

MAY 1987 \$1.50

# Popular Mechanics

GET YOUR WHOLE CAR IN SHAPE

## CAR CARE

### TUNE UP/SPRUCE UP GUIDE

- Engine • Chassis
- Exterior
- Interior
- And Much More

### POWER AT THE BRICKYARD

Full Tech Report On The  
Most Exotic Indy Engines Ever

### DETROIT'S ULTRA SOUND SYSTEMS

Ear-Testing Motown's  
Best New-Car Stereos

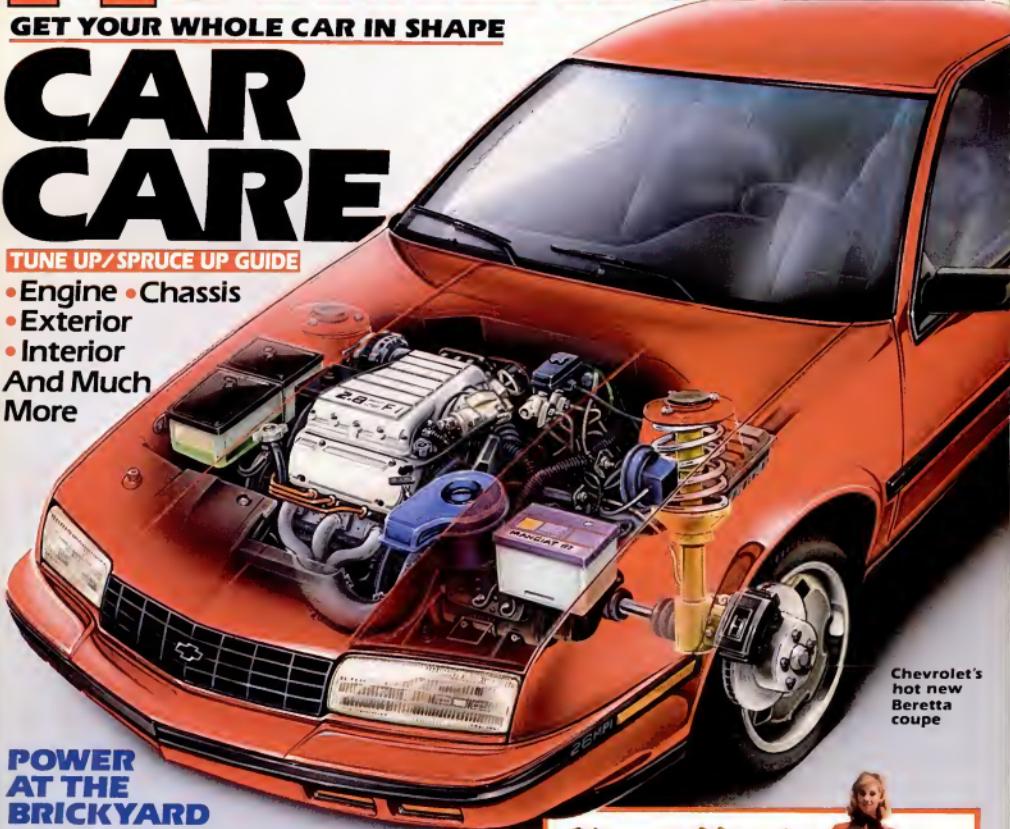
### TESTING 10 NEW-ERA FAMILY SEDANS

Common-Sense Cars  
You Drive Every Day

BUILD IT  
YOURSELF  
Roomy, Child-Safe  
Bi-Level Deck



Chevrolet's  
hot new  
Beretta  
coupe



**Your Next  
BIKE!**

Bicycles Pedal Into The 21st Century With Revolutionary Materials, Styling And Aerodynamics



0

# New Ford Ranger High Rider!

Announcing the tough  
'87 Ford Ranger STX 4x4.

You'll ride high 'n handsome  
in the new "High Rider"  
Ford Ranger with sporty STX trim.

It's time for the competition to move aside, because Ford now has the newest high-ridin' small 4x4!

Ford has added to the already sporty Ranger STX look by making this tough little 4x4 *higher* for off-road ridin'. Ford's high ride is designed in, not added on. The imports better double-check their shocks, 'cause the new High Rider's got improved handling and a smooth ride!

#### Port fuel-injected V-6.

To help you pack extra power under your hood, there's Ranger's 2.9L V-6 with electronic multi-port fuel injection. It's got 140 hp of muscle—to make this High Rider a real high-powered performer. Add the 5-speed manual transmission that's standard in all Rangers, and you

get one little pickup that's fully equipped for fun!

#### The STX look.

In addition to the sporty feel of ridin' high, this hot 4-wheeler also comes with The STX Look—special accenting, sporty trim, tinted glass, black foldaway mirrors, black grille and bumpers, and new tape treatment. That's The STX Look!

#### Built fun tough.

Above all, Ranger High Rider's one *tough* little truck—with Ford's exclusive Twin-Traction Beam independent front suspension to help soak

up jolts and bumps for more down-to-earth fun!

service on '86 models, and in a six-month period



#### Best-Built American Trucks six years running.

"Quality is Job 1." In fact, for the past six consecutive years Ford quality has led all other American automotive companies. This is based on an average of owner-reported problems in the first three months of

on '81-'85 models designed and built in North America.

#### 6-Year/60,000-Mile Powertrain Warranty.

New Ford limited warranty covers powertrains for 6 years/60,000 miles and provides protection against body-panel rust-through for 6 years/100,000 miles, whichever comes first. Restrictions and deductible apply. Ask to see a copy of this limited warranty when you visit your Ford Dealer.

#### Buckle up—together we can save lives.

Optional light bar not for occupant safety.



# Ranger

BUILT FUN TOUGH



This One



LXS8-BEJ-5XKO





## The Peachtree™ Fuzzy Navel.

When the flavor of  
fresh-picked peaches  
meets orange juice,  
it's love at first sip.  
1½ oz. Peachtree™ from  
DeKuyper®. Fill glass  
with orange juice.  
Serve over ice.

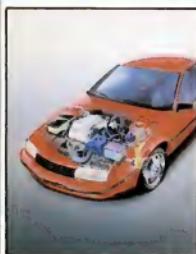
PEACHTREE™ FROM DEKUYPER®  
Bite into something wonderful.

DeKuyper® Original Peachtree™ Schnapps Liqueur, 48 Proof, John DeKuyper and Son, Elmwood Place, OH.



MAY 1987

VOLUME 164 NO. 5



**ON THE COVER**  
Keeping a car running and looking like new is no simple task. It involves more than just changing the oil, filter and sparkplugs. This month's Car Care Guide starting on page 101 solves the complications and helps you keep your car humming along.

—PM illustration by Jeff Mangiat



78 Tow It



81 Car tunes



84 Rad wheels



88 Social grace

## DEPARTMENTS

- |                  |                       |
|------------------|-----------------------|
| 4 Editor's Notes | 44 Inside Detroit     |
| 8 Letters        | 48 Minicourse         |
| 12 Imports       | 51 Audio              |
| 14 Photography   | 55 New/Home           |
| 21 Science       | 57 Electronics        |
| 24 Car Clinic    | 62 New/Auto           |
| 30 Tool Test     | 65 Tech Update        |
| 32 Outdoors      | 201 Coming            |
| 37 Cycles        | Next Month            |
| 41 Freewheeling  | 203 Worth Writing For |
| 42 New/Workshop  | 215 Time Machine      |

## CAR CARE GUIDE

- 101 Cover  
103 Contents  
**104 Tune Up Your Whole Car**

Getting the best out of your car involves more than just changing the oil, filter and plugs.

- 108 Tune Up Your Engine**

Get maximum power, economy and durability while your engine keeps humming along.

- 128 Tune Up Your Chassis**

For comfort and safety, take proper care of brakes, tires and suspension.

- 140 Tune Up Your Interior**

Modern chemistry comes to the rescue.

- 146 Tune Up Your Body**

Careful inspection, quick action stave off rust.

- 150 Tools Of The Trade**

You can't do good work without good tools.

- 168 What's New?**

Clever new products make it easier and faster to tune up your whole car.

## AUTOMOBILES

- 71 Daily Drivers**  
We pit Chevy's new Corsica against nine new-wave family sedans.

- 75 Indy Engine Spotter's Guide**  
We found out who's running what at The Brickyard this year.

- 78 Tow It**

Choices are few, payloads are downsized, but you can still tote that Airstream.

- 186 Hyundai Excel**

Owners rate this Korean car a good value.

## ELECTRONICS

- 81 Car Tunes**  
We evaluate the latest highway hi-fi from Detroit.

## HOME AND SHOP

- 88 Social Grace**  
Build our classic mahogany butler's tray table.

- 92 Double Decker**  
Our family-size deck is loaded with great features.

- 97 Instant Color**  
Learn the basic techniques for applying plastic laminates and special edge treatments.

- 193 The Better Home**

Use our guide to repair that decaying porch.

## TECHNOLOGY

- 84 Rad Wheels**  
Bicycles gear up for the 21st century.



# Editor's Notes



The trouble with being the Editorial Production Manager is that it sometimes seems like you can't leave your desk for five minutes. There's a deadline every hour, the in box is piled high with manuscripts that you must read and correct, line by line, comma by comma, and the computer at your left elbow is your only link with the outside world. Pretty bleak, right? Especially when all the other editors are running off to Palm Springs or Hawaii or Scottsdale or Paris or Italy, covering press conferences, shooting photos or even "scouting photo locations." Meanwhile, here you are, slaving away. Perhaps that's how our Editorial Production Manager, Peter Francesconi, was feeling that day a few months ago when a unique opportunity presented itself. The Home & Shop Department guys needed someone to be a model for a photo shoot. They needed someone to pose with the elegant butler's table we show you how to build in this issue (page 88). The person would have to dress in, and look good in, a full-bore formal outfit—right down to the black silk lapels and white gloves. Would Peter do it? You bet! Anything to get out of the office for a few hours. And besides, his photo would be in the magazine just like the other editors on staff who were always off in Tahiti testing blowguns or something. At the appointed hour, Francesconi was indeed in the required dress and did serve as our model. Unfortunately, as you can see on page 88, Peter's photo didn't exactly get into the magazine. Only one of his hands made it. So for all of you who would like to know what an Editorial Production Manager looks like, here is another take of the same photo with Peter Francesconi a little more prominent. . . .



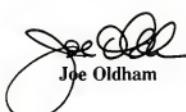
Francesconi: Anything to get out.

The first photo ever taken by Electronics/Photography Editor Steve Booth was snapped on the seventh day of his seventh year. It was taken at one of Booth's hangouts then, Yankee Stadium. And it was of the Yankee centerfielder who wore No. 7. Since that day, Mickey Mantle has remained one of Booth's heroes. And recently, at the Photo Marketing Assn. show in Las Vegas (see page 14), when Booth had a chance to have his photo snapped with The Mick, well, Booth went gaga and couldn't resist. What was it like to meet the Hall of Famer in person after all the years of hero worship from a distance. "He's a genuinely nice guy," Booth says.

Til next time.



Booth and Mantle: Together at last.



