a car or truck or rear-drive, front-drive or all-wheel drive, there is a spring and shock absorber at each wheel.

Push down on each corner of your car and let the car bounce back up. If the car bounces up and down more than two times, the shock absorber should be replaced. In addition, crawl underneath (raise the car and place it on safety stands or ramps for safe access) and inspect each shock absorber. Look for dents, cracks or other damage to the shock-absorber tube, piston rod and mounts. Also look for signs of leaking hydraulic fluid from the shock. If there is any doubt, the shock absorber must be replaced. And unless the shock absorber is close to brand new (less than about 1000 miles), replace its mate on the other side of the car.

Replacing most shock absorbers is a fairly straightforward task. Undo the lower mounting bolt, swing the shock free and then undo the top mount. Gaining access to the top mount of some shock absorbers, however, may involve removing a trim panel in the trunk, in the cargo area or behind the rear seat back. You also may need a deep socket or a special, sharply offset box wrench.

When installing the new shock, install new rubber bushings, top and bottom. Follow the shock maker's instructions for tightening the mount-

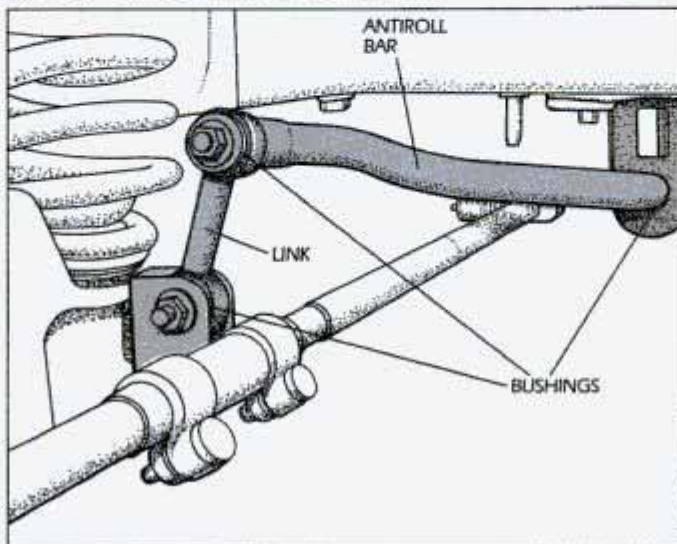
ing nuts—overly tight mounts can deform the bushings, adversely affecting ride quality. Leaving the mount too loose can lead to a broken shock or mount.

If your car is equipped with MacPherson struts, the shock absorber is integral with the coil spring to form the strut unit. To replace a shock absorber in a MacPherson strut, in almost all cases, you must remove the strut unit from the car.

Begin by making alignment marks at the strut's upper and lower mounts so you can approximate proper camber and possibly caster settings when you reinstall the unit. After replacing shock absorbers in a MacPherson strut, you should still have the wheels aligned professionally.

Raise the front of the car, and remove the wheels, front brake calipers and rotors (check your manual). Undo the lower strut mount—this may require undoing the link from the antiroll bar. Then undo the top mount and lower the strut unit out from underneath the fender well. Compress the coil spring with a spring compressor, undo the upper retaining nut and remove the upper spring mount and bearing/bushing unit. Lift off the coil spring and then slide out the shock-absorber cartridge. Most cars use replaceable cartridges. Install the new cartridge

and replace the still compressed coil spring. Before putting the upper mount bearing/bushing unit back, check that it is not binding or grinding. If the bearing is bad, replace it as well. Tighten the retaining nut to spec, remove the spring compressor and reinstall the strut unit.



All suspension components have bushings in their mounts—possibly even of different sizes and shapes.

Smooth rolling

While you're inspecting the shock absorbers, also carefully check the springs and all of the suspension components.

Check that all of the links and arms are secure in their mounts and are not bent, cracked or showing wear spots. If any of the individual pieces are suspect, they must be replaced. A shiny or flat spot may indi-

cate that the piece is rubbing or fouling against another underbody part.

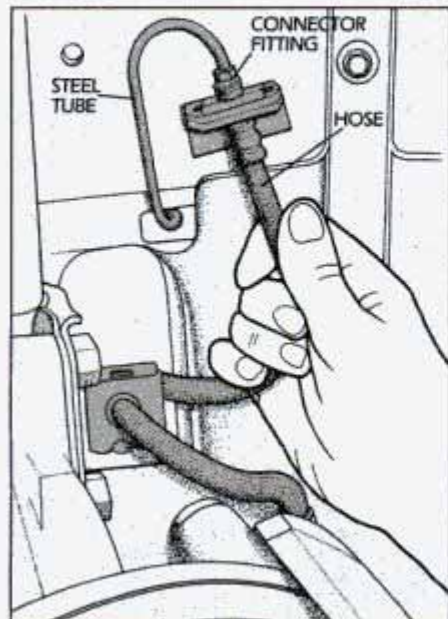
Pull, tug and twist each suspension piece at each mount. Check all of the mounting bushings. Hardened, cracked, missing or overly loose bushings must be replaced. Put a wrench on each mounting nut and bolt and check its snugness. Also check the tightness of the steering box or rack.

Inspect the individual components of the steering linkage—including the Pitman and idler arms for parallelogram systems. Regardless of the steering system, check the tie-rod ends at the steering knuckles at each front wheel. If your vehicle has grease fittings, add grease as needed.

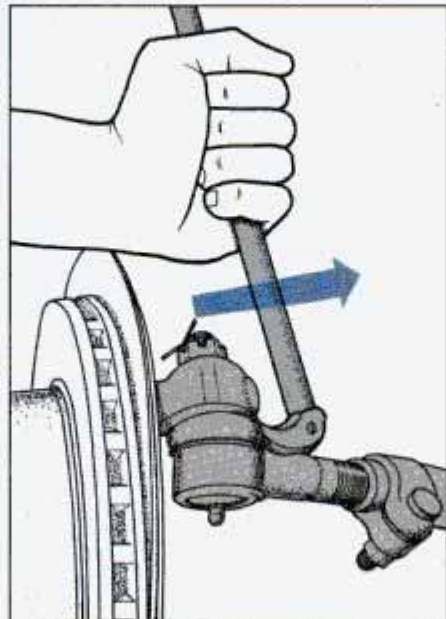
The bearings of the non-driven wheels—the rears on a front-drive, the fronts on a rear-drive—must be inspected and repacked and adjusted if necessary.

With the vehicle sitting on safety stands, try to rock the wheel and tire in and out to feel for free-play in the bearing. If you feel any perceptible movement, the bearing should be adjusted. Spin the wheel. Feel and listen for roughness in the bearing hub. If there is any roughness, the bearing must be replaced.

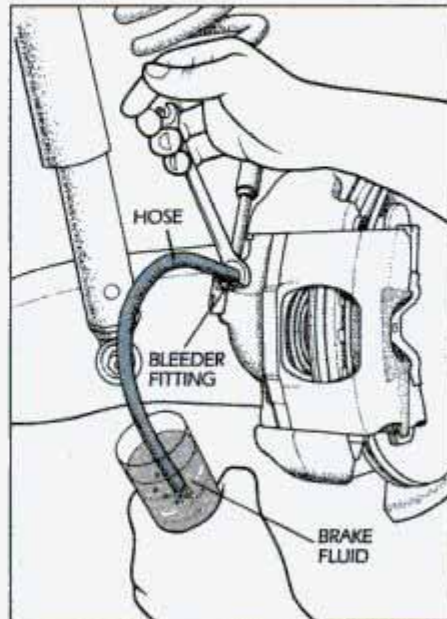
Remove the wheel, tire and bearing grease cap. Remove any lock and cotter pin, then undo the retaining



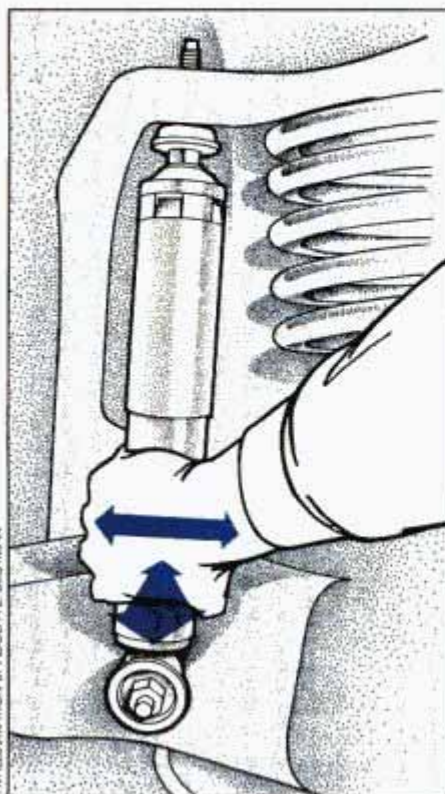
Inspect each brake hose, steel tube and connector for leaks and damage.



Vertical looseness in tie-rod ends or ball joints indicates replacement time.



Purge the brake system of contaminants by flushing the fluid at each wheel.



PM ILLUSTRATION BY ADAM E. BROTHMAN

Check the mounts of each nonstrut shock by pulling and pushing on the shock.

nut and washer. Pop out the outer bearing and pull off the wheel hub. Remove the grease seal that holds the inner bearing in the hub and throw it away. Never reuse the old grease seal.

Carefully wash the bearings in clean solvent. Let them air dry so you don't damage or scratch the rollers or races. Clean and inspect

the wheel spindle. Look for heat bluing or deep scores on the bearings and spindle. Damaged components must be replaced.

Coat the bearing with wheel-bearing grease, forcing the grease around each of the rollers and into the roller cage. Place the inner bearing back in the hub and install a new seal. Partially fill the hub cavity with grease and put the hub back on the grease-coated spindle. Put the greased outer bearing in place and hold it there with its retaining washer. Put the nut on the spindle and lightly tighten it while spinning the wheel. Follow your carmaker's instructions regarding tightening specifications for the retaining nut. If you overtighten the nut, you can damage the bearing. If you're not sure of the tightening specifications, as a rule of thumb, tighten the nut only enough to keep the retaining washer from slipping beneath it. Replace the lock, cotter pin and cap.

Sure stopping

Inspect the brake system. Look at the brake hoses and steel tubing at each wheel. Inspect the hoses and tubing for cuts, tears and corrosion. Check all connections for leaks. Replace any suspect brake lines. Tighten any loose connections.

Also check how much friction material there is on all the brake shoes. Disc brakes usually have a large inspection hole in the caliper so you can see the lining on the shoes. Disc brake pads typically have a wear in-

dicator in the form of a groove—once the groove is gone, it's time to replace the brake pads. Many cars also have an audible brake-wear indicator—a piercing shriek each time you step on the pedal indicates that the pads must be replaced.

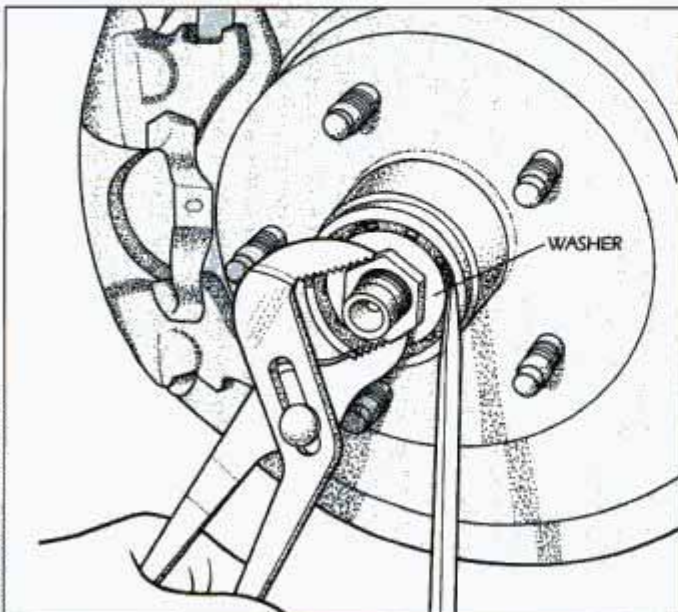
Drum brakes may have an inspection hole in the brake backing plate. If not, you must remove the brake drums to inspect the linings.

However, given the fact that the front brakes do most of the work—especially on front-engine/front-drive cars—chances are you will have to replace the front brake pads more frequently than the rear shoes.

Most disc brake systems allow for quick and simple shoe replacement. Undo one or two retaining clips, remove the pins that go through the caliper and slide out the worn brake pads. To install the replacements, you must push the caliper piston back into its bore—without damaging its dust boot. This forces the brake fluid back into the master cylinder, raising the fluid level.

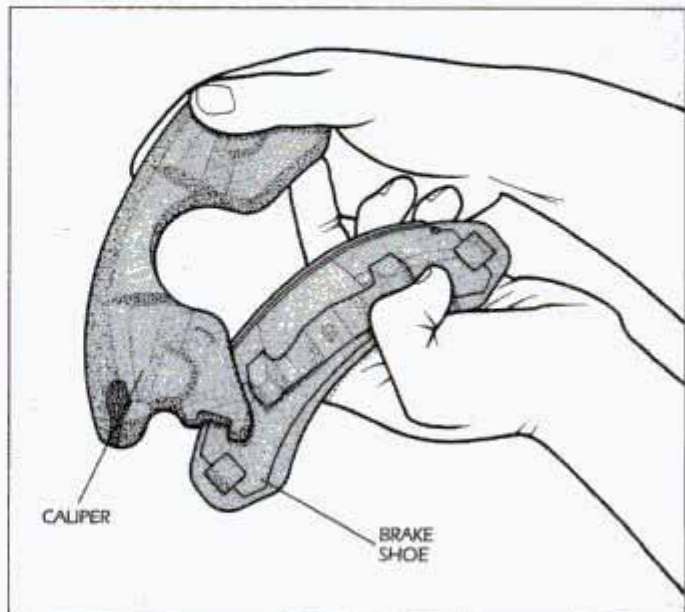
Before installing new pads, inspect the rotors for cracks, scores, chips or other damage. It's better to replace than resurface the defective rotor.

You should also flush the hydraulic fluid from the brake system if it has been in service for two years or more. The fluid collects moisture and other contaminants which corrode the brake lines from within. Flush the system as you would bleed the brakes, working your way around to all four brakes. **PM**



PM ILLUSTRATIONS BY RON CARBON

Only tighten a wheel-bearing nut until the retaining washer stops slipping. Use a screwdriver to check the washer.



On some vehicles, you must remove the brake caliper from the rotor to gain access to and replace the brake shoes.

Starting your engine is a terrible thing to do.[®]

SLICK[®]
The Engine Wear
Protector. 50

ENGINE FORMULA
Protection at Start-up
for Automotive Engines



SLICK[®]
The Engine Wear
Protector. 50

ENGINE FORMULA
Protection at Start-up
for Automotive Engines

1 U.S. QUART (946 liter)

Because at start-up, virtually all your oil's in the pan, not in the engine. So when you turn the key, moving engine parts grind together. And in those first critical seconds, 70 to 80 percent of all engine wear occurs.

Slick 50 Engine Formula reduces engine wear. It treats the surfaces of moving engine parts with PTFE, the slipperiest solid substance known. Independent lab tests have shown that a single application of Slick 50 protects an engine at start-up and keeps on protecting oil change after oil change. In fact, test engines treated with Slick 50 showed 50 percent less wear than identical engines run with a premium carrier oil alone.

So to help your engine last longer, start driving with Slick 50 Engine Formula. Or start taking the bus.

SLICK[®]
The Engine Wear
Protector. 50

THE WHOLE CAR TUNEUP TUNE UP YOUR INTERIOR



Patience, a good eye and good light will let you match your interior's vinyl color. Match the graining pattern and apply heat to cure the patch.

● Each time you take to the road, your butt is in the driver's seat, your hands are holding the steering wheel and operating all the controls and your eyes are looking through the windshield, at the mirrors and at the dashboard. So, if for no other reason than your own comfort and pleasure, you should take the time and effort to keep your car's interior as clean, fresh and functional as possible. After all, you spend hundreds—maybe thousands—of hours inside that passenger compartment each year.

Of course, it's an added bonus that

a like-new interior most favorably impresses your passengers and helps maintain your car's worth.

Cleanliness is next to...

The first step to tuning up the interior of your car is cleaning it. In fact, if there is nothing damaged in the passenger compartment, a thorough cleaning may be all that is needed to restore it to its original showroom condition. This is especially true if your car or truck has been subjected to the ravages of a particularly sloppy winter—one complete with lots of

tramped-in snow, salt and sand.

Begin by vacuuming the seats, floors and cargo area. Use a pointed nozzle attachment, if your vacuum cleaner has one, to clean in the crevices between the seat back and cushion, under the seats and between the seats and center console. Vacuum the insides of door and seat-back pockets, as well as any other storage bins.

Move the front seats all the way forward and vacuum the floor behind them, then run them all the way back and vacuum the floor in front. If your car has removable mats or carpet, re-

move them to vacuum them and the floor beneath. After you've vacuumed, club the seats—a little leaguer's baseball bat is the perfect-size club—and carpet to shake loose ground-in dirt. Then vacuum it all again.

If your car has vinyl upholstery, you can clean it with some household cleaner mixed in warm water or with a spray cleaner. Leather upholstery should be cleaned with a special leather-care product. Cloth upholstery may be cleaned with household upholstery cleaner.

If there are stains on the upholstery, remove them using the appropriate method and cleaning product. Dried food and other water-based stains may be carefully scraped up using the edge of a spoon and then cleaned. Chewing gum can be stiffened by chilling with an ice cube and then scraped off. Butter, oil and other grease-based stains should be scraped and treated with a solvent-type stain remover, according to the directions of the solvent's maker. Try to work from the edge of the stain toward the center to avoid leaving a ring.

Reclean the upholstery after removing any stains. Treat clean cloth upholstery with a fabric protector.

Remove the floor mats, scrub them, hose them clean and let them dry before putting them back on the floor. Carpeting and non-removable mats should be cleaned, either using warm water and a household cleaner or a special carpet cleaner.

Stubborn dirt and grime stains on the floor may need an old-fashioned scrubbing. White salt stains can be neutralized with some vinegar and warm water.

Vinegar and warm water can also be used to clean smoke-scum-covered windows. Otherwise, use a quality window cleaner and clean, lint-free cloth or paper toweling to clean windows. Be sure to lower the windows an inch or two and clean their edges. When cleaning the inside of the



Foam cleaner, scrub brush and elbow grease will remove stubborn stains from floor mats and carpeting.

rear window, take care not to damage the defroster grid lines.

Also use glass cleaner to clean the rearview mirror, visor vanity mirror and the instrument lenses or cover.

Lastly, clean and polish the dashboard, window sills, armrests, center console, door and interior trim panels. Use a mild cleaning solution or one of the special cleaners.

Take care to clean window winders,

door handles, dashboard switches, shift lever, steering wheel, steering column cover, radio and heater controls, direction-signal lever and the louvers for the dashboard vents. You can add luster to the cleaned surface by following the cleaning with a coat of special protectant. Do not treat the accelerator, brake or clutch pedals, steering wheel or shift lever with a product that leaves them slippery.

Attention to detail

As you clean the interior, note any damage that needs to be repaired. Tears or holes in the seat upholstery, cracks in the dashboard, armrests or vinyl door panels and missing or broken switches or controls ruin the effect of your concours-clean interior.

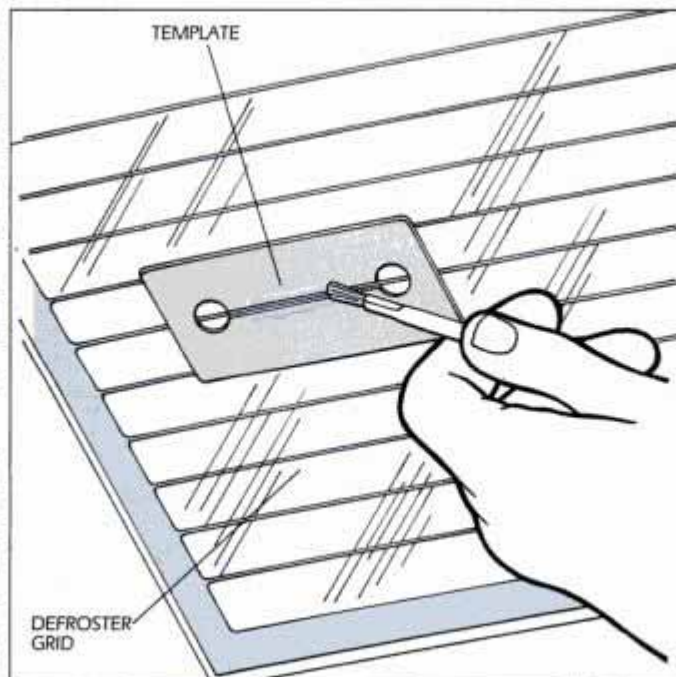
Small tears, cracks or holes in vinyl—seats, dash or trim panels—can be neatly patched using a special repair kit. Mix the supplied ingredients and add appropriate coloring pigments to match the color of your interior. Then select the graining paper from the kit that matches the surface finish of the damaged area. Smear the repair mixture over the damaged area, lay the graining paper over the mixture and use the kit's heating iron to cure the repair.

Severely weatherbeaten, torn or cracked dashboards can be improved by covering them with a preformed, molded dash cover.

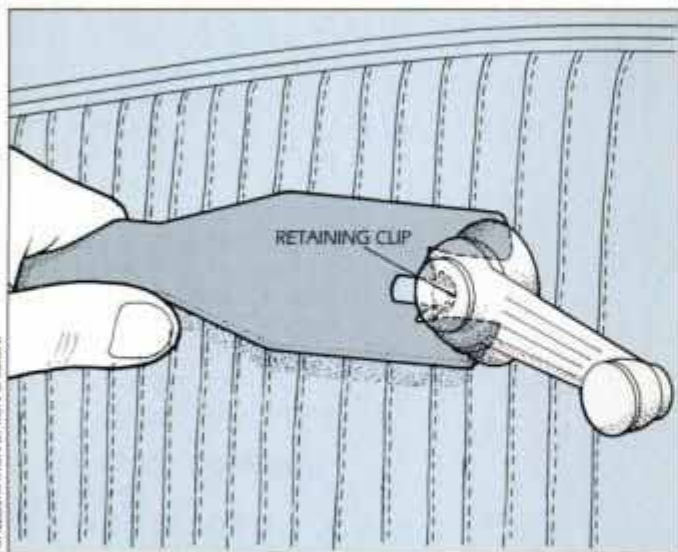
Loose interior door trim panels can be reattached by replacing the broken push-clips with new ones available at auto parts stores, particularly those stores that specialize in body repair. If a small section of a trim panel is neatly torn, you can reattach it to its backing using trim adhesive.

Spray trim adhesive can also be used to reattach sagging headliner fabric by spraying the adhesive through a small slit that you cut in the headliner fabric.

Replace badly worn or damaged controls—armrests, window-winder cranks, radio controls—with new



Brush on just enough conductive paint to fill the break in the defroster grid. Clean thoroughly with solvent first.



Window cranks on some GM and other vehicles are held by a retaining clip. Push out the clip using this slim tool.

pieces. Duplicates are available at your dealership's parts department, while near-duplicate replacements are available at auto parts stores.

While some switch covers and buttons may pull off and snap on, most have a small setscrew or retaining clip. Look carefully before you pry.

Window-winder cranks either have a center-mounted retaining screw—possibly hidden under a pry-up cover—or a hidden retaining clip. To replace a window-winder crank, either remove the screw—which may be Phillips, Torx or Allen—or the retaining clip. To remove a hidden retaining clip, slide a special tool between the winder crank and door panel and push out the clip. To install the replacement, install the clip on the back of the crank and snap it into place on its shaft.

Looks good, works right

Also tighten and repair loose or damaged interior components such as sun visors, rearview mirror, heater/

defroster ducts and rear-window defroster.

You may be able to tighten a loose rearview mirror on its mount by tightening a setscrew. You can reattach a loose mount to the windshield using special mirror-mount adhesive. Thoroughly clean the glass with some isopropyl alcohol before attempting to reattach the mirror.

If the rear-window defroster has not been clearing the glass at all, check its fuse. If the fuse is good, check the wiring connections to the defroster grid. Clean any corrosion from the connections and recrimp loose connectors. Be sure that the ground connection is solid and corrosion-free. On hatchbacks and station wagons, be sure that the hatch itself is grounded securely to the rest of the vehicle.

If only one or a few of the lines of the rear-window defroster grid are not clearing, carefully check those nonworking lines for breaks. If you cannot see or feel the physical break or see where the grid may have come away from the glass, use a voltmeter to find the problem spot. Switch on

How Secure Is Your Job

Layoffs and cutbacks could end your job security at anytime. It doesn't matter whether your white collar, blue collar or no collar recession, cutbacks, mergers and foreign competition are destroying any job security we once had. Not only have we lost our job security, but most raises don't even keep up with the cost of living.

You Can Do Something About It. If you're tired of making do with little or no pay increase you can become your own boss. Out of the over 16,000,000 businesses in the United States more than 12,000,000 are individual proprietorships. These individuals know the secret to wealth, self esteem and respect, lies in owning their own business.

There Is No Risk, There Is No Cost to find how you like thousands of other Foley-Belsaw graduates can learn the skills and business techniques to make you the boss. The boss of a profitable cash business where 90¢ out of every dollar you take in goes in your pocket.

Foley-Belsaw Can Help. You see since 1926 we've been training and helping people start their own successful businesses. We provide the training in the skill you choose. We provide the business knowledge to help you get started. We always provide the technical assistance and parts and supplies your business will need. You're in control, but we help you every step of the way.

Foley-Belsaw has helped more people start their own successful business than any other company of its kind. Pick one of the opportunities listed and we'll send you a **FREE INFORMATION PACKET**. It's Free and it could be the best thing you ever do for yourself.



Check The Business You Are Interested In Below:

- Locksmith** - A high demand business where we teach you how to command \$25.00/hour. 12293
- Small Engine Repair** - Make \$45 in 1/2 hour for a simple tune-up even more on simple repairs you learn. 52248
- Professional Saw and Tool Sharpening** - Make \$18 to \$25 by running simple machines that do the work for you. 21206
- Professional Woodworking** - Build over \$3,000 worth of valuable furniture and woodworking products while you learn. 43193
- Upholstery** - You learn Upholstery to make big profits in both commercial and consumer markets. Income potential unlimited. 80858

Name _____
 Address _____
 City _____
 State _____ Zip _____ + _____

**For Your
FREE
Business Kit Mail
This Coupon
To:**
 Foley-Belsaw Co.
 6301 Equitable Rd.
 Kansas City, MO
 64120-1395

the defroster and hold one of the voltmeter leads to the power buss at one end of the grid. Slowly move the other lead along the grid line. The voltage reading will drop very slowly as you move the lead. However, when the voltage drops precipitously, you have found the break in the grid line.

If the grid line has merely detached itself from the glass but has not broken, carefully clean the glass around the grid line—without tearing the defroster grid—with isopropyl alcohol on a lint-free cloth. Then reattach the grid line to the glass by brushing either a thin film of clear nail polish or special defroster repair paint over it.

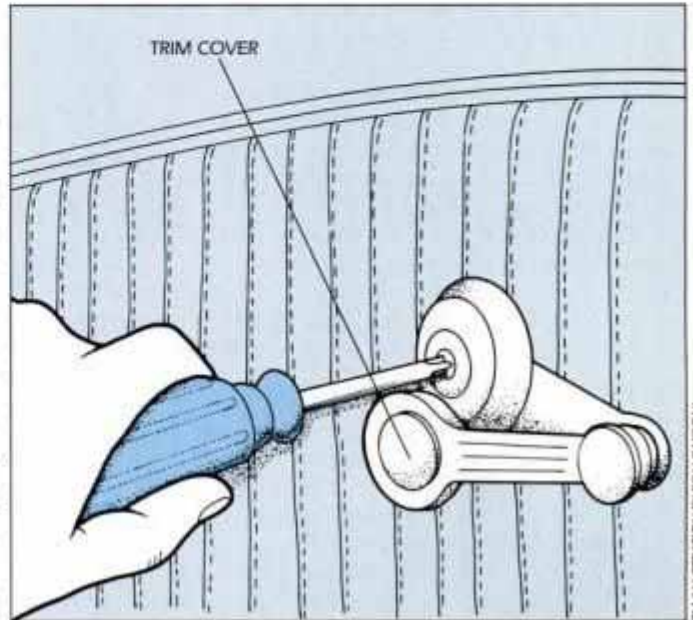
If the grid is broken, you can repair the break using an inexpensive repair kit available at auto parts stores. The repair kit contains a special conductive paint, a thin brush and an adhesive template. Place the template over the broken spot in the grid line, aligning the slot in the template with the grid. Brush a small amount of liquid over the damaged area. Allow it to dry.

There's something rotten in Denmark

After a thorough cleaning, the interior of your car or truck should smell as fresh as it is pristine. However, after a long winter of closed-window driving, the carpeting and upholstery may hold some stale odors—as from wet pets, cigars and spilled food. Wet feet and other moisture may also create a mildew odor.

Rather than resorting to heavy perfumes to mask these odors—all the cleaning products have their own scents—try to locate any sources of mildewing carpet and dry—using an electric hairdryer if necessary—and

disinfect them. Then trap the odor by placing small open containers of baking soda under the seat cushions and inside the trunk. Replace the containers once a month until the condition is alleviated. **PM**



A window-crank screw may be hidden behind a vinyl or plastic cover. Pop off the cover to gain access to the screw.

PM ILLUSTRATION BY RICH CARBONI

**HIGH WIND
HEAVY RAIN
HIGH SPEED**

Windspoiler

TRICO

18"
WINDSPOILER
24-110



Windspoiler™ Performance

Safe driving through high wind and heavy rain demands the performance of Windspoiler... the premium aerodynamic wiper blade from TRICO.

Windspoiler features a durable steel frame and exclusive spoilers to fight windlift and provide superior windshield-wiping action... even at highway driving speeds. It fits most popular cars, light trucks and mini-vans.

So ask for TRICO Windspoiler by name wherever quality auto parts are sold.

Anything other than TRICO is highway robbery!

TRICO is the leading original equipment supplier of wiper blades for auto manufacturers worldwide.

TRICO

TRICO PRODUCTS CORP.
HIGH VISIBILITY

THE LIFESTYLE RESOURCE®

**CALL TOLL FREE
24 HRS. A DAY**

800-872-5200

ORDER WITH CONFIDENCE

- No risk 30-day return privilege.
- Most orders ship within 24 hours of receipt.
- Credit Card orders billed only upon shipment.
- We will not sell or rent your name to anyone!