Joe Oldham

# Popular Mechanics

**Editor-In-Chief**  
Joe Oldham

**Managing Editor**  
Bill Hartford

**Graphics Director**  
Bryan Canniff

**Science/Technology/Aerospace**  
Dennis Eskow, editor  
Fred Mackerdt, contributing editor

**Automotive**  
Wade A. Hoyt, SAE, editor  
Jim Dunne, Detroit editor  
Mike Allen, assistant editor  
Michael Lamm, Norman S. Mayersohn,  
Mort Schultz, Rich Taylor,  
contributing editors

**Home And Shop**  
Steven Willson, editor  
Joseph Truini, shop and tools editor  
Thomas Klenck, associate editor  
Norman Becker, Rosario Capotosto,  
Steve Toth, Bob Villa,  
contributing editors

**Electronics/Photography**  
Stephen A. Booth, editor  
James B. Meigs, Frank Vizard,  
contributing editors

**Boating/Outdoors**  
Timothy H. Cole, editor

**West Coast**  
Steve Parker, editor

**Editorial Production**  
Peter Francesconi, manager  
John Bostonian Jr., art  
Nancy Coggins, Deborah Frank, assistants

**Art**  
John Johnsek, art director  
Alan Andresen, Ann Bennett,  
Diane DePasque, associate art directors

**Editorial Administration**  
Josephine Caronia, administrative assistant  
Barbara A. Novak, executive assistant

**Editorial Offices**  
224 West 57th St., New York, NY 10019  
We cannot be responsible for loss of  
unsolicited queries, manuscripts,  
photos. For return, they must be accom-  
panied by adequate postage.

**SUBSCRIPTION SERVICE:** Popular Mechanics Magazine  
is upon receipt of payment ready to accept subscriptions.  
With each order, unless otherwise indicated, that order is 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 be used for the first copy. Please retain any  
further instructions you may have concerning your order.  
Please address all such orders to us at Popular Mechanics, P.O.  
Box 10064, Des Moines, IA 50360. Should you have any  
questions with regard to your subscription, write to our  
Customer Service Department, Popular Mechanics, P.O. Box  
10064, Des Moines, IA 50360 or call toll-free 1-800-247-5470;  
IA residents call 1-800-632-1272. Please enclose your mailing  
label when writing to us to renew your subscription. \*  
Renewal orders must be received at least eight weeks prior to  
expiration to assure continued service.

Use this address for subscription orders & inquiries. POPU-  
LAR MECHANICS, P.O. Box 10064, Des Moines, Iowa 50360.

# Marlboro



Marlboro Red or Longhorn 100's—  
you get a lot to like.

16 mg "tar," 1.0 mg nicotine av. per cigarette, FTC Report Feb '85

SURGEON GENERAL'S WARNING: Quitting Smoking  
Now Greatly Reduces Serious Risks to Your Health.

© Philip Morris Inc. 1985

# NOW YOU CAN CONQUER RUST!



## New NEUTRA RUST Gets Rid of Rust For Good!

**NOT A PAINT, NOT A COVER-UP**, but an entirely new and revolutionary process for eliminating rust. Neutra Rust was originally developed to control the incredible rust on oil rigs in the North Sea and on ships of the Royal Navy. Think of the rust problems they have! Naturally they use vast quantities of Neutra Rust and buy it in huge 50 gallon drums. For a long time that was the only way you could buy it. But at last Neutra Rust is available in smaller sizes for home and shop.

Now you can get rid of rust for good just the way they do at industrial and military installations all over the world!

### WHAT NEUTRA RUST DOES

Neutra Rust is like nothing you've ever used

before. It's amazing! No tiresome scraping, wire brushing and sanding to get down to bare metal. Neutra Rust works best applied right over rust. It penetrates the rust. Gets right down there and chemically changes the rust into an entirely new substance—a hard, black, paintable compound called fersol ferric. The rust is gone—not just covered up—GONE! For good. It no longer even exists.

### NEUTRA RUST IS EASY TO USE

First knock off the loose or scaly rust, but leave the rest of the rust there. (Remember Neutra Rust works *with* rust.) Then just brush Neutra Rust on. Within minutes that rust will be gone and the new surface will be there. That's all there is to it. Clean up is easy, too. Just soap and water.

### YOU CAN ACTUALLY SEE NEUTRA RUST WORK!



When you first brush on Neutra Rust it is white. Then, as you watch, it turns pale green, then darker green, then finally a deep, wrought-iron

black. What you have seen is the rust being chemically converted. The hard new surface can be painted any color you want, or left as is.

**USE NEUTRA RUST ON:** Automobiles • Boats  
Outdoor Furniture • Drain Pipes • Gutters  
Mailboxes • Swing Sets • Tools • Lawnmowers  
Appliances • Toys • Bikes • Wagons • Hinges  
Railings • Anywhere There's Rust!

For Mail Orders Call:

1-800-221-6545

For further information  
about Neutra Rust  
write to:

Jeff Morrison, VP Marketing  
New York Bronze Powder Co., Inc.  
777 Dowd Avenue, Elizabeth, New Jersey 07201

**nybco**



# Popular Mechanics

**Publisher**  
Daniel J. Coleman

**Advertising Director**  
Floyd Sembler

**National Sales Manager**  
Bud Gilbert

### Advertising Offices

**New York**  
224 West 57th St.  
New York, NY 10019  
(212) 262-8824

**Chicago**  
1 South Wacker Dr.  
Chicago, IL 60606  
(312) 984-5190

**Detroit**  
377 Fisher Rd.  
Grosse Pointe, MI 48230  
(313) 881-3520

**Los Angeles**  
3000 Ocean Park Blvd.  
Santa Monica, CA 90405  
(213) 450-8881

**Direct Response Advertising**  
Al Cohen  
224 West 57th St.  
New York, NY 10019  
(212) 262-4279

**Business Manager**  
Agnes P. Maillaro

**Marketing Director**  
Edward Vaquero

**Production Manager**  
Lori Ellwood

**Advertising Production**  
Patricia Woods  
(212) 262-4800

**Classified Sales Manager**  
Sophie Gronowicz  
(212) 262-4225

**Reader Service Department**  
Gary Frederick, supervisor  
224 West 57th St., New York, NY 10019  
(212) 262-4292

**Published by The Hearst Corporation:**  
Frank A. Bennack Jr., President  
E. Howard Hunt, Vice-President  
Gilbert C. Mauer, President, Magazines Division  
Richard E. Deems, Publishing Consultant

**POPULAR MECHANICS** is published monthly by the Hearst Corporation, 500 Eighth Avenue, New York, NY 10019. Frank A. Bennack Jr., President; Randolph A. Hearst, Chairman; Harvey L. Lipton, Vice-President and Secretary; Edwin A. Lewis, Vice-President and Treasurer; Hearst Magazines Division: Gillette, Chairman; President, K. Robert Brink, Executive Vice-President; George J. Green, Executive Vice-President; Mark F. Miller, Executive Vice-President, General Manager; Raymond J. Peterkin, Executive Vice-President; Thomas J. O'Connor, Vice-President & Research Contracts; Daniel J. Colemen, Vice-President for Popular Mechanics.

**INTERNATIONAL EDITIONS:** CARIBBEAN, MEXICO, SOUTHERN HEMISPHERE

**AS A SERVICE TO READERS:** Popular Mechanics reviews new products, techniques and scientific and technical devices designed to popular interest 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 plans published in this magazine.

# Go hunting this weekend.



When an unwelcome intruder wanders into American air space, it's our job to track him down and show him the way out. We're your hometown Air National Guard. Pilots, engineers, radar technicians, communication specialists—each serving just one weekend a month and fifteen days a year. It's a big responsibility. So we need good people. Maybe you've got what it takes. Call 800-638-0936 today. Or visit your local recruiter. And help us guard America's skies.

**Air National Guard** AIR  
NATIONAL  
GUARD

*Americans at their best.*

A2PMMS™057NP

# Letters



## Projects On Wheels



Coach, emblem of GM's Body by Fisher, built by reader Wolf.

Now that I've finally finished the famous Fisher Body coach that I started over 50 years ago, I'm ready to build another model. (The one I remember so well is the Overland Coach, a classic stagecoach design you ran in PM years ago.) Back in 1930, Fisher Body of the General Motors Corp. sponsored a model-building competition for youths 17 years old or younger. The model was to be of the Napoleonic coach used as the trademark. Collins and Aikman donated swatches of velvet that could be used for the upholstery. I never finished the coach by my 17th birthday, but saved it for future completion. It was in a carton for the next 50-plus years traveling from house to house, cellar to cellar, through dry, wet, hot and cold conditions, until I rediscovered it and finally finished it. What is extraordinary is the velvet; the original 1930 pieces, are still strong and full of color!

RALPH J. WOLF  
CLOSTER, NJ

looking up for you the date  
the Overland Coach ap-  
peared in PM.  
Here's the letter:

Forty years ago I bought the January issue of POPULAR MECHANICS magazine (Vol. 85, No. 1—1946). In that issue was an 18-in. model of the Overland Stage. I started the model in '46, then changed jobs, moved three times and now, all of a sudden, its 1986 and I'm retired. I just finished the stagecoach and it's magnificent.

JOHN SCHLADENHAUFEN  
BAY CITY, MI



Incredibly, a few days after receiving your letter we received another that saved us

Classic wagon was built  
from PM plans by reader Shutt.

## Rolling stock

All the toys in your construction story were beauties (*Children's Toys: Three Classics You Can Build*, page 127, June '85). I chose to build the Coaster Wagon for my two grandsons. The oak I used is native Missouri lumber. A friend who built his cabin entirely of native oak planed some planks down to  $\frac{1}{2}$ -in. thickness for my project. I formed the major hardware items from flat and bar stock. Thanks for the plans for this really classic wagon!

RAY SHUTT  
MARYLAND HEIGHTS, MO

## Two wingmen

Your Davis Flying Wing story (*Wing Ding*, page 53, Jan. '87) brought back memories of my college days at California Polytechnic in San Luis Obispo. Under John D. McKellar, we students helped design and build his prototype flying wing, working on it from '37 to '40. The design evolved into the Northrop wings of the '40s with McKellar's invention, "elevons."

EUGENE R. THOMSEN  
SACRAMENTO, CA

I did all the steel and aluminum welding of the first Northrop wing, the N1M, and part of the welding on the magnesium XP-56 fighter. The Heliarc welding torch was inspired by Jack Northrop and developed in our

welding department. It was later assigned to Linde Air for marketing. Thanks for PM; I've enjoyed it since the '30s.

CHARLES DUNCAN JR.  
INDIAN WELLS, CA

## Desks for dollars

Your classic desk became a perfect project for me (*A Classic Desk For Your Computer*, page 106, Feb. '85). I have a part-time woodworking business and make clocks, tables, band-saw boxes and other items from unique woods and burls. Occasionally, someone will request a custom piece of furniture, like "some sort of desk to hold a computer." That's when I remembered your story. I added modifications to the plans, such as hidden casters, reversed slides, a



Computer desk of oak, built by Bob Behrent, brought top dollar.

lock for the file drawer, and dimension changes for my customer's computer system. I used solid oak—so those casters were a good idea! The best part was that the desk was so well described with plans in PM (where I've found so many great plans and articles over a good number of years). The desk was really easy to make, and it commanded a price to the customer of—let's say—in excess of \$1000. Thanks for a great publication.

BON BEHRENT  
FLANDERS, NJ

We've included this classic desk in our latest brochure of Plans And Ideas. It's PM-1047. To order blueprints, send \$4.95 to Popular Mechanics, P.O. Box 1014, Radio City Station, New York, NY 10101.

PM

**"T**here are few  
things you can count  
on in this life. A friend  
should be one of  
them." **MERCURY**  
**INTRODUCES**  
**A NEW**  
**FRIEND...**

**"PHONES AREN'T supposed  
to ring at 3:00 a.m. And people  
aren't supposed to go 40 miles  
on turnpikes in their pajamas.  
But I'm glad he called.  
And I'm glad I made the drive.  
What are older brothers for?"**



*Buckle up— together we can save lives.*

LINCOLN-MERCURY DIVISION 

To buy or lease, see your Lincoln-Mercury dealer. \*Restrictions and deductibles apply. Ask to see this limited warranty at your dealer.

**T**HE 68  
standard features of  
new **MERCURY**

**TRACER.** Because  
*the best friends are  
the ones that go out of  
their way for you.*

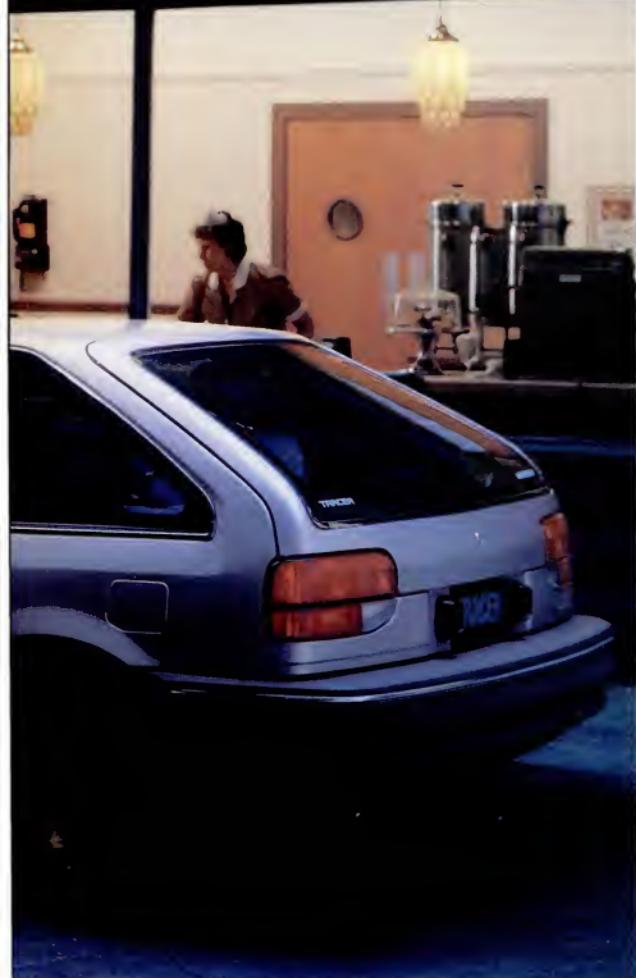
- Electronic fuel-injection
- Front-wheel drive
- 5-sp. manual transaxle
- All-weather steel-belted radial tires
- Power front disc brakes
- Four-wheel independent suspension
- Front MacPherson struts
- Rack-and-pinion steering
- Tachometer and analog gauges
- AM/FM four-speaker stereo system
- Digital clock
- Dual power remote-control mirrors
- 3-speed wipers with pause feature
- Side window demisters
- Reclining bucket seats
- Driver's-side lumbar support
- Adjustable back-angle rear seats with headrests
- 50/50 split-fold rear seat
- Rear seat heat ducts
- Rear window defroster
- Illuminated Entry System: lighted keyhole and ignition
- Reminder tones for headlamps-on, ignition and seat belts
- 16-oz. cut-pile carpeting
- Passenger-side under-seat storage tray
- Removable cargo-area storage tray
- Remote fuel door release
- Tinted glass
- Aerodynamic halogen headlamps
- Urethane lower body-side protection
- 6-year/60,000-mile powertrain warranty\*
- And 38 other standard features.

For more information call  
**1 800 822-8292**



**MERCURY**

*The shape you want to be in.*



# Imports

BY BILL HARTFORD

## Fast-Track Valve Trains



VW's 16-valve is the 123-hp engine-of-choice for Treser.

Cars with engines yearning to breathe free are our latest immigrants. A turn of the key is all it takes to get heavy respiration going in 4-valve-per-cylinder motors. The increased horsepower and torque from these 16-valve Fours, 24-valve Sixes and 32-valve V8s are produced by the greater gas flow in and out of the cylinders, so the boost is as free as the air

you breathe. Even maintenance of the twin-camshaft designs is a free ride, with hydraulic lifters keeping the right clearances.

What can a modest displacement of 1.8 liters crank out? An answer can be found under the hood of VW's GTI 16V. Thanks to 16 valves, the hot hatchback has 123 horses ready at the gate. We gave them their head recent-



VW's 16V, seen mounted in the GTI, is a 1.8-liter handful.

4-VALVE IMPORTS	
MAKE/Model	
FERRARI	Integra, Legend
LAMBORGHINI	Countach Quattrovalvole
LOTUS	Turbo Esprit
MERCEDES-BENZ	190E 2.3-16
NISSAN	Pulsar
PORSCHE	944S, Turbo; 928S 4
SAAB	900S, Turbo; 9000 S, Turbo
STERLING	825S, SL
TOYOTA	Corolla FX 16, GTS, 1.6; MR2; Camry; Celica; Supra
VOLKSWAGEN	GTI 16V Scirocco

ly and found that, indeed, 8 seconds is all you need to get to 60 mph. As for the 124-mph claimed top speed, we had no legal place to try it, but can believe the top-end performance is as impressive as the car's ability to sprint from light to light.

If you think all this get-up-and-go is wasted on a plain and practical hatchback like VW's GTI, then take a look at a car where lots of power would be right at home: The Treser Roadster mounts VW's 16-valve amidships, and with the car's lighter weight could easily flash any GTI 16V over to the right-hand lane of the *Autobahn*. The roadster is the brainchild of Walter Treser, who developed his skills at Audi, and who now plans to build a half-dozen cars a day using the VW engine at his Berlin plant later this year. As for U.S. avail-



Speed techniques on the Skip Barber Racing School video "Going Faster!" For info: 1-800-537-1600.

est car for the 62,000 miles was 132.542 mph. The endurance run of assembly-line Saab 9000s set world records confirmed by the autospors federation (FISA).

Saab's 16-valve gets its latest application, minus the turbocharger, in the 9000 S. This is the "bargain" 9000, new for '87, for drivers who don't need all the Turbo's punch and luxury, but appreciate Saab's basic attributes.

Drivers who do feel the need for speed, though, can



Saab's 16-valve is 2 liters, good for 160 hp with turbocharger.

ability, it's in the don't-hold-your-breath category.

Only one manufacturer on the 4-valve list has dared put its 16-valve powerplant to the test that Saab did recently. Under supervision of NASCAR, Saab ran three 9000 Turbos at full throttle for 100,000 kilometers at Alabama's Talladega Motor Speedway. Speed of the fast-

get it in a Saab of a whole different shape—an open-wheel racer used in the Barber Saab Pro Series. Here, Saab's 16-valve turbo is tuned for 212 hp, which will fly you down the straights at 160 mph. If you qualify to become one of these racers, you'll find that sweet sixteens are a helluva way to go—and go fast!



VW GTI 16V turns 0-60 mph in 8 sec.; 124 mph is its top speed.

# THE BEST GENERATORS ARE POWERFUL, RELIABLE AND QUIET. THAT'S WHY THEY'RE CALLED HONDAS.

Currently, Honda generators are the most widely-used, widely-trusted generators in the world.

Which should come as no surprise.

Especially when you consider that most Hondas are built around fuel-efficient, trouble-free Overhead Valve engines inspired by decades of world-class automobiles and motorcycles.

Or that Honda has the world's broadest range of multi-purpose generators from 650 to 6500 watts. For camping, boating, construction uses, power outages, outdoor parties, recharging car batteries—or most electrical needs at home or away-from-home.

Still, the real difference between an ordinary generator and a Honda generator can most accurately be summed up in one word: reliability.

The power you need is there when you need it. Because we engineer every single generator to ensure easy starts, quiet operation and durability that's measured in years—not months.

Honda generators. Quite simply the finest machines your money can buy. A claim no one else has the

**HONDA**

**Power**

**Equipment**

**IT'S A HONDA**



For optimum performance and safety, we recommend you read the owner's manual before operating your Honda Power Equipment. Connection to house power requires transfer device to avoid possible injury to power company personnel. Consult a qualified electrician. © 1996 American Honda Motor Co., Inc.

# Photography



BY STEPHEN A. BOOTH

## Dawn Of A New Age

**I**t's easy to take progress for granted. Each camera show heralds equipment that's faster, sharper, lighter or smarter—and the most recent photography exhibition in Chicago delivered as promised. Fortu-

changed much over time. All you had to do was point and shoot. I was carrying a point-and-shoot camera in Chicago



All-electronic control is the hallmark of Canon's EOS 650 and 620 autofocus SLRs.

nately, for me, the presence of former Yankee slugger Mickey Mantle provided a unique perspective on the innovations and new technology unveiled in the Windy City.

The baseball hall-of-famer was on hand at Fuji Photo Film's exhibit to help publicize that company's sponsorship of major-league ball. Our chance encounter caused me to recollect that I'd made my first trip to the ballpark, and taken my first photograph, at the age of seven. Coincidentally, the subject of those early snapshots was No. 7 of the Bronx Bombers at the plate, making his customarily liberal contribution to the home team's 5 o'clock thunder.

On that warm spring day more than a quarter-century ago I carried the family camera, a fixed-focus Kodak of the box type whose design and operating principles hadn't

the day I caught up with Mantle and his autograph, but it's a camera destined to change 35mm SLR photography.

The camera is Canon's new EOS 650, an autofocus SLR that is Canon's answer to Minolta's Maxxum series cameras. The 650 (\$600 with 50mm f/1.8 lens) and its sibling 620 model (\$800) share the EOS name, which stands for Electronic Optical System. The mythology buffs at Canon note that EOS also is the name of the ancient Greeks' goddess of dawn—and claim their cameras represent a new day in photography.

A hands-on evaluation of the EOS 650, plus brainstorming sessions with Canon's technical staff, confirms that these cameras are the first of a new breed. They're certainly the fastest autofocus SLRs available today. Though this feature owes mostly to the cameras' pioneering use of electronic controls, there are some new innovative mechanical aspects, too.

At the heart of the EOS cameras is the sensor that makes autofocusing possible. The BASIS chip (Base-Stored Image Sensor) developed by Canon is more sensitive than the charge-coupled devices used in other autofocus SLRs. Accordingly, it can focus automatically in light levels as low as EV-1—an exposure requiring one sec-

ond at f/1.4 using ISO 100 film. Light that low would make it difficult to read a newspaper. Low light has been the stumbling block of all previous autofocus SLRs, the best of which can't focus in light below EV-2.

The BASIS chip enables the EOS cameras to autofocus one f/stop lower than other cameras, but it's the cameras' main microprocessor, all-electronic lens mount and lens motors that enable them to autofocus faster.

Whereas other electronic cameras use an 8-bit microprocessor to handle focusing and exposure information, the EOS duo uses a higher capacity 16-bit chip to speed communication between the AF sensor (in the body) and the microprocessor and motor within each lens. Additionally, there is no mechanical linkage between Canon's new EF (Electro-Focus) lenses and the EOS bodies. Instead, eight gold-plated contacts convey all the focusing and exposure instructions electronically. This not only increases speed and accuracy, but also means that EOS components won't become obsolete when the future brings even more electronic innovations.

Still another area of innovation in the EOS system is its autofocus EF lenses. With all other autofocus SLRs, the motor that focuses the lens is

(Please turn to page 16)

## PM PHOTO ALBUM—TIPS FOR BETTER PICTURES

Long exposures will blur the image of most moving subjects on your film—but you can use this phenomenon creatively.

Take the subject on the right, the elevators. This scene was exposed for 16 seconds, using the B (bulb) setting on the camera. The camera itself was placed on a bench, facing straight up, and triggered with a cable release. Note how the elevator lights traced their movement on film.

Exposure was determined manually, at the 1-sec.

shutter setting. Double the exposure time whenever the aperture is closed down by one f/stop. For example, 1 sec. at f/4 is the same exposure as 2 sec. at f/5.6, or 4 sec. at f/8, and so on.

You can get similar effects with automatic cameras if you use a slow film, such as ISO 25. If you have control over aperture, set it to the smallest opening (largest f/stop number). The photo on the left was taken with an automatic camera from a moving car inside a tunnel.—Armand Ensanian



# TURN HOME REPAIR PROBLEMS INTO NO PROBLEMS.

## WITH ELMER'S®—THE HOME SOLUTION™ PRODUCTS.



If you have a problem in your home that needs gluing, caulking, filling, glazing or spackling, Elmer's has the answer.