CREATE YOUR OWN CALM ZONE

Sleep better, relax, read, or concentrate without being disturbed by unwanted noise — traffic, neighbors, nearby TV or stereo, even a snoring spouse! Or add soothing environmental sounds to an otherwise distracting silence. The advanced *Marsona® 1250 Sound Conditioner* effectively masks noise with 10 of nature's most calming sounds. At the touch of a button, you'll hear the soothing murmur of rain on the roof, the rhythmic pounding of ocean surf, or the playful splash of a babbling brook. Simple controls let you combine these sounds with soaring gulls and bell buoys, chirping crickets and bird songs. Easily adjust each sound to your personal preference. Ideal for home, office, dorm. Perfect for night table or desk (only 9" x 6" x 3"). Plugs into any wall socket and uses no more current than a night light. UL listed. Made in USA. Mfr.'s 1 yr. ltd. warranty. **\$149.95 #4610.** Compact *Marsona* with sounds of gentle rain and rushing waterfall — and travel case, **\$99.95 #4615.**



QUALITY AND VALUE — GUARANTEED



So confident of the workmanship in this high-performance watch, Xonix offers a 5 yr. ltd. warranty — five times longer than warranties offered on watches costing thousands of dollars! Wear this stylish *Scuba Master Dress/Sport Watch* anywhere...office, sports, even 325 feet under water! It's made for divers, who demand accuracy, exceptional water resistance, total reliability. Precision quartz movement. Magnifying-dome crystal for easy reading. Luminous hands and hour markers make telling time a cinch...day, night, under water. Rotating bezel gives elapsed time. Two-tone stainless-steel, adjustable-link band with safety clasp. **\$79.95.** Men's, with date window, **#4300;** Ladies', **#4310.**

TAKE YOUR CONTACTS FOR A SPIN

Contact lenses—so convenient to wear, so inconvenient to clean! The risk of eye damage is significantly reduced by proper lens care. *Clensatron™*, developed specifically to minimize problems of lens care, offers contact lens wearers an alternative to the traditional "finger-rubbing" method which can scratch or tear lenses. Revolving at a rate of 300 cycles/minute, it scrubs lenses in 2 minutes, removing protein deposits and other eye-damaging contaminants. Works with hard, soft and gas-permeable lenses. Compact for travel. Uses two AA batteries; AC adaptor included. UL listed. Mfr.'s 1 yr. ltd. warranty. **\$59.95 #2680.**



NO ANTENNA. NO STATIC. NO HASSLE.



The *Cobra Intenna II®* is the easiest-to-use cordless phone ever! No external antenna protrudes from the slim-line handset to bend, break, poke your head, or hit doorways while you walk and talk — indoors or out. Nothing extends from the base, so it fits almost anywhere — under a cabinet or lamp, on a shelf, or on your wall. The handset can be off the base up to 7 days without recharging. Take your cordless handset from room to room or out in the yard. Wherever you use it, Cobra's sound is as crisp and clear as on a corded phone. A patented noise-reduction system gets rid of annoying static and background sounds. (Select either of two separate channels for the clearest conversation possible.) Switchable tone or pulse dialing, page/signal button, and digital security codes to prevent unauthorized use. UL listed. Mfrs. 1-yr. ltd. warranty. **\$129.95 Ivory, #4440 or Charcoal, #4445.**

CUSTOM BACK SUPPORT

Air Belts help relieve and prevent back pain without restricting movement. Enjoy activities that were once off-limits — or simply sit in comfort. Squeeze the removable aspirator bulb to inflate belt for individualized lumbar support. A system of air chambers applies gentle pressure to help relax muscles and encourage proper alignment of your lower back. Contoured shape is flexible to allow a full range of movement. Adjustable, handwashable, lightweight. Soft, breathable material keeps you cool and dry. The *Air Belt®* is worn around your waist for support centered at the small of your back. Waist measurement: M (29"-35"), L (36"-41"), or XL (42"-50") **\$59.95. #3580.** For broader support and stability for your lower back, the *Lumbosacral Air Belt®* wraps around your hips. Additional air chambers and straps provide direct lumbosacral support. Hip measurement:

M (29"-35"),
L (36"-41"),
XL (42"-46")
**\$99.95
#3606.**



DEEP HEAT RELIEF

Pain from inflamed joints and muscles can be excruciating. Heating pads and hot water bottles mainly warm the surface of the skin — heat does not penetrate deep into muscles and joints. Infrared heat goes deep beneath the skin to reach the site of inflammation and discomfort for safe, natural relief. The easy-to-use *Infralum* is contoured and angled to reach all parts of your body. Oversized heating surface. Hi/Low heat. Uses household outlet. UL listed. Includes case and extra bulb. **\$39.95 #3110.**



TO YOUR HEALTH

Dating back 800 years, *Chinese Exercise Balls* have been used to induce well-being and serenity of the spirit. Rotating these polished chrome balls in the palm of each hand stimulates fingers and acupuncture points, improving the circulation throughout the body. Their soothing chime makes them effective for relaxation and meditation. Great muscle conditioners for sports enthusiasts, musicians, computer users, arthritis sufferers and health-conscious people. Silk brocade box. **\$29.95 #1702;** two sets for **\$49.95 #1705.**



THE LIFESTYLE RESOURCE®

FOR FASTEST SERVICE 24 HRS. A DAY

800-872-5200

DEPT. PMXE03; 4184 TAYLOR ROAD, BATAVIA, OH 45103

CREDIT CARD ORDERS—CALL TOLL FREE

TO ORDER BY MAIL:

- Send us a letter to the above address specifying the item number, dept. code, and quantity of each item.
- Total the amount, add shipping charge, make check payable to: THE LIFESTYLE RESOURCE.
- For MasterCard, Visa and American Express, include your full account number, expiration date and signature.

ORDER WITH CONFIDENCE

- Most orders ship within 24 hours of receipt.
- Credit Card orders billed only upon shipment.
- No risk 30-day return privilege.
- We will not sell or rent your name to anyone!

Delivery Charge covers UPS, handling, insurance and applicable taxes for guaranteed delivery. Airborne Express delivery available for an additional \$7.50 per order.

| | | | |
|---------------------------|----------------------------|-----------------------------|-----------------------------|
| Up to \$40 . \$ 5.95 | \$50.01 to \$70 . \$ 8.95 | \$100.01 to \$150 . \$14.95 | \$200.01 to \$250 . \$19.95 |
| \$40.01 to \$50 . \$ 6.95 | \$70.01 to \$100 . \$11.95 | \$150.01 to \$200 . \$16.95 | Over \$250 . \$21.95 |

Canadian residents, we can only accept telephone orders.

NEW PRODUCTS

● Tuning up your entire car will restore its performance, reliability and appearance, and here are a variety of new products that will help you in your tuneup project. There are tools to reduce the chances of skinned knuckles and a paint-chip repair kit and polish to bring back that new-car luster. Performance products are featured that will give your vehicle more zip and better handling. Added comfort and convenience haven't been overlooked with products that will increase the carrying capacity of your minivan, and a unique mount for your cellular phone. And there's more: including a unique fire extinguisher/tire inflator and a complete body makeover kit. So after you tune up your whole car, you'll have more ways to enjoy it.



Body Conversion

Calypto Emotion is a 22-piece bolt-on replacement body-panel package for Pontiac Fieros. Fenders will accept tires up to 10 in. wide in the rear and 7 in. up front. Cost of the kit is less than \$3000. Contact: Fundamental Dynamics, P.O. Box 2103, Woodbridge, VA 22193; (703) 730-2501.



Phone Mount

Port-A-Cradle cellular phone mount swivels to adjust to any position and provides the convenience and safety of one-hand dialing. Easily moved from one vehicle to another, the mount plugs into the cigarette lighter and costs \$39.95.

Contact: Group X Concepts Inc., 2554 Lincoln Blvd., Suite 294, Marina Del Rey, CA 90291; (310) 944-0823.



Minivan Carriers

New Mopar accessories increase the carrying capacity of your Chrysler product minivan. Available are a molded roof rack with adjustable steel crossbars, an optional large, black vinyl luggage carrier and a receiver hitch-mounted ski or bike carrier. The carrier holds two bikes or four pairs of skis and poles. Contact your local Chrysler-Plymouth or Dodge dealer for more information.



Ultra-Performance Tire

BFGoodrich's 18-in. Comp T/A ZR ultra-high-performance tires are available in sizes P235/40ZR18 and P245/40ZR18. The tire, with its short, stiff sidewall responds more quickly to steering inputs, enhances vehicle stability and provides superior wet and dry traction. Contact: BFGoodrich, 600 S. Main St., Akron, OH 44397; (216) 374-2805.



Paint-Chip Kit

The Action ChipKit contains everything to repair paint chips and produce a surface that's flush with the surrounding paint. A special brush removes rust and wax, then touchup paint or clearcoat is built up in the chip or scratch. Microfine sanding papers, a specially sized flexible sanding block and a polishing compound bring back gloss and blend in the repaired area. **Contact: Pro Motorcar Products, 22025 U.S. 19 N., Clearwater, FL 34625; (800) 323-1090.**



Protectant

303 Protectant beautifies and protects vinyl, rubber, leather and plastic surfaces without affecting breathability. The product contains no greasy oils and dries in seconds. It also has sunscreen and antistatic agents. **Contact: 303 Products Inc., P.O. Box 966, Palo Cedro, CA 96073; (916) 549-5617.**



Deodorizer

Odor Eraser is an odorless aerosol air deodorizer that eliminates odors by capturing odor molecules and breaking them down rather than just masking over them. The product is sprayed on a car's interior surfaces to neutralize undesirable scents. Prices for the 1.8-ounce size of Odor Eraser range from \$2.99 to \$3.99. **Contact: Gold Eagle Co., 4400 S. Kildare, Chicago, IL 60632; (312) 376-4400.**



Rust Stabilizer

Corroless Rust Stabilizer is now available in a 20-ounce aerosol, making it much easier to treat those hard-to-reach areas. The product stabilizes corrosion by changing rust into magnetite. It also forms an impermeable finish to seal out moisture and other corrosive elements. The nontoxic formula contains no isocyanates, chromates, acids or lead. The cost of a can of Rust Stabilizer is \$19.95. **Contact: The Eastwood Co., 580 Lancaster Ave., Malvern, PA 19355; (800) 345-1178.**

Get back under the hood!

Sunpro is your source for high quality, affordable diagnostic tools that put you back in touch with today's computer-controlled engines.

SENSOR TESTER PLUS™

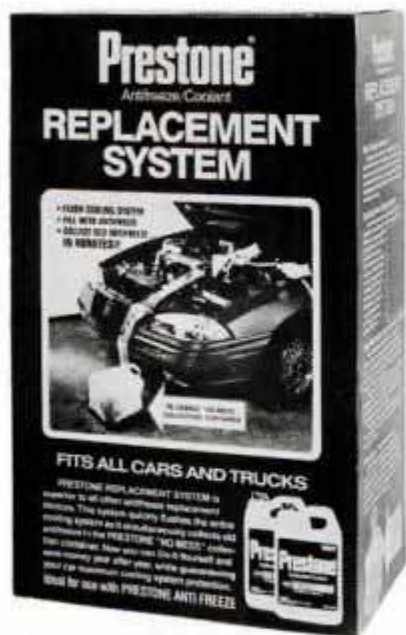
Troubleshoots for faulty sensors and tests ignition modules

CODE SCANNER™

Easy-to-use plug-in Car Computer Code Reader identifies trouble codes

Sunpro
by **DELCO-RV**

Available at your favorite automotive store
For more information call 1-800-537-0106



Coolant Changer

Prestone's antifreeze/coolant replacement system comes with a 5-gallon sealable container for collecting used antifreeze for proper disposal or recycling, plus a phone number for the recycling office in each state. Also included are all the tools necessary for the drain and fill process—hose menders, funnel, garden-hose adapter, drain sleeve and hose clamps. Contact: Prestone Consumer Information Line, (800) 835-4523.



2-Step Polish

Rated No. 1 for depth of gloss and paint protection in its original formula, the new 2-step Show Car Polish system delivers an even deeper wet-looking gloss and doubles the protection against UV rays, weather and detergent washes. No single-step polish or wax can match it. Polish Lok deep-cleans the surface and super-bonds the Show Car Polish to the finish. The 2-step polish system is available exclusively by mail order for \$24.90. Specify regular or clearcoat paint. Contact: ZBCO, 5700 Arlington Ave., Suite 9V, Bronx, NY 10471; (718) 796-5402.

DON'T SCRAP IT! J-B it!®

For over 20 years, J-B WELD has been an indispensable item in the tool boxes of America's professional mechanics as well as the do-it-yourselfers.



Cold Welds Almost Anything!

IRON * STEEL * COPPER
ALUMINUM * BRASS * BRONZE
PEWTER * WOOD * PORCELAIN
CERAMIC * PLASTIC

It's So Easy to Use!



Squeeze equal parts from the two tubes onto a clean, disposable surface and mix them together thoroughly.



Prepare the surfaces making certain they are thoroughly clean and free from dirt, grease and paint.



Apply J-B WELD with a putty knife or similar tool in either an even coat or globule shape as needed.



For best results, let the work piece together for 4 to 6 hours and leave it to dry overnight.

Drill It! Grind It! Machine It!

J-B WELD works by etching the metal surfaces you join, causing a metalizing process to bond pieces together, forever. J-B WELD is not affected by gasoline, oil, water, chemicals, or battery acid and will withstand temperatures up to 600° F!

Send \$1.00 for Key Ring, Decal, and J-B Weld Product Brochure.



P.O. Box 483, Dept. PM • 1130 Como
Sulphur Springs, Texas 75483
Phone: 903/885-7696 • Fax: 903/885-5911



Change your oil

...and keep your engine clean

Replace a quart of oil with a quart of Rislone® Engine Treatment at oil change or when down a quart.

Or, top off a full crankcase with our new 15-ounce, add-anytime formula. The added advantage of Rislone will help keep your engine clean for peak performance. There's also Rislone Premium Fuel Injector Cleaner to remove deposits from fuel injectors and intake valves.

FREE brochure, *How to Treat Your Engine Right*. To order the brochure or Rislone products direct, write The Shaler Company, Dept. PM0593, P.O. Box 471, Waupun, WI 53963 or call 1-800-452-2888.

Rislone: The Clean-Engine Advantage™

© 1992 The Shaler Company



Remote Electrics

Auxiliary lighting can be installed without routing wires with this remote-control system that features a removable wireless switch and a receiver that is wired to the lights. Available in June. **Contact:** KC HiLites Inc., Avenida De Luces, Williams, AZ 86046; (800) 528-0950.



AC Generator

Power-Mite 110 installs under your hood and turns any engine into a 3500-watt, 120-volt AC generating system. Compact in size, the unit measures 5½ x 10 in. and weighs 29 pounds. A control panel features automatic overload protection that is self-resetting. **Contact:** Fabco Power Inc., P.O. Box 582, Chester, NY 10918; (914) 469-9151.

Valve Stem Tool

K-D Tools' new valve-stem seal puller features a unique jaw and collar design that firmly grips seals for easy removal. It offers the fastest removal of positive-type valve-stem seals with the cylinder head on or off the engine. **Contact:** K-D Tools, 805 Estelle Dr., Lancaster, PA 17604; (717) 898-6575.



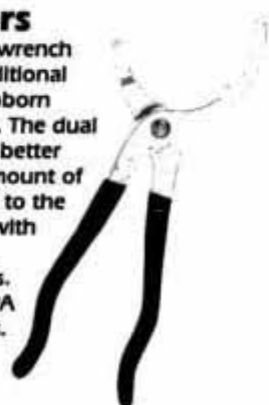
Inflator/Extinguisher

SafetyMate is a refillable, CO₂-charged cylinder with a special valve that rapidly inflates tires and also serves as a fire extinguisher. Weighing less than 3 pounds, the unit features a built-in air gauge and will inflate four auto tires. **Contact:** SafetyMate Sales, P.O. Box 70060, Baltimore, MD 21237; (410) 682-3500.



Filter Pliers

NAPA's oil-filter wrench pliers supply additional leverage for stubborn "on tight" filters. The dual handles provide better control of the amount of pressure applied to the filter compared with ordinary single-handle wrenches. Available at NAPA auto parts stores. **Call:** (800) LET-NAPA.



Our spark plug fires clean for 30,000 miles

The spark plug that's engineered for your Ford, Mercury or Lincoln is the one that performs. For the Motorcraft retailer nearest you, call 1-800-521-5181.

Motorcraft 

QUALITY PARTS FOR QUALITY CARS™

98% of all road dust is screened out by **our** air filter.



The filter that's engineered for your Ford, Mercury or Lincoln has to pass Ford's demanding performance specifications. For the Motorcraft retailer nearest you, call 1-800-521-5181.

Motorcraft 

QUALITY PARTS FOR QUALITY CARS™

©1992 Ford Motor Company

Chamois

Wheelskins' genuine sheepskin chamois are imported from England. The tannery that manufactures them has been making chamois with the true cod-liver-oil process for more than 200 years. The chamois is available in small and large sizes at fine auto parts and accessory outlets. *Contact: Wheelskins Inc., 2231 4th St., Berkeley, CA 94710; (510) 841-2128.*



Brake Cleaner

Gunk nonchlorinated brake cleaner features high solvency and fast evaporation. It quickly dissolves and flushes away brake fluid, oil, grease and other contaminants from drum and disc brake units and CV joints. The product leaves no residue, helps to stop disc-brake squeal, is environmentally friendly and costs \$2.49 at auto parts stores. *Contact: Radiator Specialty Co., Charlotte, NC 28234; (800) 438-4532.*



Aluminum Wheel

The Centra Type 27, a 7-spoke, one-piece cast-aluminum wheel for most domestic and import cars, comes in 15-, 16- and 17-in. diameters. An optional chrome-plated finish is available. *Contact: Ronal International, 15692 Computer Ln., Huntington Beach, CA 92649; (714) 891-4853.*

Cup Holder

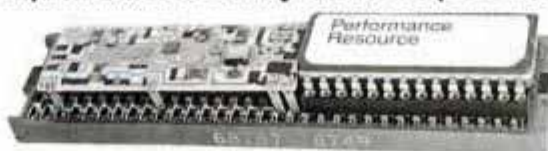
Cup Clamp attaches to the windshield with a suction cup and rests on the dash. It holds a variety of cups and mugs, uses a lid system to prevent spills and costs \$19.95. *Contact: Cup Clamp Products, 1559 Pacific Coast Hwy., Bldg. E, Suite 624, Hermosa Beach, CA 90254; (800) 723-3867.*



Hot Truck Chip

This high-performance replacement computer E-prom (chip) is designed to dramatically improve the performance of trucks, vans and sport/utilities. It increases torque up to 25% for quicker acceleration and crisper throttle response. All-around driveability is improved and fuel economy is increased up to 15%, especially when towing. Easy to

install, chips are available for most '87 and newer GM vehicles. *Contact: Performance Resource, 12 Barbara Dr., Fairfield, NJ 07004; (201) 343-0680.* **PM**



DETROIT SPY REPORT

BY JIM DUNNE, Detroit Editor



Ford Compact

● An almost exact replica of the new European Ford Mondeo, this Ford compact will make its American debut late this year. As yet unnamed, the car will replace the Tempo/Topaz in the Ford and Mercury lineups. While the European lineup features a 4-door sedan, 5-door hatchback and station wagon, the American version will be built in the 4-door sedan-style only. Compared to Tempo, the car will be bigger overall, with a wheelbase stretched more than a half-foot to 106.5 in., and front and rear track widened 3.5 in. and 0.5 in.

Lincoln Continental

Longer and wider grows the Continental. With a 4.6-liter V8 engine replacing the 3.8-liter V6, Lincoln will be positioned directly against Cadillac's De Ville for the first time. A completely new exterior appearance

will make the Continental look larger on the outside. Interior dimensions will remain unchanged. Prototypes like this (see photo below) carry the new passenger compartment sandwiched between current-style fenders, hood and trunk.

Mustang Motor

Ford executives are in a tizzy. Press reports that the restyled 1994½ Mustang may be powered by Ford's 4.6-liter V8 engine are off the mark. Instead, the trusty 5.0-liter V8 will be carried over in the new model, at least for initial production. What has the chiefs concerned is that buyers may be disappointed when the more advanced engine is not part of the Mustang package. Still, the 5.0-liter V8 has a strong reputation as a top performance engine. That, and its lower price tag, should keep ponycar buyers happy.



Saturn/Olds

Despite denials, Olds and Saturn are planning a hookup that will link dealers and car models. First, the two GM divisions want to direct Saturn owners to Oldsmobile dealers when they want higher-priced cars. The key is a "transition car" that will be shared by Olds and Saturn. This low-priced intermediate would fit at the top of the Saturn lineup and right in the middle of Olds' offerings. The linkup plan is ready, but now awaits an okay from GM headquarters. Because cash is short at GM right now, there will be a delay in getting the plan off the ground. But when GM starts making money again, look for the Saturn/Olds car to make a quick appearance.

Chrysler V8

Chrysler needs eight cylinders to power its flagship New Yorker and LHS sedans. So look for the company to develop a V8 for the sedans, then use the same engine in the Thunderbolt—if that concept car gets the production green light. The 4.0-liter V8 in the Thunderbolt



V8 power and size increase will pit next-generation Continental against Cadillac De Ville.

now making the show-circuit rounds is a more modern engine than the 318-cu.-in. and 360-cu.-in. V8s that Chrysler now produces for its light-truck lines.

No V6 Saturn

Don't look for a V6 engine in the Saturn lineup soon. Saturn engineers have tried one already, and they don't think it's necessary. They put a 3.1-liter GM (Chevy) V6 in a Saturn test car to see if the bigger engine was worth the investment. "We want to stay at the affordable end of the market," reports one Saturn executive. "That V6 adds a lot of complexity. And we want to keep our ease of service and maintenance [with the 4-cylinder]." Saturn's earliest plans included a dohc V6 of its own. But that too is deemed unnecessary now.

In fact, don't look for important engineering changes in Saturn's models soon. As part of GM's cost-savings program, Saturn cut back its engineering head count by 38% late in 1992. That means Saturn will stick with its current chassis designs for at least the next five years. Meanwhile, watch for minor styling changes to continue each year.

Universal Neon

Chrysler will sell the 1994 subcompact model through two of its dealer bodies under one name—Neon. That means a Neon Dodge and a Neon Plymouth. The car is different in exterior styling from any small model Chrysler has offered to date. Its body shape is more rounded than anything you've seen from Chrysler or its competitors so far. Headlights have gone back to a round style to complement the body shape.

Chrome Wheels

More popular than ever are chrome-plated wheels. A sprinkling are showing up at auto shows. And you'll see more on new cars in coming years. Modern ones are made of chrome plating over a cast-aluminum wheel. One problem in applying the chrome

is getting a smooth surface on the aluminum casting. Most castings have a rough surface that bends the chrome sharply and causes early pitting. Two overseas companies are using high pressure to mold the wheels. This smooths out roughness and results in a long-lasting chrome finish.

Won't Die

Rear-wheel drive presents a problem at Chevy. While its Caprice is selling below expectations, there is still a big market in police fleets. Officers of the law prefer rear-wheel-drive cars. "A trooper gets out of a sample front-wheel-drive police car and says 'that's nice,'" reports a Chevy marketer. "Then they go over to the rear-wheel-drive cruiser." So whoever sells rear-wheel drive will get that market. Chevy doesn't want to leave the highly visible police-car market for Ford's Crown Victoria alone. That's a big reason for the Caprice staying alive.

Grand Jimmy?

Look for GMC to offer two levels of the Jimmy sport/utility vehicle when a new model appears in 1995. While production ramps up on the new Jimmy, the current model will continue to be built. The plan is to sell the current Jimmy at a reduced price, the new model at a premium—a marketing recipe now used for the Jeep Cherokee and Grand Cherokee.

GM Midsize Sedan

Changes in GM's engineering assignments signal a major change in future rear-drive cars. As part of GM's cost-cutting, the midsize rear-drive sedan project was dropped from current schedules. At the same time, a key manager in GM's rear-wheel-drive project was transferred to Opel in Germany, where rear-drive midsize sedans are already in production. Put the two reports together with other information about GM's plans and you can predict that Opel will be the source of a midsize, rear-drive sedan for the U.S. market. **PM**



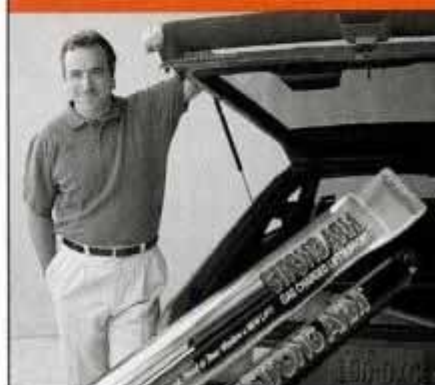
Restyled Mustang will continue to be powered by a 5.0-liter pushrod V8 engine.

PROBLEM:



Your hood won't stay up, opening your trunk gets harder every day, and your hatch is getting impossible to lift. Your car's lift supports are weak and that is a real pain.

SOLUTION:



StrongArm Gas Charged Lift Supports are the replacement answer. They lift, hold open, and close your car's hood, hatch or trunk. Unique piston assembly and triple-lobe seal assure reliable operation year after year. StrongArms are easy to install and available at automotive parts outlets.

REWARD:

We'll make your new lift supports even more rewarding. Buy a pair, fill out this coupon and send it to us with your receipt or credit card slip and two StrongArm package tops displaying the StrongArm name and bar code. A check for \$4.00 will arrive in 4-6 weeks. Mail to: StrongArm Reward, P.O. Box 8037, Clinton, IA 52736-8037

\$4

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

VEHICLE MAKE _____ MODEL _____ YEAR _____

Some vehicle applications require only one StrongArm. A \$2.00 rebate will be honored for single unit replacement upon verification of vehicle make/model application. Offer may be revoked at any time without notice.

STRONG ARM
GAS CHARGED LIFT SUPPORTS

PN535

ANNOUNCING THE 1994

Popular Mechanics

DESIGN & ENGINEERING AWARDS

• POPULAR MECHANICS annually honors exceptional new ideas, products and innovations with its Design & Engineering Awards. We are now inviting nominations for our 1994 awards.

Entries will be reviewed by PM editors in their specialty areas: automotive, boating, outdoors, home improvement, science, technology, electronics and photography.

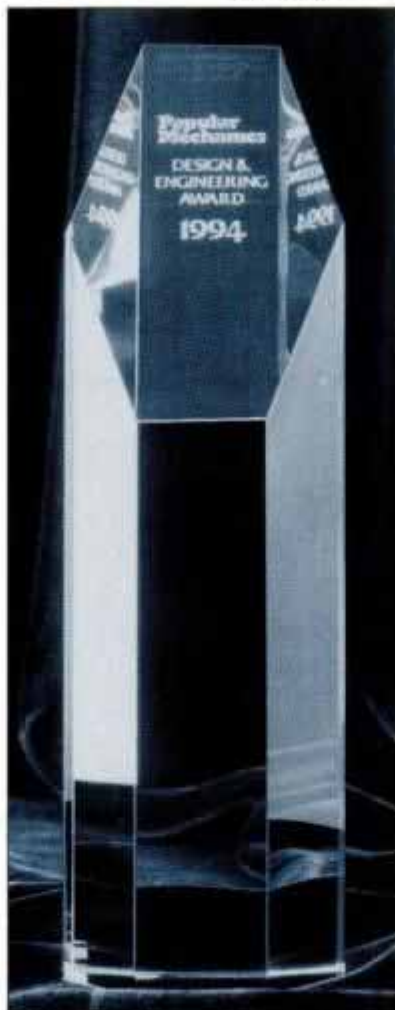
Because of the wide range of areas we cover editorially, to us a "new product" can be anything from a socket wrench to a spacecraft. A simple idea has just as much chance of winning an award as a complex one.

Nominations can be made by anyone, including individual readers or companies. The rules are simple: Submit a sample or a good, clear photograph or illustration of the product or project, and include a complete description with all the details of what it is, what it does, how it works and why you think it's deserving of a PM Design & Engineering Award.

Mail entries to Design & Engineering Awards, POPULAR MECHANICS, 224 W. 57th St., New York, NY 10019.

The deadline for nominations is Aug. 27, 1993. Good Luck.

Joe Oldham
Editor-In-Chief



NEW CARS



Rebirth Of The Ram

● If you think style has nothing to do with beasts of burden, this muscular newcomer from Dodge may make you think again.

Due in dealerships this fall, the new pickups represent Dodge's first major redesign to its full-size truck line since 1972. The unique styling, which says truck in unmistakable terms, is only one element that promises to help Dodge increase its precarious share of the full-size pickup market. The new Rams are also billed as having the biggest standard cab in the business, the first driver's airbag in a full-size pickup, standard rear-wheel antilock brakes (4-wheel ABS will be optional) and a 40/20/40 front seat with modular storage compartments behind it.

Even more compelling is the availability of a cast-iron truck version of the Dodge Viper V10—this in addition to the rest of the current Magnum engine line: the 3.9-liter V6, 5.2-liter V8, 5.9-liter V8 and 5.9-liter Cummins turbodiesel.

The new Rams will come to market in a full range of body styles—standard cab, club cab and chassis cab—with 2wd and 4wd available across the board. Basic wheelbase dimensions in the Ram 1500 and 2500 models will be 119 in. and 135 in. A 5-speed man-

Dodge's new line of full-size Ram pickups will be on sale this fall as 1994 models. Cast-iron version of Viper V10 engine (right) will join Magnum truck engine offerings.



ual transmission will be standard for most models, with two 4-speed automatics available, one designed for heavy-duty applications.

Initial production will be limited to the chrome-grilled version pictured above, but plans are in the works to offer the body-color grille displayed on a Sport edition at the Detroit show. Dodge also plans to revive its famous Power Wagon badge. Power Wagon indeed.

Callaway SuperSpeedster

Basing his latest creation on a ZR-1 chassis and powertrain, Connecticut-

based Reeves Callaway has unleashed the 750-hp twin-turbo version of what has become a continuous stream of seriously bad rides.

Ductile iron sleeves are added to the ZR-1 alloy block to contain the 17-psi turbo boost, which is routed through two intercoolers. Custom engine management software to handle the positive manifold pressure was written by AC Delco. The Vette's standard transverse composite spring

(Please turn to page 110)



Callaway twin-turbo super Vette boosts ZR-1 V8 engine output to 750 horsepower.



New LHS (above) and New Yorker round out luxury end of Chrysler LH sedan range. Posh LHS interior (upper right).

was replaced by coil-over shocks to make room for the plumbing, including twin dry-sump tanks for the turbocharger oil drains.

The chassis receives additional stiffening, and the fiberglass/carbon-fiber/Kevlar bodywork is wide enough to provide coverage for the Bridgestone P345/35ZR18 rear rubber. Brakes are Brembo billet Indy-car pieces.

Production of the SuperSpeedster will be limited to 50 vehicles.

LH Goes Upscale

Anticipated since the launch of the original LH sedan trio—Chrysler Concorde, Dodge Intrepid and Eagle Vision—Chrysler is expanding offerings based on the new platform with two upscale editions: the Chrysler New Yorker and Chrysler LHS.

Though the two newcomers share the same wheelbase as the rest of the family—113.0 in.—at 207.5 in. overall, they're longer. And they're also heavier, topping out at 3503 pounds for the LHS.

Only one powerteam is offered—



Chrysler's 214-hp dohc 24-valve 3.5-liter V6 and 4-speed automatic. Like the other LH sedans, dual airbags

Although pricing wasn't fixed when we went to press, the New Yorker and LHS are expected to fall into the \$25,000-to-\$30,000 range.



BMW's handsome new 3-series Convertible is available as a mid-'93

The Ultimate 3-Series

If you like BMW's nifty new 3-series coupes and sedans, you're likely to experience even stronger emotions over the latest newcomers to the line.

One of them—the Convertible version—tells its story at a glance. The Convertible edition of the old 3-series was a strong member of the lineup in terms of sales, and the new one looks even better.

The new hot-rod M3, however, raises a question, as well as the performance ante. Powered by a 3.0-liter dohc 16-valve straight-Six, the M3 goes from potent to sizzling. Thanks to its new infinitely variable cam

timing system and other tweaks, the M3 (M for BMW Motorsport) Six produces 286 hp and 235 ft.-lb. of torque.

That adds up to a formidable 95.7 hp per liter and 0-to-60-mph times of less than 5 seconds.

There's no question that this limited-production rocket will appeal to BMW faithful everywhere. But there is a question concerning its availability in the U.S., due to cost. BMW is looking at ways to get the price

are standard. Four-wheel disc brakes with ABS are standard equipment on both cars, and traction control is standard for the LHS, optional for the New Yorker.



Limited to European markets so far, the new BMW M3 coupe offers supportive multi-adjustable bucket seats. M3's 3.0-liter dohc 16-valve Six produces 286 horsepower, 0-to-60 in less than 5 seconds.





of a North American version somewhere within hailing distance of \$40,000.

New Cues For Q45

We all gave Infiniti lots of credit for taking a distinctive styling approach with the Q45 luxury sedan—in contrast to the derivative look of the Lexus LS 400. But the Q45's no-grille look didn't produce the kind of sales response Infiniti had in mind, and in its first update the car gets an extensive front-end restyling that includes a Jaguaresque grille, slightly larger



a viscous limited-slip differential.

Infiniti will continue to offer the Q45 in standard and touring (Q45t) editions, the latter with Nissan's Super HICAS 4-wheel steering system. A new variant—the Q45a—includes Nissan's Full-Active Suspension sys-

New front end, seating and trim highlight revisions to Infiniti Q45 for '94.

decades. Based on the Carrera 2, the Speedster is propelled by Porsche's classic 3.6-liter sohc air-cooled dual-plug horizontally opposed Six, delivering 247 hp and 228 ft.-lb. of torque. Performance projections (with a 5-speed) are about the same as the Carrera 2: 0 to 60 mph in 5.5 seconds, with a top speed of 160-plus mph.

Designed primarily for top-down motoring, the Speedster's manually operated canvas top stows neatly under a nifty composite tonneau cover.

Look for pricing to start at \$64,000.



Introduced at the Detroit show, new Porsche 911 Speedster is based on Carrera 2.

headlights and foglamps integrated into the front air dam.

Other appearance changes are more subtle. The side mirrors have been redesigned to reduce wind noise, there's a new rear bumper and a bit more chrome trim.

Inside, the leather seat upholstery has been redesigned to provide a more conventional tuck-and-roll appearance. Another concession to conventional luxury appearance is the addition of a bit of wood trim.

Functional changes include the addition of dual airbags and pretensioners for the front seatbelts.

While the Q45's excellent dohc 32-valve 4.5-liter V8 engine still produces stimulating power—278 hp at 6000 rpm, 292 ft.-lb. of torque at 4000 rpm—the chassis engineers have backed off on the suspension tuning to improve all-around ride quality. Antilock brakes are standard, as is

With 225 hp and chassis upgrades, the 9000 Aero is the hottest Saab ever.

tem, as well as traction control (optional on the Q45 and Q45t).

Fresh-Air Porsche

If fresh air can revive Porsche's stagnant North American sales, here's a car that displaces the atmosphere in style. And quickly.

The 911 Speedster represents another update on Porsche's most hallowed—and thoroughly developed—series, dating back over three

Hot-Rod Saab

Here's the latest upgrade on Saab's steadily improving 9000 series—the hottest production car ever offered by the Swedish automaker. In addition to its distinctive cosmetic touches, the 9000 Aero brings 225 hp to the party, 25 more than anything else in the lineup.

The engine is Saab's familiar 2.3-liter dohc 16-valve turbo Four, but in Aero tune, the turbocharger gallery is 10% bigger.

A number of chassis revisions promise to make the 9000 Aero quicker around corners. ABS and traction control are standard.

The Aero's leather-lined interior features new sport seats, with side bolstering worthy of a racing car.

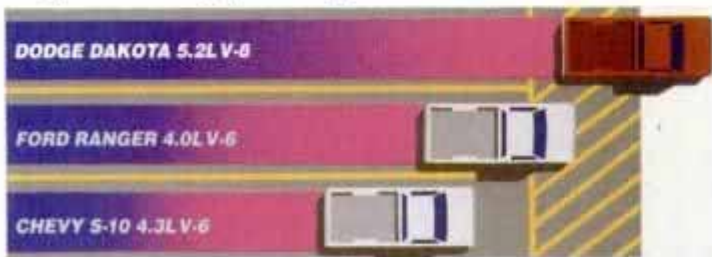
Aero editions come with a 5-speed manual. A 4-speed automatic is available, at the sacrifice of 25 hp—the higher output engine is offered only with the manual transaxle. **FM**



“Out-powers and Chevy and Ford compact or

Comparing a Dodge Dakota V-8 to other pickups is easy. There's simply no comparison.

5.2L Magnum V-8, out-ran the most powerful compacts Ford or Chevy have to offer. Out-accelerating them both. With loads or without. Even when loaded up with a trailer, too.



*Dodge Dakota 4x2 Club Cab out-runs the compact extended cabs 0-60, with 960 lbs payload and with 5,850 lbs combined payload and trailer weight.**

Compacts like Ranger and S-10 can't measure up. They don't have this Dakota's room. Its available payload. Its power. And certainly not its quickness off the line. We can prove it, too.

In a whole series of SCORE certified tests, a mid-size Dakota, equipped with our available



BUY OR LEASE AT YOUR DODGE DEALER. Buckle up for safety.

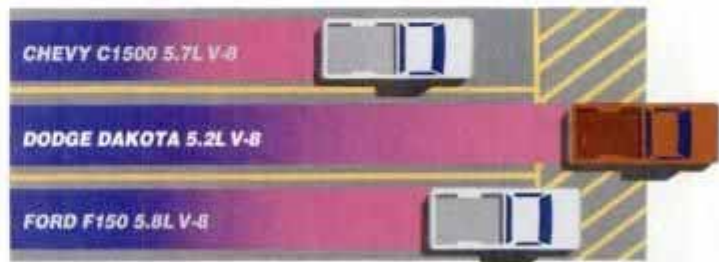
©1994 Dodge Ram Trucks. All rights reserved.

out-accelerates hands down, half-ton."

-Certified by SCORE International, January 1992

With that 230 hp power plant pulling for it, Dakota over-powers full-size Ford and Chevy half-tons, as well. Out-running them, empty and loaded. And delivering more horsepower and more available towing than a standard F150 or C1500 pickup.

The warranty's no contest either. Dakota is backed by a



Dodge Dakota 4x2 Club Cab out-paces full-size regular cab pickups 0-60, with 1,150 lbs payload and with 6,040 lbs combined payload and trailer weight.¹

choice unmatched by any truck manufacturer, anywhere. Our exclusive Owner's Choice Protection Plan.²

All in all, it's one very powerful story. Just one more example of how our Magnum engines make Dodge the most powerful line of trucks you can buy.³

Call 1-800-4-A-DODGE
for a free product brochure.



THE NEW DODGE
A DIVISION OF THE CHRYSLER CORPORATION

1993 Dodge Dakota LE Club Cab
5.2L Magnum V-8

¹All trucks equipped with auto. trans. & max. avail. axle ratios. Graphs not proportional to test data. ²See limited warranties, restrictions & details at dealer. Excludes normal maintenance, adjustments & wear items. ³Overall total scores of combined model segment comparisons. All claims & comparisons based on '92 models/data.



SCIENCE

SCIENCE AND THE PRESIDENT

BY ABE DANE, Science/Technology Editor



Clinton and Gore present their technology plan to workers at Silicon Graphics. Science advisor Gibbons (inset) was one of its principal architects.

● Like few presidents before him, Bill Clinton has seized upon science and technology as a keystone of America's economic future. Nearly a month before his swearing in, he'd already chosen his chief science advisor, Dr. John H. Gibbons—a step the last three presidents didn't get to until well into their first year. Now, a little more than a month into his presidency, and just before we go to press, Clinton and his team have presented a comprehensive outline of what they intend to do.

Apart from the speed with which it was put together, the most striking thing about the report, titled "Technology For America's Economic Growth," is the underlying belief that the government has a big role to play in keeping America at the leading edge not only of military technology but also of industrial technology.

In this respect, it's a sharp departure from earlier policies, particularly those of the last two administrations. Never before has the U.S. government aimed for such tight coordination between government research and

civilian industry. It's a path full of unknowns. But many feel it's an idea whose time has come.

Although former Presidents Reagan and Bush both spent heavily on research and development, their policies reflected doubts about the effectiveness of targeting these funds in response to specific industry needs. Instead, they focused government research dollars either on long-term

basic research or on clear-cut national goals, like defense and space exploration. If some of the resulting technologies spilled over and helped private companies, that was just a bonus.

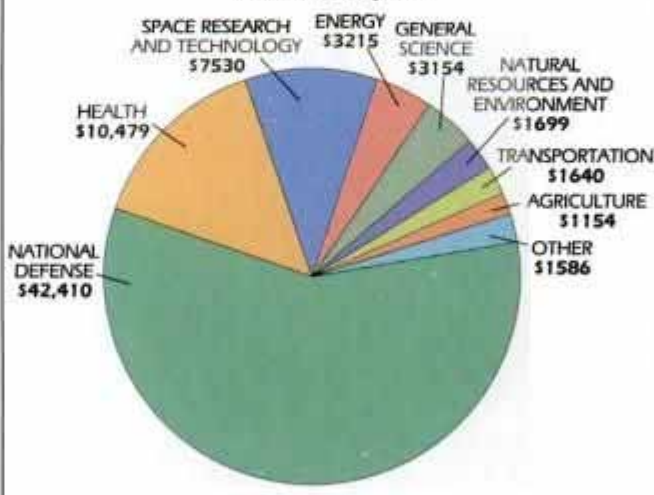
Since World War II, this basic approach has produced some great commercial successes. Two of America's foremost industries—computers and aerospace—are rooted in military spinoffs. But the pattern hasn't continued. Despite substantial gains in defense research-and-development spending throughout the 1980s, America's industrial dominance has measurably eroded. Meanwhile, however, our military has left its rivals in the dust.

As a result, there has been growing support for the idea that we need to do something like what we've done for the military for American business. Government has to get actively involved in directing the country's vast storehouse of scientific expertise toward things we can sell, while continuing to fund the basic research that keeps the storehouse stocked. Until Clinton's election, however,

WHERE THE MONEY GOES NOW

1993 FEDERAL R&D BUDGET IN MILLIONS OF DOLLARS

Total: \$72,866



The 1993 R&D budget inherited from the Bush administration is 58% defense and 42% everything else. Clinton wants it 50/50.

this point of view had been confined mostly to universities because it was incompatible with Republican free-market economics.

Now the advocates of industrial policy are getting their shot.

So what's their plan? It breaks down into three broad goals, which will be approached through the resizing and redirection of a variety of existing programs, and several new initiatives. The total cost over a 4-year period: \$17 billion. Some of the new steps will be part of a supplement to the fiscal year 1993 budget now in effect. The rest will begin with the 1994 budget which takes effect this October 1.

The first and most complicated of the goals goes under the ponderous heading "Long Term Economic Growth That Creates Jobs and Protects the Environment." Devoted to these ends will be a variety of mechanisms for funding commercial R&D, and fostering cooperation between government and industry researchers.

A key instrument of this policy will be the Advanced Technology Program (ATP), part of the Commerce Department's National Institute of Standards and Technology. ATP, which parcels out matching grants to the developers of promising technologies, currently controls a rela-

tively small budget of \$50 million, but that will swell by more than \$1 billion over the next four years.

This tremendous influx of funds comes in response to calls for the creation of a civilian version of the Defense Advanced Research Projects Agency (DARPA), which has gained a reputation for success in fostering budding military technologies. DARPA itself will remain part of the Defense Department, but will be renamed ARPA, signifying a shift toward technologies with commercial as well as military potential. NASA and the Department of Energy's National Labs will be asked to chip in by devoting some 10% to 20% of their budgets to cooperative research with private sector scientists.

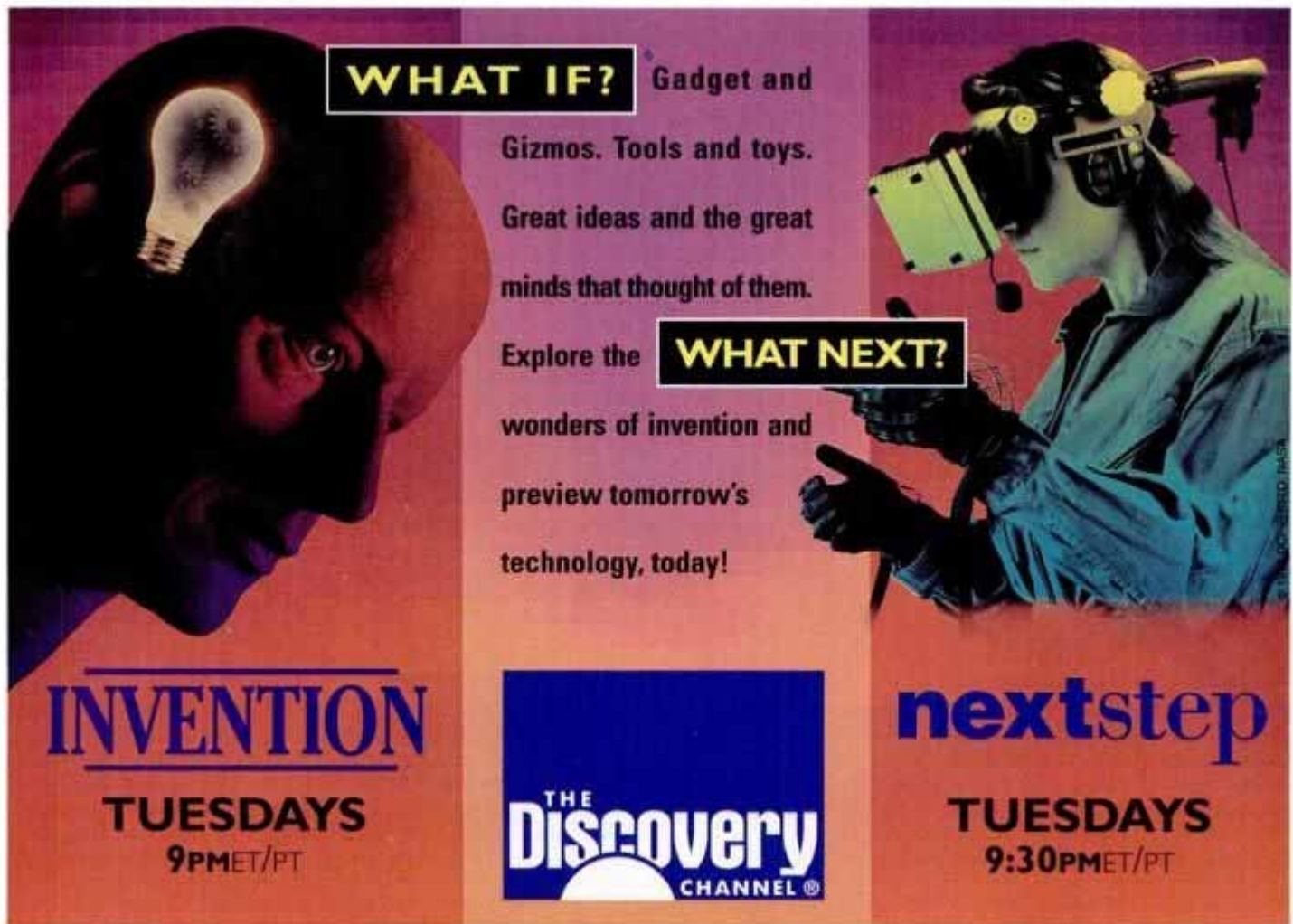
Also in the plan are such measures as tax breaks for investment in research, reform of antitrust laws to permit joint ventures and matching funds for education in manufacturing engineering. The other two goals—"Making Government More Efficient and More Responsive," and "World Leadership in Basic Science, Mathematics and Engineering"—encompass still more programs. And then there are the six free-standing initiatives including development of entirely new types of automobiles, a nationwide data superhighway and

improved manufacturing technology for education.

All in all, it's a tremendously ambitious package. Two big questions now loom: Can Clinton get it through Congress? And if he can, will it work? Critics of the whole concept of an industrial policy abound, and they point to the many massive, government-funded failures rusting by the wayside of technological progress.

Supporters counter that, like any other aspect of governance, industrial policy can be well or badly managed. Susan J. Tolchin, a professor at George Washington University and co-author of the book *Selling Our Security*, thinks Clinton's plan is a good start. "It was a signal to Silicon Valley and the whole tech community that they weren't going to be alone in the desert anymore, which is what they were for the last 12 years." She adds, however, that the plan doesn't adequately address the need for legal and financial reforms that would make the U.S. a better climate for business.

One thing that is clear from all of this is that President Clinton has staked his future on being able to nurture American technology. And while it's certainly possible to argue with his approach, his commitment and enthusiasm are a hopeful sign for the next four years. **FM**



WHAT IF? Gadget and Gizmos. Tools and toys. Great ideas and the great minds that thought of them.

Explore the **WHAT NEXT?** wonders of invention and preview tomorrow's technology, today!

INVENTION
TUESDAYS
9PMET/PT

THE DISCOVERY CHANNEL

nextstep
TUESDAYS
9:30PMET/PT

OUTDOORS

OFF-ROAD ODYSSEY

BY JOE SKORUPA, Boating/Outdoors Editor



● Remember when a steering wheel was surgically grafted to your hands? It was high school. You had just gotten your driver's license, and everything worth doing seemed to require driving, even visiting your best friend across the street. Hopping into a car on the slightest pretext was as automatic as breathing back then. Actually, it still is. But when it was new, it felt like exploring. Discovery was around every corner.

One of the biggest discoveries I made at the time was finding a secret network of roads that ran throughout northern New Jersey. This wasn't the biggest discovery I made at the time. After all I was a teenager and there were a lot of interesting distractions. Nevertheless, it was up there.

Anyway, I'd never noticed these side roads before, and there were dozens of them. They were unlike familiar roads, which were paved and graded. These roads were bumpy, off camber and followed the natural lay of the land. Most were dirt. Some had a thin base of crumbling asphalt. A few were virtually tire tracks that snaked into the woods.

Many of these roads led to dead ends. Several, however, really went somewhere, and the places they went were always interesting—an old farm house (read haunted house), a neglected (spooky) cemetery, an abandoned (secret) camp or, if we were lucky, another dirt (lost) road that climbed high up on the ridges. Although these expeditions were hard on family cars, my friends and I had great fun on these roads, and they quickly became our favorites.

Years later I discovered that my love for these roads had not diminished. Using well-equipped 4wd vehicles, I have explored the Great Divide, Death Valley, Alaska and the Yukon. And in doing so, I discovered another secret network of roads. This one runs through all 50 states.

There are, in fact, more than a million miles of dirt roads in America. At least 500,000 miles are on public land, and many lead to genuine ghost towns, cowboy camps, abandoned mines, historic sights and awesome natural wonders. The more I drive these roads, the more I realize what a fabulous resource they are.

However, it soon dawned on me that I was not alone in this appreciation. Four-wheeling or off-roading, a sport in itself, are popular in many areas of the country. Millions of hunters and fishermen also drive on these roads. And due to the stress of city living, more and more people are choosing to escape to the countryside on weekends and vacations. Rock climbing, trail hiking, wilderness camping, horseback riding and mountain biking, plus riding ATVs, dirt bikes and snowmobiles are becoming increasingly popular.

Uh oh, I thought a few years ago. Booming popularity often leads to booming market forces, and they both frequently spiral out of control. Boomers, unfortunately, all too often kill the things they love.

Consequently, in 1990, I lobbied hard for POPULAR MECHANICS to become one of the first corporate backers of a newly formed off-road environmental organization called Tread Lightly. At the time, Tread Lightly was in the process of departing from its government umbrella and becoming a self-funding, not-for-profit,

member-supported entity.

My lobbying paid off, and PM became one of Tread Lightly's founding members. I was named the magazine's official representative, and in surprisingly short order, I was elected to the board of directors. Today, I serve as the board chairman.

During its first three years of existence, Tread Lightly has achieved a surprisingly long list of accomplishments. This is due to the efforts of executive director Cliff Blake and his staff in Ogden, Utah. With the help of Lori McNeely, Brenda Randall, Tara Corgiat and Stew Jacobson, Cliff makes sure the Tread Lightly message reaches millions of 4-wheelers and others active in the outdoors. Much of this work is accomplished through the distribution of educational materials to the U.S. Forest Service, the Bureau of Land Management, the automotive industry, the media and drivers' and hunters' education programs. Last year alone, Tread Lightly distributed \$70,000 worth of educational pamphlets, brochures and teachers' aids.

At the same time, membership in Tread Lightly has grown at a rapid pace. In 1990, the entire group could fit around a conference table. Today, with membership doubling annually, there are more than 70 corporate sponsors and more than 2100 individual and associate members.

Among the major corporate sponsors and benefactors are a who's who of the automotive world—Toyota, Jeep, Ford, Dodge, Isuzu, Mazda, Geo/Tracker, Nissan, Land Rover, Goodyear, Michelin, Warn Industries, Superwinch and many others. Nonautomotive companies include Ski-Doo, Polaris, Arctic Cat, Coleman and Bass Pro Shops.

The main goal of Tread Lightly is to educate the outdoor public about environmental ethics and off-road responsibilities. In basic terms, Tread Lightly encourages people to enjoy the outback, but to do so without causing damage. Its mission statement declares that Tread Lightly will "protect public and private land through education. Emphasis is placed on responsible use of off-highway vehicles and other forms of backcountry travel, and on low-impact principles applicable to all recreation activities." In simpler terms, remember pro-use, low impact.

I must admit I was a little skeptical when I first heard about Tread Lightly. I had often come across areas where off-roaders had blazed new trails and ripped up terrain. I had also seen how the damage was compounded until the area had to be



On the set of the Tread Lightly video and cable production, "Where The Pavement Ends."

closed off. Could an organization that uses education and voluntary restraint as its only tools really prevent this kind of abuse?

After several meetings with Cliff and key automotive industry leaders, I realized that it could. To start with, Tread Lightly established a toll-free information line and developed a thriving national distribution network. Then, it produced educational materials and a video that will be

seen on cable TV this year. It also established a national educational conference to be held in Santa Fe, New Mexico, on May 6-8.

Future plans call for the production of several more videos, the establishment of seminar programs, coordination of trail-preservation programs, and much more. To learn more about Tread Lightly, write: 298 24th St., Ogden, UT 84402, or call (800) 966-9900. **PM**

Laugh At Work.



New Big Boss 6x6 350L

This lifting, hauling, dumping, towing, easy-to-use ATV can make your workday more productive. Maybe even fun. To see how, call 1-800-POLARIS.

Warning: ATVs can be hazardous. Always wear a helmet and protective clothing. Adult riders only, age 18 and over. Never carry passengers or ride on pavement. All riders should take a training course.

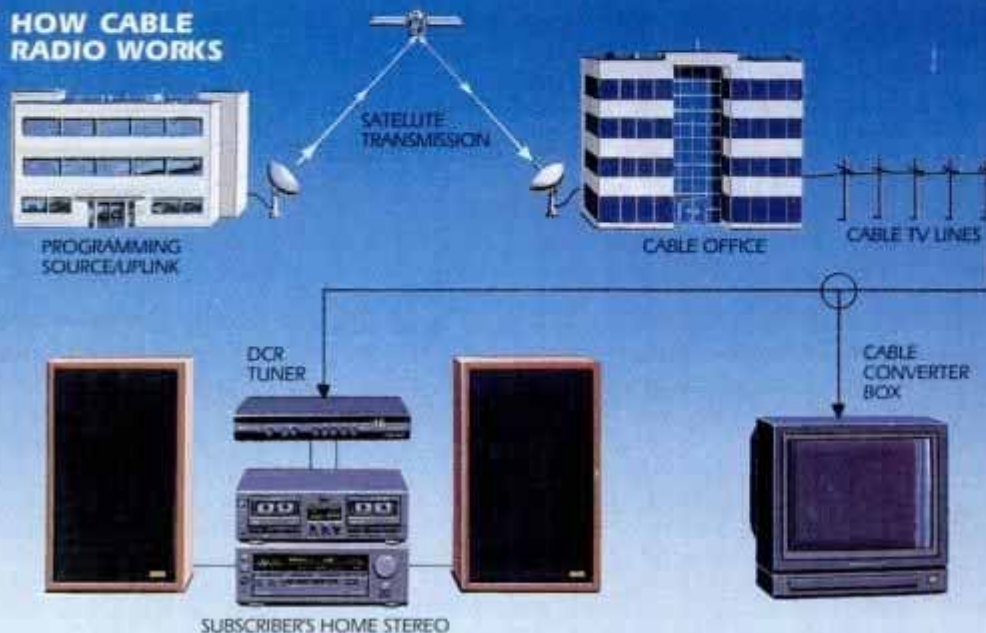
POLARIS
Believe It.

©1992 Polaris Industries L.P.

GOOD MORNING, CABLE RADIO

BY FRANK VIZARD, Electronics Editor

HOW CABLE RADIO WORKS



The cable radio signal piggybacks onto the cable TV signal. At home, a separate tuner processes the digital signal, which can then be heard in stereo on your audio system.

home by hitching a ride with the cable TV signal. The radio signals occupy only about one-tenth the bandwidth required for a television signal. Simply put, the radio signals get shoehorned into the space between TV channels. For cable operators this is a boon because they can generate extra revenue without giving up any cable space.

The cable radio signal, however, is processed by a separate cable box that acts much like a radio tuner, which connects to your home stereo.

What do you get for your \$10 per month? A lot of variety, judging by the program guide. At Digital Cable Radio, for example, recently added channels include Dance, Rap, Show Tunes, Traditional Country, Regional Mexican, New Age, Tropical Rhythms and Adult Acoustic Alternative. Add jazz, blues, classical, rock, love songs, big band, TV simulcasts and just about everything else to the mix. There's even a storytelling channel for children.

Cable radio also has one other nice



Song title and artist are transmitted digitally, with the information displayed on the remote control's LCD screen.

Given the almost ubiquitous nature of cable television, it was only a matter of time before cable radio became a reality.

Okay, your first reaction may be one of resignation. Television used to be free, now you get a monthly bill. Now you'll have to pay for radio as well. Great news.

Well, cable radio is good news for music lovers. And no one is saying free broadcast radio is dead either.

In a way, the radio stations themselves are creating the window of opportunity for cable radio. On the one hand, the type of music being broadcast by radio stations tends to be what's deemed the most popular. If you're a jazz or blues music fan, for instance, you're often hard pressed to find the same on the radio. In fact, you may have a tough time finding any music at all as radio stations increasingly adopt news and talk entertainment formats.

Secondly, while FM was once a high-fidelity (particularly as compared to AM) medium, this is no

longer the case. Disc jockeys may be playing compact discs but FM has a limited bandwidth that doesn't do justice to the dynamic range offered by CDs. This means you don't hear all the high and low notes present on the compact disc. Broadcast radio simply can't transmit the information. To a large degree, the digital age, represented by the compact disc, is threatening to bypass radio.

So, assuming you don't want to buy every CD released on the planet, an ideal music source would be a radio technically capable of producing CD-quality music. Here's where cable radio comes in.

Cable radio services already exist and have names like Digital Cable Radio, Digital Music Express and Digital Planet. Most services charge around \$10 per month. Digital Cable Radio now offers 38 channels of music, Digital Music Express offers 30 and Digital Planet has 26. Many of these channels are free of both commercials and disc jockeys.

Cable radio signals arrive in your

convenience feature. Nearly everyone has heard a song on the radio but has missed the disc jockey's identification of the song and artist. With cable radio, artist and song title are transmitted digitally with the music. Press a button and the information appears on an LCD screen on the remote control.

Interestingly, while record companies have been wary of digital musical formats because of piracy concerns, digital cable radio is getting a positive reception. Sony and Time Warner Cable are investing \$20 million in Digital Cable Radio, the operation emerging as the industry leader. Digital Cable Radio, they believe, will help boost CD sales. The Sony Software and Warner Music labels will jointly program eight channels of music. This arrangement will allow the music companies to promote the artists and music they choose.

Digital Cable Radio, in Hattiesburg, Mississippi, expects to grow to 50 channels this year and to 250 channels by the year 2000. Sports, news, education and foreign programming are planned. Digital Music Express is headquartered in Los Angeles and Digital Planet is located in Carson, California.

Just where does this leave our existing framework of broadcast radio stations? For the moment, they are in a bit of a bind, technically speaking, as far as the quality of the signal being delivered is concerned.

Cable radio, of course, is limited in the sense that wires can't be connected to portable and car radios. The

Federal Communications Commission is considering a satellite radio system that would digitally transmit 30 to 200 channels directly to subscribers. A decoder built into the radio would unscramble the signal. Cost would be \$5 to \$10 per month.

Lined up against this proposal is

Personal Communicators

The science-fiction writer Arthur C. Clarke once noted that "any sufficiently advanced technology is indistinguishable from magic." Taking that thought to heart is a new Silicon Valley startup company called General Magic that proposes to develop a line of handheld personal communicators.

What might seem to be a notion from the Star Trek television series has a lot of major players very excited. General Magic is a consortium comprised of some impressive names, including Apple, AT&T, Motorola, Matsushita, Sony and Philips. Admittedly, some big names are missing from the list, namely IBM, Microsoft and Intel. Indeed, the competition involving a product that doesn't exist is already fierce. Sun Microsystems, the largest manufacturer of computer workstations, intends to compete with a separate standard of its own.

What everyone is striving to develop is a handheld device that marries the computer and the telephone. These nomadic devices would be connected to larger communications networks by wireless radio links.

While it may take some years yet for this product to materialize, the technical standards battle is already beginning. General Magic has a communications platform called Magic Cap and a programming language called Telescript that it would like to see widely adopted. Video is also likely to be included farther down the road.

FM



Even this many rags won't dry your car like this chamois.

You can dry your whole car with just one chamois. You can't use a rag more than once after it gets wets.

Real chamois is more absorbent than anything in the world. It actually holds more than four times its weight in water.

And, unlike rags that can hold the dirt and grit that can streak and scratch your car's paint, chamois rinses clean. So it's soft and gentle on your car. Rag after rag after rag, you can't beat one chamois.

Look for the Chamois Seal of Quality. You'll find it on genuine chamois wherever better car care products are sold.



Genuine Chamois.
The gentlest way to dry your car.

the National Association of Broadcasters (NAB), representing the nation's radio stations. The association wants to develop an in-band digital transmission system that would be inclusive of existing radio stations. In any event, over-the-air digital transmissions aren't likely before 1995.

While it may take some years yet for this product to materialize, the technical standards battle is already beginning. General Magic has a communications platform called Magic Cap and a programming language called Telescript that it would like to see widely adopted. Video is also likely to be included farther down the road.

hind whatever the airplane was doing. Fortunately for my ego, the tanks were down to their last quarter and it was time to go home.

Next stage

After landing, the videotapes from my and Jay's planes were played on side-by-side monitors. There I was on the "Hero" camera, grunting and cursing while trying to escape, and there was Jay the "Hero" in pursuit, grunting and cursing as he tried to do me in. We watched ourselves laboring, determined, riveted. All the while behind our videoed heads the

world was a swirl of green, blue, red clay and bright sunbursts as we wheeled and rolled our Mentors through the North Georgia sky. I was transfixed by what I was seeing—that couldn't possibly be me doing that. Yet it was.

My reverie ended when a cool can of brew was thrust in my hand and attaboy slaps hit my shoulder. I looked around at my colleagues in their sweat-stained flightsuits talking, laughing and recalling dogfights with their hands. And suddenly that F-4 that was never mine became a little less important. **PM**

(Continued from page 35)

years of studies have discerned no health risks from the radio frequencies used in cellular telephony. Nonetheless, the Cellular Telecommunications Industry Association has volunteered to bankroll new studies to be performed independently by the federal government.

In some ways, the comparison of ELF fields from electricity and appliances and the microwave radiation from cellular phones is an apples-versus-oranges situation.

The ELF radiation from utility lines is a long-wave, high-power field. Portable cellular phones, meanwhile, propagate tiny waves at 1/10ths of a watt or less. The concern with portable cellular phones is proximity to the head, and with the new pocket models the microwave transceiver and antenna are in the handset, not elsewhere in the car.