THE HOME SOLUTION™ line of products. Look for them at your favorite store.

© Borden Inc 1987



**Problem:** How to stop the draft from drafty windows.  
**THE HOME SOLUTION™:** Elmer's Silicone Caulk. Gives you a long-lasting, flexible seal that insulates and waterproofs.



**Problem:** How to repair a crack in a wall.  
**THE HOME SOLUTION™:** Elmer's Redi-Spack™ spackling compound. Fast-drying acrylic latex formula stays flexible but sands easily.



**Problem:** How to patch the deep gouge in the dining room table.  
**THE HOME SOLUTION™:** Elmer's Carpenter's Wood Filler. Resists shrinking and accepts dark and light stain.



**Problem:** How to replace caulking around your tub and tile.  
**THE HOME SOLUTION™:** Elmer's Tub Caulk. Provides a flexible seal that's water and mildew resistant.



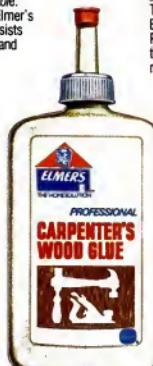
**Problem:** How to protect your hands from paint, oil and grease.  
**THE HOME SOLUTION™:** Elmer's Invisible Glove Protective Hand Cream. Just apply before any dirty job.



**Problem:** How to replace broken window glass.  
**THE HOME SOLUTION™:** Elmer's Glaze-Tuff™ glazing compound. It's paintable in only 30 minutes.



**Problem:** How to attach Formica® to a countertop.  
**THE HOME SOLUTION™:** Elmer's Contact Cement. Forms a strong bond.



**Problem:** How to glue the arm back on the armchair.  
**THE HOME SOLUTION™:** Elmer's Carpenter's Wood Glue. Penetrates wood deeply for a strong bond.



**Problem:** How to glue protective felt to the bottom of the statue.  
**THE HOME SOLUTION™:** Elmer's Glue-All™. It's the ideal all-purpose household glue.

# The Intelligent Window tells all.

Here's why more and more people are choosing the comfort, beauty, energy savings and value of The Intelligent Window®—the one with *Sungate*® coated glass from PPG.

It's the exclusive *Sungate* coating: it lets in the sun's light and heat, but reflects the heat

from your furnace, and the other radiant heat in your home, back into your rooms.

You can get the full story on how *Sungate* coated glass works by filling out and returning this coupon. Or, to find out who in your area sells windows and doors with *Sungate* coated glass, just call 1-800-2-GET-PPG.



PPG INDUSTRIES, INC.  
SUNGATE MARKETING GROUP SC228  
P.O. BOX 8727  
HARRISBURG, PA 17105

Please send me more information on how windows with *Sungate* coated glass from PPG can add to the beauty, comfort and value of my home.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

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



## PHOTOGRAPHY

(Continued from page 14)

housed within the camera body. Canon's system places the motors inside the lens—with no increase in the size and weight of the lens barrel.

Canon explains that building-in the motors enables them to be custom-tailored for the specific lens—with the advantage of faster operation. Besides the focusing motor, each EF lens contains a second motor, which regulates the aperture of the diaphragm. Canon says that such electronic control of the diaphragm provides more precise, reliable and quieter operation than lever-actuated mechanical diaphragms. Finally, a memory chip in each lens identifies its focal range and speed and provides other information that enables the microprocessor in the EOS body to calculate exposure and focus values.

The focusing motors in the 14 new EF lenses merit attention because they've never been used in photographic applications before. Twelve are focused by Canon's Arc-Form Drive, a tiny but powerful motor that's shaped to the curve of the lens barrel and closely geared to the moving elements of the lens.

Two other EF lenses, a novel 50mm f/1.0 (\$2760) and a 300mm f/2.8 telephoto (\$4210), are driven by a unique ultrasonic motor (USM) that adds virtually no bulk to the lens. The USM is comprised of two flat piezoceramic rings that fit inside the barrel on the same plane as the lens elements. When electrical current is applied, they vibrate at super-high but inaudible frequencies, rotating the lens either clockwise or counterclockwise to achieve focus. Operation is virtually spontaneous, and eerily silent.

Tiny motors aside, what contributes to the compact size of the EF lenses is their use of molded-glass (GMo) aspheric elements, a Canon first. Aspheric shaping means a lens needs fewer elements than are normally required, resulting in a smaller, lighter lens. Seven of the 14 EF lenses now available use GMo elements, including the 50mm f/1.0—the fastest lens available for a 35mm SLR camera.

The ability to manufacture such large-aperture lenses at reasonable cost is another benefit of this glass-molding technology. In the case of the f/1.0 lens, the speed is also made possible by Canon's adoption of a new, wider 54mm lens mount (compared to the 48mm gauge of current Canon cameras). This means you can't use EF lenses on non-EOS bodies, or non-EF lenses with the new EOS 650 and 620. But Canon maintains this break with the past is necessary in order to exploit future electronic innovations without compromise.

One final noteworthy point on the EF lenses is their calcium fluoride crystal elements. Canon's use of this man-made crystal in the optical glass lends a degree

of color accuracy usually found only in more expensive apochromatic lenses.

Does all of Canon's technological deriving-do yield practical results in the field? You bet it does. In our hands-on evaluation we found the EOS 650 to be the fastest autofocus SLR we've handled so far, the only one that doesn't balk when the lights grow dim and, overall, a joy to use. (For the record, we used the standard EF 50mm f/1.8 and the \$356 EF 35-105mm f/3.5-4.5 zoom for our tests.)

Each camera is capable of single-shot or "servo" autofocus, plus manual focus. In the single mode, the cameras find focus and lock it in at that point. If the subject moves (or if you do), you have to refocus. In "servo" the cameras continually readjust focus to follow any motion. In these circumstances you'll want to use the continuous film-advance mode. Keep the shutter release pressed and the built-in motor drive will fire away at up to three frames per second.

As you might expect, the EOS 650 and 620 provide a variety of automatic exposure modes. They share a do-everything program that selects shutter speed and aperture for you. Also shared is shutter priority, aperture priority, metered manual and two flash programs. Here's where the differences begin.

The EOS 650 has an innovative program called Depth Of Focus Autoexposure. To use it, you first fix focus on the nearest point you want in sharp focus, then the farthest. The EOS 650 then calculates the proper f/stop to maintain the depth of field you desire.

In place of this program, the EOS 620 substitutes Autoexposure Bracketing. This lets you play it safe by compensating for the "correct" metered exposure with up to five stops of under- and overexposure. Set the camera for the degree of plus or minus compensation you want, release the shutter and EOS 620 makes three continuous exposures under, correct and over. Until recently, this advanced feature was available only as a custom modification to pro cameras.

Other major differences between the EOS 650 and 620 are, respectively, 1/2000-sec. shutter speed vs. 1/4000 sec., and 1/125-sec. flash sync vs. 1/250 sec. Additionally, the EOS 620 can perform multiple exposures, and adds bright blue backlighting to the 650's plain gray LCD data display.

Shutter speed on both cameras is electronically controlled, in half-stop increments down to 30 sec. plus Bulb. Film speed ranges from ISO 25 to 5000 with automatic DX setting, and ISO 6 to 6400 manually. The cameras also share 6-zone evaluative center-weighted light metering, plus partial center metering (6.5 percent of the image). Each weighs 22½ ounces, including long-life lithium battery, and can use either of two flashes and two interchangeable data backs.

# SNAPPER NATIONAL SPRING SAVINGS

Surf you want a Snapper. And now's the time to get one. Your local dealer is making it a snap to own. That's right, with a little help from your bank and easy credit.



FOR COMPLETE DETAILS  
SEE OUR WARRANTY  
AT A DEALER NEAR YOU.



SNAP-CREDIT MEANS  
NO MONEY DOWN AND  
LOW MONTHLY PAYMENTS.



PUSH MOWER  
**\$299<sup>95</sup>**  
Suggested  
retail price

WITH FREE CATCHER AS SHOWN  
21" 3.5 HP (21351D)

RIDING MOWER  
**\$999<sup>95</sup>**  
Suggested  
retail price

WITH FREE CATCHER AS SHOWN  
28" 6 HP (25066)

SELF-PROPELLED  
**\$399<sup>95</sup>**  
Suggested  
retail price

WITH FREE CATCHER AS SHOWN  
21" 3.5 HP (21381PD)

At participating dealers. While supplies last. Above offers include grass catchers only.



# MORE WAYS TO SAVE

## DEPENDABLE QUALITY ★ VALUABLE BONUS

For complete details see our warranty at a dealer near you.



### LOW MONTHLY PAYMENTS WITH SNAP-CREDIT

More Americans have chosen Snapper's rear engine rider than any other brand. For good reason. No where else will you find the performance or durability of this American classic. Buy now at regular retail price and choose one bonus attachment.

(Shown with optional twin bag catcher)

## REAR ENGINE RIDING MOWERS



**FREE Dump Cart**  
For hauling heavy loads  
Retail Value \$189.95



**FREE Single Bag Catcher**  
Slides for easy dumping  
Retail Value \$139.95

**50% OFF Twin Bag Catcher**  
Holds 30 gallon trash bags  
Retail Value \$259.95



**50% OFF Bag-N-Wagon®**  
30 bushel, great for leaves  
Retail Value \$369.95



### LOW MONTHLY PAYMENTS WITH SNAP-CREDIT

Choose a gas push mower with our patented Hi-Vac® system. Vacuum action stands grass up for an even cut and removes clippings, leaves, pine straw. Buy at regular retail price and choose one bonus attachment.

(Shown with free optional grass catcher)

## PUSH MOWERS 19" or 21"



**FREE Snapperizer®**  
Shreds fall leaves  
Retail Value \$59.95



**FREE Mulcherizer®**  
(not for use on BBC models)  
Mulches for lawn food  
Retail Value \$44.95

**FREE Grass Catcher**  
For Kwik-N-Ezy dumping  
Retail Value \$49.95



**50% OFF Pac-N-Sac®**  
21" 4HP models  
Retail Value \$99.95

**"SNAP-CREDIT MEANS NO MONEY DOWN AND**

# WITH A SNAPPER

## ATTACHMENTS ★ SNAP-CREDIT PLAN

It's a snap with  
**SNAPPER**

880 1234 123456 7  
JOHN Q CUSTOMER



### LOW MONTHLY PAYMENTS WITH SNAP-CREDIT

The self-propelled models come with state of the art features that get the job done fast. Like our patented Hi-Vac® and famous disc drive. Buy now at regular retail price and choose one bonus attachment.

(Shown with free optional grass catcher)



### LOW MONTHLY PAYMENTS WITH SNAP-CREDIT

When you're ready to ride first class, look to Snapper. The limousine of lawn tractors. With features no others can match. Like the Hi-Vac® system and the patented disc drive. Buy a 12.5 or 16 hp lawn tractor at regular retail price and choose one free cutting system.

(Shown with free 33" deck and optional twin bag catcher)

## SELF-PROPELLED MOWERS



**FREE Thatchizer®**  
Detatches while you mow  
Retail Value \$69.95



**FREE Snapperizer®**  
Shreds fall leaves  
Retail Value \$59.95



**FREE Grass Catcher**  
For Kwik-N-Ezy dumping  
Retail Value \$49.95



**50% OFF Pac-N-Sac®**  
Holds 30 gallon trash bag  
Retail Value \$99.95



**FREE Mulcherizer®**  
(not for use on BBC models)  
Mulches for lawn food  
Retail Value \$44.95

## LAWN TRACTORS



### FREE 33" Mower Deck

The patented Hi-Vac® deck  
Retail Value \$259.95

### FREE 41" Mower Deck

Medium wide double blade

Retail Value \$339.95

### FREE 48" Mower Deck

Ultra wide triple blade

Retail Value \$509.95

Attachments limited on certain models. All prices shown are manufacturer suggested list price and may vary by dealers.