Companies like Motorola have always cautioned users not to grip the antenna—though mostly to prevent burns. Regardless, the Specific Absorption Rate for a cellular portable is 0.45 watts per kilogram—a fraction of the 1.6W/kg limit over a 30-minute period recommended by the American National Standards Institute and the Institute of Electrical and Electronics Engineers. By comparison, CB radios weigh in at 1.5W/kg and police radios at 3.6W/kg.

"With these devices and frequencies, you're concerned with the amount of energy absorbed by the tissue or any other material," explains Dr. Jerrold T. Bushberg, professor of radiology at the University of California. He, like Dr. Slesin, tells PM that with microwave equipment it's measurements of power density that matter, not field strength as measured in milligauss.

A milligram of prevention

If you've got a healthy dose of skepticism about things you can't see—and want to keep it healthy—there are some measures you can take to limit your exposure to EMF. You'll find specific recommendations in the accompanying chart on page 34.

Cellular telephone users have the greatest leeway—it's their nickel. As for ELF/EMFs from utility power lines, there isn't much anyone can do—even moving might not help. But prudence can be applied to appliances, where an ounce of prevention might not help, but sure can't hurt.

"With electromagnetic fields, distance is your friend," says Dr. Slesin. "The farther away you are from an appliance, the better." **PM**

Sleep On Air Cushion Comfort

• Adjust Firmness to Fit Your Exact Needs.



• Research shows 94% of back pain sufferers report Select Comfort gives them the back support they need to get a better night's sleep.

• Unique air-cushion design contours to your body, providing superior back support and comfort.

Revolutionary Air Support System.

Select Comfort's unique air support system lets you control the feel and firmness of your bed—simply by pushing a button. Your mattress can be firmer than the firmest innerspring or softer than the softest feather bed...helping you sleep more comfortably, reducing back pain and muscle aches, and providing true support. Change the firmness whenever you like to meet your exact preference.

Variable Firmness = Great Sleep.

You control the firmness of your bed—simply by pushing a button. Change the firmness as often as you like. Make your mattress hard as a board, or soft as a feather bed. The choice is yours.

Adjust Your Side Separately.

Inside the mattress are two air chambers. You can adjust your own side independently. With Select Comfort, you satisfy your own needs without compromise.

Try Risk-Free for 90 Nights.

Sleep on a Select Comfort for 90 nights. If you are not completely satisfied, return it for a full refund.

Discover why 96% of Select Comfort users recommend it to their family and friends.

"I am a doctor and often come home exhausted. This mattress is the most comfortable I've tried."

Dr. Connie Horn, M.D., Clarksville, OH

"The best mattress I've seen in respect to total body and especially spine support."

Dr. W. F. Lenz, Mankato, MN

"For the first time in years, we wake up without aches and pains and have more energy!"

Mr. & Mrs. Dennis Clevenger, Lawrenceville, GA

Call now for your **FREE VIDEO**

and **FREE Brochure**

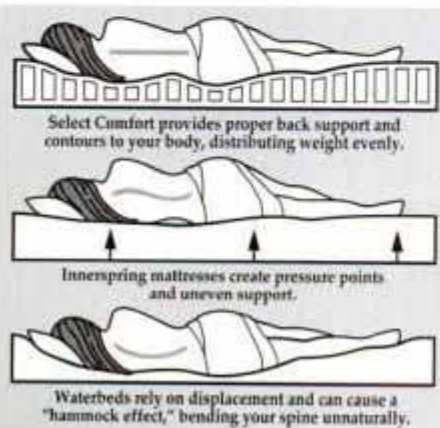
1-800-831-1211



9301 75th Ave. N. Dept 1405
Minneapolis, MN 55428

© Select Comfort Corp. 1993

Dept 1405



Select Comfort provides proper back support and contours to your body, distributing weight evenly.

Innerspring mattresses create pressure points and uneven support.

Waterbeds rely on displacement and can cause a "hammock effect," bending your spine unnaturally.

Presenting the ultimate fully motorized replica
of America's most beautiful locomotive.

THE CRESCENT LIMITED



The traditional, fully motorized HO-scale locomotive arrives with a handsome display with a genuine brass nameplate for showcasing when not in use.



The distinctive golden crescent moon gleams brightly.

Model shown smaller than actual size of 127 1/2" L.

The tender is filled with coal.



A look inside the engineer's cab reveals amazing detail.

The locomotive travels on the 4-6-2 wheel configuration that was the hallmark of "Pacific" type locomotives.



The smokestack juts forth from the smokebox, and the polished brass bell heralds the arrival of the train.

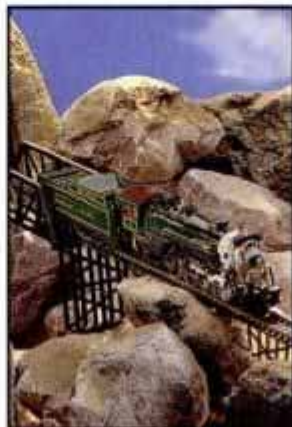
An authentically detailed, handcrafted HO-scale model. Precision-cast in gleaming metal and polished brass.

It was introduced in 1925 with the bold claim, "There is no finer train..." The "Crescent Limited," a powerful locomotive created to pull the first premium-fare, all-Pullman deluxe train. When all other locomotives were black, this unique beauty was gleaming "Virginia Green," with rich burnished red trim. Emblazoned with a brilliant golden moon and stars logo and golden striping.

Now, Franklin Mint Precision Models re-creates the "Crescent Limited" in its premier motorized HO-scale replica. Precision-crafted from over 100 components with no detail overlooked—from the authentic colors to the gleaming brass bell...to the coal-filled tender. Created from actual photographs and engineer's blueprints, then hand-assembled to exacting standards of excellence, this fully motorized, traditional HO-model can be operated with train sets of that size. And at the issue price of just \$395, this one-of-a-kind replica is an extraordinary value too.

SATISFACTION GUARANTEED

If you wish to return any Franklin Mint Precision Models purchase, you may do so within 30 days of your receipt of that purchase for replacement, credit or refund.



Please mail by May 31, 1993.

Franklin Mint Precision Models
Franklin Center, PA 19091-0001

Please send me the "Crescent Limited," a fully motorized replica in the traditional HO scale. Complete with a handsome track display base.

I need SEND NO MONEY NOW. Prior to shipment, I will be billed for a deposit of \$79*, and after shipment, for the balance in 4 monthly installments of \$79* each.

*Plus my state sales tax and a one-time charge of \$3. for shipping and handling.

SIGNATURE _____ ALL ORDERS ARE SUBJECT TO ACCEPTANCE.

MR./MRS./MISS _____ PLEASE PRINT CLEARLY.

ADDRESS _____ APT. # _____

CITY _____

STATE _____ ZIP _____

TELEPHONE # (_____) _____
© 1993 FMFM 14032-6VSB-79

Exclusively from Franklin Mint Precision Models.*

PHOTOGRAPHY

THE NEW POLAROID

BY GEORGE SCHAUB

● For the past three years the engineers and scientists at Polaroid have been working on a secret mission, code-named the "Joshua Project." Leaks and teasers gave hints of what was to come and built anticipation to a high level, but there was no "Deep Throat" in the Polaroid hierarchy to spill the beans. The camera, first distributed in Europe under the Vision moniker, is hitting U.S. shores this summer as the Captiva. Though we did get a quick hands-on in Europe last year, we waited until it was ready for the market here to give it a true field test.

Ever since Dr. Edwin Land showed the world a 60-second print in 1947, the name Polaroid has been linked with instant photographic gratification. That first "instant" print was a sepia-toned black-and-white image, but loading the film, tugging the print from the camera after exposure, separating the sheets of paper and coating the print with gooey chemicals made for a somewhat messy experience and, all too often, a trial-and-error process for beginners. But no one denied that it was a miraculous achievement.



This is the actual size of pictures taken with the Captiva. Primary colors are rich and true. Pictures begin to appear in 40 seconds and are fully processed in less than 3 minutes.



Many years ago, Polaroid scientists developed an "integral" film—a cartridge-loading, full-color print that required no effort on the part of the user. After the shutter was pressed, the motorized camera pushed the film through rollers that spread the developing chemicals inside a plastic-covered packet on the image carrier itself. Magically, the details and colors of the scene came up right before the viewer's eyes, even in broad daylight.

But, given the configuration of the new Captiva camera, something must have seemed incomplete in the minds of the Polaroid engineers. Once the film was ejected from past



The Captiva pops up for shooting and folds for carrying. Film appears in window.

cameras, it sat in the jaws of the camera waiting for a hand to take it away and place it in a pocket or on a nearby table. The new camera behaves more like a marsupial than a mammal, holding the print within a camera "pouch" after exposure rather than ejecting it into the cruel world right after birth.

Those who still thrill from watching a Polaroid "come up" needn't fear, as the pouch, located on the back of the camera, has a clear window that allows you to witness the image as it emerges. It collects a full 10-shot pack of exposed film, and gives you a buzz when it's full.

Once you do get a hold of the print, you'll notice that it's smaller than those from the most recent Polaroid snapshot cameras. The image size is 2.9×2.15 in., a rectangular format equivalent to a conventional wallet-size photo. However, the paper backing, which holds the plastic-enclosed picture, is 2.5×4.4 in., and you can't cut the image away from the backing to fit it into your wallet. Do so, and



the careful arrangement of the image layers comes apart, and the image will discolor and fade.

Polaroid is quick to point out that the proportions of the image match those of TV and computer monitors (4:3). This may hint at a black box to come—one that uses the film to print out images from sources such as Photo CD and computer-enhanced imaging software.

As with most cameras aimed at the snaphooter, the Captiva has fully automatic exposure and focusing control. There are virtually no dials to set or buttons to push. There's even no need to carry fresh batteries, as each packet of film carries a battery for all the camera's power needs. The only controls are a lighten-darken slide, which allows you to make pictures slightly lighter or darker to taste, and a self-timer.

Focusing works with what Polaroid refers to as a "Wink" system. Thousandths of a second before the actual exposure, the built-in flash sends out a beam of light. This is reflected back to the camera and tells it whether the subject is within or beyond close-focusing range. If it's more than 9 ft. away, a tiny solenoid is fired which drops a far-focusing correcting lens in the light path. That, and the "normal" focusing range of 2 to 9 ft. are the only two focusing ranges on the camera.

Because the Wink system, and the flash, are at the heart of the camera's operating system, every picture made with the camera uses flash. When the subject is more than 9 ft. away, the flash is ineffective and exposure is based solely on the aperture and shutter-speed control.

This flash-always exposure makes for some limitations. When shooting closeups (around 3 to 4 ft.), the flash tends to become the sole source of illumination, which makes the background go dark.

The solution is to back off slightly and take your shots from about 6 to 7 ft. away. This shooting distance provides very good exposure results that include both subject and background detail. And, if shooting indoors with flash, avoid going beyond 9 ft. from your subject, as the flash is ineffective beyond that range.

Once exposure is made, the film transports through what Polaroid describes as a "luge-like" channel for processing, and eventually the film appears in the window at the back of the camera. At first, a grayish plate appears. The first glimmer of a picture appears in 40 seconds, with the final print ready in 2 to 3 minutes.

The film itself is somewhat of a

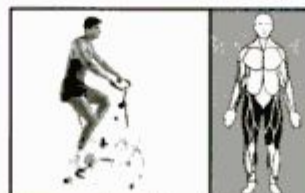
warm-weather friend. Polaroid recommends shooting at 55° F for best results—shooting at lower temperatures can yield bluish results. For shooting outdoors on cool days, take the print out of the compartment immediately and place it in an inside pocket of your clothes.

The primary colors on the films we shot were rich and true, though fleshtones did appear somewhat sallow. On some closeups (2 to 3 ft. away), the pictures seemed somewhat overexposed, which gave faces a ghostly white appearance. Going to the darken control to compensate made the picture too dark overall.

The best results we got indoors were at an ideal shooting range of about 5 to 7 ft. Outdoors the camera performed admirably, though getting too close did make the background go dark even on sunny days.

All in all, the Captiva is an impressive piece of engineering that provides a fairly compact and lightweight instant picture experience. Though the smallish print size takes getting used to, the pictures are sharp with excellent color. As with all new systems—and this is a new approach to instant photography—experimentation and experience will help you get the most out of the camera. **FM**

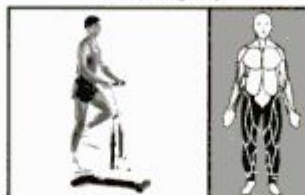
Only NordicTrack gives you a total-body workout.



Lower-body only

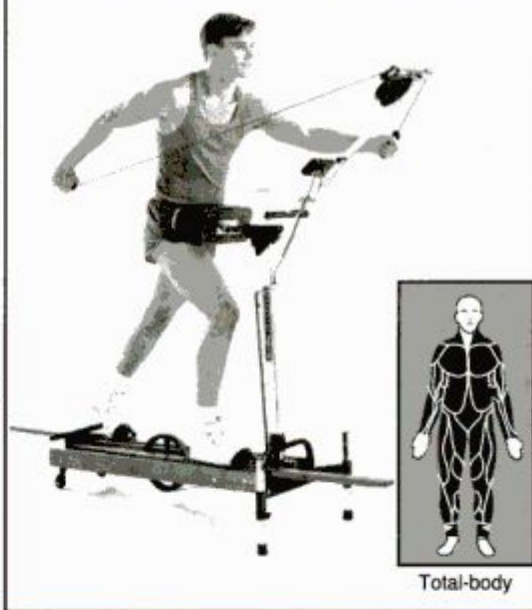


Lower-body only



Lower-body only

NordicTrack: "The World's Best Aerobic Exerciser®."



Total-body

Exercise bikes, treadmills and stairsteppers don't give you half the workout NordicTrack does.

Most in-home exercisers completely ignore the muscle groups in your back, chest, shoulders and arms.

But a NordicTrack® workout exercises **all** the major muscle groups in **both** your upper and lower body.

That's why it's more efficient at elevating your heart rate to the fitness-building level. And why it burns more fat. And up to 1,100 calories per hour.

Don't settle for less than a total-body workout.

30-day in-home trial!
Models priced from \$299⁹⁹

NordicTrack
A CML Company

Call for a FREE Video and Brochure

1-800-328-5888 Ext. 275E3

or write: NordicTrack, Dept. 275E3
104 Peavey Road, Chaska, MN 55318

Please send me a free brochure
 Also a free VHS videotape

Name _____
Street _____
City _____ State _____ Zip _____
Phone () _____

©1993 NordicTrack, Inc., A CML Company • All rights reserved.

A BUILDING THAT CAN DO ANYTHING!



SAVE Up To 40%

Buy Factory Direct

800-888-4606

20x30
25x50
30x40
40x60



WHY RENT? SAVE! SAVE!

CABLE TV DESCRAMBLERS

JERROLD • OAK • HAMLIN • ZENITH
 PIONEER • SCIENTIFIC ATLANTA

READY-TO-SHIP!

6 MONTH WARRANTY! ABSOLUTELY
 LOWEST WHOLESALE / RETAIL PRICES!

MASTER CARD • VISA • AMEX • C.O.D.
FREE COLOR CATALOG!

1 (800) 950-9145



1470 OLD COUNTRY ROAD, STE-315
 PLAINVIEW, NY 11803
 NO NY SALES - PM

SHOP-TASK
 MILL • LATHE • DRILL

*The Original Home Machine Shop
 Designed in USA by Shoptask*



3 Models to Choose
 Best quality, best price

3 Axis Power
 Feed Available

12 Month
 Warranty

100% Parts
 Supply

All Tooling
 Available

17" Swing
 11 x 18 Mill Table

1-800-343-5775 FREE CATALOGUE

DEMAND THE BEST

SHOPTASK P.O. BOX 591, MONTESANO, WA 98563
 SINCE 1981

INSTANT WORKSHOP

COVER IT
 INSTANT GARAGES
 ALL WEATHER SHELTERS
 Assembles and Anchors
 Quickly & Easily.



22 x 20 x 8
\$999

2 YEAR WARRANTY

FREE DOORS!

12 x 20 x 8 **\$469**

STARTING AT **\$199**


Protection for: Cars, Trucks, Boats, RV's,
 Motorcycles, Paint booths, Docks, Pools,
 Workshops, Gov't. and Industrial Contracts,
 Sandblasting, Camp or Temporary Shelter,
 Walkways, Hot Tubs, and More! **HEAVY DUTY** Steel Frame,
 Durable Dupont® Cover with Zipper Door. Sizes available from 5'
 to 60' Wide, 30' High, Any Length. Withstands High Winds, Sun,
 Sap & Heavy Snow. No Property
 tax or permit required. Survived
 Hurricane Andrew! Canadian
 Weather Tested! Covers last up to
 20 Years We Ship to Your Door.
 Dealers and Exporters Welcome.
 For Information Call Toll Free

CALL 1 800 932-9344 } Ext. 202
 NOW (203) 732-1900 }
 FAX# (203) 735-0556

BUY ONE AND WE'LL MAKE YOU AN EXCLUSIVE DEALER

max 6 wheel drive **ATV**

Amphibious 2 and 4 passenger models



(21-years-old and over, Please!)

No Money Down. As low as \$110 mo.

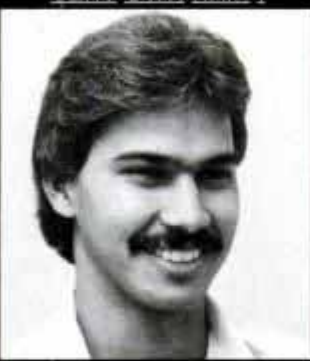
Call Toll-Free 1-800-255-2511
 (From anywhere in the U.S. or Canada)

Recreatives Industries, Inc.
 60 Depot Street, Buffalo, NY 14206

A PERMANENT LIFETIME ANSWER TO BALDNESS!

• Not a conventional hair piece
 • Not a hair weave
 • Not scalp reduction
 • Thicken existing hair
 • See own scalp
 • No limit to length of hair you want
 • Performed by doctors
 • Cost \$1200 - \$5500
 • Reversible if desired
 • Natural waving duplication

THIS COULD BE YOUR VERY OWN HAIR!




• Not a hair transplant
 • Not a cream
 • Not hair extension
 • Comb hair back
 • No tape or glue
 • Hair lines filled in
 • Lifetime Warranty
 • No scheduled maintenance appointments
 • Controlled application
 • Any texture of hair duplicated

A simple 3 hour medical procedure where cosmetic hair filaments are applied to the scalp to thicken or restore hair to any balding area. These filaments will duplicate hair... The C/S/P PROCEDURE

TO END BALDNESS PERMANENTLY!
 Call Now For A FREE Brochure & Evaluation Package
 7 days a week!

U.S. 1-800-262-8844
 Canada 1-800-523-8844
 NJ 1-609-829-4300

Or Write: ICL Labs
 The Presidential Center
 Jefferson Building - 1B - 101 Route 130
 Cinnaminson, NJ 08077




STEEL RUST REPAIR PARTS

Restore your car, van or truck to showroom condition with TABCO parts. Over 100,000 domestic and foreign parts, available for immediate delivery.

Send \$5 for illustrated, 150-page catalog with instructions to install TABCO parts. Refundable with order. Shipped 1st Class. Dealer inquiries invited.

TABCO (216) 248-5151
 FAX (216) 248-8979

30800 Solon Industrial Pkwy, Dept. PM Cleveland, OH 44138

Wood-Mizer World's Largest Manufacturer of Portable Sawmills

Models from **\$6995!**

Own a Sawmill!



1-800-553-0219

32-Page Full-Color Catalog \$2.00
 Business Profitability Booklet \$2.00
 66-Minute Demonstration Video \$10.00
 Mastercard or Visa Accepted
 *Shown with optional trailer

Wood-Mizer Products, Inc.
 8180 West 10th Street Dept. D80
 Indianapolis, IN 46214-2400

Men

- Don't have unprotected

DIVORCE!



Get extensive help from -
MEN'S RIGHTS ASSOCIATION
17854 Lyons Forest Lake, MN 55025
>> 2 bucks brings info <<

NEW

FROM T.E.K. RADAR JAMMERS

"MAKES ANY VEHICLE ELECTRONICALLY
INVISIBLE TO POLICE RADAR"

30 DAY
MONEY BACK
GUARANTEE



- 100% LEGAL
- OPERATES ON X, K, AND KA BANDS
- UTILIZES STATE OF THE ART
"PASSIVE RE-RADIATION" TECHNOLOGY.
- PROTECTS FROM ALL "INSTANT ON RADAR"

TO ORDER CALL:

1 (612) 783-1666

T.E.K. DISTRIBUTORS • 7928-B UNIVERSITY AVE.
FRIDLEY, MN 55432

MOLDS



for making Ornamental
Concrete Items

Book about Aluminum Molds
including over 425 designs,
prices and production trade
secrets from the world's
largest mold manufacturer.

Book
only
\$10

CONCRETE MACHINERY CO., INC.
P.O. Box A99, Hickory, NC 28603

FREE OFFER



LOOK

HURRY

If you've been waiting for the
PERFECT time to buy Tufoil,
NOW's the time! Check the
coupon below for details and
REALLY change your oil...into
a patented engine treatment.

1-800-922-0075

ORDER TODAY

YOU BUY TOTAL COST YOUR FREE GIFT

| | |
|---------------|----------|
| ___ 1 8-OUNCE | \$17.75 |
| ___ 2 8-OUNCE | \$30.00 |
| ___ 1 QUART | \$39.95 |
| ___ 1 GALLON | \$132.00 |



Coupon exp 8/31/93
 → 1 8-OUNCE FREE
 → 1 8-OUNCE FREE
 → 2 8-OUNCE FREE

Here's my check __, money order __, credit card __ for \$ ____.

VISA __ MC __ AM.EX __ # _____ Exp _____

NAME _____

STREET ADDRESS _____

CITY, STATE, ZIP CODE _____

Fluoramics, Inc. 18 Industrial Avenue N.J. residents, add 6% sales tax.
Mahwah, NJ 07430 MONEY BACK GUARANTEE ON 8 oz.
PM593

Satellite-TV

FREE

100% Satisfaction
Guarantee

56 Page
Catalog Buyer's Guide

Systems
from
\$479

- All Major Brands
- Complete Systems
- Accessories.
- Huge Savings
- Easy Installation
- Complete Instruct.

Let Us Help You Select
Your New Satellite TV
Entertainment System

Over 40,000 Satisfied Customers

1-800-334-6455

Int'l 215-730-6521 Fax 215-730-4879

SKYVISION INC.®

1020 FRONTIER DRIVE
FERGUS FALLS, MN 56537

YOU CAN

INSTALL OR UPDATE YOURSELF!

BE A HOME INSPECTOR!

Professional-level
home study helps you
be more independent,
make better money in-
specting homes. Join
a booming industry!
Free career literature.

Send or call:
800-223-4542



Name _____ Age _____

Address _____ Phone _____

City _____ State _____ Zip _____

The School of Home Inspection

6065 Roswell Road, Dept. PF129
Atlanta, Georgia 30328

FREE YOUR DOG

... (and yourself) with the Patented
FREEDOM FENCE™ for dogs!

**FREEDOM FENCE keeps your
dog safely and happily at
home!**

■ **Frees your dog** from being
cooped up, tied up, cramped and
bored... by allowing him to run
free without fear of his leaving your
property.

■ **Frees you** from the aggravation
of having to walk, tie, or kennel
your dog.

■ **Better than any ordinary
fence** because the **FREEDOM
FENCE** can't be seen. (It's buried 1"
to 2" underground around your
property.) Dogs can't tunnel under
or jump over it.

■ **So well designed** it carries a
2-year warranty and a 30-Day RISK
FREE TRIAL! It'll keep your dog
safely at home... or your money
back!

CALL OR WRITE TODAY!
(Dealer opportunities also available)

Your dog
will love
you for
it!



call 1-800-828-9089
or mail this coupon to:

FREEDOM FENCE INC. Box 03053 • River Road RD
North Adams, MA 01247

YES! I want to free my dog! Please send me full
details on the patented **FREEDOM FENCE**, including
prices, and your 30-day RISK-FREE Trial!

Name _____

Address _____

City _____

State _____ Zip _____

SAVE \$\$\$, ENJOY FAMILY FUN WITH VACUUM HAIRCUTTER

Does all styles. Tapers, layers, feathers, collects clippings. Great haircuts easy. You get it all: electric haircutter with precision-dial, angled adapter for styling, adapter for pets, styling guide, hose with adapter for any vacuum, power supply, lubricant. Works even with weakest vacuum. Blades stay sharp for years, are easy to change. Used world-wide from Germany to Japan. **MADE IN USA.** RoboCut, the original since 1985.



As seen on TV

.....now improved:

- Precision-dial no steps & replaces loose parts
- Angled adapter tapers and layers
- Pet adapter for easy grooming
- Quieter, lighter
- New options: 1. Thick hair blade
2. Model with built in vacuum



As seen on TVnow for less:

Full money back guarantee.

Mail today: ~~\$149~~ \$79.95 plus \$5 s&h to:

RoboCut Co-PM, POBox 9596, Ft Collins, Co 80525, USA. FAX 303 226 4558

Call Now **1-800-825-0139** VISA/MC/D/COD

WATER BALLOON LAUNCHER 120 YARDS!! ONLY \$12

EASY TO USE

 • FANTASTIC OUTDOOR FUN FOR ALL AGES
 TO ORDER: Call Toll Free
1-800-441-1047
 VISA/MC - or send check to:
 BLASTER - 13218 Jessica Dr., Spring Hill, FL 34808
 Every Order Shipped Next Day!
 Made in U.S.A. \$3.00 P & H **MONEY BACK GUARANTEE**

WOOD HEAT



WOOD FURNACES
HEAT YOUR ENTIRE HOME

Call 1-218-326-6786 or Write

Charmaster®
2307A HWY 2 W.
GRAND RAPIDS, MN 55744

CABLE TV "BOXES" WHOLESALE PRICES!

CONVERTERS • DESCRAMBLERS
REMOTE CONTROLS • ACCESSORIES

CALL FOR A CATALOG NOW!

-BEST PRICES-
-BEST WARRANTIES-
-IMMEDIATE SHIPPING-
-CREDIT CARD OR COD-

LAKE SYLVAN SALES, INC.

SORRY, NO MINNESOTA SALES

1-800-800-4582

CALL US FIRST - YOU'LL CALL US LAST!

Is your Cable Company Alienating You?



Say **NO** to unearthly
rental fees!

Owning your cable
equipment saves you
the high cost of
monthly equipment
rental charges, and
gives you control of
your TV.

We have the *Best* in

CONVERTERS and DESCRAMBLERS!

Everquest • Panasonic • Jerrold • Zenith • Pioneer
Scientific Atlanta • Oak • Eagle • Hamlin • Tocom

1 800 624-1150

**FREE
Catalog!**



MD Electronics

**CALL
TODAY!**

P.O. Box 241296 • Omaha, NE 68124-5296

REPLICA MODELS

HISTORIC
NON-FIRING MODEL GUNS...

Safe! Full size. Zinc alloy. Realistic.

Over 30 parts. Cannot chamber or fire

real ammo. Assembled. FREE Catalog.

COLLECTOR'S ARMOURY Credit

800 Slaters Lane Card Orders: \$107 ppd.

Box 58, Dept. P.M. 1-800-544-3456 Ext. 515

Alexandria, VA 22313 Toll Free 24 Hrs.

U.S. M1911
45 AUTO.
Length: 6.5"
Weight: 41 oz.



IDEAL FOR HOME OR AUTO 119 PC. TOOL KIT \$69.95

SAE and metric high strength carbon steel tool kit with
1/4" and 3/8" drive sockets. Heat treated for strength
and durability. Heavy duty storage case included.

MD Res. Add 5% Sales Tax.
Send Check or Money Order.

Barron Distributors

43 Randolph Rd., #141
Silver Spring, MD 20904

Includes:
• Tire Gauge
• Combo Wrenches
• Screwdrivers
• Pliers
• Battery Tester
• Much More

OWN A MACHINE SHOP

Do your own machining and shop work with a
Smithy 3-in-1 Lathe • Mill • Drill



FIX IT YOURSELF!

Easy to use!
Save Money!
Save Time!
As low as \$995



For FREE Fact Kit

Call:
1-800-345-6342
(Ask for operator PM)

or write:
Smithy Dept. PM
Lathe • Mill • Drill
3023 E. 2nd Street
The Dalles, OR 97058

CONVERTERS DESCRAMBLERS TEST MODULES

Se Habla Espanol
BEST WARRANTIES/BEST GUARANTEES
#1 IN CUSTOMER SATISFACTION
FOR FREE CATALOG OR TO ORDER CALL:

1-800-833-2915

For Technical Assistance or Information
call: 407-336-8538

NU-VUE ELECTRONICS

1861 Savage Blvd., #105, Port St. Lucie, FL 34953

At Least a New Amazingly Simple GAS TURBINE JET ENGINE

Build from easy to follow plans.
Length 15", Dia. 8 1/2", Wt. 15 lbs.
Fuel: Gasoline or Kerosene.
Screaming Demon develops 20 H.P. Ideal project for
serious-minded hobbyists, students, scientific and industrial
arts classes. Make on 5 metal cutting tables with milling
attachment. For use on small racing boats, model cars,
etc. Full size assembly drawings with critical dimensions,
bill of materials and photos. Price \$14.00



SAVOY SCIENTIFIC P.O. Box 1388
SANTA MONICA, CALIF. 90408

CRACK REPAIR OVER A FOOT LONG

PATENTED
PROCESS
HUGE DEMAND!
JUST LOOK AROUND YOU

Be Your Own Boss
Ultra B-O-N-D, Inc.
1 (800) 347-2820
11151 Pierce Street, Riverside CA 92505

NEW All-Hydraulic MAGNATAC.

No Belts... ALL-HYDRAULIC DRIVE!
Use for excavating, clearing,
landscaping, gardening,
logging...or work for
others for Extra CASH!

●CATALOG \$1.50
●VIDEO - New .. \$9.50
●Technical Manual. \$8.50

STRUCK-KIT • Box 307 • Dept. PM53
CEDARBURG, WISCONSIN 53012



PARTS & ACCESSORIES FOR CORVETTES!

Get Mid America Designs' 196 page color catalog full of parts &
accessories for 1956-1993 Corvettes! Send \$5 for a year's
subscription & \$100 worth of coupons!

Call Toll-Free 24 Hrs: **800-637-5533**
One Mid America Place, P.O. Box 1368, Dept. PM053
Effingham, IL 62401
FAX: 217-347-2952
PH: 217-347-5591



PRIME TIME CABLE COMPANY

**CABLE TV
DESCRAMBLERS
Converters, Accessories.**

Name Brands • Great Service
Immediate Delivery
Lowest Prices

Call For
FREE Catalog: **(800) 777-7731**

Revolutionary "2-in-1" TRIMMER/ MOWER

Takes the place of both your hand-held
trimmer and steel-bladed mower!

The DR® TRIMMER/MOWER
rolls "light as a feather" on two
BIG WHEELS! TRIMS far
easier, better, more precisely
than hand-held trimmers. Plus
MOWS everything from whole
lawns (even wet!) to tough,
waist-high growth with ease!
Rocks, roots, stumps, etc., do it
no harm because the "DR®" has
no steel blade to bend or dull.
Perfect for ALL mowing and
trimming around smaller
properties, vacation homes, etc., or for
finish-up mowing and
trimming after riding
mowers on larger parcels.
A delight
for anyone
to use!



Toll
FREE
1(800)
446-8746

Please mail this coupon today for FREE DETAILS
about the Revolutionary DR® TRIMMER/MOWER, in-
cluding prices of Manual, Electric Starting and All-
Electric Models, "Off-Season" Savings now in effect,
and 30-Day Risk-Free Trial. There is no obligation.