**HURRY! OFFERS  
END SOON.**  
At participating dealers

**SNAPPER  
Lawn Tractors**  
880 1234 123456 7  
JOHN Q CUSTOMER

## LOW MONTHLY PAYMENTS"

# SNAPPER NATIONAL SPRING SAVINGS



**LOW  
MONTHLY  
PAYMENTS  
WITH SNAP-CREDIT**  
This versatile 2-way tiller breaks hard new ground or cultivates your existing garden. Buy one at regular retail price and choose one bonus attachment.



**LOW  
MONTHLY  
PAYMENTS  
WITH SNAP-CREDIT**  
Tough. Hard working and long lasting. Buy a front tiller now with garden tractor wheels at regular retail price and choose one bonus attachment.



**LOW  
MONTHLY  
PAYMENTS  
WITH SNAP-CREDIT**  
Snapper's electric mower runs cleanly and quietly. Buy now at regular retail price and get a free Kwik-N-Ezy catcher. (Shown with free grass catcher)

## REAR TINE TILLERS



**FREE Hiller-Furrower**  
Retail Value \$79.95



**FREE Cultivator**  
Retail Value \$99.95

## FRONT TINE TILLERS



**FREE  
Hiller-Furrower**  
Retail Value  
\$79.95



**FREE  
Dozer Blade**  
Retail Value  
\$129.95



**FREE Garden Kit** (Plow kit, cultivator and 2 gauge wheel kits) Retail Value \$159.95

## 19" ELECTRIC MOWER



**FREE Grass Catcher**  
Retail Value \$49.95



For complete details see our warranty at a dealer near you.

Snap-Credit means no down payment, low monthly payments.



## TRIMMERS, REGULAR AND COMMERCIAL

After handling a Snapper trimmer, the others seem like toys. Whether for home or commercial use, you'll find all the power and features you expect—and more.

**FREE** Buy now and get a pound of spare line and a six pack (4 oz. bottles) of Snapper 2 cycle oil—FREE!

## BLOWERS, HANDHELD AND BACKPACK

Snapper offers blowers for both homeowner and commercial use. You'll find all the quality you'd expect from Snapper, plus special features to make a snap of your clean-up chores.

**FREE** Buy a hand held blower and get a shoulder strap and a six pack (4 oz. bottles) of Snapper 2 cycle oil—FREE!

HURRY! OFFERS END SOON AT PARTICIPATING DEALERS.

Visit the SNAPPER dealer nearest you. Or look in the Yellow Pages under lawn mowers.

# Science

BY DENNIS ESKOW

## A Simulated Goddess

**A**urora is the Roman goddess of the dawn. It also is the name for the U.S. Army Laboratory Command's nuclear blast simulator. In the past year, Aurora has blasted more than 100 experimental objects with its four gamma-ray injectors. In each experiment, the object is dosed with the equivalent radiation of a nuclear weapon of a given charge. The process has cut down drastically on the need for actual nuclear blasts to perform tests.

At the Laboratory Command's Harry Diamond Labs in Maryland, the Defense Nuclear Agency passes judgment on all combat materials as to their "hardness" to a nuclear attack. Also, the Army's Space Command and several agencies working on the Strategic Defense Initiative have used Aurora's services. Even Defense Contractors are using the simulator to pretest new nuclear-resistant materials.

"A single underground test shot costs millions of dollars, and of course, can't be readily repeated," says Jack Agee, who runs the testing program. "A typical test shot at Aurora costs under \$3000 and can be repeated as needed to gather data."

When the Defense Department points to the new series of tests, a shift in nuclear testing policy is confirmed without comment. In seeking new weapons agreements with the Soviet Union, the U.S. has been trying for years



A-bomb simulator reduces real blasts.

to select reliable testing procedures without actual nuclear weapons blasts. The testing on both sides has been a major bone of contention.

The doors to the Aurora chamber were recently enlarged to help it accommodate an M1 tank. Again, this is tacit acknowledgement that the familiar vehicle is going through material upgrades to "harden" it for nuclear combat.

Finally, Aurora has been upgraded recently to simulate electromagnetic pulse and high-power microwave environments. This suggests applications for hardening materials against known Soviet Star Wars machines. Aurora does not eliminate the need for underground nuclear testing, Agee points out. But it does reduce the number of tests.

Some readers may be alarmed at the presence of such a device. Does it spur us on in the nuclear arms race? I'd say no. The race goes on

with or without Aurora. But it does reduce insults to the environment, and tensions in the diplomatic community.

### Research giant

When the national telephone monopoly was broken up, there was a great cry from the scientific community. Bell Labs, generator of major research and winner of a pile of Nobel Prizes, might go out of business, was the concern many expressed at the time. It was really the only major lab in the country doing research that often didn't have an obvious payoff. Would any corporation in America risk R&D funds on such basic research?

Well, Bell Labs is alive and well two years after the break-up, and now a new lab-in-the-making is growing out of a pact made between The Rockefeller University and the Howard Hughes Medical Institute. The Hughes Institute will invest an average \$10 million a year for the next 10 years in specific projects at Rockefeller's almost 50 labs. Actual research goals have not yet been announced, but Hughes has already devoted a lot of its energies to the medical application of lasers, radiological sciences and space medicine.

Rockefeller, which has done breakthrough work in genetic engineering, physics, mathematics and other basic sciences, has also shown interest in these technologically generated fields. Look for breakthroughs in lasers themselves and in medical imaging equipment. This is a marriage made in science heaven, with lots of copycats waiting in the wings.

### Remember this

**P**sychology Prof. William Hoyer of Syracuse University talks to older people. Most of them are professionals. And he reports one very unexpected discovery. Experts retain their memories on subjects about which they are expert into old age. Preliminary findings are that experts develop an unconscious set of reasoning rules that stay with them throughout their lives. This applies to scientists and other professionals, and it may well also apply to carpenters and other skilled people.

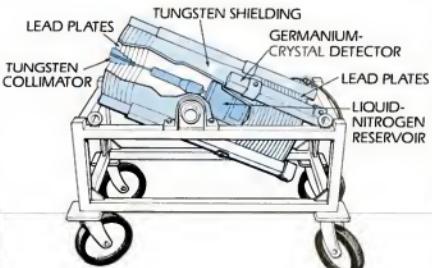
Hoyer currently is studying various groups of medical experts to see how far this memory-retention capability goes with them.

### Waste not

Federal regulations for the policing of low-level radiation in waste products has gotten so demanding in recent years that new equipment has had to be developed.

One ingenious machine, discussed in a recent issue of the Electric Power Research Institute's journal, is called QuantiScan. The QuantiScan system was first used in the cleanup after the Three Mile Island nuclear accident. It is now commercially available.

Rigged like a telescope, QuantiScan is shielded by lead plates to eliminate interference and inaccuracies. Its tungsten collimator picks up gamma rays and feeds them to a germanium-crystal detector for an accurate count of radiation in nuclear waste. It should be in widespread use within five years.



The QuantiScan detects radiation in waste products with crystals.

# ANNOUNCING: A VERY QUIET

The new Goodyear Wrangler AT and ST radials. Engineered for year-round peace and quiet.

The biggest drawback of most tires made for light trucks, vans and RVs isn't the way they look.

It isn't even the way they perform.

It's the way they sound.

The noise they make. As they drone, whine, or rumble down the highway.

Now, with the introduction of the new Wrangler AT and ST radials, Goodyear has started a very quiet revolution.

And, as you'll discover, noise reduction isn't the only improvement to be found in these remarkable new tires.

#### ***The strong but silent type.***

The characteristics demanded by our development engineers for the new Wrangler AT and ST radials were strategically very simple:

They had to be the strong but silent type.

And strong they are.

Both the Wrangler AT and ST are true steel-belted radials, with a minimum of two high-strength steel belts.

Beneath the steel belts, you'll find two plies of chemically stabilized polyester cord for long tire carcass life.

For additional strength, the sidewalls are reinforced and have a cut-resistant compound.

One more benefit of the

reinforced sidewalls; they provide responsive steering.

We also added a cool running subtread compound.

And a butyl liner for good air pressure retention.

And a new lower sidewall design for better stability in the bead area.

And those are just a few of the design features of the new Wrangler AT and ST radials.

So, as you can tell, we didn't take any shortcuts on our road to stronger, quieter tires.

#### ***Radials that aren't afraid of the weather.***

Because you cannot always choose when or where you drive,

**QUIET  
ZONE**



both the Wrangler AT and ST were designed for quiet, year-round performance.

In all weather. In all seasons.

On dry roads, they run cool, quiet and easy.

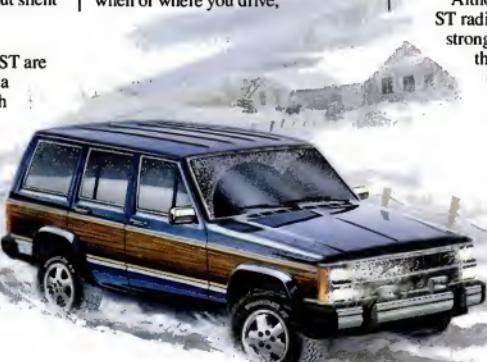
In the wet, they both channel away water to maintain contact and control.

And in snow, the deep traction biting edges dig in deep to get you through.

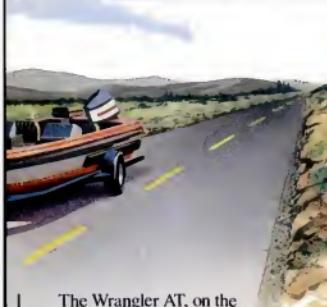
#### ***The concept is the same. The execution is different.***

Although the Wrangler AT and ST radials share many of the same strong construction features, their final execution is different. Most noticeably in the tread design.

The Wrangler ST radial was designed for light trucks, vans, and RVs that operate primarily on the street and highway. And it has been tuned for quiet, smooth operation in that particular environment.



# THE START OF REVOLUTION.



The Wrangler AT, on the other hand, was designed for light trucks and RVs that need both an on-road and off-road capability.

The open shoulders of the new Wrangler AT radial let it reach down deep for a solid grip in dirt, mud and wet grass.

The broad, open tread face of the Wrangler AT also gives it excellent traction in soft soil.

And while the tread of the new Wrangler AT gives outstanding off-road performance, it has been tuned to a low noise pitch sequence to help maintain a quiet highway ride.

Additionally, the Wrangler AT comes in a wide variety of widths and sizes, with a maximum load capacity of up to 3,042 lbs. per tire.

But no matter which Wrangler you choose, both offer you low rolling resistance to aid fuel economy.

## *When the road ends, the performance doesn't.*

In everyday use, the new Wrangler ST radial will come as a very pleasant, quiet surprise.

It is a strong, year-round, all-weather tire that has been designed to give you long wear, better handling and excellent traction.

Ditto for the Wrangler AT radial.

Except that the new Wrangler AT has another pleasant surprise.

Because when the road ends, its true performance begins.

See the Wrangler ST and AT radials at your Goodyear dealer. And witness the start of a very quiet revolution.



# GOOD<sup>WING</sup> YEAR

*Take me home. The quiet way.*



# Car Clinic



BY MORT SCHULTZ

## Ford Truck Tire Trends

In last month's Car Clinic (page 53), I brought up the business of steering pull (drift) and tire wear that concerns many Ford light truck and utility vehicle owners. The latest information about how to resolve pulling was addressed; now let's discuss abnormal tire wear. There are several factors you have to consider, as follows:

■ Toe of wheels should be set between 0 and  $\frac{1}{12}$  in. out. If the shop manual for your vehicle doesn't say so, disregard the manual. Technical Service Bulletins (TSBs) 82-15-13 and 85-19-16 set the guidelines. Keep in mind that if your vehicle is modified and you don't reset toe, abnormal tire wear will probably occur. In other words, if you add a snow plow, winch or toolbox to the truck, the toe will be thrown off, so readjustment is a must.

■ Camber is a factor for those who like to ride high by beefing up the front suspension. This creates excessive positive camber. The best camber at which to set the wheels for maximum tire wear is 0 to  $1.5^\circ$ .

Watch it if you order a truck with a heavy-duty suspension system with plans to eventually install a snow plow or winch. Camber is set at the factory in anticipation of this weight. If you don't follow through and install the equipment, you'll be driving around in a vehicle that has excessive camber.

■ Modern tread patterns provide lower rolling resistance, improved fuel economy and better traction in all kinds of weather and over all types of terrain. These so-called all-season and all-terrain tires are more susceptible to irregular, heel-toe and diagonal wear. The only way to minimize wear is to maintain correct wheel alignment and tire pressure, and to cross-rotate tires as often as your owner's manual recommends.

### That's shocking

How do my wife and I get out of our 1986 Plymouth Reliant and close the doors without getting shocks? The dealer says to hang a piece of rubber from the bumper to the ground. I've never heard of such a thing. Have you? I've

tried several static sprays on the seats, but no luck. Can you help, please?

WARREN D. HUGHES  
NEWPORT, RI

I've tried a couple of things and have checked with a few knowledgeable sources concerning the long-standing problem of static electricity, and this is what I've learned:

Will a static electricity strap such as that recommended by your dealer work? Some of my sources say yes, others say no. So I tried one. I still got jolted.

Here's how I keep from getting a jolt. As I slide across the car seat and out of the car, I keep hold of the inner door handle, which is metal. But let me caution you that some handles are made of plastic and won't act as a ground. However, you could keep your fingers wrapped around a window frame if the window happens to be open or on the side of the door.

### Pillars of strength

We are a small auto repair shop with the attitude that if you've paid to have it fixed, you're entitled to have it fixed right. We are having a problem with a 1978 Datsun 280Z that is putting our philosophy to the test, and we need your help. We can't get rid of a

front brake squeal. So far we've fine-turned rotors on an Amico brake lathe, used Clover Lapping Compound and replaced pads several times with various brands and types. Still, within a day the darn squeal returns. We don't know what else to try. Can you give us a clue?

GUY PILLARS  
ROCK FALLS, IL

Nissan has had success in dealing once and for all with this brake-squeak bugaboo. It's in the form of a fairly new compound called Nissan Brake Grease, which you can get from a Nissan dealer as part No. MSS 99990-00939. Apply it to the backs of brake pads and shims. The product does a great job absorbing high-frequency pad vibrations that are heard as squeals. One application is usually all that's needed for the life of the pads.

### A brake with tradition

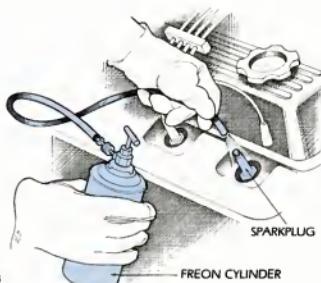
Our 1985 Oldsmobile Ciera has been a super car, except for one dangerous problem. When braking moderately hard, the rear tires don't hold. Carrying two 80-pound bags of sand in the trunk helps some. Is the trouble caused by unequal weight distribution, which would be a design flaw? Are there any

(Please turn to page 26)



### Instant winter

Steel sparkplugs and aluminum cylinder heads often can be dangerous to separate when the head is hot. Either you wait 'til the engine cools off, or risk taking all the threads out of the head with the plug. Brian Ward of Peoria, Illinois, wrote to Motor magazine with this suggestion. He uses a rubber hose hooked up to a can of Freon refrigerant. A cold blast of Freon only a few seconds long directed right at the plug cools it off in a hurry. Wear gloves, or you'll



cool off your fingers more than you might like. Safety glasses, too. This beats pulling a head to fix stripped threads, but somehow just waiting to let the engine cool off doesn't sound too bad either.



## IT'S NOT YOUR TYPICAL MAINSTREAM STATION WAGON.

Of all the good things you can say about the average station wagon, exciting to drive isn't one of them. Which is why Isuzu builds the Trooper II instead.

It's easy to drive and park, just like a station wagon. It carries a lot of luggage, just like a station wagon. And it even has seating for five, just like a station wagon.

But there, thankfully, the similarities end.

Because with the shift of a lever, the Trooper II instantly turns into a four-wheel drive machine potent enough to win the

agonizing Baja 1000. An off-road machine that made even the premier enthusiast's magazine, *4-Wheel & Off-Road*, exclaim, "It accepts abuse with so much grace it's hard to stop looking for jumps to drive over."

From \$10,809\*

So the choice is yours.

Are you going to buy something practical, economical and middle-of-the-road?

Or something practical, economical and capable of leaving it?

\*Manufacturer's suggested retail price P.O.E., excluding tax, license and transportation fee for Deluxe 2-Dr. model, 4 Dr. LS shown \$12,999. Price subject to change. Rear Seat Optional.

*The First Car Builders of Japan.*



# ISUZU

## CAR CLINIC

(Continued from page 24)

recall notices I've missed or TSBs I should have my dealer look at?

C.R. RETTSTATT  
KINNEON, NJ

*The answer is no to both questions. So where do you go from here? To an Olds dealer or first-class brake shop—that's where—to make sure every cause of uneven braking action is checked out. The Olds service and general brake repair manuals list 20 causes, with contaminated brake linings, including too much brake lining dust, being cited as the more probable cause. In addition to the 20, you should have two others looked into—possibilities that are more remote with GM A-body vehicles. They are:*

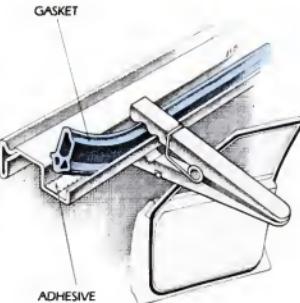
- One or both rear drums being out of round, which could cause brakes to lock under hard braking.
- The parking brake not releasing all the way when it's disengaged. If the parking brake is not adjusted correctly, the rear brake shoes which are set against the drums when the parking brake is engaged may remain in hairline or very close contact with the drums when the parking brake is released. The effect of this "barely" or



### Hung up to dry

Our thanks to Jerry Flenige of Freeway Truck Sales in Lyons, Illinois, for this gem we came across in the Fall '86 issue of *Service Life*, a magazine that Ford and Lincoln-Mercury service personnel receive:

Instead of using metal clamps that might scratch the paint, or tape that doesn't clamp well and leaves a sticky residue, try ordinary wooden or plastic spring clothespins to clamp weatherstripping in place until the



adhesive dries. The things are so cheap that you'll be able to use one every inch or two all around the seal, ensuring a really good fit. The spring keeps clamping pressure constant as the rubber sets.

almost lining-to-drum contact would not be noticeable. However, when you brake, the pressure you bring to bear against the drums plus the pressure or closeness already there because of partial parking brake engagement could convert a moderately hard brake applica-

cation into a panic stop that is making rear tires break loose from the road.

### Pesky ping (a.k.a. kooky knock)

My 1984 Pontiac Parisienne 5-liter engine began pinging (knocking) at about

## Dress Up Your Doorway, Fix Up Your Home.

Buy a new Kwikset entry lockset and get a home repair manual FREE!

Spring's the time to spruce up your home, so dress up your doorways with a new easy-to-install Kwikset entry lockset and get a copy of the *Better Homes & Gardens Step-By-Step Home Repair Manual* FREE—even the postage is prepaid!

A \$6.95 value, this fully illustrated, 96-page book gives you easy-to-follow instructions on how to perform hundreds of common household repairs, including plumbing, electrical, walls, floors, doors, windows and much more.

To get your free book, choose from a variety of Kwikset's most popular entryset designs, then send in the attached coupon redemption tag and proof of purchase. Kwikset, manufacturers of America's largest selling residential locksets, has a style to complement any home's decor.

Look for the specially tagged Kwikset packages wherever you buy fine hardware. This offer is for a limited time only, so stop by today!

America's Largest Selling Residential Locksets  
**kwikset**  
HARDWARE GROUP

EMHART

America's  
Largest Selling  
Residential Locksets  
**kwikset**  
HARDWARE GROUP

36.95 VALUE

key or turn-button  
unlocks both knobs.

**ENTRANCE**

Home Repair Manual  
with Entry  
Lockset Purchase

**FREE!**

36.95  
VALUE

Home Repair Manual  
with Entry  
Lockset Purchase

4000LCP  
BEL AIR  
BRIGHT BRASS

6000 miles. The car now has 24,000 miles and continues to ping, despite all our efforts to get rid of the noise. The following is important for you to know:

- The ping occurs primarily when the car is warmed up and is under a light load, such as going up a slight grade.
- I use premium fuel of major oil companies. Regular gasoline causes an increase in the intensity of the ping.
- Octane additives have no effect.
- No trouble code is stored in the computer memory, and all voltage readings are per the factory shop manual.
- The dealer has replaced the EGR control solenoid, canister purge valve, temperature sensor, barometric sensor and oxygen sensor. I've replaced the 195° thermostat with a 180° unit and switched from R45 to R44 sparkplugs.

If you can help me, I'd greatly appreciate it.

JEFF FRANCIS  
EATONTOWN, NJ

*There are six causes of ping that you don't cover.*

*1. Don't assume that an intake air leak will set a trouble code in the computer. It doesn't always. The old way of finding an intake air leak is still effective—that's to spritz oil around possible leak areas with the engine running and a tachometer connected. If the tach records a change in engine rpm following a spritz, there's a leak at that point.*

#### SERVICE TIPS

- According to Ford TSB 86-25-9, a plugged manifold absolute pressure (MAP) sensor vacuum hose may be behind rough idling, black exhaust and/or poor fuel economy you're getting from a 1985 or 1986 Tempo or Topaz. The fix is to replace the plugged hose with a new one and install a new vacuum fitting (part No. E73Z-9A474-B) and MAP sensor bracket (part No. E63Z-9G476-A).
- Buick says that a humming noise from the engine of a 1987 Century, Somerset or Skylark with 2.5-liter engines may be caused by an air cleaner cover that's too tight.
- Chrysler has taken a long, hard look at all the complaints about its 2.2-liter carburetor-equipped engine sagging on acceleration until it gets warm, and has issued TSB 18-50-86. It applies to 1984-87 models. Now there's no reason for you to believe a mechanic who says, "They all do it—it can't be helped."
- If your Toyota turbocharger begins making noise, check the oil supply pipe to make sure oil coke, caused by excessive heat being transferred from the turbo to the oil pipe by way of the oil pipe clamp, isn't clogging the pipe. If the pipe is partially or completely restricted, it has to be replaced. Don't try to clean it out. If you haven't experienced trouble yet, avoid it by removing the clamp. Toyota says doing so won't damage the pipe. In fact, the clamp is no longer installed during production.

2. You mention that the dealer replaced the EGR control solenoid, but did he test to see if the EGR valve is working? A malfunctioning EGR valve may cause ping. However, if the EGR valve is bad, the engine will usually stall as well.

3. Did your dealer check to see if the electronic spark advance (ESA) is operating as it should with timing set at the base specification given on the vehicle emissions control label?

4. Full-time EFE—it's supposed to be off when the engine is warm—will cause a ping under light-throttle operation.

5. Has anyone checked the Thermac (heated inlet air) system? The Thermac damper valve may be stuck in the ON position, so air being fed into the engine is too hot, resulting in pinging.