Name _____
Address _____
City _____ State _____ ZIP _____
TO: COUNTRY HOME PRODUCTS®, Dept. 37305
Ferry Road, Box 89, Charlotte, VT 05445

Save Money on Solid Hardwood Furniture DO-IT-YOURSELF KITS

Now, you can furnish your
home with the very finest solid
cherry and oak furniture, and
clocks, at a fraction of retail
cost.

Imagine a bedroom in solid
cherry at a cost of hundreds,
instead of thousands.

Picture your living room in
Queen Anne Styling.
Tables, lowboy,
secretary desk. All this
from easy-to-assemble
kits and easy-to-apply
finish.

All parts pre-cut. All
frames, doors
pre-assembled for you.

Thousands of satisfied
customers.

Send \$1.00 for
Color Catalog

Name: _____
Street: _____
City: _____
State: _____ Zip: _____

**EMPEROR®
CLOCK COMPANY**
WORLD'S LARGEST MANUFACTURER OF
GRANDFATHER CLOCK AND FURNITURE KITS
Dept. 4703 Emperor Industrial Park
Fairhope, AL 36532
Tel: 205-928-2316

NH Northern®

Where the Pros and Handymen Shop
1-800-533-5545
Sale Prices Good Thru 5/30/93 Key #14916

Do it Yourself Savings!

STAR 1500 PSI
Pressure Washer
3 1/2 HP Briggs and Stratton
engine. Pump blasts
2.2 GPM at 1500 PSI.
Item# 157159 Sale **\$379.00**

Tow Sprayer
15-Gallon
12 V. 55 PSI. 1.8 GPM.
27"H x 52"L x 27"W.
Item #2692
Sale **\$239.00**

**3000 PSI
Water Blaster**
11-HP Honda
GX340 engine
has over-
head
valve.
4 GPM
Item#
157146
Sale **\$1199.00**

3.5 HP Trash Pump
11,100 GPH. 28-ft. suction
lift. 4000 RPM max.
17" x 14 1/2" x 13 1/2".
Item# 10916 Sale **\$379.00**

5 HP Trash Pump
15,840 GPH with a 28-ft. lift.
19 1/2" x 15 1/2" x 15 1/2".
Item# 10917 Sale **\$469.00**

**Ball Bearing
Water Pump**
5000 GPH. Lifts 15 feet
at 1725 RPM, 25 ft. at
2600 RPM. Needs
1/4 HP motor
or larger.
1 1/2" intake,
1" output.
1/2" shaft.
Item# 10994
Sale **\$29.00**

**Gas Engines
Vertical &
Horizontal**
5 HP Sale **\$139.00**
#6051
8 HP Sale **\$209.00**
#6081
10 HP Sale **\$249.00**
#6014
Lowest Prices!
1000's in Stock!

**4000 Continuous
Watt Generator**
8 HP Tecumseh
engine has cast iron
sleeve. Item# 16425
Sale **\$409.00**

Solar Security Light
Up to 12 hours of night time
light on 6 hours of daylight
charging! You can position
solar panel up to 12' away
from light. Item# 33432
Sale **\$27.00**

**Solar-Powered
Battery Maintainer**
Keeps your 6 and 12 V
batteries at full charge.
36 solar cells. Blocking
diode. Item# 33431
Sale **\$54.00**

**Pocket Workshop
is 12 Tools in One!**
4" workshop has 3 sizes of standard
screwdrivers, a Phillips screwdriver,
can opener, bottle opener, knife,
blade, ruler, fish scaler, file, awl,
punch and needle nose pliers.
Simulated leather pouch.
Item# 14623 Sale **\$12.00**

Shipping not included.
Send or call for your FREE Discount Catalog!
ORDER TOLL FREE
1-800-533-5545
Fax: 1-612-894-0083

Name _____
Address _____
City _____ State _____ Zip _____
Key #14916 SEND TO: NORTHERN,
P.O. Box 1219, Burnsville, MN 55337-0219

LEARN GLASS REPAIR
EARN \$90 AN HOUR!
 REPAIR CRACKED WINDSHIELDS FOR PENNIES
 CALL NOW! FREE BOOKLET: 800-695-6224

INSTANT INCOME

NAME _____
 ADDRESS _____
 CITY _____ STATE _____ ZIP _____

NVS CORPORATION • OPTILESS SYSTEMS
 DEPT. P.M. P.O. BOX 8086, L 794, MA 01904

CABLE T.V. EQUIPMENT
 Why Pay High Rental Fees?

Replacements for all models. 60 day unconditional money back guarantee. Low Prices. Ship within 24 hours. SBAE for free catalog. Visa, MC, COD. Let our experience work for you.

1-800-243-3967
 SKYLINE SYSTEMS INC.
 114 S. Euclid Ave.
 Park Ridge, IL 60066

TiP Turbine Paint Sprayer
 HVLP-High Volume, Low Pressure

TP-77 pumps out 60cfm @ 4-5psi. Eliminates up to 80% overspray. Heated air reduces moisture. Eliminates runs. Has 1qt. cup, gun, nozzle, cart, 30ft. hose, turbine. U.S. Made. 45 Lbs. Requires no air compressor. 1 yr warranty. Call for FREE Catalog. Also see PM

\$599 PPD. UPS US 48 Nov. '92 issue.
 TiP Tools & Sandblast Equipment, Dept. PM,
 7075 Rt. 446, P.O. Box 649, Canfield, OH 44406
 1 800 321-9260 Fax 216-533-2876 VISA/MC

Affordable, Personal **HELICOPTER**

Revolution
 2400 P.M. 5 (11) Hwy. 7496,
 52000 MI 48868

(816) 792-1011

Info Package Catalog \$19.
 1/2 hour Action Video \$30.
 Info Pack & Video Combo \$40.
 PAL Remote Control Video \$45.
 Info Pack & PAL Video Combo \$65.

Check Card Orders Only: 1-800-82-9272

FREE ENERGY!

Permanent Magnet Motors. Fuel-Less Motors & Generators? Free Energy Created From Nothing? Patented Devices Are The Proof! Hi-Mileage Carburetor Doubles & Triples MPG. Amazing Principles & Details Write: H & A Industries, Box R2-E-35 Dept. 7, Bowling Green, MO 63334.

SURVEILLANCE

COUNTER SURVEILLANCE Electronic Devices
 Mini Transmitter Kits.. \$39.95 ppd., Voice Changers, Vehicle Tracking, Touch Tone Decoders, Phone Scramblers, Caller ID's, Scanners, Bug & Phone Tap Detectors & More!

TELEPHONE RECORDING SYSTEM • 10 hour extended play (5 hours per side), complete \$149.95 ppd.

FOR CATALOG SEND \$5.00 TO...
EDE P.O. Box 237, Buffalo, NY 14226 (716) 891-3478

CABLE TV DESCRAMBLERS
1-800-233-9388
 FREE CATALOG
 GUARANTEED BEST PRICES • IMMEDIATE SHIPPING
 APPLE ELECTRONICS
 3309 Sheridan St. • Suite 257
 Hollywood, FL 33021

Great money in VCR repair!

Home study. Learn high-profit repairs without investing in high-tech instruments. FREE BOOKLET: 800-223-4542.

Name _____
 Address _____
 City _____ State _____ Zip _____

The School of VCR Repair, 2245 Perimeter Park, Dept. VF129, Atlanta, Georgia 30341

FREE Shipping & Handling *Plus...* **Easy Pay!**
 Take 4 Months to pay on orders totaling \$59.99 or more!

Save BIG on Power & Hand Tools!

Palm-Size Orbital Finishing Sander

Orig. Made To Sell For: **\$79.00**
OUT THEY GO!
\$39⁹⁹
 Item C6342-1072
 S/H: \$6.00 ea. *free*

Make rough surfaces butter smooth AND easily remove rust from metal! Refurbished-like-new (with a 1-year ltd. warranty) this Ryobi is now liquidation priced! Features:

- All ball bearing construction
- Simple, one-hand operation
- Flush sanding capability
- Dust-protected lock-on switch; double insulated
- 12,000 orbits per minute
- 3" x 4-1/8" pad uses 1/6th sheet abrasive; U.L. listed

RYOBI.

Carrying Case Included!

275-Pc. Tool/Fastener Set

Tackle hundreds of jobs with this complete Set!

- Ratchet handle; extension bar
- 31 1/4"-dr. and four 3/8"-dr. SAE/metric socket sets
- 18 ignition wrenches
- 16-oz. claw hammer
- 4 pliers; 8" adjustable wrench
- 6-pc. combination wrench set
- Hacksaw with 10 blades
- 7 snap-on handle screwdrivers
- 14 hex key wrenches
- 168-pc. nut/bolt set with case
- 16" measuring tape and more

Mr. List: **\$169.95**
OUT THEY GO!
\$69⁹⁹
 Item N5576-1072 *free*
 S/H: \$7.00 ea.

4 EASY PAYMENTS
\$17⁵⁰

45-day C.O.M.B. Guarantee

Orig. Made To Sell For: **\$303.00**
OUT THEY GO!
\$139⁹⁹
 Item C6343-1072
 S/H: \$7.00 ea. *free*

12V 3/8" Cordless Drill & Driver

Perform multiple drilling/driving tasks miles from outlets! This refurbished-like-new variable speed/reversing model delivers up to 120 inch-lbs. of work-stomping power! Features:

- 6 torque settings from 12 to a full 220 Inch-lbs. of power
- Includes 3/8" keyless chuck & double-ended bit
- Electric brake preserves power
- 12V battery pack; 1 hr. charger incl.
- 0-400/0-1,300 rpm
- 1-year ltd. warranty

RYOBI.

COMB AUTHORIZED LIQUIDATOR
 720 ANDERSON AVENUE
 ST. CLOUD, MN 56395
 Segment #4616066

Call Toll Free to Order and ask for our **FREE Catalog!**
1-800-328-0609
 Add 6.50% sales tax for MN deliveries; 6.25% for TN

CUTS AUTO EMISSIONS BY UP TO 90%
EMISSION BUSTERS Proven & Tested
\$14⁹⁵ plus shipping and handling

These aerodynamically designed air foils cause intake air to circulate and dramatically reduce emissions while enhancing air/fuel mixture. Improved gas mileage & increased power will result. They fit most vehicles.

Quick and easy to install. Emission Busters fit in the intake snout and are easy to install.

1-800-324-7008 TO ORDER

Emission Reduction Technologies, Inc. • P.O. Box 887 • Bountiful, UT 84011

Mail This Coupon for Free Facts!

GET A DEGREE AT HOME

54 ways ICS can help you get a better job

Rush free facts and color brochure on how I can train for the career I have chosen. No obligation. No salesman will visit me. **CHECK ONE BOX ONLY!**

- | | |
|---|--|
| ASSOCIATE IN SPECIALIZED BUSINESS DEGREE PROGRAMS | ASSOCIATE IN SPECIALIZED TECHNOLOGY DEGREE PROGRAMS |
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Mechanical Engineering Technology |
| <input type="checkbox"/> Accounting | <input type="checkbox"/> Civil Engineering Technology |
| <input type="checkbox"/> Business Management with option in Finance | <input type="checkbox"/> Electrical Engineering Tech. |
| <input type="checkbox"/> Business Management with option in Marketing | <input type="checkbox"/> Industrial Engineering Technology |
| <input type="checkbox"/> Applied Computer Science | <input type="checkbox"/> Electronics Technology |
| <input type="checkbox"/> Hospitality Management | |

- CAREER DIPLOMA PROGRAMS**
- | | | |
|--|---|---|
| <input type="checkbox"/> Computer Programming | <input type="checkbox"/> Hotel/Restaurant Management | <input type="checkbox"/> Art |
| <input type="checkbox"/> Computer Programming/COBOL | <input type="checkbox"/> Auto Mechanics | <input type="checkbox"/> Wildlife/Forestry Conservation |
| <input type="checkbox"/> Personal Computer Specialist | <input type="checkbox"/> Child Day Care | <input type="checkbox"/> Animal Care Specialist |
| <input type="checkbox"/> Computer-Assisted Bookkeeping | <input type="checkbox"/> TV/VCR Repair | <input type="checkbox"/> Diesel Mechanics |
| <input type="checkbox"/> PC Repair | <input type="checkbox"/> Surveying & Mapping | <input type="checkbox"/> Electrician |
| <input type="checkbox"/> Desktop Publishing & Design | <input type="checkbox"/> Catering/Gourmet Cooking | <input type="checkbox"/> Interior Decorating |
| <input type="checkbox"/> High School Bookkeeping | <input type="checkbox"/> Fitness & Nutrition | <input type="checkbox"/> Motorcycle Repair |
| <input type="checkbox"/> Secretary | <input type="checkbox"/> Small Business Management | <input type="checkbox"/> Gun Repair |
| <input type="checkbox"/> Medical/Dental Office Assistant | <input type="checkbox"/> Drafting | <input type="checkbox"/> Photography |
| <input type="checkbox"/> Legal Secretary | <input type="checkbox"/> Air Conditioning & Refrigeration | <input type="checkbox"/> Journalism/Short Story Writing |
| <input type="checkbox"/> Fashion Merchandising | <input type="checkbox"/> Electronics | <input type="checkbox"/> Dressmaking & Design |
| | <input type="checkbox"/> Travel Agent | <input type="checkbox"/> Florist |
| | <input type="checkbox"/> Police Sciences | <input type="checkbox"/> Teacher Aide |
| | <input type="checkbox"/> Private Security Officer | <input type="checkbox"/> Home Inspector |
| | | <input type="checkbox"/> Medical Transcriptionist |
| | | <input type="checkbox"/> Real Estate Appraiser |

Name _____ Age _____
 Address _____ Apt. # _____
 City/State _____ Zip _____
 Phone () _____

CALL TOLL FREE 1-800-992-8765 Ext. 859
 CALL ANYTIME—24 hours a day, 7 days a week.
ICS International Correspondence Schools
 Dept. AP8543S, 925 Oak Street, Scranton, PA 18515

Presenting...

The DR® FIELD and BRUSH MOWER

—the amazing walk-behind "brush hog" that—

CLEAR & MAINTAINS meadows, pastures, woodlots, wooded and rough non-lawn areas with ease. **CUTS** tall grass, weeds, brambles, tough brush and saplings up to 1" thick.

CHOPS/MULCHES most everything it cuts. Leaves **NO TANGLE** of brush to pick up like hand-held brushcutters and sicklebar mowers. Perfect for low-maintenance wildflower meadows, European-style woodlots, walking paths, or any area you only want to mow once a month or once a season!



TOLL FREE 1 (800) 446-8746

Please mail this coupon TODAY for complete FREE DETAILS of the DR® FIELD and BRUSH MOWER including prices, specifications, and "Off-Season" Savings now in effect. There is no obligation.

Name _____
 Address _____
 City _____ State _____ ZIP _____
 To: COUNTRY HOME PRODUCTS®, Dept. 37305F
 Ferry Road, Box 89, Charlotte, VT 05445



Be your own weatherman.

Why wait for a professional weather report when you can have it at your fingertips anytime you want. The Weather Monitor II offers the most complete state-of-the-art weather monitoring system you can buy.

FEATURES INCLUDE:

- Inside & Outside Temps
- Wind Speed & Direction
- Inside Humidity
- Time & Date
- Barometer
- Wind Chill
- Alarms
- Highs & Lows
- Instant Metric Conversions
- Outside Humidity & Dew Point Option
- Rainfall Option
- Optional PC Interface



WEATHER MONITOR II

THE PROFESSIONAL HOME WEATHER STATION

Order today: 1-800-678-3669 • PM629B
 M-F 7 a.m. to 3:30 p.m. Pacific Time • FAX 1-510-670-0589
 MC and VISA • One-year warranty • 30-day money-back guarantee

DAVIS INSTRUMENTS 3465 Diablo Ave., Hayward, CA 94545



To be raffled off Father's Day, June 20th, 1993, at 10 p.m., by the Stafford Volunteer Fire Department at the culmination of our annual carnival:

This is a beautiful frame-off restored Sateen Silver 1961 Corvette Roadster, #'s match, 283/230 hp, 4 speed, red interior, white convertible top, with AM radio.

Winner's option—take the car or \$22,500 cash. Winner need not be present, but if present at drawing, the winner will receive an additional \$2,000 cash. If not present, the \$2,000 will be donated to Mercy Flight.

The winner of last year's 1963 split window coupe was Matthew Kristine of Batavia, New York, ticket #110916.

Send \$10.00 check or money order for each book of 15 tickets. Make payable to the Stafford Volunteer Fire Department along with your name, address, and phone number, and your tickets will be returned to you before the drawing.

Send to: Stafford Vol. Fire Co.
 c/o Reed Kingsley
 6060 Main Rd.
 Stafford, NY 14143

VISA **CABLE T.V. DESCRAMBLERS** MasterCard
 --LOWEST PRICES-- CNC Concepts Inc
 P.O. Box 34503
 -Money Back Guarantee- MPLS., MN 55449
BIG SALE 9-5 CST
 MON-FRI
 Please have MODEL used in your area when calling
 DEALERS WANTED
 EARN EXTRA \$\$\$ **1-800-535-1843**

SEE THE MAGIC OF THE UNIVERSE!

Distant galaxies, colorful nebulae, the solar system and thousands of fascinating objects are yours using large affordable Optosky telescopes. If telescope complete only \$275! "Best Buy" Astronomy Magazine (Dec. 1991) Size up to 17.5! Ask for free information that includes a telescope dealer and an Optosky telescope operation manual. See it now!

COULTER OPTICAL, INC. P.O. Box K, Dept. PM
 Ilyltwid, CA 92549 Phone (909) 659-4621
 "Optimum Optics At Minimum Cost Since 1967"

BUILD YOUR OWN JET-PACK

NEED STARTING INFORMATION ON HOW YOU CAN BUILD YOUR OWN JET-BELT? WE'VE STRIPPED TO YOUR BONES YOUR ABILITY TO UNDERSTAND IN-DEPTH CALL FOR NATIONAL FORM #17

1-900-835-UFLY (8359)

ONLY 4 MEMBERS COULD BE BUILT
 THE MANAGER, MANUFACTURER, PERSONALIZED MEMBERSHIP CARD AND CHARTER MEMBERSHIP #107 OF BEST TO YOU IN THE WORLD
 ALL MEMBERS OF VOLUNTEER SOCIETY OF JET-BELT ENTHUSIASTS, YOU'LL RECEIVE: CONSTRUCTIVE STUDY MANUAL, INSTRUCTOR PLAN & DEPTH VIDEO TAPE, MONTHLY NEWSLETTER, PRODUCT CATALOG, TESTER WORKSHEET, 1 YEAR OF JET-BELT ENTHUSIAST, 1 YEAR OF JET-BELT ENTHUSIAST, 1 YEAR OF JET-BELT ENTHUSIAST, 1 YEAR OF JET-BELT ENTHUSIAST
CALL NOW - WHILE MEMBERSHIPS ARE OPEN

UNIQUE **SELL BELT BUCKLES** FOR BIG PROFITS

JUST SHOW THIS BIG, FULL COLOR WHOLESALE CATALOG. SELL MORE THAN 1,000 STYLES OF BELT BUCKLES, BELTS, WALLETES AND JEWELRY.

SEND \$1.00 FOR THIS FULL COLOR MONEY MAKING CATALOG TODAY.

ANCHOR SPECIALTIES CO., DEPT.
 P.O. BOX 398A, NORTH PROVIDENCE, RI 02861

TV DESCRAMBLERS

BEST BUYS BEST SERVICE

BULLET PROOF
 CABLE TV TESTED
 Call or send for your FREE Wholesale catalog:
 Multi-Vision Electronics
 2790 So. 123rd Ct. #126
 Omaha, NE 68144

1-800-835-2330

VOLKSWAGEN RESTORATION PARTS

• BUG • GHA • TYPE 3 • SUNROOF
 • BUS • RABBIT • GOLF • CONVERTIBLE

FREE CATALOG
WEST COAST METRIC, INC.
 (800) 247-3202
 FAX (310) 325-9722
 24002 FRAMPTON AVE., PM
 HARBOR CITY, CA 90710

SAVE MONEY! Environmentally Safe
YEARS IN TESTING: PROVEN RESULTS! PAYS FOR ITSELF! BETTER FUEL ECONOMY!

LIPH-T-X™ FUEL TREATMENT
 LOWERS HC, CO, CO2, & NOX EMISSIONS!
 GAS OR DIESEL

LIPH-T-X™ IS THE BEST FUEL TREATMENT YOU CAN BUY! IT PROTECTS BETTER THAN LEAD & IT ACTUALLY BONDS TO, AND LUBRICATES ENGINE SURFACES. LIPH-T-X™ STOPS RING IN LOWER OXYGEN GAS & DRAMATICALLY REDUCES BLACK SMOKE IN DIESEL. SEND S.A.S.E. FOR INFO.
 \$11.50/pt. treats 100 Gal. \$19.75/pt. treats 200 Gal.
 CHECKS MC 0-7 VISA / MC Price \$4.50 USA CA. TEL: 1-800-547-4588 LIPH PRODUCTS ADD TAX
 Box 1213, Dept. M Redondo Beach, CA 90278

*****PRESENTING*****
CABLE TV DESCRAMBLERS
 *****STARRING*****
JERROLD, HAMLIN, OAK
 AND OTHER FAMOUS MANUFACTURERS

- FINEST WARRANTY PROGRAM AVAILABLE
- LOWEST RETAIL / WHOLESALE PRICES IN U.S.
- ORDERS SHIPPED FROM STOCK WITHIN 24 HRS.
- ALL MAJOR CREDIT CARDS ACCEPTED

FOR FREE CATALOG, ORDERS & INFORMATION **1-800-345-8927**

PACIFIC CABLE CO., INC.
 7325 1/2 Reseda Blvd., Dept. 1773
 Reseda, CA 91335

ULTRA SHIELD
AUTO POLISH with TEFLON SEEN ON TV FOR '29.99/pt.
\$21.95/qt.
 Acid & Fire Resistant. Bugs, Grease & Grime Don't Stick.
 2 qts. only '33¢! That's a savings of 72% over the TV ad!
 MD Res. Add 5% Sales Tax. Send Check or Money Order.
Barron Distributors
 43 Randolph Rd. #141, Silver Spring, MD 20904

WORKLIGHTS
FREES HANDS WHILE YOU WORK
 •Use for automotive, electrical, plumbing, recreational
 •Lightweight-Wear with or w/o glasses.
 •Batteries, bulbs included
 Send \$12.95-\$3.00 S&H to:
NIGHT LOGIC P.O. Box 1081
 Orchard Park, New York 14127-9998
 New York State residents add sales tax

Stunt Kites
Free 80 Page Color Catalog
 Start with an easy-to-fly beginner's kite or experience the thrill of control at 120 MPH!
 Send for our free Catalog and choose from hundreds of unusual and innovative kites.
Into The Wind • (800) 541-0314
 1408-M Pearl St., Boulder, CO 80302

FREE CATALOG! 1-800-648-7938
JERROLD HAMLIN OAK ETC
CABLE TV DESCRAMBLERS
 • Special Dealer Prices! • Compare our Low Retail Prices! • Guaranteed Prices & Warranties!
 • Orders Shipped Immediately! VISA/MC/AmEx
REPUBLIC CABLE PRODUCTS, INC.
 4080 Paradise Rd. #15, Dept. 432 Las Vegas, NV 89109
 For all other information (702) 362-9026

CABLE TV
DESCRAMBLERS
CONVERTERS
ACCESSORIES
SAVE \$\$\$ DON'T RENT
30 DAY MONEY BACK GUARANTEE
PANASONIC, OAK, JERROLD,
ZENITH, SCIENTIFIC ATLANTA
PLUS MORE!!!! LOWEST PRICES!!!
AAA Electronics
CALL 1-(800) 258-9512

WATERLESS CAR WASH
 •No water needed •Removes all kinds of dirt
 •Does not scratch •Waxes •Protects w/silicon
 •Total exterior car care •Excellent for car shows
 •300mls of Maxi Dri Kleen •Directions included
 Order Now \$16.00 ppd •MC •Visa •Ch •MO
 Yoder Co./29495 C.R. 50/Nappanee, IN 46550
 1-800-745-7294 Independent Distributor

LEARN COMPUTERS!
 Home study: become an expert with the personal computer for home or business use. Free literature: call 800-223-4542.
 Name _____
 Address _____
 City _____ State _____ Zip _____
 School of Computer Training, Dept. KP129
 2245 Perimeter Pl., Atlanta, Georgia 30341

Now you can do something about the weather
Low as \$149
 Our new Home Weather Station helps you plan your day, safeguard your family and property by alerting you to local weather conditions that often vary from distant forecasts.
 Alerts you when wind chill threatens frostbite. Tells you to secure outside belongings against unexpected gusts, protect plants against dangerous heat or cold, and much more. Designed to far outlast all others, the ULTIMETER II gives you over 20 most-wanted features including:

- Wind Speed and Direction
- Temperature
- Chill factor
- Alarms
- Highs / lows / times / dates
- Metric / English
- Quick-Mount (no tools) masthead mounting
- Fast, easy "Point & Plug" direction calibration (pat. pending)
- 40 ft. cord
- Optional self-emptying rain gauge
- 30-day money back guarantee
- One-year warranty

Home Weather Station only \$179
As above, without wind direction sensor \$149
 Del. in US, add \$8.25 shipping & insurance. NJ res. add 6% tax.
 VISA/MC phone orders: 800-USA-PEET (872-7338).
 FAX: 908-517-0660
 Or send check, m.o. or credit card no. and exp. date to:
PEET BROS. COMPANY 601-305m Woodland Rd., W. Allenhurst NJ 07711
 Free Brochure Our 17th Year ©1988 Peet Bros. Co.

Distributors WANTED
Start Your Own Business by Capitalizing on the Exploding Growth of Steel Framing in Home Construction
Experts Agree, the Potential for Steel Framing in Today's Residential Construction Market is UNLIMITED, and Expanding Rapidly. Join Tri-Steel, the Industry Leader.

It's Easy to Start with:
 *Low, 100% Refundable Investment
 *4 Unique Programs
 *No Franchise Fees
 *Training Manuals
 *Financing Available
 *Clearspan Interiors
 *Hands-On Training
 *Technical Support
 *Construction Assist.
 *Commercial & Smaller Buildings

Tri-Steel Homes feature:
 *Bolt-Together Construction
 *Fast, Simple Erection
 *9" Thick R-30 Insulation
 *100 Standards Models or Custom Designs
 *Environmentally Preferred Materials
 *High Strength for better Protection against Fire, Termites, High Winds and Earthquakes (Seismic 4)
 *And Much, Much More

Call Today to Order a \$19.95 Video Tape or FREE Information Packet:
1-800-TRI-STEEL
 (817)497-7070 Fax: (817)497-7497
 Tri-Steel Structures 5400 E. Stemmons Freeway, Denton, Texas 76205

IS YOUR DRIVEWAY CRACKING YOU UP?
How to \$ave on HOME DRIVEWAY Installation and Repair
 1st ever complete how-to-do-it driveway book with a step-by-step illustrated guide!

- Complete instructions for maintaining or installing asphalt or concrete driveways that enhance the Value of Your Home!
- Tools and materials needed for a professional-looking job.
- Over 50 illustrations, 112 pages, to guide the handyman or contractor.
- What to watch for when hiring a driveway contractor.

Driveways and sidewalks are your 3rd largest home repair expense!
Send \$12.95 (Includes S/H)
 Allow 4-6 weeks for delivery.
Family Originals, Inc., Box 250,
 13956 Cedar Rd., University Heights,
 OH 44118 (216) 321-9441
Mention this ad and Save \$2

CABLE T.V. CONVERTERS
WHY PAY A HIGH MONTHLY RENTAL FEE?
 All Jerrold, Oak, Hamlin, Zenith, Scientific Atlanta, Pioneer and all specialized cable equipment available for shipment within 24 hours. For fast service MC/VISA or C.O.D. telephone orders accepted. 30 Day Guarantee (Quality Discounts) 8 A.M. to 5 P.M. C.S.T. Monday through Friday.
 Send self-addressed stamped envelope (60¢ postage) for **FREE CATALOG**.

MIDWEST ELECTRONICS INC.
 P.O. Box 5000
 Suite 311 (PM)
 Carpentersville,
 Illinois 60110

INFORMATION/ORDERS (800) 648-3030
 Note: Decoders and Descramblers must not be used without authorization by your local cable operator. No Illinois Orders Accepted.

**STORAGE BUILDINGS
WORKSHOPS & MORE
MANUFACTURER DIRECT
LIMITED OFFER**



**EASY DO-IT-YOURSELF CONSTRUCTION
PACKAGES INCLUDE STEEL FRAMES,
SHEETING AND HARDWARE
FEATURED PACKAGES INCLUDE:
12'-0" BAY SPACING
40 psf Snow Load, 20 psf Wind load
CERTIFICATION AVAILABLE**

30x36
Value \$6,552
NOW \$3,359

34x48
Value \$10,349
NOW \$5,317

42x60
Value \$14,779
NOW \$7,731

46x72
Value \$20,008
NOW \$10,935

Other sizes available

MIRACLETRUSS
1-800-843-8275
FAX 612-544-1835

Made in America

PM

BUILD YOUR OWN HELICOPTER!

*From your backyard
to open-sky adventure!*

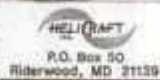
- Simple low-cost assembly
- No license needed
- Several helicopter kits & plans available

Helicopter Plans \$14.95
Hel. Experimenter Book . . . \$11.95
All New Catalog/Kit Info. . . \$10.00

SPECIAL! All 3 items: Only \$19.95

ADD \$3 postage, handling and P.S.T.

Credit card order line: 1-810-557-6366



TELEPHONE LISTENING DEVICE



Record telephone conversations in your office or home. Connects between any cassette or tape recorder and your telephone line. Starts automatically when phone is answered. Records both sides of conversation. Stops recorder when phone is hung up.

\$19.95 EACH (by the foot)



Super Powerful FM TRANSMITTER

Many times more powerful than other transmitters. Transmits up to 1/2 mile to any FM radio. Easy to Assemble Kit - up to 9V battery (not incl.) For catalog of Transmitters, Voice Scramblers and other specialty items, enclose \$2.00 to USI Corp.

Call 807-725-1000 or send \$19.95 + \$1.00 shipping per item to: USI Corp., PO Box #41-3082, Melbourne, FL 32902, COD 'N' O.K.



U.S. Funds
Call 800-241-4663

for subscription offer # T01361 by MC/VISA, or send payment to:

Hemmings Motor News

P.O. Box 100-S09356, Bennington, Vermont 05201
VERMONT RESIDENTS ADD 5% SALES TAX. CANADIAN RESIDENTS ADD 7% SALES TAX.

1 & 2 Seaters
1 Hour Training
No License Required
Land, Ice or Snow
Thousands in Use
Nothing Safer, Easier or More Fun!

Excellent Dealership Opportunities

Man's oldest dream come true! Yearround family fun! You have to see this craft to believe it. Fascinating video with complete information on the safest most unique aircraft ever conceived by man. Destined to be the hottest selling aircraft in the world. Video in VHS, Beta or PAL. Add \$10 for Beta. \$20 for PAL. Add \$2 5/8 for Canadian. \$10 Foreign. U.S. Funds Only. FL State, add 6.5%. Send check, money order or call for COD (U.S. only).

PARASCENDER Technologies Inc.
Info Pack \$ 1
Dealer Info Pack \$ 3
Video and Info Pack \$21
Video and Dealer Info Pack \$23

3600 SW 27th Ave., Dept. PM
Homestead, FL 33031-3814 - TEL: 305-242-1340 FAX: 305-242-1345

BE A LOCKSMITH

\$99.95

COMPLETE VIDEO COURSE

All Contains: Master Lock Pick Set, Car Opening Tools, Impressioning Files & Keys, Lock with Pins & Springs
Course Covers: Lock Picking, Car Opening, Key Impressioning, Re-Keying

Today, a trained locksmith can just about write his own ticket. Locksmith's average \$88/hr. Learn at home - earn as you learn. Start part-time for extra income. Fast easy course starts you hands-on. All jacks, car opening tools, keys, tools, and special equipment supplied. Complete course on VHS video tape. Rewind the tape until you master every skill. Cash in at once. Earn extra \$88 right away. Locksmithing is recession-proof. Complete course \$99.95. All orders shipped same day as received. Send \$99.95 + \$5.00 shipping and handling to: D.S.O. Inc., 7514 Grand Ave. #238, La Jolla, CA 92037. On res. add 7.25% sales tax. More info call 619-567-6265.

HOMEOWNERS!

RECYCLE LEAVES, LIMBS & YARD DEBRIS...AS YOU WALK!

Send for your **FREE CATALOG** featuring the revolutionary **TROY-BILT® Chipper/Vac!**

The TROY-BILT® Chipper/Vac eliminates raking, piling and bagging forever! This breakthrough yard clean-up machine vacuums, chips, shreds, reduces & bags yard debris...*automatically!*

- **Powerful Vacuum Shredder** - 20" wide vacuum draws debris into the shredding chamber...as you walk!
- **Auto-Feeding Chipper** - Simply drop limbs and branches into the chute; the machine does the rest!
- **Reduces 10-to-1** - Yard debris is vacuumed and reduced to one-tenth its original volume, then bagged for easy one-step collection!



▲ Collects yard debris as you walk!
▼ Chips branches up to 3 1/2" thick!



**FREE CATALOG! CALL TOLL-FREE:
1-800-532-9494** DEPT. 3925

3 76

TROY-BILT Dept. A3925
102nd Street and 9th Avenue
Troy, New York 12180

YES! Please send me your FREE Chipper/Vac Catalog including details on all Models, Special Sale Prices...PLUS your TROY-BILT® Easy Payment Plan.

Name _____
Address _____
City _____
State/Zip _____

Also Available in Canada ©1993 Garden Way Inc.

SALE!

**CABLE TV
DESCRAMBLERS
WE'LL BEAT
ANY PRICE!
CALL TOLL-FREE
1-800-284-8432**

• JERROLD • TOCOM • ZENITH •
• OAK • PIONEER • HAMLIN •
• SCIENTIFIC ATLANTA •

**24 HOUR SHIPMENTS!
QUANTITY DISCOUNTS!
MONEY BACK GUARANTEE!
FREE CATALOG & INFORMATION**

MasterCard • American Express • Visa • C.O.D.

HAVE MAKE AND MODEL NUMBER OF EQUIPMENT USED IN YOUR AREA
1-800-284-8432
FOR ORDERS ONLY
For technical & customer service: 305-749-3122
ALL SHIPPING & HANDLING FEES AT CUSTOMER'S EXPENSE

CABLE WAREHOUSE
10117 WEST DANLAND PARK BLVD., SUITE 515, SUNRISE, FL 33351
NO FLORIDA SALES

GO KARTS LARGEST SELECTION DISCOUNT PRICES

RUN KARTS • MIDGETS
ALL-TERRAIN KARTS
ENGINES • KITS • PARTS

88 PAGE CATALOG \$39
Order this catalog by phone or VISA
or MasterCard or call \$3.00 to address
change. Catalog sent by 1st Class Mail



KART WORLD DEPT. M PHONE
1488 MENTOR AVE. PAINESVILLE, OHIO 44077 (216) 357-5968

Telephone Listening Device

FM Transmitter Inside Common Dual Modular Adapter - up to 1/4 mile range!

- *Voice "Sleep For" Kit! - No wiring to phone!
- *Super Powerful! Trans - 88-108MHz
- *Crystal clear reception
- *Can be picked up on any FM Radio
- *Transmits both sides of conversation
- *Uses phone line for power and antenna

Check, money order, Visa/MC (214) 255-7490

Sorry no catalog \$25.95

Signer-Radio Box #66055 Dept PM44 Irving TX 75060



FLUSH UP TOILET
To Above Floor Drain

Install It Yourself - Anywhere
No Digging Up Floors

Write McPherson, Inc., Dept. 16
Box 15133, Tampa, Florida 33684



ADVERTISEMENT

WORTH WRITING FOR

684 DIAGNOSE AUTO ENGINE PROBLEMS AT HOME

Get back hands-on knowledge of your car's electronic engine with high quality, affordable tools from Sunpro. The Code Scanner safely plugs into the car's computer to identify trouble codes. Sensor Tester Plus troubleshoots faulty sensors and test ignition modules. Both have Eng./Span. user manuals. Free

685 OCEAN RAY

Famous maker of wet suits and dry suits for scuba divers and surfers. Available to you direct from manufacturer, mens and womens, all sizes available to XXX Large. Bladderless BC and regulator also offered by Ocean Ray. Free Brochure

686 INSTANT CONCRETE

Nomix™ PostSet Instant Post Hole Concrete takes the time and mess out of working with all-day setting concrete. This quick-setting concrete needs no mixing and no tools. Brochure explains all. Free

687 THE SIGNATURE COLLECTION

Shakespeare Fishing Tackle introduces a line of Signature apparel and accessories. Consumers can order quality jackets and shirts embroidered with either Shakespeare, Ugly Stik or Sigma logos. Items available in the four color catalogue, includes a Shakespeare tote bag, fishing vest, golf balls, sport towel, coffee mug, thermos, key chain, beverage hugger, or hard-to-find tackle equipment. Free

688 STARTING YOUR ENGINE

Slick 50 Engine Formula, from Petrolon, Inc., protects car and light truck engines against wear at start-up. A single application treats metal surfaces of moving engine parts directly with super-slippery PTFE. Independent lab tests have shown that Slick 50 reduces engine wear by 50 percent for 50,000 miles. Free Brochure

689 KNIFE SHARPENER

Chef's Choice® Diamond Hone® Knife Sharpener Model 110. Professional multistage electric knife sharpener uses 100% diamond abrasive sharpening system to create incredibly sharp, long-lasting triple-angle edge. Gentle re-sharpening helps preserve fine cutlery. Sharpens entire blade edge. U.L. listed. 2 year warranty. Free

690 GEARS, BEARINGS, JOINTS, HINGES . . .

"The Complete Lubrication Guide" booklet shows you how to choose a lubricant for every move. Contains information on greases, gear lubricants, oils and equipment from LubriMatic. Free

691 A BETTER WAY TO BUILD A FLOOR

The Silent Floor® system from Trus Joist MacMillan is a beautiful alternative to bumpy, squeaky floors. Brochure explains how the Silent Floor® System is engineered and guaranteed to stay flat, solid and quiet for the life of your home.

692 WINDOW AND PATIO DOOR FACTBOOK

Full-color brochure provides information on custom combinations, planning a project, choosing a contractor, and much more from Andersen Windows, Inc. Free

693 ELIMINATE BATHROOM MILDEW

From William Zinsser & Co., Inc., learn how your bathroom can remain mildew free for up to 5 years. Perma-White is a unique, high performance, water-based paint designed to withstand humid conditions and prevent blistering and peeling. Provides a decorative, washable and scrubbable satin finish. Free Booklet

694 KEEP YOUR HOME ENERGY EFFICIENT

If you're thinking about remodeling or adding a room in your home, a free brochure called "Need More Space" offers tips on insulating and helping to keep your new living space energy efficient. From CertainTeed Corporation

695 FORD COMPACT DIESEL TRACTORS

Receive a 28-page color catalog describing the full line of Ford compact diesel tractors. Ford compact diesels are designed for comfort, productivity and versatility. They're perfect for lots of jobs—mowing, digging, loading, tilling, snow removal and more. Free

696 GLOCK INC.

Hailed by police and sport shooters alike, find out why the remarkable Glock pistols are setting new standards for handgun simplicity, reliability, cost effectiveness, and safety. Send for the Glock semi-automatic, safe-action pistols and accessories catalog and also receive "The Basic Rules of Firearm Safety" booklet. Fr 3

697 LIFETIME FINISH

Liquid Glass Enterprises, Inc. proudly announces 3 new products—Liquid Glass Pre-Cleaner, Connoisseur's Choice Cleaner with Mink Oil, and Wash Concentrate to complete its line of high-tech appearance chemicals for automotive, marine, aircraft, and household uses. Eight-page brochure, sample pack kit, and ordering information. \$1.00

698 SLIP-PLATE PRODUCTS

A line of Dry Film Lubricants used from all do it yourself applications. The dry nature of SLIP-PLATE provides long lasting lubrication while resisting build up of dirt and rust. SLIP-PLATE can be used on saw blades, tools, lawn mowers, snow blowers etc. . . . Wherever you have sliding frictions problems is a job for SLIP-PLATE. Free

699 SMART LEVEL

Smart Level reads all angles—not just level and plumb—making jobs that involve stairs, roofs and drainage simpler. Digital display provides decimal point precision and can be recalibrated to factory perfect accuracy with the touch of a button. Color brochure describes this versatile, professional level. Free

700 HOBBYIST CATALOG

Edmund Scientific's 112 page catalog contains over 3,200 products for the hobbyist, gadgeteer, and educator - featuring telescopes, weather instruments, fiber optics, magnifiers, high-tech science toys, plus many items suitable for science fair projects. Free

701 CONTROL WATER WEEDS

The Water Weeder™ Harvester works just like a hedge trimmer under water. It cuts a four foot swath, and can be operated from a boat, dock or shoreline. Perfect for waterfront property owners, fishermen or boats. Free Brochure

702 INFORMATION FOR THE DIVORCED

DIVORCE: Attorney and local group referrals, literature on finances, law citations, top writers, common sense on all gender issues. Membership information and sample newsletter from national organization. \$3.00

Popular Mechanics 5/93
Box 1718, Sandusky, Ohio 44871-1718

Please see that I receive the items checked below

- | | | | | |
|------------------------------|------------------------------|------------------------------|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> 684 | <input type="checkbox"/> 688 | <input type="checkbox"/> 692 | <input type="checkbox"/> 696 | <input type="checkbox"/> 700 |
| <input type="checkbox"/> 685 | <input type="checkbox"/> 689 | <input type="checkbox"/> 693 | <input type="checkbox"/> 697 \$1.00 | <input type="checkbox"/> 701 |
| <input type="checkbox"/> 686 | <input type="checkbox"/> 690 | <input type="checkbox"/> 694 | <input type="checkbox"/> 698 | <input type="checkbox"/> 702 \$3.00 |
| <input type="checkbox"/> 687 | <input type="checkbox"/> 691 | <input type="checkbox"/> 695 | <input type="checkbox"/> 699 | |

Total money for priced items \$ _____

Service Charge \$ 1.50

Total money enclosed \$ _____

Total items requested _____

Name (Please Print) _____

Address _____

Town _____ State _____ Zip Code _____

(Please send cash, check or money order made out to POPULAR MECHANICS. No stamps, please)

Note: Popular Mechanics processes your requests for the above information and forwards these inquiries to the organization making the offer. Each company mails the material directly. Your order will be on its way to you within 90 days.

CLASSIFIED ADVERTISEMENTS

Dorothy Nolan, Classified Manager

Rates: \$11.00 per word. 10 word minimum.

Bold Face Type—\$1.00 extra per word. (First word automatically set in Bold Face Type). **Gray Background**—Flat rate of \$54.00 per advertisement. **Centered Headlines** (5 words or less)—\$54.00 per line. Our **JULY** issue closes on **MAY 5TH**. (On sale date is **JUNE 15TH**). All advertising is payable in advance by check, money order or credit card. Advertisers wishing to charge their MasterCard, American Express or Visa accounts, please be sure to include number and expiration date. Send order and remittance payable to: Popular Mechanics, Classified Advertising, 224 West 57th Street, New York, NY 10019. Be sure to indicate classification under which advertisement is to appear.

Advertisers using a P.O. Box number must furnish complete name and street address for our records. To avoid delay in the publication of your advertisement, please send samples and descriptive materials with your request if your advertisement does not state clearly what is being offered. For additional advertising information call 1-212-649-3167 or FAX: 1-212-586-5562.

**PLEASE NOTE: WE HAVE 142 CLASSIFICATIONS TO CHOOSE FROM.
FOR OUR LIST WRITE TO ADDRESS ABOVE AND REQUEST OUR ORDER FORM.**

PUBLISHER'S MART BOOKS & PUBLICATIONS

"SHARPENERS REPORT" Monthly Newsletter. Valuable Tips—Sources—Buy/Sell Used Equipment. Free Brochure. Skog Company, Dept. PM5, P.O. Box 22559, Minneapolis, MN 55422

"ANARCHIST COOKBOOK" Available again! \$25, delivered. Barricade Books, Box 1401-X, Secaucus, NJ 07096

HAVE FUN! Enjoy winning! Uniquely rewarding \$7.95. Success Books. Free Details: MC Publications, Box 27, Olivia, MN 56277

BECOME WEALTHY ALMOST OVERNIGHT. We'll show you how. Send LSASE for Free facts. Dr. Huddleston, Box 31719, Aurora, CO 80041

GIANT VALUES - On Miniature Furnishings For Your Dollhouse Collection. \$2.00. GPCO, 804 West Central, Andover, Kansas 67002

KNOTS - ILLUSTRATED BOOKLET, \$3.00. KINGSLEY, PO BOX 5716, SCOTTSDALE, AZ 85261

SAVE Hundreds—Imports, Wholesale, Auctions! Complete report \$3. NWP, Box 14611-PM, Portland, Oregon 97214

HOW-TO SELECT a CONTRACTOR, write agreements, schedule payments. Don't be a victim. \$6.95 to: CDN Publishing, Box 7763, Auburn, CA 95603

LOW INTEREST RATES? Solution . . . "Zero Coupon Bond Guide". \$3.00. Family Living, Suite 108-M, 175 Valentine Lane, Yonkers, NY 10705

NEW! Exotic, Rare & Unusual Merchandise Directory! 700+ Sources! \$15. Delivered. Thomson Publishing, 520 Truman, Branson, MO 65616

BREAK INTO YOUR HOUSE!! Home Security Test - plus - Free Lockpick Kit. \$4.00: Dagley, Box 64561, Tucson, AZ 85728

GOLD MINE IN YOUR GARAGE. How to organize your garage sale. \$3.00 plus \$1.00 S/H. A & J Enterprises, POB 869, Cortez, CO 81321

DON'T BE A VICTIM!
AVOID RAPE, THEFT, INTRUDERS, ETC.
FIFTEEN reports on PROTECTING YOURSELF from CRIME. Reports \$5 Information/SASE. JAN Services, Box 794, Island Lake, IL 60042

DROWNING IN DEBT? Bankruptcy Lawyer Explains Debt Relief Options. Free Information. Cakewalk Press, Box 1536-PM2, New York, New York 10276

HEALTH, SUCCESS, LOVE. Self-Help books. 100's of titles. Free catalog. Aumon & Wiggins Book Sales, P.O. Box 1066, Alhambra, CA 91802-1066

WINNING Secrets Revealed How To Win Books, Lottery, Bingo, Horses, Blackjack, More. Free Catalog. Gambling Phenomena, P.O. Box 34326, Omaha, NE 68134-0326

BEAT THE B.T.U. TAX

SIMPLE, concise, complete information to eliminate or minimize proposed Federally mandated tax on your family & business! \$4.95 plus \$2 P&H: Eagle Enterprises, P.O. Box 1414 DTS, Omaha, NE 68101

FUEL FROM WATER. Energy independence with hydrogen. Amazing free report. Merit, Box 694, Louisville, KY 40201

PORNOGRAPHY IN THE CHRISTIAN HOME?
KEEP IT! But be sure to add **THE SENSUAL CHRISTIAN.** Send \$12 plus \$3 s/h to: Chris Comm Publishing, Dept. R, P.O. Box 92289, Long Beach, CA 90809-2289. The **SEXUAL** Business is **CHRISTIAN** Business.

INTERESTED IN CLASSIFIED ADVERTISING?

READ POPULAR MECHANICS Latest Edition of "TIPS ON HOW TO MAKE MONEY THROUGH CLASSIFIED ADVERTISING". This Informative 24-Page Booklet Will Show You The Do's And Don'ts of Classified Advertising And How You Can Make It Work For You. So Order Today: Only \$1.00 Plus You'll Receive A \$2.00 Coupon Refundable With Your First Order. Send To: **POPULAR MECHANICS CLASSIFIED**, Dept. SG, 250 W. 55th Street, New York, NY 10019

CATALOGS

GIFTS. Free catalog. Mailbox Selections, 1548 Carlisle Pike, Hanover, PA 17331

"SMALL ENGINE PARTS" catalog \$1. Smith's, 513W Spring, Weatherford, TX 75086

LEARN ALTERNATIVES! HOW-TO . . . Virtually **ANYTHING!** Security, Money, More!!! \$3.00. Information House, P.O. Box 420, Sequim, WA 98382

AUTOMOBILES

\$225 DAILY "CHROME PLATING" Auto Parts, Motorcycles, inexpensive, easy. (Free) information. Chrome Finish, Box 2285, Waldorf, Maryland 20604

FREE DETAILING Discount Supply Catalog: 4411 Bee Ridge Road, Suite 455-E, Sarasota, FL 34233

BUY NEW PORSCHE! STINGRAYS! 5.0 MUSTANGS! \$171 White T-shirt, blue artwork! Order today! S to XL. Arceneaux Graphics, Dept. M3, 2450 Drexel, New Orleans, LA 70122

DROP Your Vehicle Temperature 15-25 Degrees With Auxiliary Radiator Mounted Under Vehicle. Call 602-263-8242.

\$1,250 OR MORE—From slashing your car costs!! Amazing new book reveals industry secrets—Why? Free Message: 301-495-9420.

CARS & TRUCKS! Vinyl lug nut covers. Red, blue, neon pink, 3/4" (19mm) or 13/16" (21mm), 19¢ ea. plus \$1.50 sh. Check/MO to: S&M Products, Inc., 2515 E. Bonnie Brook Ln, Waukegan, IL 60087

HOW To Get FREE OIL For Your Car . . . Details \$3.00. ECHA Services, Box 378, Ridgway, PA 15853.

CARBURATOR DESIGN With Claims Of 150+ MPG. For Plans Send \$10.00: Todd Curtis, P.O. Box 41207, Rochester, N.Y. 14604.

ENGINE BELT BROKEN? Instant Emergency Repair. Any Size. No Tools - Hands Clean. Cheap. Any One Can Do It. Save \$\$\$! Send Now \$5.00/SASE. Loutrel, 1617 Lincoln Blvd, Suite 242-P1, Venice, CA 90291

PROTECT YOUR MOTOR - Fingers And Spark Plugs Order Your Spark Plug Starter Today Send Check Or Money Order \$4.95 + \$1.95 Shipping And Handling To: Recycled Tec-Nology, P.O. Box 614, Mead, Wash. 99021

HOW to REFINISH ALUMINUM WHEELS. Fifteen Page Instruction Manual, \$15.00. BBRC, 612 Brock St. S, Whitby, Ont. L1N 4K9

YOUR Car Motor Can Run Better Longer Using My Simple "Do it Yourself" Instructions. Send \$3.00 and SASE to: Methods, P.O. Box #1, Jamestown, N.D. 58402

SAVE 50% or more on auto and gasoline expenses. Send for free information. Logan Square, 1931 W. Wilson Street, Suite 445A, Batavia, IL 60510

YOU CAN AFFORD THE CAR OF YOUR DREAMS. Games Dealers Play, The Complete Car Book. Guaranteed! \$11.95/pp. Free Pocket Checklist While Supplies Last. Oregon Wordworks, Box DPM, Manzanita, OR 97130. VISA/MC only: 1-800-547-9755, ext. 9.

DRUG RAID SEIZURES: Buy Dirt Cheap! Cars, Trucks, Boats, Computers. Seizures, Box 51488-AT, Ontario, CA 91761

WOW! Power your car **WITHOUT GASOLINE!** Five Ways!! A powerful report. \$10. The Ideaworks, P.O. Box 423, Colfax, WA 99111

DRUG SEIZED CARS Porsches, BMW's, Mercedes. **DETAILS.** Write: Drug Seizures, P.O. Box 2554, Goleta, CA 93118

GOVERNMENT SEIZED Vehicles from \$100. Fords, Mercedes, Corvettes, Chevys. Surplus. Buyers Guide. (1) 805-962-8000 Ext. S-20024

HOW TO AVOID GETTING MUGGED BY MR. BAD-WRENCH. Escape Costly Unnecessary Automobile Repairs! 224 page Informative Book, \$9.95. Exceptional Products, 12075-A Oxbow, Eden Prairie, MN 55347-4229

ELECTRIC VEHICLES

35 MPH Convertable 2 Speed Electric Bike Plans \$12.00, Info \$1.75. Smiths, 2419 N. Monroe, Enid, OK 73701

AUTO SUPPLIES & EQUIPMENT

AMSOIL SYNTHETIC LUBRICANTS FREE INFORMATION, FREE USA SHIPPING DISCOVERY OIL COMPANY 1-800-845-2881

ALTERNATOR Generator Rebuilding Book. Details: HV Technologies, 7505 Barkentine, Las Vegas, NV 89128

ELECTRONIC ANTI-THEFT DEVICE PREVENTS BREAK-INS. ONLY \$12.95. Information \$1 (refundable). SASE. JPS, Box 5352, Fresno, CA 93755

AUTOMOTIVE ELECTRONICS, Major Brands, Send LSASE, CLASSIC, P.O. Box 1568, W. Babylon, N.Y. 11704

NEED BRITISH CAR PARTS? Send \$15.00 for complete ordering information. Budget Service, P.O. Box 8342, Green Bay, WI 54308

(Continued on next page)

AUTO SUPPLIES & EQUIPMENT

(Continued from preceding page)

WEAR-Proof Your Engine Plus Double Its Mileage With Power-X, World's Finest Friction-Fighter! Free Proof. Dealerships Available. Almqvist Engineering, Milford, Pennsylvania 18337.

ALTERNATOR & STARTER REBUILDING KITS! Easy, detailed instructions. From \$14.95. A & S Kits 1-800-925-8096. Guaranteed! P.O. Box 514, Belen, NM 87002

MOTORCYCLES, MOTORSCOOTERS & GO-KARTS

GO KARTS, Minibikes & ATV's. Assembled, Kits, Parts, Engines. Discount Prices. Large Selection. 88 Page Catalog \$3.00. 216-357-5569. Karl World, Dept. C., 1488 Mentor Ave., Painesville, Ohio 44077

ATV ACCESSORIES Snowplow, Lawn Mowers, Sprayers, Spreaders, V-Bar Tire Chains. Cycle Country Accessories Corp. 1-800-841-2222.

OUR NEXT AVAILABLE ISSUE:

JULY 1993

ORDERS MUST BE RECEIVED BY

MAY 5TH

ON SALE DATE: JUNE 15TH

AVIATION, HANG GLIDING

BUILD YOUR OWN WOOD ULTRALIGHT AIRPLANE. No License Needed. Over 1000 Sold. Kits And Plans, Only \$8.00. Team, 10790 Ivy Bluff Road, Bradyville, TN 37026

BOOMERANGS ... H-TECH DESIGNS! Incredible Returns. Amazing Fun. **FREE CATALOG.** BoomerangMan, 1806-1 N. 3rd, Monroe, LA 71201-4222

INFORMATIVE POWERED PARACHUTE BOOK. \$16.70. Waltz Publishing, Box 6088-W, Fall River, MA 02724

"THE AVIATION & SPACE AGENDA" Comprehensive schedule of major airshows, competitions, Blue Angels, Thunderbirds, military open houses, space shuttle launches, aviation destinations. 4 times/yr \$8.00. ASA, P.O. Box 2381, Dept. P, Clarksville, IN 47131

AIRBOATS. Hovercraft, Airdrives, Propellers, Hulls, Engines, Plans, Accessories. Catalog \$5.00. Arrowprop, Box 810M, Meeker, OK 74855

FLY! And own your own airplane inexpensively. Free information. **ROCOCO**, 2429A East Main, Snellville, GA 30278

PILOT SHORTAGE IN THE 1990's? YES! Learn How To Become A Pilot. 15 Page Manual. \$5.00. Hump Enterprises, Dept. 500, P.O. Box 40571, Memphis, TN 38174

AIRCRAFT CRASHES! See over 75 plane crashes in this 37 minute VHS tape. \$13.50 to: H.F. Collins, Box 31242, Dayton, OH 45437-0242

KIT AIRCRAFT BUYER'S GUIDE. Photos, drawings, specs, info on Hundreds of kits, sources, supplies. The best information source available. Satisfaction Guaranteed. Send \$3.95 Plus \$1.00 Shipping to: Coyne Publishing, 1313 Paseo Alamos, San Dimas, CA 91773

HOVERCRAFT

DEALERSHIP information \$11. Kits, VW Plans. Neoteric, Terre-Haute, Indiana, 47807-2394. (812) 234-1120.

QUIET New Fast Hovercraft. Catalog \$2. Box 281M, Cordova, IL 61242

HOVERCRAFT plans, 3 to 160hp. Information, \$5 (refundable). Sevtec, Box 846, Monroe, WA 98272

SPORT hovercraft newsletter, latest technology, commercial, homebuilt. Sample \$2.50. HCA, Box 908B, Foley, AL 36536

CB'S, RADIO & HAM EQUIPMENT

POLICE-FIRE SCANNERS. CB's. MARINE 2WAY. ANTENNAS. HPR, BOX 19224PM, DENVER, CO 80219

CB MODIFICATIONS! Frequencies, sliders, FM, amplifiers, books, kits, repairs, high-performance accessories. Catalog \$2. CBCI, Box 31500M, Phoenix, AZ 85046

ELECTRONICS

SEXY? The Real "SPYSMART". NO JUNK, Good Electronics, Transmitters, NightVision, Surveillance, Cellular, Catalog \$5.00. OPERATIVE SUPPLY, P.O. Box 2343M, Atlantic Beach, NC 28512

TINY MATCHBOOK VIDEOCAMERA, Under \$200!!! Tiny TV Transmitters! R/C Airborne Video! Ultracovered Surveillance! Catalog, \$3.00. SUPERCIRCUITS, 13015 DeBarr Drive, Austin, TX 78729

LONG PLAY CASSETTE RECORDERS, Voice Activated. 12 Hours/Cassette. Other Surveillance/Countersurveillance Devices. Catalog \$3.00. Productive Electronics, Box 930024, Norcross, GA 30093

COMPUTERS & SOFTWARE

BUILD or upgrade your own computer. Free catalog PC-Build 1-800-798-6363

FREE CATALOG-ON-DISK. IBM Compatible ShareWare. ASP Approved Vendor. Buster Software 1-800-598-7238

GREAT opportunity! Build your own PC. It's easy and exciting. Save money. We'll show you how in a few hours. Guaranteed! 24 hour free recorded information: (901) 683-3920

SATELLITE - TV

FREE Catalog - Lowest prices world wide. SKYVISION, 1022 Frontier, Fergus Falls, MN 56537. 1-800-334-6455.

FREE DETAILS! INSTALL IT YOURSELF! Complete systems, upgrades. Orbitek Satellite Communications, Box 264-M5, Bohemia, New York 11716-0264. (516) 589-1292.

SUPER LOW PRICES. FREE U.S.-INTERNATIONAL CATALOG. SATMAN 800-472-8626

SATELLITE TV Factory Direct. 24 HOUR PRICING HOTLINE 516-763-6842. **ORDERS AND INFORMATION** 305-344-6000. ECHOTRAK

TEST CODES: TEST CHIPS: 806-354-0280 EXTENSION 333.

TV, VIDEOS & VIDEO EQUIPMENT

NOTICE: USE OF CERTAIN ITEMS IN THIS CLASSIFICATION REQUIRES STATION AUTHORIZATION.

DESCRAMBLER KITS. Complete cable kit \$44.95. Complete Satellite kit \$49.95. Add \$5 shipping. Free Brochure. Summit PM, Box 489, Bronx, NY 10465

CABLE, WIRELESS AND SATELLITE DESCRAMBLING. All New 1992 Edition. Turn-ons, Circuits, Bypasses. \$15.95. **VIDEOCIPHER HACKER'S MANUAL** Includes Plus. New. \$15.95. **SCRAMBLING NEWS**, 1552 Hertel, Buffalo, NY 14216. (716) 874-2088. Catalog \$1.

CABLE TV EQUIPMENT

CABLE Test Chips. Puts cable box into full service mode! \$29.95 to \$59.95. 1-800-452-7090, (310) 867-0061.

CABLE CONVERTERS, ACCESSORIES BELOW WHOLESALE! Immediate delivery from giant stock! COD orders only. 1-800-995-1749

CABLE TV DESCRAMBLERS. BARGAIN HEADQUARTERS! We'll beat any price. All brands **EZ ELECTRONICS** 1-800-497-8273

CABLE DESCRAMBLERS! Build Your Own Descrambler for LESS than \$12.00 in SEVEN EASY STEPS! **RADIO SHACK** Parts List and **FREE** Descrambling Methods that COST NOTHING To Try. Included. Send \$10.00 to: Harry White, P.O. Box 1790, Baytown, Texas 77522

CABLE TV Descramblers and Converters. BUY DIRECT FROM FACTORY WHOLESALE AND SAVE A FORTUNE! CALL US LAST, WE'LL BEAT ANY PRICE! B&R Electronics 1-800-453-7482.

CABLEMAN Descramblers, Zenith, Tocom, others call. Low Prices. 1-800-795-1408. 2333 241st #4, Lomita, CA 90717

TOCOM Descrambling Chips. Only \$35. For information. Call 1-800-725-1198.

"CABLE T.V. CONVERTERS" Jerrold's, Zenith, Pioneer, Oak, Scientific Atlanta, And Many More. 12 Years Experience gives Us The **ADVANTAGE.** VISA/MC, AMEX, COD. Advantage Electronics, Inc. 1-800-952-3916, 1125 Riverwood Dr., Burnsville, MN 55337

CAMPERS & TRAILERS—KITS, PLANS

BUILD YOUR OWN - Travel Trailer - Fifth Wheeler - Motorhome - Camper - Pickup Cover - Plans - Patterns - Kits - Catalog \$1. Glen-L, 9152 Rosecrans, Box 1804/RV3, Bellflower, CA 90706.

172 TRAILER PLANS Motorcycle, Utility Car, Construction—Strong, Streamlined, Easily Built. Catalog \$4.00. (Refundable). Tag-Along, Box 15107, Salem, OR 97309

TIRED of holding fuel nozzles open at those self serve pumps, for those 20 plus gal. fillups. **AUTO FILL** converts all nozzles to automatic nozzles instantly. Adjustable flow instant shutoff. \$19.95 & \$2.00 S&H to: Ro-Ha Eng. & Mfg., PO Box 275, Marshallville, Ohio 44645

NEED HELP Figuring the Cost of your Advertisement?? Call us at 212-649-3167 or send us a FAX (212-586-5562) and we'll FAX Back with a Price Quote.

BOATS, OUTBOARDS, TRAILERS, & KITS

PRECUT BOAT KITS - PLANS - PATTERNS - AMERICA'S LARGEST SELECTION - 6'70" - Powerboats - Sailboats - Trimarans - Dinghies - Houseboats - Hydroplanes - Tunnel-hulls - Duckboats - Canoes/Strippers - Kayaks - Dories - DISCOVER no dryrot epoxy boatbuilding - **HUGE ILLUSTRATED CATALOG \$3.00** (Airmail \$5.00), Book "Amateur Boatbuilding", \$6.00. - Free Epoxy/Fiberglass/Supplies Catalog - **CLARKCRAFT**, 16-6 Aqualane, Tonawanda, NY 14150

BOAT PLANS - PATTERNS - KITS - Unsurpassed selection - 7'55" - Hydroplanes - Canoes - Kayaks - Rowingboats - Duckboats - Dories - Sailboats - Houseboats - Quick/simple Stitching. Tremendous savings! 168-page DESIGN BOOK - \$4.00. Includes Free "Boatbuilding Supplies" catalog. "Epoxy Manual" \$2. **GLEN-L**, 9152 Rosecrans, Box 1804/PM3, Bellflower, CA 90706. 310/630-6258.