6. If the compression in one cylinder is much greater than in the others, knock will result. The valves in that cylinder may have to be reseated to lower compression.

PM

#### DO YOU HAVE A CAR PROBLEM?

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



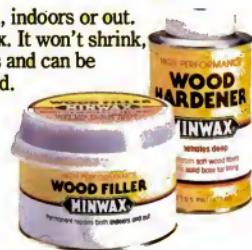
Photos by a registered trademark of Minwax Company Inc.

## \$300 to replace. \$10 to repair.

Now there's a wood filler for the big jobs, indoors or out. High Performance Wood Filler by Minwax. It won't shrink, crack or fall out. It hardens in 15 minutes and can be sanded, planed, drilled, painted or stained.

If the wood is soft because of rot, prepare a rock-solid base with High Performance Wood Hardener.

Send today for our free 30-page booklet, *Tips on Wood Finishing*. Minwax Company, Inc., Dept. PM-057 P.O. Box 426, Little Falls, NJ 07424.



**High Performance Wood Filler**

**MINWAX**

Get the flavor of these leading brands, but less tar.



# Breakaway



© Philip Morris Inc. 1987

SURGEON GENERAL'S WARNING: Smoking By Pregnant Women May Result in Fetal Injury, Premature Birth, And Low Birth Weight.

Kings: 8 mg "tar," 0.5 mg nicotine  
av. per cigarette, FTC Report Feb '85

# to Merit.

Breakaway to flavor.



Comparisons based on King Size versions of smoking shown at 1 mg levels from latest FTC report.

# Tool Tests



## Electronic Radial-Arm Saw

After testing the new Craftsman 10-in. electronic radial-arm saw, I was so impressed that I decided I wanted one for myself. I gave my old, reliable radial-arm saw to my son. The features that sold me on the Craftsman include an electronic liquid-crystal display (LCD), large 27 x 44-in. worktable, up-front fence clamps and six roomy drawers. I also liked the horizontal handle.

Located on the end of the saw's arm is an LCD window and various pushbutton keys. Press a button and a digital

readout shows the blade position for elevation, bevel, miter and rip. Bevel and miter cuts are shown in  $\frac{1}{2}$ -degree readings. Read blade elevation and rip cuts in .01-in. increments. The LCD is powered by a 6-volt battery. To save battery power, the LCD shuts off automatically after three minutes. However, a built-in memory will recall the last setting.

All these features are useless if the saw is inaccurate. After testing various types of cuts and settings, I found the saw to be precise and, just as

important, very consistent.

It's powered by a  $1\frac{1}{2}$ -hp, direct-drive, ball-bearing motor with a maximum output of  $2\frac{1}{4}$  hp. Maximum depth of cut at 90° is 3 in.; at 45° it's  $2\frac{1}{4}$  in. The saw will crosscut a  $15\frac{1}{2}$ -in.-wide board. Maximum ripping capacity is 26 in. wide. The ON/OFF switch has a removable locking key to prevent unauthorized use.

The saw comes with a carbide-tipped blade, antikick-back pawls and kerf spreader, and four casters.

The Craftsman 10-in. electronic radial-arm saw costs about \$470 at larger Sears stores and through the Sears tool catalog. Contact Sears, Sears Tower, Dept. 703-PM, Chicago, IL 60684.

—Rosario Capotosto



Smooth-sliding steel drawers with durable plastic fronts provide plenty of storage. The six drawers measure 3, 6 and 10 in. deep.



An easy-to-replace 6-volt battery powers the saw's LCD. To the right of the LCD window are six pushbutton function keys.



Quick-release clamps make it easy to change or reposition saw fence. Lift handles to release tension; push down to lock fence.



The saw will cut bevels between 0 and 90°. Here, a 30° bevel cut is made. Note the 30° reading visible in the LCD window.



To test accuracy, I cut an odd-angle miter — $20\frac{1}{2}^\circ$ —and then checked the cut with a bevel square. Cut was right on the mark.



Rule is used to check  $\frac{1}{4}$ -in.-deep dado cut in  $\frac{3}{4}$ -in. stock. Elevation reading of .50 in. is distance from table to blade.

COMPLETE 1987 BOATING GUIDE

MARCH 1987

\$1.50

# Popular Mechanic

SUPERCAR TEST!

FLAT OUT  
AMERICA'S  
FASTEST  
CAR



## HOW TO GET THOUSANDS OF TIPS WITH A SCREWDRIVER.



AND SAVE UP TO 76% ON  
FOUR GREAT MAGAZINES.

Send in proof-of-purchase along with a coupon and your subscription payment.

It's that easy.

So look for The Stanley Subscription Break display and coupons at your participating Stanley dealer.

After all, Stanley tools have always saved you time, and now they can save you money.

Introducing the Stanley Subscription Break. Where you can save up to 76% off the cover price on any one of four great magazines when you buy a Stanley tool.

76% off magazines like Sports Illustrated, Newsweek, Popular Mechanics or Field & Stream. With as many as four issues free.

Just buy one of the featured Stanley tools... and



**STANLEY**

helps you do things right.

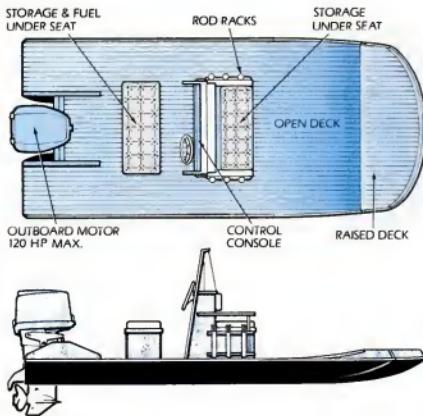
Offer expires June 30, 1987. © 1987 The Stanley Works

# Outdoors

BY TIM COLE



## Running The Flats



The Texas Scooter—a perfect design for getting into tight spots.

**B**one fishermen on the Bay of Florida and anglers along the Texas Gulf Coast are well aware of the problem. How can you get to where the fish are in extremely shallow water with a conventional boat and motor setup? The answer is: you can't. Unless you come equipped with a Scooter, a high-speed fishing platform that draws a mere 4 in. of water running.

Like most specialty boats, the Scooter is a product of its environment. It's characterized by reduced freeboard, a tunnel hull, center console and, usually, a means to raise and lower the engine bracket under way, in

addition to standard trim/tilt. I ran a Scooter following a recent boat show. After throttling easily onto plane, the water slicing through the tunnel provides the fluid medium that the prop operates in, and raising the engine vertically—out of harm's way—into the tunnel wash doesn't seem to result in any appreciable efficiency loss.

Glen-L marine designs recently came up with a Scooter design for the home-

builder. The Glen-L plans (\$45) include full-size patterns, or you can use Glen-L's prefab frame kit (\$310). Fastening kits for the Scooter are also available (\$68.20 for galvanized; \$147.50 for bronze), along with a fiberglass covering kit (\$129). The finished article is 15 ft. 9 in. long, 6 ft. 10 in. wide and weighs about 600 pounds. You can mount up to 120 horses on the back, and take a couple of friends to fishing spots that other boats will never—ever—get to see.

Contact Glen-L Marine Designs, 9152 Rosecrans, Bellflower, CA 90706.

### Taking aim

Laser sighting devices for small arms have been around for quite a while, particularly on military arms. As an example, we covered the Laser Products 14A and 15A in the November '85 issue (*Setting Sights On The Future*, page 93). They're intended for the Ruger Mini 14 and Colt AR-15, respectively. But high cost (around \$1000) has always impeded the laser's acceptance on a broad scale.

Touring the SHOT Show in New Orleans, however, I stumbled on an interesting laser sighting instrument that's serviceable on a variety of weapons and costs a relatively inexpensive \$449. The Lasersight LS45 operates on twin 9-volt batteries that energize the helium-neon laser tube to 12,000 volts. The tricky part in manufacturing this compact unit is suspending the tube inside the casing so it won't break, and making it adjustable for windage and elevation. It weighs less than 12 ounces and offers 45 minutes of continuous use, or 2700 seconds of intermittent use. Best of all, it works. The laser beam concentrated a highly visible pinpoint of light across the cavernous interior of the New Orleans Convention Center. The jury is out on how well the LS45, or any laser aiming device for that matter, operates in



The Lasersight—high-performance aim.

THE ANTIQUE  
OUTBOARDER



The Antique Outboarder, AOMC's official book.

bright sun, but a 300-yard range at dusk or in the evening isn't bad. Contact Lasersight Inc., P.O. Box 8594, Incline Village, NV 89540.

### Outboard info

The vast majority of requests for information we get at the PM Outdoors Department pertain to out-of-production outboard engines. A typical reader wants to know where he can get a water pump impeller for his Homelite Bearcat, or a new carb for his good-as-new '63 Evinrude, or a magneto for Dad's old Elto. Now there is a source for everything—and I mean everything—you'll ever want to know about outboard engines. The Antique Outboard Motor Club Inc. has literally thousands of members who buy, sell, swap and otherwise dabble in elderly outboards. Consider the following advertisement, typical of the classifieds found in the latest AOMC Newsletter: "Wanted—Forward gear for 1966 Sportfour 60-hp Evinrude. Prop shaft seals for 1943 Sea King 5 hp and 1963 Evinrude 7 hp." From basic components to musty esoterica, at least one AOMC member will have the part you need, or aim you in the right direction. To join and take advantage of AOMC information, newsletters and other activities. Send \$20 to The Antique Outboard Motor Club, Inc., c/o Marianne "Waterwitch" Jones, 436 S. Marina St., Prescott, AZ 86301.

(Please turn to page 36)



# HIGH STYLE. RIGHT PRICE.

## THE SPECIAL VALUE DODGE RAM 50. \$6661.\*

Think the only way to get a high-styled pickup is to pay a high price? Well, get ready for the right price. Courtesy of the new Japanese-built Dodge Ram 50 with special value features. It's a specially equipped edition of our imported compact truck. With sport stripes on the outside. Wide-spoke 14-inch chrome wheels on the corners. And a cloth seat, cut-pile carpeting and a sport steering wheel.

on the inside. All for only \$6661.\* The new special value Ram 50. It's a great way to go in style, for a price that's right. Buy or lease it at your Dodge dealer now. And be sure to ask about special value packages available for other Ram 50 models.

\*Base list price, excluding tax & destination charge.



DIVISION OF CHRYSLER MOTORS  
**DODGE IMPORT TRUCKS. WHERE GOING PLACES.**

BUCKLE UP FOR SAFETY.



## ACTUALLY, A NUMBER OF THINGS RUN LIKE A DEERE.

You don't have to limit yourself to a tractor or a riding mower that runs like a Deere.

You could be the proud owner of a lawn mower that runs like a Deere. Maybe one of our 21-inch models that lets you adjust its ground speed to match your walking pace.

Or a trimmer that runs like a Deere.

Choose from ten different models, most with semi-automatic line feed, electronic ignition, low vibration, and unusually high ratios of power to weight.



Or a chain saw that runs like a Deere. We offer ten, including two new models with vertical-cylinder engines that operate at so many revolutions a minute, they're revolutionary.



Or a tiller that runs like a Deere. The one below is our Model 216 with enough power for most home gardens. Plus the advantage of three different tilling widths, from twelve to twenty-six inches, with optional extension kit.



There are also John Deere portable generators, John Deere leaf blowers, John Deere high-pressure washers, John Deere edgers, John Deere log splitters, John Deere snow blowers, John Deere hedge trimmers, and each of them runs exactly like a Deere. Or we wouldn't be selling any of them.



For more information about the products that nothing else runs like, and the address of the John Deere dealer



nearest you, please call us toll-free at 800-447-9126. (In Illinois, call 800-322-6796.) Or write to John Deere, Dept. 52/62/82, Moline, IL 61265.