EVINRUDE-MERCURY—NEW 1991 Bargains - Top Brands ... all sizes ... \$2.00 handling ... Scott McCulloch parts ... Electra Marine, 610 Merrick Road, Lynbrook, New York 11563. **INFLATABLES.**

ELECTRIC TROLLING MOTOR PARTS & SERVICE Minn Kota, Motorguide, Ram, Pflueger, Shakespeare, Mercury, Evinrude 1-800-628-8161. Service Center Unltd., Inc., 1440 Holland Rd., Suffolk, VA 23434

JON Boat Wood Classic, Build For \$100, Plans \$10, Route 2, Box 304A, Pink Hill, NC 28572

FIBERGLASSED FOAM BOATS, Three Plans \$24.95. Technico, Box 973, Kalkaska, MI 49646

SWIMMING POOL, SPA & POND EQUIPMENT

BUILD artificial rock formations, waterfalls. Big demand by pool builders, landscapers, etc. Highly profitable. Create your own backyard paradise. Video + Details \$5.00. Write: Waterscapes, 2887 Green Valley Pkwy., Suite 380, Henderson, NV 89014

ATHLETIC EQUIPMENT/BODY BUILDING COURSES

BIGGER, Powerful Muscles Faster! Free Booklet. Dyna-Method, P.O. Box 591-M, Temperance, Michigan 48182

GUNS, DECOYS, HUNTING

BEEMAN ADULT AIRGUNS! World's most accurate and most powerful regular production airguns. Calibers: .177, .20", .22", .25" Largest U.S. sales. Unequaled trigger action, durability, ownership pride, quality. Also: pointed, hollow point, extra heavy, hi-velocity, and match pellets. Request Free Catalog C13. Add \$3.00 for fast mail. Beeman Precision Arms, 3440-C13 Airway Dr., Santa Rosa, CA 95403. (707) 578-7900 (24 hours).

ENGINES, MOTORS

ENGINES - Briggs, Kohler, Others - HUGE DISCOUNTS! Catalog \$2. Engine Mart, 2642 Newfound, Merritt Island, FL 32952

SMALL ENGINES and PARTS "GALORE". Fantastic Savings. Briggs, Tecumens, Kohler, Others. Illustrated Catalog \$5.00 (Refundable). Ashland Small Engines, Box 166PM, Ashland, MO 65010

TOOLS FOR SALE

BOLTS, SCREWS, TOOLS, WHOLESALE, DIRECT. Guaranteed. Catalog \$2.00 (Refundable). Camelot, Dept. 44, Box 65, Bristol, Wisconsin 53104

CHARGING SYSTEM ANALYSER - Diagnoses Alternator, Regulator, Battery Problems. 750,000 Purchased By Professional Mechanics Worldwide. Lifetime Warranty. \$30.00. WSD Company, Box 643P, Sterling Hts., MI 48311-0643

MACHINERY, TOOLS & SUPPLIES

LATHES, Milling Machines, Supplies, Metals, Tools. Catalog \$1.00. Blue Ridge, Box 536-V, Hurricane, WV 25526. 1-800-872-6500.

FOUNDRY SETS Supplies, Brochure \$1.00. Pyramid Products, H.O.C.-1 P.O. Box 21, Niland, CA 92257. (619) 354-4265.

LATHES - INDUSTRIAL/HOBBY FROM \$350.00, METALS, SUPPLIES. LARGE CATALOG \$2.00. CAMPBELL TOOLS, 2100-D SELMA RD., SPRINGFIELD, OHIO 45505. 1-513-322-8562.

4" METAL Cutting Lathe \$125.40. Taig, 12419 Nightingale, Chandler, AZ 85249

LUMBERJACK chain saw sawmills - power-feed. Brochure \$2.00. Brown Engineering, Box 40, West Point, CA 95255

NEW Metal and Woodworking Machinery Catalog \$1.00. TOOL BARN, Box 2405, Ft. Bragg, CA 95437

ATLAS CRAFTSMAN Lathe Parts. HERMAN, 9306 NW 60th Street, Tamarac, FL 33321

ENERGY SAVING

OUTDOOR WOODBURNING FURNACE Build For Under \$500. Save Thousands. Complete Plans \$25. ENCCO, 1029 Bauer Road, Hill City, MN 55748

GROUND WATER AIR CONDITIONING cools for 1/4 \$\$\$\$. Plans, Parts List. \$19.95. SJ Concepts, RD#2, 3 O'Hara Ave., Newtonville, NJ 08346

STOP or Slowdown Your ELECTRIC Meter! WITHOUT Tampering. Info On "How To" Manuals \$10.00 To: High-Tech, P.O. Box 352164, Toledo, Ohio 43635

SOLAR & ALTERNATE ENERGY

WIND/SOLAR Electric Systems. Electric Tractors. **COMPOSTING TOILETS**. Propane Refrigerators. Solar Cookers. Grain Mills. Efficient Lights. Catalog \$4. Kansas Windpower, R 1PM, Holton, KS 66436

NEW! BUILD AMAZING LIQUID PISTON ENGINE from pipe fittings. Easy plans. Free information. ABCO, Box 306-M5, Seminary, MS 39479

SOLAR Collectors You Construct. Send Stamp. 10909-PMP Hayvenhurst, Granada Hills, CA 91344

SOLAR HOTDOG COOKER Great For The Summer. Write: ADDV Enterprises, 420 N. Basque, Fullerton, California 92633

HOW TO BUILD SOLAR ROOM HEATERS, \$5.00. Eldridge Enterprises, POB 118067, Toledo, Ohio 43611

HOME CRAFTSMAN

MAKE WOODEN TOYS! Whirligigs! Door Harps! Doll-houses! Banks! Music Boxes! Dozens of fun Wooden Toys from our easy to use plans, parts and kits. All Skill Levels! Catalog \$1.00. Cherry Tree Toys, Box 369-310, Belmont, OH 43718. Phone Free: (800) 848-4363. Ext. 310.

PICNIC TABLE KITS Walk-thru seating design. Galvanized steel components. Send SASE To: ERCAS, P.O. Box 1241, Concord, MA 01742

WOOD, WOODWORKING

MAKE TERRIFIC resale and gift projects with our easy to follow **EXCLUSIVE** woodcraft patterns and accessories. **FREE CATALOG**. Geneva Specialties. 1-800-556-2548. Dept. PMA53.

PLANS, BLUEPRINTS, PROJECTS

SKYLIGHTS: How To Buy, Install, Maintain Your Own Skylights With Illustrations - \$9.95 - Skylight Designs, 1200 Alabama Rd., Suite 3160, Acworth, GA 30102

NEVER BEFORE OFFERED: SAND SCENES How to make them. Detailed. Complete. Guaranteed. Profitable Opportunity. \$17.00. I.O.H.L., 2144 So. 1100E. Ste: 150-180, Salt Lake City, Utah 84106

DETAILED PLANS 10' x 16' Barn Style Shed Send Address \$19.95 To: ELA Designs, PM, P.O. Box 2764, Mt. Vernon, WA. 98273

CROSSBOWS, WHIRLPOOLS, GADGETS-Easy Plans. Catalog \$4 Refundable. Info Resources, Box 3572, Grand Rapids, MI 49501-3572

MODIFIED "8" Accessorizes Rope, Provides Self-Defense. Plans, Instructions \$5. E. P. Donahue, 1934 Woodmont Avenue, Arnold, PA 15068

ALASKAN SMOKER PLANS, Plus recipes for smoked fish and squaw candy. \$7.50 - Box 4703, Soldotna, AK 99669

CHILDREN'S Wooden activity centre. Fully illustrated, detailed plans \$7.95. L.M.S. Graham Enterprises, 8 Perth Street, Brampton, Ontario, Canada L6Z 4P3

ADULT SIZE Picnic Table From ONE Sheet Of Plywood - NO WASTE - Send \$5.00 to: SCOTT Dist., P.O. Box 1810, Prescott, Arizona 86302

MEDIAEVAL Crossbow. Detailed, illustrated, instructions. \$7.00. Barn Owl, POB 613, Grain Valley, Missouri 64029.

STORAGE SHEDS: 3 Sizes, Drawings, Instructions, & Materials List included. \$5.95. P.H. Arsenault, 101 Henley Rd., SW Palm Bay, FL 32909

GIANT MUSHROOM PLAYHOUSE! Plans \$10. Translite, P.O. Box 1498, Gloucester, MA 01930

PAINT SAFELY! Benchtop spray booths. Plans, kits, parts. Brochure & price list \$2.00. Morse Technical, P.O. Box 4, Northfield, VT 05663

DOUBLE your shower pleasure. E-Z to install secondary shower head. Invite friend. Complete plans \$12.95. Water Pleasure, Box 15895, Philadelphia, PA 19103

VCR Multiplying System under \$20.00. Send \$10.00 for parts list and instructions to: P.O. Box 2575, Summerville, SC 29484

FOR THE HOME

SECURITY System Decals 8/\$10. Securitys, P.O. Box 1263, Brandon, FL 33509

"BUG Proof Your Home!" Written By Entomologist. No Chemicals, Gimmicks. Only \$3.95. DWS, Box 290475, San Antonio, TX 78280

ALARM WARNING DECALS Scare Off Burglars. Satisfaction Guaranteed \$4.00 Each. WSD Company, Box 643P, Sterling Hts., MI 48311-0643

NEW! Carbon monoxide/gas alarm. Protects your family! Info \$2.00: Integrated Marketing, Box 7656-PM, Colorado Springs, CO 80933

ADVANCED SURGE SUPPRESSION - Circuit Breaker Installation - SASE. Box 50072, Knoxville, TN 37950

ROOFING

STOPPING FLAT ROOF PROBLEMS SINCE 1978 liquid applied fiberglass reinforced acrylic roofing system. Waterproofs asphalt, metal, new sheathing. Call Polar Seal® 1-800-343-7663. *Weekdays 8-5 CST*

HOME BUILDING & REMODELING

TILT SASH BALANCES modernize your old windows. Easy Installation, Economical. Narflex Corp., 7959 Grand Ave., Elmwood Park, IL 60635. 708-453-4043.

STEEL FRAME HOMES - Fast/Easy Construction, Strong, Economical. Tough Steel Homes, (817) 294-6063.

FIBERGLASS

FIBERGLASS Resins, Materials, Epoxies, Supplies. Catalog \$1.00. (Fiberglassing Book \$6.00) MAILAD, 16 Aqualane, Tonawanda, NY 14150

PLASTICS

CASTOLITE Liquid Plastics. Crystal clear, colors. For casting, embedding, coating, fiberglassing, repairing and reproducing with our Mold Making Supplies. Catalog \$2.00. **CASTOLITE**, Dept. 93E/PM, 4915 Dean, Woodstock, IL 60098

RUBBER, plastic compounds, techniques, sources. Free information: Castcrafter, Box 18586 (A5), Memphis, TN 38186-0586

DO IT YOURSELF

BELT BUCKLES for coins, stones, jewelry mountings, cut stones, clock works. Wholesale catalog \$1.00. Eloxite, Box 729, Wheatland, Wyoming 82201

YOU'VE invented something. Now what? Contact The Inventors Advertising Agency. 1-800-IAA-0871.

METALWORKING!! Book catalog FREE ... **BLACKSMITHING - CASTING - ELECTROPLATING - LOCKSMITHING - MACHINING - WELDING**. Corbin, 7954 Transit, Suite 143M, Williamsville, New York 14221-4117

BUGGED? PHONETAPPED? Free Catalog Counter-Surveillance Equipment tells you Fast! 1-800-732-5000

UPHOLSTERY TRAINING VIDEOS. Free Brochure. VUE, Box 128PM, El Verano, CA 95433. 800-635-3493.

LEARN TO REPAIR YOUR COPY MACHINE Valuable Tips Book \$26.95. "Details Free". Prime Tech, P.O. Box 48188, Watauga, TX 76148

WINDOW CLEANING MADE EASY includes equipment send \$17.95. Crystal-3, 1750 Orr, Simi, CA 93065

CUTTING GLASS CORRECTLY INSTRUCTIONS AND PROFESSIONAL CUTTER \$6.95. GLASS, 363-A CEMETERY ROAD, RIVER FALLS, WI 54022

DO-It-Yourself TV Diagnosis/Repair Booklet. LSASE: TV Doctor, 5223-M Hackberry, Sacramento, CA 95841

SAVE \$1000'S! Build Your Own Hot Tub. Complete Plans and Simple Instructions \$10. Tub Co., Box 7333, Tacoma, WA 98407-0333

TUNE-UP Your Lawnmower Professionally For Under \$15.00 - Full Instructions \$5.00. 97B St. Louis Street, St. Eustache, Quebec J7R 1X8

ARTS, CRAFTS, SUPPLIES

"GETTING Started in Stained Glass." \$1.00. Whittemore, Box 2065T, Hanover, Mass. 02339

CLOCK WORKS, beading supplies, rockhound supplies, belt buckles, cut stones. Wholesale catalog \$1.00. Eloxite, Box 729, Wheatland, Wyoming 82201.

MINI-quartz clock movements as low as \$1.75 complete! Posters, epoxy, videos, kits, plans - over 2000 items! Wholesale catalog \$3.00 (credited) Steebar, P.O. Box 463-P, Andover, NJ 07821-0463

CARTOONING, COMMERCIAL ARTS, SIGN PAINTING

SUPERMONSTERS Drawing Lessons Book! \$4.95. Phelps, Box 22401-PM, Cleveland, OH 44122

BE A PROFESSIONAL CARTOONIST! Write for free brochure. **CARTOONERAMA**, Box 854PM, Portland, ME 04104

TOYS, GAMES, KITES, PUZZLES, NOVELTIES

BASEBALL BUFFS Test Knowledge Of League Leaders! New Game Promo! \$9 + \$3 S&H. S.C. Bussey & Cooke, 184 Gold Street, So. Boston, MA 02127

MAGIC TRICKS, JOKES, VENTRILOQUISM

VENTRILOQUIST Supplies. Instruction. Information **FREE!** Dummy Catalog \$2.00. Maher, Box 420-PM, Littleton, Colorado 80160.

FREE! World's Leading Novelty Catalog. 1600 Jokes, Tricks, Science, Sports, Hobbies. Johnson-Smith, F-01, Bradenton, FL 34206-5500

AMAZING, TRICK JUMPING QUARTER \$3.00. Target, Box 418, Stafford, VA 22554

HOBBIES & COLLECTIONS

MILITARY Medals Catalogue \$1.00. Vernon, Box 890280PM, Temecula, CA 92589-0280

ANTIQUES, RELICS, ETC.

ANTIQUE maps, newspapers, books. Free catalog. Steve Nefstead, 113 Second St. W., Jordan, MN 55352

STAMP COLLECTING

FREE sample plus catalog. Jefferies, 3480 Middlebelt, West Bloomfield, MI 48323

50 DIFFERENT Old U.S. between 1861 and 1939 - \$1.00. Ed Roush, Box 3734, Mansfield, Ohio 44907.

OLD U.S. stamps on approval. Sherman, Box 15355E, Philadelphia, PA 19111

"PENNY Stamp Approvals." Regardless Catalog. Kloster, 4164 52nd St., San Diego, CA 92105

ISRAEL 15 Different 10¢ Approvals. Sam Chazen, Box 666, Delray Beach, Florida 33447

FREE Worldwide Packet, Penny Approvals. Froehlich, Box 177DA, Pine River, WI 54965

FREE!! Gold Silver Approvals. Delor, 21127 Fleetwood, Harper Woods, MI. 48225

100 Space stamps 50¢ Approvals. Becker, Box 3284-M, Portland, OR 97208

300 Breathtaking Stamps - 25 Countries. Only \$1.00 with latest bargains and sensational approvals. NeoTrends, ME93, Box 982F, Toronto, Canada M4Y 2N9

127 Mint Used Blocks \$31.81, Pairs \$14.92. M. King, 330 Alexander, Kamloops, B.C. Canada V2B 3R3

COINS, TOKENS, CURRENCY

90% SILVER 5 Different Mercury Dimes \$5.00 Or 10 Different Plus Free Coin Folder \$10.00. Postpaid. **YORK COIN CO.**, P.O. Box 2486, Newport News, VA 23609

PLAYS, SONGS, MANUSCRIPTS

CASH ROYALTY! SONGS COMPOSED FROM YOUR POEMS. Broadway Music Productions, Box 7438-PM, Sarasota, FL 34278

MUSIC INSTRUCTIONS & INSTRUMENTS

ACCORDION Top Brands, Cordovox, Buy Direct Tremendous Discounts. Trades, accepted. Free brochure. PM, Accordion-O-Rama, 16 West 19th Street, New York, NY 10011. Phone 212-675-9089.

ACCORDIONS, CONCERTINAS, Button boxes, new, used, repairs, trades, credit cards. Castiglione, Box 40S, Warren, MI 48090. Catalogs 313-755-6060—800-325-1832

SELF IMPROVEMENT

STOP SMOKING, lose weight, cope with stress. Self-hypnosis tapes. \$9.95 each tape. Victory Gifts, P.O. Box 207, Boston, MA 02123-0207

EDUCATION & INSTRUCTIONS

INVESTIGATION CAREER. Quick home study. Become a professional. (800) 272-6680.

NONRESIDENT UNIVERSITY DEGREES. Bachelor's, Master's, Doctorates. Accredited, inexpensive, fast. Credit for life experience. Free sixteen page booklet. Dr. John Bear, Costedoat & Bear Book Sales, P.O. Box 826PM, Benicia, CA 94510. (800) 835-8535.

TERMPAPER assistance. 19,278 papers available! 306-page catalog—rush \$2.00. Research, 11322 Idaho, #206MK, Los Angeles 90025. Toll-Free Hotline: 800-351-0222 (California: 310-477-8226)

LOCKSMITHING, Universal School of Master, Correspondence and Shop Training. Box 214652PM, Sacramento, CA 95821

(Continued on next page)

EDUCATION & INSTRUCTIONS

(Continued from preceding page)

PARALEGAL GRADED CURRICULUM. APPROVED home study. Affordable. 100 years experience. Free catalog 800-826-9228. **BLACKSTONE SCHOOL OF LAW**, P.O. Box 871449, Dept. PM, Dallas, TX 75287

EDUCATIONAL Cassettes - Languages, Salesmanship, Personality Improvement, Investments! Free Cassette Catalog! Addison, Box 1065-PM, Black Mountain, NC 28711

FREE PH.D. Degree! Ministerial License! Psychic Diplomas! Progressive, Box 276265-M Sacramento, CA 95827.

FULLY APPROVED UNIVERSITY DEGREES! Economical home study for Bachelor's, Master's, Ph.D., **FULLY APPROVED** by the California Superintendent of Public Instruction. Prestigious faculty counsels for independent study and life experience credits (5000 enrolled students, 400 faculty). **FREE INFORMATION**—Richard Crews, MD (Harvard), President, Columbia Pacific University, Dept. 2E85, 1415 Third Street, San Rafael, CA 94901. Toll free (800) 227-0119; California: (800) 552-5522; or (415) 459-1650.

OUR NEXT AVAILABLE ISSUE

JULY 1993

ORDERS MUST BE RECEIVED BY

MAY 5TH

ON SALE DATE: JUNE 15TH

MAKE MONEY BARTENDING-NOW! Easy guide reveals how! Only \$5. Byrne Co, 15 Milford, #7206M, Suffern, NY 10901

SERVING Jesus Include Acts 2; 8; 19. Prove Success: Rom. 8; 10; 12. Tracts, 1709 Fredricksburg Ave., Lakeland, Florida, 33803

SCHOOLS

HIGH SCHOOL AT HOME, NO CLASSES. LOW MONTHLY PAYMENTS. INFORMATION FREE. EST. 1897. CALL 1-800-228-5800 OR WRITE AMERICAN SCHOOL, DEPT. #345, 850 E. 58TH ST., CHICAGO, IL 60637

DETECTIVE Home Study Course. Free lapel pin, certificate, great future. Professional Investigator School, Dept. CP, P.O. Box 41256, Los Angeles, CA 90041

EMPLOYMENT INFORMATION

JOBS AT SEA! Information, procedures, companies, unions. Send \$10.00 to: WAYD, Inc., 9122 S. Federal Hwy, Suite 230C, Port St. Lucie, FL 34952

HELP WANTED

OVERSEAS. To \$1000 Daily! **FREE** list. ZINCPO, Box 585, Dearborn, MI 48120

EASY Work! Excellent Pay! Assemble Products At Home. Toll Free 1-800-467-5566 Ext. 5038.

\$329.84 Weekly. Assembling Our Products At Home. Toll-Free Information: 1-(800) 333-3294.

GUARANTEED Work! Top Pay! Assemble easy products at home. 1-800-377-6000, Ex7030.

\$200-\$500 WEEKLY Assemble products at home. Easy! No selling. You're paid direct. Fully Guaranteed. **FREE** Information-24 Hour Hotline. 801-379-2900 Copyright #NY060850

LAW ENFORCEMENT JOBS. \$17,542-\$86,682/yr. Police, Sheriff, State Patrol, Correctional Officers. Call (1) 805-962-8000 Ext. K-20024

FOR INVENTORS

PATENT AND DEVELOP Your Invention. Registered Patent Agent and Licensed Professional Engineer. Send for **FREE PATENT INFORMATION** Every Inventor Should Have. Richard L. Miller, 12 Parkside Drive, Suite-M, Dix Hills, NY 11746-4879. (516) 499-4343

PATENT IT ECONOMICALLY! Free details. Licensed since 1958. Raner Associates, 2008 Fondulac, Richmond, VA 23229.

WORK DIRECTLY WITH REGISTERED PATENT ATTORNEY AND ENGINEER

WITH thirty-two years combined engineering and patent experience. U.S. and international patent applications. **PATENT AND DEVELOP** your idea with the experience of an expert. Call or write for free **CONFIDENTIAL DISCLOSURE, RECORD OF INVENTION** and 148 **PAGE BROCHURE**. Introduction to Industry, Marketing Plans, Overseas Production, Prototypes and Research Readily Available. Also specializing in Copyrights and Trademarks. **LESS THAN ONE HOUR FLIGHT TIME TO U.S. PATENT OFFICE—TOLL FREE FROM U.S. AND CANADA 800-367-7749** or write: **MICHAEL I. KROLL** Registered Patent Attorney, U.S. Patent registration #26,755; 171 Silkwood Lane, Syosset, New York 11791. Outside USA (516) - 367-7777 - FAX: (516) - 692-2787.

INVENTORS! Can you patent and profit from your idea? Call **AMERICAN INVENTORS CORP.** for free information. Serving inventors since 1975. 1-800-338-5656.

INVENTORS: If you have an invention for sale or license, write for free booklet explaining how we can help you. Kessler Sales Corp., C-5-FI-3, Fremont, Ohio 43420

ACCUSEARCH Specializes in Thorough, Prompt, Inexpensive Patent Searches. 1-800-999-5498.

REGISTERED PATENT ATTORNEY. D.A. Kettlestrings. Free Information. 1-800-966-7577.

AVOID "SCAMS" - Free Government reports exposing invention marketing companies. 1-800-428-5779.

FREE help for inventors! No charge for protection forms and information kit. Affiliated Inventors Foundation. 1-800-525-5885.

INVENTIONS, Ideas, new products. We submit to industry. Call 1-800-288-IDEA.

INVENTORS! Comprehensive Patenting/Marketing services can help you profit. **FREE ADVICE!** Call **ADVANCED PATENT SERVICES**, 800-458-0352.

INVENTORS' Digest. America's Only Inventors' Magazine. \$20/year. Satisfaction guaranteed. Free patent manual. 1-800-525-5885.

INVENTORS-NEVER SEND IDEAS TO STRANGERS! Avoid ripoffs - save thousands! Revolutionary protection/marketing method! Nonprofit organization. Free information 24 hours: 1-800-846-3228.

ALL New Ideas/Products Free Patenting, development, licensing package, call Davison & Associates 1-800-677-6382.

INVENT SOMETHING? Free Eureka Solutions International invention/idea package provides unique marketing information. 1-800-547-7885.

OBTAIN PATENT PENDING STATUS and PATENT SEARCH by patent office for your invention for about \$150. For instructions and strategy by inventor, send \$12 to: Inventor, 1637 Linden, Memphis, TN 38104

PRODUCT DEVELOPMENT SERVICES: Analysis, Design, Prototypes, Testing. 503-452-7344.

FREE PATENTING GUIDE: mechanical, electrical, computer and software inventions. 24 hours, 1-800-966-0119.

PATENT SEARCHES for simple inventions. Reasonable rates. Confidential. Larry McCall, Postbox 15724F, Houston, TX 77020-5724.

INVENTORS! Let us guide you through the invention process. Free details. Conceptor Corporation®, 709 Solano Avenue, Albany, CA 94706.

INVENTORS! Free 24 Hr. Message Details on Protection & Marketing of your ideas. Call Pro Plus at 1-800-374-9185.

INVENTORS Don't Be Fooled - Call Our Inventors Club 1-800-466-1793.

PATENT SEARCHES, FREE DETAILS. PATENTFINDERS, SUITE 185-C, 3220 N STREET, N.W., WASHINGTON, D.C. 20007

INVENTIONS WANTED

LEARN how to offer your invention for sale or license. Free booklet outlines procedures, royalty rates, requirements. Kessler Sales Corporation, C-5-IW-3, Fremont, Ohio 43420

INVENTIONS DEVELOPED & MARKETED. Licensed Professional Patent Engineer. U.S. Patent Office Former Examiner. Manufacturers Representative. Patmart, Suite 702PM, Woolworth Bldg., New York, NY 10279.

INVENTORS! NordicTrack, America's fastest growing fitness equipment company, seeks patentable ideas for fitness equipment and for Healthy Kitchen™ (healthy cooking made easy) product line. Inquiries treated confidentially. Each idea gets individual attention and response within 10 days, with royalty revenue possible. We treat inventors right! Write: Weston Cutter, NordicTrack, 104 Peavey Road, Chaska, MN 55318, or call 1-800-967-2113.

REAL ESTATE

COUNTRY REAL ESTATE CATALOG—United National's **NEW** catalog features over 200 pages of the best country real estate bargains across America! Wilderness lands & retreats, farms, ranches, historic homes, waterfront properties & more. Send \$4.95 to: **UNITED NATIONAL REAL ESTATE**, 4700-PM Bellevue, Kansas City, MO 64112. Or call 1-800-999-1020, Visa/MC accepted.

ARKANSAS - FREE CATALOG. **NATURAL** beauty. Low taxes. The good life for families and retirement. Fitzgerald-Olsen Realtors, P.O. Box 237-P, Booneville, AR 72927. Call toll-free (800) 432-4595, Ext. 641P.

BRANSON investment Opportunity, 600 Choices, Send \$4.95. DPZ, P.O. Box 1471, Forsyth, MO 65653

GOVERNMENT HOMES from \$1 (U repair). Delinquent tax property. Repossessions. Your area (1) 805-962-8000 Ext. GH-20024 for current repo list.

PROPERTY OWNERS

BASIC money saving techniques. Manage your own property. Concise program. Send \$12.95 to Hartman Property, P.O. Box 971, Blythe, CA 92225

CALIFORNIA Land. \$50 Down. \$50 Monthly. PM, Box 35291, Los Angeles, 90035

BUY IT WHOLESALE

BELTS, Buckles, Hat Tacs, Jewelry, More. Complete line fast sellers. Big Profits. Complete dealer set up. Color catalog \$1.00. Anchor, Box 3958-PMR, North Providence, RI 02911

EARN MONEY selling Gold and costume jewelry, rings, watches-Buy Direct. 130% Below Retail. Catalog \$1.00. Anka-PM, 40 Freeway Drive, Cranston, RI 02920

WORLDS FINEST WATCHES. Top Quality Replicas. Below Wholesale Prices. Brochure. 1-800-553-4334.

CLOSEOUT SALE! Replica watches - Color Catalog: Jetaylor, 1200 Barrett Parkway, Suite 14-217, Kennesaw, GA 30144

ADVERTISING AGENCIES, ADV. SER. MAILING LISTS

NEVER Used Before - New Hotline Opportunity Seekers! 200/\$18; 500/\$28; 1000/\$45. Mixed States! Immediate Shipment! Order Now! Advon, Drawer B2, Shelley, ID 83274. Creditcard orders: 800-992-3866.

PREMIUM Mailing List Guaranteed. Free Details. Box 234, Imlay, Mich. 48444

CUSTOM MAILING LISTS: Many categories, P/S Labels. (Free Newsletter). Dept. 6, P.O. Box 40651, Memphis, TN 38174

RUBBER STAMPS

MAKE Rubber Stamps. Highly Profitable. Free details. Stamper, POB 22809 (GX), Tampa, FL 33622

OUR NEXT AVAILABLE ISSUE

JULY 1993

ORDERS MUST BE RECEIVED BY

MAY 5TH

ON SALE DATE: JUNE 15TH

PRINTING PRESSES, RUBBER STAMP OUTFITS

BARCO Printers Type Or Rubber Stamp And Foil Stamp- ing Catalog. \$2.00 Each Refundable. Box 1011P, Bensenville, 60106-8011

RUBBER Stamp Makers. Letterpress Printers Supply Catalog. \$2.00 Deductible. Acme/Star, 1720 N. Marshfield, Chicago, 60622

TYPE for printing and stamps. Catalog \$2.00 deductible. Quaker City Type, R.D. 3, Box 134, Honeybrook, PA 19344

CLOCKS, WATCHES, OLD GOLD, JEWELRY

HIGHEST CASH for Gold, Jewelry, Gold Teeth, Rings, Diamonds, Watches, Silver, Platinum. Mail Articles Today. Free gift with information. Chicago Gold & Precious Metals, 10 South Wabash, Dept. 958, Chicago 60603.

REPLICA Swiss Watches Best warranty, prices, quality, service, guaranties. (404) 682-0609

TREASURE FINDERS

BURIED TREASURE - Sensitive equipment allows locating from distance. Brochure free. Simmons, Box 10057-MA, Wilmington, NC 28405

HOME BASED BUSINESSES

MONEY MAKING CATALOG 250 Popular Gift Items No Capital, No Inventory. Info \$3.00. Croxton Import, 314 5th Ave. S., Naples, FL 33940

PROFITABLE OCCUPATIONS

FREE information Starter & Alternator Rebuilding. Box 422, Seymour, TN 37865

PLASTERCRAFT ... Profitable Home Business 3000 Molds Available. Details. Lynette, 6251C Mentpark, Mentor, Ohio 44060.

BIG PROFITS Replacing Automotive Headliners **NO OVERHEAD.** Complete Instructional VIDEO \$39.95. CIV, P.O. Box 2440, Eaton Park, FL 33840

SALESMEN-DIST.

WANTED! **INDEPENDENT DISTRIBUTORS** for super high-quality auto, home, and personal alarm systems! No experience needed! Profits from 30%-40%! Send \$3 for info to: **SONNCO**, P.O. Box 656, El Cerrito, CA 94530

BUSINESS OPPORTUNITIES

IMPORT-EXPORT opportunity, profitable world-wide, mail order business from home, without capital. We ship plan for no risk examination. Experience unnecessary. Free Report. Mellinger, Dept. H2706, Woodland Hills, California 91367

LET The Government Finance your small business. Grants/loans to \$500,000. Free recorded message: 707-449-8600. (K23)

\$225 DAILY "CHROME PLATING" Auto Parts. Motorcycles, inexpensive, easy. (Free) information: Chrome Plating, Box 2285, Waldorf, Maryland 20604

MAKE homemade "How-to/opportunity" booklets. Mine have earned \$436,097. Money never stops. Free information. Booklets, 507J Oak Drive, Friendswood, TX 77546

FIRE YOUR BOSS. Homemade Booklets Are Better! Free Information. Booklets, Box 154, Adams, NY 13605

DISCOVER SUCCESSFUL MINI STORAGE SECRETS. "How To Create, Market, Operate." Free details. Action, Box 21M, Sturgeon Bay, WI 54235-0021

HOMEWORKERS DESPERATELY NEEDED! But don't get caught in the homework fraud trap! Hundreds of legitimate companies want to employ you now! Free report! Long SASE to: Consumer Network, Dept. P2, Box 8138, St. Paul, MN 55108.

BE YOUR OWN BOSS. REPAIR CRACKED WINDSHIELDS. It's easy. We'll teach you how to start and run your own business. Keep all the money you earn. Patented Equipment. FREE valuable report. Call 1-800-321-2597. Glas-Weld Systems, Inc., Box 5755-D, Bend, OR 97708

BUMPERSTICKER Printer. Cheap, simple, portable. Free details. Bumper, POB 22791 (GC), Tampa, FL 33622

PROFITABLE Gold Foil Printer. Personalize business cards, pencils, matches. Free details. Gold, POB 24986 (GC), Tampa, FL 33623

HYDRAULIC JACK REPAIR MANUAL, CATALOG \$10.00. HYDRAULIC PARTS SUPPLY, BOX 4157, BROWNSVILLE, TEXAS 77820-4157

RECYCLE METALS. NO, NOT BEER CANS! Easy \$458 weekly! Free information. Recycler, Box 681804, Franklin, TN 37068-1804

PIANO Tuning quickly learned with home study courses. Diploma granted. American Tuning School, 17050 Telfer Drive, Morgan Hill, Calif. 95037.

MAKE YOUR DREAM COME TRUE, EARN \$75,000 YEARLY REPAIRING CRACKS IN WINDSHIELDS AND PLATE GLASS. NOT REPLACING THEM. CALL 1-800-626-8523 (US/CANADA): THE GLASS MECHANIX INC., 5313 NOB HILL ROAD, FT. LAUDERDALE, FL 33351

\$392.00 From Square Foot Plywood. (Huge Demand) \$1.00. (Refundable). Woodwin-PM, POB 859, Bridgewater, Mass. 02324-0859

LEARN Sewing Machine Repairing. Men, Women. Lucrative Profits. Gresslin Correspondence School, Box 5104, Spencer, Iowa 51301.

NEW! GROW EXPENSIVE PLANTS. SELL FOR 2,000% PROFIT. Free information. Growbiz, Box 306-M5, Seminary, MS 39479

TAKE PICTURES for profit. Camera Ventures, Box 771, Lamar, CO 81052

MAILORDER Books. 1,000% Profit. Selectco, Box 1140, Clearwater, FL 34617

\$500.00 FROM ONE SACK CEMENT! FREE Picture Proof. BRINCO, Box 401092-M, Hesperia, CA 92340

\$40,000 ON 1/2 ACRE! New Hydroponics - inexpensive, pleasant, practical! Free information. Robin's, Box 681804, Franklin, TN 37068-1804

START A Million Dollar mail order business. We drop-ship 2955 best selling products. Lowest below wholesale prices. Immediate delivery. Spectacular home business opportunity. Free Book. SMC, 9401 De Soto Avenue, Dept. 20-53, Chatsworth, CA 91311-4991.

\$1,000'S POSSIBLE, FREE. Stamped envelope: Progress, Box 93248, Los Angeles, CA 90093.

GET RICH! Secret law smashes debts—brings Cash, Credit!!! Details 50¢ (coin). Wealthkit/B, Box 32398, PBG, FL 33420

\$300.00 PER DAY for MAILING LETTERS! Details 50¢ (coin). Money-makers/B, Box 32368, Palm Beach Gardens, FL 33420

NEON, COURSE WITH FREE VIDEO! NEONICS, BOX 4410, ARLINGTON, VIRGINIA 22204

NEW! 2000% PROFITS - in Moldmaking/Casting. Free information. Castcrafter, Box 16586(M5), Memphis, TN 38186-0586

\$2,000 DAILY From Your Telephone Answering Machine! I've made over \$1,000,000 using mine! (303) 674-2219. Recorded Details.

RECYCLE! (AMAZING PROFITS MADE) Reconditioning Automobile Batteries! (Free) Information! Battery Outlet, Box 3300PM, Hickory, N.C. 28603-3300.

BUY Wholesale! Direct from factories. Hong Kong, Taiwan, Philippines. Free Report. Key-Ways, Box 86884-PM, Portland, OR 97286

RECORD VIDEOTAPES ... At Home. \$5,000 Monthly Possible. No Pornography. Free Details. Write: CMS Video Company, Dept. 17, 210 Loma Square - #163, Birmingham, AL 35216

COUNTERTOPS: Spot Repair Burned and Damaged Areas WITHOUT REPLACEMENT! Quick, easy to \$600/day. Change Countertop Colors WITHOUT REMODELING! Details Free! 206/256-9742. Renew-All, Box 4506-PC, Vancouver, WA 98662

\$1804 MONTHLY Buy/sell used cars (spare-time) FREE Details. Autonet, 507 Oak Drive, Friendswood, TX 77546

21,497 Products, Direct. TAIWAN, PHILIPPINES, HONG KONG! Samples, Small lots, Freebies! Echo, Box 739-PM5, Shalimar, FL 32579-0739.

BIG MONEY REPAIRING AUTO WINDSHIELDS. Supplies and information. Grubbs Glass Patch, P.O. Box 243, Monticello, IA 71655. 1-800-243-2133

VINYL'S where the money is! Professionally repair, recolor furniture. Quick, easy. Two \$20 jobs a day earns you \$1,000 a month. Homes, cars, offices, restaurants. Start earning in a few days. Details free. VIP, 2007 Montrose, Chicago 60618.

ASSEMBLE Products At Home. Many Opportunities paying High Weekly Profits available without investment. Businesses-B, Box 9008, Baldwin, New York 11510-9008

DISTRIBUTE Unique Electronic Product. Manufacturer, Box 28307, Kenneth City, FL 33709

\$50,000.00 yearly cleaning carpets. \$150.00 startup. Details. Cleaner, Box 792, Novi, MI 48376-0792

MILLIONAIRE'S Money-making Program! Free Videotape. Lintel-8PM, 184 Shuman, STE200, Naperville, IL 60563.

\$1,000 WEEKLY AIR TOOL REPAIRING. Free Details, Box 534, Wichita Falls, TX 76307

REAL ESTATE APPRAISER CAREERS. Home Study. P.C.D.I., Atlanta, Georgia. Free Literature. 800-362-7070 Dept. RF127.

GLASS and SCREEN repairs. Start your own business. Send \$3.00 for glass cutter, instructions, and discount price list. Jayar, P.O. Box 402, Midland Park, New Jersey 07432

WORK FROM HOME! Clerical - Computers - Assembly - Others! Excellent Pay - Some Benefits! Guaranteed Legitimate! FREE Details: Association - PM593, Alexandria Bay, New York 13607-0250

HOME Assembly Work Available! Guaranteed Easy Money! Free Details! SASE. Homeworker, Box 520, Danville, NH 03819

ABANDONED ALUMINUM SCRAP! Collect - SELL FOR \$3.00/POUND!!! Free Information: Americrap - PM593, Alexandria Bay, New York 13607-0127

\$30 PER HOUR! SEND \$1.00 TO: ALTECH, P.O. BOX 10029, BEDFORD, NEW HAMPSHIRE 03110-0029

WINDOW TINTING AUTO'S, HOMES, BUSINESSES, COMPLETE MANUAL PLUS VIDEO. \$59.00. 1-800-238-2156.

OPERATE HOME BABY SHOE Bronzing business. Potential unlimited! Kits, Supplies, Store Displays. FREE information 1-813-655-0346

BIG PROFITS! REPAIRING WINDSHIELDS and plate glass. \$70,000 yearly. Call 1-800-441-4527 for FREE details. Glass Technology, Inc., Dept 5P, 434 Turner Dr., Durango, CO 81301

PRIVATE INVESTIGATION TRAINING! BIG INCOME! OWN BOSS! FREE INFORMATION. PROBE, BOX (PM) 2133, BEVERLY HILLS, CALIFORNIA 90213-2133.

HOW would you like to receive 100 letters a day, each containing \$1.00? Copy of plan and 15 formulas only \$1.00. Rush a dollar to: W. Kilgore, 1340 St. Lawrence, Bronx, N.Y. 10472

EARN \$50,000 A Year With Our Mini-Radiator Shop. Send \$14.95 for Video To Rad-Ex, N-87 W-14817, Fond du Lac Avenue, Menomonee Falls, Wis. 53051

GUARANTEED: EARN \$100.00 PER HOUR REPAIRING VCR'S. NO ELECTRONIC EXPERIENCE NECESSARY. MOST MALFUNCTIONS SIMPLE MECHANICAL OR ELECTRO-MECHANICAL. START REPAIRING THE FIRST DAY! CALL 1-800-682-6677 OR WRITE VCR MASTER SERVICE, 2001 Denison, Denton, TX 76201

SAFEGUARD Your Community Earn \$100.00 to \$300.00 A Day. Send \$12.95 to: P.M. Enterprises, 86 Howard St., Pittsfield, MA 01201

MONEY from lead. Free information. Precision PM, P.O. Box 323, Timonium, MD 21094

REPRINT Rights! Free catalog. Solutions, 4255 Filtrier, Mississauga, ON Canada L5J 2J5

WE'LL pay you to type names and addresses from home. \$500.00 per 1000. Call 1-900-896-1666 (\$1.49 min/18yrs.+) or write: PASSE - XPM593, 161 S. Lincolnway, N. Aurora, IL 60542

SELF-TAUGHT NEON. Free Sample Lesson. NEON, 115 Riverbirch Creek. S.E. Calgary Ab., Canada T2C 3M1.

\$150 DAILY WOODWORKING. Send Stamp. Pine, 897-3 Mammoth, Manchester, NH 03104

EARN "Weekly Check Payments!" Mail Advertisements - Universal (#136), Box 558027, Chicago, IL 60655

A NATIONAL PUBLIC COMPANY. First time offer. Coin-operated hot pizza machines. Worldwide patents. FDA compliance, UL listed. Unlimited potential. Tested, proven money-maker. \$5000-\$6000 weekly cash earnings possible. Prime areas available for minimum investment. Call Mr. Gregg. 1-800-772-2688.

THROW Away Your Alarm Clock! Home Businesses: Full or Part-time. \$\$\$, \$\$\$ Possible! Free Details: Global Publishing, 800-E McDonell, Columbus, Ohio 43230-1620

"AGENTS WANTED" TO SELL PROFITABLE WORK AT HOME, START YOUR BUSINESS MANUALS. WHOLESALE PRICES. TRAINING INCLUDED. ANY AGE! INFORMATION PACKET \$1.00. J P MARKETING, 2375 E. TROPICANA AVE., LAS VEGAS, NV. 89119 (702) 593-0730.

(FREE) Profit catalog creates cash! Swift, 20531-M Huntington, Detroit, MI 48219-1414

BE A DETECTIVE, professional secrets revealed. FREE catalog. NORTHWEST, 14431pm Ventura Blvd., Sherman Oaks, CA 91423

\$400.00 EACH DAY REPAIRING AIR COMPRESSORS AND AIR TOOLS. Grow Big Fast. Write Now For Free Proof. Birmingham Compressor, 1316 2nd Street Northwest, Birmingham, AL 35215

REMODEL, REPAIR Homes for Banks, Ins. Co. Details. ADMARK, P.O. Box 11164, Ocala, FL 34473.

OUR NEXT AVAILABLE ISSUE
JULY 1993
ORDERS MUST BE RECEIVED BY
MAY 5TH
ON SALE DATE: JUNE 15TH

PROFIT From Your Pickup! Free Exciting Example! SEND NOW! Bielkiewicz Publishing, Box 175A3, Greenfield Center, NY 12833-0175.

MAIL ORDER BUSINESS. Step By Step Pamphlet To Financial Security. Send \$4.00 & \$1.00 S/H To: Gilbert Enterprises, P.O. Box 3278, Humble, TX 77347-3278.

\$50,000 in 90 days! Without working! Incredible new method. Easy, fun. Complete instructions, \$2.00. Importation, O.P., 62 Du Limousin, Blainville, Que, Canada, J7C 2Z7

#1 MONEY MAKER Spare Time! No selling! No inventory! Publicly documented seven week \$19,919 income! Free audio cassette and Report reveal everything. Real Money, 911-PM Bryant Place, Ojai, CA 93023

MAILORDER - Publishing Opportunity. Earn While You Learn! Discover Int-Act Wealth-Builders! Facts free. Colvin, 1696F-1 Lawhorn Rd., Cassatt, SC 29032

MAKE BIG \$ - On Small Real Estate Deals! Works anywhere. Details. ADMARK, P.O. Box 11164, Ocala, FL 34473.

HUGE PROFITS \$2,100+ Monthly. Complete Home-maintenance Program. \$5: Lux Company, Box 66, Hancock, MN 56244

\$320,000 Yearly Selling books by mail. Recruiting business associates. TPCF, Box 4113, Torrance, CA 90510

\$1,000'S WEEKLY MAILING LETTERS, GUARANTEED! Free postage/supplies. Free details. Genisis, Box 215-PM, Brooklyn, NY 11204

\$100 Weekly At Home. Learn To Cut, Style Hair. Easy, exciting FREE information. Hair, 2315 Allen, Madison, Ind. 47250

GROWING Company Needs Help! \$500-\$900 plus per week. Easy/fun too! Part-time/full time. Will train. Set own hours. No experience necessary. Call for information packet. 24 hours. 1-800-846-1326

\$36,400 A Year, Part Time. Office Cleaning Business. No Investment. Not Available in NH Free Details: Rob, Box 3112, Manchester, NH 03105

BIG PROFITS IN AUTO SECURITY. NO EXPERIENCE NECESSARY - 1-800-238-2155 24HRS

ATTENTION: \$10,000 Weekly Minimum! Make fortune working spare time at home! New and Exciting! Nobody offered before! Amazing recorded message: 1-800-959-7792, Ext. 32.

(Continued on next page)

BUSINESS OPPORTUNITIES

(Continued from preceding page)

BIG \$ Taking Pictures. Complete Instructions \$4.00. M.L. Bonney, 214 Wellesley Road, Syracuse, NY 13207

EARN \$1000's at home free info. PTAW, 904 L.I. Ave., Deer Park, N.Y. 11729

THIS IS A SCREENED AD!

LET Your Advertisement Achieve The Same Effect! For An Additional \$54.00 Per Advertisement You Can Order Our Screening Process. Same Price Applies To All Advertisements No Matter What Size, Small Or Large. For More Information Call POPULAR MECHANICS CLASSIFIED—1-212-649-3167.

MONEYMAKING OPPORTUNITIES

EASY Business. Earn \$1,000's Weekly. Free details. Write or send stamped addressed envelope: Toddco, 4219 W. Olive Avenue, Burbank, CA 91505

PROFITABLE Gold Foil Printer. Personalize business cards, pencils, matches. Free details. Gold, POB 24986 (GG), Tampa, FL 33623

GOVERNMENT AUCTIONS Find Out When And Where Government Auctions Are Held In Your State. Send \$5.00 to: S&B Enterprise, 3926 New Section Rd., Baltimore, MD 21220

TURN PENNIES INTO DOLLARS Free Details. Zangle, 411 7th Street, W. Babylon, New York 11704

IBM COMPUTER SOFTWARE DISTRIBUTION BUSINESS No computer knowledge or selling required. Guaranteed income first week. Complete business package including 10 exciting computer program disks \$49.95. EZPCware, 5525 Gibson Road, Gibsonia, PA 15044

FORTUNES IN BURIED TREASURE. Why coins can make you - **RICH** - Report worth its weight in - **GOLD** - Send \$4.00 SASE To: MGM Ent., P.O. Box 24067, #13, 1853 Grant Ave., Winnipeg, M.B., R3N 1Z0

AUTOMOBILE emissions standards enables staggering profits! Publication explains proven methods. Guaranteed. \$10. Autotec, Drawer C, Broadway, VA 22815

MALORDER OPPORTUNITIES

MALORDER Millionaire Reveals Moneymaking Secrets. Free, exciting cassette: Mel Powers, No. Hollywood, California 91609

EARN Thousands Processing Mail. Send SASE to: Alternative Concept, P.O. Box 1313, Keller, TX 76244

BALDING

GROW hair 4 months. New Discovery! Box 1012-C, Makati 1250, Philippines. Brochure \$1.00.

HAIRPIECES FOR MEN

HAIRPIECES Save \$ Write Perry King, 2730 Octavia St., San Francisco, CA 94123

FREE Men's Hairpiece Catalog! Lowest Prices. Request Catalog (37) 1-800-899-1141.

OF INTEREST TO ALL

FREE PRIVACY CATALOG. Cash income opportunities. Secret loans. New identity. Eden, Box 8410-PC, Fountain Valley, CA 92728. 1-800-338-8484

OUTLAWS Sourcebook Of Forbidden Devices/Knowledge. Write: #365-X5, Penfield, NY 14526-0365.

OAKLEY STYLE SUNGLASSES, Fool Everyone, Expensive Looking. \$8 to Name Brand Discounts, 39 Curtisdale, Hamlin, NY 14454

WIN THAT SPECIAL SOMEONE - Learn to write what you feel. Samples. Booklet \$3.00. Words Plus, Dept. PM-5, 2 Laurel Drive, Smithtown, N.Y. 11787.

HOW to get one million people to send you \$2. Easy method, receive proof, method works. Send \$4. Large self-addressed stamped envelope to: Cedar, C-310/PM, 117 W. Harrison, Chicago, 60605

GOVERNMENT SURPLUS

DRUG RAID SEIZURES: Buy Dirt Cheap! Cars, houses, boats, computers: Seizures, Box 51488-A, Ontario, CA 91761

LOANS BY MAIL

NEED-A-Loan \$500-\$100,000.00 Bad Credit No Problem 1-800-441-3012

SIGNATURE Loans Must Have Checking Account & Steady Job. 1-800-445-0680.

BORROW \$100-\$100,000! Fast! Confidential! Glendale, Box 260279, Plano, TX 75026 - 1-800-444-8599

FEDERAL LOANS for small business now available. 1-800-777-6342 for free details.

MONEY Problems? Free Book describes Loans, Cash, Government Grants, other benefits available to individuals. Associates-AX, Box 9008, Baldwin, New York 11510-9008

V/MC Guaranteed. Solve Your Credit Problems. 1-800-777-6342 For Free Details.

BORROW \$500-\$40,000! "Overnight" on Signature. Keep indefinitely! Action, Box 5499-A, Diamond Bar, CA 91765

BORROW \$300-\$100,000 By Mail!! Free Details! Write: TRK, Box 1058, Clearwater, FL 34617

IMMEDIATE CASH LOANS! Borrow \$1,000-\$75,000. Regardless of credit or income - No Collateral Required! **SAME DAY PROCESSING.** Call Toll-Free 1-(800)-452-9889.

PERSONAL

IMPOTENCE: NEW ANSWERS Latest worldwide research - ONLY complete authoritative report. Revolutionary new treatments over 90% successful. Illustrated - 122 pages - M.D. APPROVED. \$12.50 + \$3.00 handling. Refund if not satisfied. BioResearch, P.O. Box 55936, Seattle, WA 98155

YOU TOOK EARLY RETIREMENT? Let-go? Forced-out? Laid-off? Me Too! Now I make loads of money **SEND \$5.00** for my Special Report. CWR, POB 292856, Ft. Lauderdale, FL 33329

COLLEGE DEGREES, High School Diplomas. Authentic looking novelty. Free Catalog. Dept. PM-143, National Certificate, 126 13th St., Brooklyn, NY 11215. (718) 768-6803 (24 Hours) FAX 718-965-3400

REMAILING SERVICE

CONFIDENTIAL Mail Receiving. Forwarding Worldwide. MailPost, 2421-M Pratt, Chicago, Illinois 60645. (312) 784-0100.

FREE! REMAILERS LIST. AGENTS NEEDED. PS, Box 29658, San Antonio, TX 78229

WANTED MISCELLANEOUS

BUYING Tungsten Carbide, Moly, Tantalum, Gold, Silver, Platinum 1-800-321-6914.

FINANCIAL

FREE Visa/MC Save You \$100's yearly. Book: \$6.80. Ineznun, 3 Essex #43, Boston, MA 02129-1655

ERASE BAD CREDIT We **GUARANTEE** to improve your credit, get you a credit card and unsecured loan or our service is **FREE!** ClearCredit 1-800-835-0880

GET FREE CASH! Private grants. Foundation giveaways. Loans, Millions available. Sources, Box 5529-A, Diamond Bar, CA 91765

COMPUTER—Erase bad credit free instantly, legally. Free details: Gold (PM), 13950 Ventura, Sherman Oaks, CA 91423

\$5,200 Instant Credit Guaranteed! For free application and immediate approval write: The Hoffman System, Dept. PM3, 13912 Old Harbor Lane #205, Marina Del Rey, CA 90292

HEARING AIDS

HEARING AIDS - GUARANTEED LOWEST PRICES! No huge commissions. Home trial, terms. All makes. We're the oldest, biggest, best. Custom instrument specialists. Free information, 1-800-323-1212. Lloyd's-PMC.

FREE Hearing Aid Catalog. All Models. Huge savings! No salesman will call. Rhodes, Dept. 31E, Brookport, IL 62910. 1-800-468-3100.

FREE HEARING AID CATALOG - Save 1/2 by mail! Write: "MoneySavers", 36658PM-5 Apache Plume Dr., Palmdale, CA 93550

FREE HEARING AID CATALOG—HUGE SAVINGS By Mail, **FREE** 30-day Trial. Amazing Technology, 531 Main Street Suite 335-M2, El Segundo, CA 90245. Call 1-800-382-0002.

EXPERT HEARING AID REPAIRS - 6 Month Warranty - \$80.00 - 1 year - \$105.00 - Satisfaction Guaranteed. National Repairs, 676 East 86th St., Brooklyn, NY 11236. (718) 251-8148.

CONTACT LENSES

WHOLESALE Contact Lenses. All Brands. Example: Disposables-\$17.00. Bausch & Lomb Softlens-\$11.00. 1-800-521-3511.

TOBACCO

CIGARS, Tobacco, Pipes, Chew. Free Catalog. Erie Tobacco Co., 1828 Euclid, Cleveland, Ohio 44115

SCIENCE & CHEMISTRY

"EXPERIMENTER" LABORATORY CHEMICALS GLASSWARE, Catalogue \$2.00. Established 1953. HAGENOW LABORATORIES, 1302 Washington, MANTOWOC, WISCONSIN 54220

SPECIAL SERVICES

INFORMATION. On anything. Ferguson Research Specialists, 60-15 Woodside, Woodside, New York 11377.

LOST friend, relative, sweetheart? We help locate. SASE: Swain, Box 861, Ashland, OH 44805-9998

HERBS

HERBS - Yohimbine Pau d'Acro Others Catalog \$1.00 (Refundable). "One stop center." Jude Herbs, Box 563PM, Huntington Station, NY 11746

HEALTH, VITAMINS

IMPOTENCY? AMAZING DISCOVERY! You might eat away your impotence! Enhance sexual power! Easily obtained specialty foods eaten together may make the difference. Send \$9.95 plus \$2.00 S&H today for new instruction booklet. Money back guarantee. Roadfinder Corp., 8208 Grail, Dept 151, Wichita, KS 67207

"FREE MEDICATION" Pharmaceutical manufactures furnish! Info. \$8.00. PO Box 515033, St. Louis, MO 63151

NEED HELP Figuring the Cost of your Advertisement?? Call us at 212-649-3167 or send us a FAX (212-685-5562) and we'll FAX Back with a Price Quote.

HYDROPONICS

GROW fresh foods indoors. Easy to build hydroponic plans. Send SASE to: Hydromech, Box 215, Burlington, WY 82411

INDOOR GROWING. Moneymaker! Greater yield than outdoors. Minimal maintenance! \$1 gets catalog and \$5 Coupon. Higher Yield, 29211-P N.E. Wylie Rd., Camas, WA 98607

RECIPES, COOKING, ETC.

FUN FOOD. Dr. Joey's Brownie Cones recipe. \$2. JLA, 1106 Oakgrove Dr., Knightdale, NC 27545

BEE Cake. Send \$2.00 SASE to: R. Fowler, 412 Casalinda Dr., Woodland, CA 95665

ITALIAN Pasta Recipes, Send \$5.00/SASE. Antonietta, P.O. Box 182, Abingdon, IL 61410

BETTER Than Sex Cake. SASE \$2.00. ASCS, 11571 Echo Lane, Hanford, CA 93230

CHOCOLATE LOVERS! Six **SUPERB** Desserts: Cakes, 5-Minute Mousse and More. \$3.00 SASE. Scholl's, 4500 Culver, Golden Valley, MN 55422

SWEET AND EASY recipes. 4 for \$5. SASE. Margaret Fennell, P.O. Box 19956, Sarasota, Fla. 34276

WINEMAKING, BEERMaking, ETC.

FREE. Homebrewer's catalog. Brewery, 1300 Quincey, Minneapolis, MN 55413. 800-347-4042.

LEARN TO BREW SENSATIONAL BEER easily, quickly. Free information. Packet #11. Call 414-631-1239.

BEER, WINE make your own. Free catalog, quality supplies, excellent fast service. Beer & Wine Hobby, 180 New Boston Street, Woburn, Mass. 01801. 1-800-523-5423

WINEMAKERS - Beermakers: Free Illustrated Catalog Of Supplies. Semplex, Box 11476P, Minneapolis, Minnesota 55411

WINEMAKERS - BEERMakers - Free Illustrated Catalog - Fast Service - Large Selection - Visa/Mastercard - (816) 254-0242 - Kraus, Box 7850-L, Independence, Missouri 64054.

FREE BEERMaking BOOK-Catalog. Finest Equipment, Ingredients. Fast Service! 1-800-852-9545.

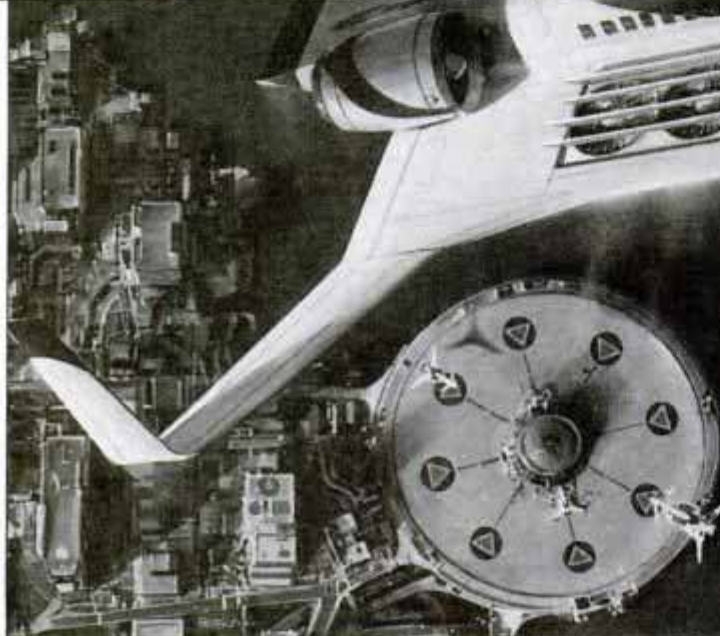
FREE Catalog, Sebastian Brewers, 7710 91 Avenue, Vero Beach, Florida 32967. 1-800-780-SUDS.

FOR BEGINNERS SPECIAL or Free Summer Catalog. Call **U-BREW** 1-800-845-4441 North Myrtle Beach, SC 29582

BURGLAR ALARMS & HOME PROTECTION

AUTHENTIC BURGLAR ALARM STICKERS \$5.00. Kit includes 5 Stickers and "10 Ways to Burglarproof Your Home." Protectionics, P.O. Box 1790, Baytown, Texas 77522.

COMING NEXT MONTH



Jump-Jet Airliners

Say goodbye to runways as vertical-takeoff and-landing, 100-passenger lift-fan jet airliners point the way to the next generation of commercial air travel. Next month's cover story gives you an inside look at all the details.

The Pane Truth

Stop. Don't buy new or replacement windows before reading this eye-opening report on the latest advances in window technology.

Big Deal

Can you beat the gambling videogames? Our feature on the technology that drives video poker and other casino games shows you what you're up against.

Indy 500 Fever

Our in-depth look at Indycars puts you inside the technology that makes them among the world's most sophisticated race cars. Plus, a great Indycar collector's poster that features a cutaway of Scott Brayton's Lola-Ford on one side and a history of the most significant Indycars on the other. And, a look at the exciting 1993 POPULAR MECHANICS/Dick Simon Race Team as we go Indycar racing and take you along for the ride.

ATV Workhorse Workout

We put the newest generation of workhorse ATVs from Yamaha, Kawasaki, Suzuki, Honda and Polaris to the test to find out which one works the hardest for you. Catch the results next month.



SOMETIMES THE BIGGEST OPPORTUNITIES
ARE THE HARDEST TO SEE!

It's tough deciding what to do with your life. Routine jobs are easy to spot. However, finding an exciting career is as difficult as finding the Stealth F-117A.

Today's high-tech Air Force can help. We offer education and training in a wide variety of technical fields. If you like working with powerful machinery, learn to repair engines on our sophisticated aircraft. Or perhaps you'd rather maintain and operate computers used in every-

thing from satellite communications to medical tests. And, almost all our specialties are equivalent to civilian jobs.

Whatever your career choice, you'll be paid a salary while you learn. Plus, you'll get free comprehensive medical and dental care and 30 days vacation with pay each year.

See what kind of opportunities the Air Force can give you. And experience the special satisfaction

of serving your country. For more information contact an Air Force recruiter.

1-800-423-USAF



"IF ONLY TOYOTA MADE A BIGGER TRUCK."

It's not by chance that Toyota has long been one of America's best-selling compact trucks. It's because of the quality. The reliability. And it's because of the way they last. So it's only natural for people who have owned Toyota Trucks, but who now need a larger truck, to wish that Toyota made bigger trucks, too. And now we do.

Just how big is the Toyota T100? Well, to begin with, it's bigger in virtually every way than our compact trucks. Bigger, even, than so-called "midsize" trucks.



Expanding on a good idea: size relation shown between Toyota T100 2WD and Compact 2WD.



A winning lineup: Toyota T100 (available in 2WD and 4WD), Toyota Compact 4x4 and 4x2.

The large, roomy cab, for example, allows for comfortable 3-across seating. The double-wall cargo bed will carry 4x8 panels between the wheelwells. And don't worry about the weight. Payloads range as high as 2,570 lbs.*

But it's not just size that sets this truck apart. The handling of the Toyota T100 is amazingly crisp. The ride, incredibly smooth. And the power that



Toyota T100 features roomy 3-across seating and a bed big enough for 4x8 panels.

surges from its responsive 3.0-liter EFI V6 makes towing up to 5,000 lbs.** sheer pleasure.

So now that the Toyota T100 is here, there's only one thing left to wish for. And that, of course, is one of your own. Call 1-800-GO-TOYOTA for a Toyota T100 brochure or the location of your nearest dealer.

"I love what you do for me."



TOYOTA T100.

NOT FOR QUALITY

* Includes occupants, equipment and cargo for One (1) occupant with 2 speed manual.
 ** Not to exceed GVWR of 9000 lbs. Requires 5000-lb. weight distribution.
 † Includes Class III tow hitch.
 ‡ Buckle Up! Don't be those who live with it.
 © 1992 Toyota Motor Sales, U.S.A., Inc.