NOTHING RUNS LIKE A DEERE®

## OUTDOORS

(Continued from page 32)

### Mergers and acquisitions

America's boating industry has always been characterized by a personalized mom-and-pop temperament. Unlike aircraft and automobiles, boats don't require ultrasophisticated R&D or tooling, which has fostered the growth of small- and mid-size boatbuilding companies.

The industry's laid-back attitude is bound to change, however, following the recent buying spree by Brunswick Corp., which owns the multifaceted

Mercury Marine, and Outboard Marine Corp., which makes Johnson and Evinrude outboards along with Cobra stern-drives. The highly competitive engineering giants have snapped up six boat builders in the past six months, and industry observers anticipate additional acquisitions throughout the summer. The new megabuilders now join industry powerhouse Genmar Corp. in controlling the largest, most dynamic segment of the American boating market. Genmar was created by financier Irwin Jacobs of Minneapolis, Minnesota, and consists of Wellcraft, Lund, Larson and Hatteras. Brunswick's new divisions are

Bayliner and Sea Ray. Bayliner is the acknowledged leader in package boats and builds more than 45,000 units annually. Ironically, Brunswick's archcompetitor OMC recently completed a multi-million dollar agreement to furnish Bayliner with stern-drives, a deal the new Brunswick unit is expected to honor. Sea Ray, based in Tennessee, makes a full range of quality runabouts.

OMC's acquisitions form a diverse and profitable cross section of the market. Joining the fold are Four Winns, makers of lake runabouts, deck boats and small cruisers; Stratos, the highly regarded bass and saltwater boat builder; Lowe, which makes aluminum boats; and Sunbird. Insiders hint OMC is negotiating to buy Ranger Boats, America's leading bass boat maker.

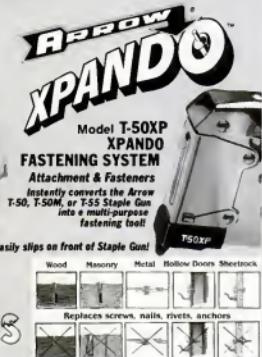
What does it mean for you? Backed by plenty of clout and capital, the new boat-building agglomerations should be able to achieve special economies that could moderate prices. And marrying hull builder with engine builder may mean new packaging. Packaging—the 1980s marketing phenomenon that unites hull, motor and trailer under one affordable price tag—just might put a boat in every driveway by the year 2000.

### A cross between . . .

Combine a scope-mounted rifle, a crossbow and a slingshot and you come up with a crossbow hybrid called the Linear Bow. The device fires a standard arrow at 280 ft. per second and has an effective range of 40 yds., according to manufacturer tests. The propellant is a latex band with extremely thick walls available in either 60- or 80-pound draw. In typical crossbow fashion, the Linear Bow is fired with a trigger mechanism, which has an automatic safety to prevent unintentional release. The extruded aluminum, flat-black stock and forearm assembly is 36 in. long and weighs 7 pounds. It combines sport and simplicity in a \$300 package. Contact Break Free, SanBar Corp., 1035 S. Linwood Ave., Santa Ana, CA 92705-4396. **PM**



### Now Brings You A Full Selection Of Professional Quality Fastening Tools For All Your Fix-It Fastening Needs!



### HOT MELT GLUE GUNS



### ARROW FASTENER COMPANY, INC.

271 Mayhill Street, Saddle Brook, NJ 07662  
In Canada: Jardel Distributors, Inc., 6505 Metropolitan Blvd. East, Montreal H1P 1X9 Quebec  
Available at all leading Hardware, Home Center, and Discount Department Stores everywhere.



The brand-new Linear Bow borrows from traditional sporting arms.

# RUGER

BEST QUALITY SPORTING ARMS



COMING ON STRONG FOR 1987



# RUGER® THE 9mm CHALLENGE



NEW

## RUGER P-85™ AUTOMATIC PISTOL

The new Ruger P-85 semi-automatic pistol is the end product of a Ruger commitment to high-tech engineering and the relentless pursuit of perfection. This lightweight, compact, 15-shot, 9mm, double-action auto is reliable and simple to operate and maintain.

All parts are designed to meet or exceed U.S. Military specifications. Its advanced features, easy takedown, accuracy and reliability all contribute to its desirability for sporting use, competitive shooting, personal defense and as a law enforcement and military sidearm.



## RUGER EMPLOYEES PRODUCE ANOTHER ONE-MILLION PRODUCT

The one millionth Ruger M-77 joins the ranks of five other Ruger guns which have already taken their place in sporting arms history by exceeding the one millionth mark. The other million "plus" Ruger guns are: the Ruger "old model" single-action revolver (1970); the Ruger Model 10/22 autoloading carbine (1978); the Standard and Mark I semi-automatic rimfire pistol (1979); the Ruger "New Model" single-action revolver (1979); and, the Ruger double-action revolver in Security-Six, Service-Six, and Speed-Six models (1983).

The company has achieved this singular acceptance in its field in less than forty years with a reputation for producing



"We're coming on strong" at the Ruger plant in Newport, New Hampshire, as seen in this photo which shows approximately 800 of the more than 1500 quality-conscious people who are employed in five Ruger manufacturing facilities across the country. All of us at Ruger are dedicated to manufacturing sporting guns of the highest quality, strength and reliability. Every Ruger firearm is tested by actual shooting on our ranges before shipping.

finely conceived firearms with an unparalleled record of quality control, safety, and reliability in the field at a fair price.

A large percentage of Ruger sporting arms are sold through the specialty gun dealer who provides expertise and "personal service" in the day-to-day business of meeting the requirements of the hunting, shooting, and law enforcement communities. Many of these dealers are listed in the Yellow Pages under headings such as *Guns, Gunsmiths, and Sporting Goods*. To experience the genuine pleasure that comes from handling fine quality Ruger firearms, visit and support your independent stocking gun dealer.

## ABOUT OUR COVER... ABOUT CONSERVATION... ABOUT SPORTSMEN...

To many sportsmen our cover painting, *Alaskan Brown Bear Out of the Shadows* by one of North America's greatest game-animal artists, Carl Rungius (1869-1959), exemplifies the objectives of the Pittman-Robertson Federal Aid in Wildlife Restoration Act which marks its fiftieth anniversary in 1987.

Much of the wilderness and its wildlife inhabitants as seen through Mr. Rungius' eyes has been restored as a result of the successful implementation of Pittman-Robertson. This unique program in which hunters pay for

conservation and hunter safety education is funded by a federal excise tax on firearms, ammunition and archery equipment. Since its inception Pittman-Robertson has provided the impetus for the preservation and perpetuation of vast populations of game birds and animals, particularly of those many species once thought to be extinct. The success of this program is a tribute to the millions of knowledgeable hunters who have helped make it possible.



# RUGER® SINGLE-ACTION REVOLVERS



## RUGER® BISLEY SINGLE-ACTION REVOLVERS

Ruger's Bisley mates a target shooting tradition with a modernized version of the Bisley grip shape to suit the most discriminating marksman. Offered in two frame sizes with roll engraved, non-fluted cylinders. Chambered for a variety of handgun cartridges for target shooting and hunting.



## NEW MODEL SUPER SINGLE-SIX® & .32 H&R REVOLVERS

The Ruger Single-Six was introduced over three decades ago and remains one of the most coveted single-actions. The patented Ruger transfer-bar ignition mechanism and other refinements have been features of New Models since 1973.

Originally chambered for the .22 Long Rifle Cartridge, the Single-Six is now offered in the new .32 H&R Magnum caliber, a hard-hitting small game, varmint and target load.



## NEW MODEL BLACKHAWK® & SUPER BLACKHAWK® REVOLVERS

Ruger Blackhawk revolvers are expressly engineered for use with powerful modern centerfire cartridges. They incorporate all the best features of the Ruger New Model centerfire single-action design, including the transfer bar ignition mechanism.

The simplicity and dependability of our single-action revolver is legendary among outdoorsmen. Available in: .30 Carbine, .38 Special, .357 Mag., .41 Mag., .44 Mag. and .45 Long Colt.

*Stainless steel model.*



*Shown Actual Size*

*Stainless steel model.  
Goncalo Alves grips.*

*Speed-Six*

*Stainless steel model.*

#### RUGER SERVICE-SIX® AND SPEED-SIX® REVOLVERS

These two Ruger double-action revolvers are reliable, durable, and perfectly mated to the .357 Magnum and .38 Special cartridges.

Over one million of these revolvers in this series have been made for use by sportsmen and the law enforcement community around the world. Available in blued steel and stainless steel, with 2 3/4" and 4" barrels, and Goncalo Alves wood or rubber grip panels.



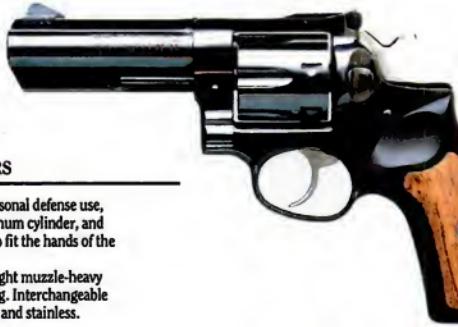
## NEW GENERATION DOUBLE-ACTION REVOLVERS FOR HUNTING AND PERSONAL PROTECTION

### RUGER SUPER REDHAWK™ DOUBLE-ACTION REVOLVER

The Super Redhawk is seen as the ultimate development in a heavy frame .44 Magnum double-action revolver of unusual appeal for today's hunter and metallic silhouette shooter. It has all the mechanical features and patented improvements of Ruger's newest double-action revolvers. Unique new Ruger Cushioned Grip panels are anatomically designed to fit the hands of a majority of shooters.

The extended frame is designed to accommodate the Ruger Integral Scope Mounting System which positions the scope rearward for superior balance and performance. Interchangeable front sight system. Offered in stainless steel in a variety of barrel lengths.

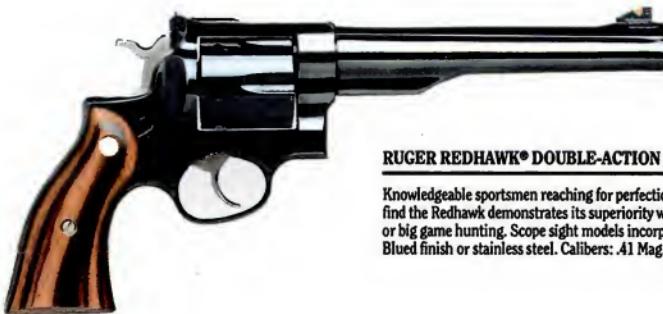
*Scope not included.*



### RUGER GP 100™ DOUBLE-ACTION REVOLVERS

Designed as the ultimate .357 Magnum for police and personal defense use, the new GP 100 includes a heavy frame, rugged .357 Magnum cylinder, and cushioned grip panels which are anatomically designed to fit the hands of the majority of shooters.

A full length ejector rod shroud helps to achieve the slight muzzle-heavy balance considered desirable for rapid double-action firing. Interchangeable front sight system. Available with 4" and 6" barrels, blued and stainless.



### RUGER REDHAWK® DOUBLE-ACTION REVOLVERS

Knowledgeable sportsmen reaching for perfection in a big bore handgun will find the Redhawk demonstrates its superiority whether silhouette shooting or big game hunting. Scope sight models incorporate bases for Ruger rings. Blued finish or stainless steel. Calibers: .41 Mag., and .44 Mag.



# RUGER® RIFLES, CARBINES & SHOTGUNS

**NEW**

*Scope not included.*



## RUGER MINI THIRTY™ SEMI-AUTOMATIC RIFLE

Ruger's new Mini Thirty chambered for the 7.62 x 39mm cartridge is destined to become one of America's most popular deer rifles. This lightweight, compact new sporter (approximately the same size as the Mini-14) is ideal for hunting whitetail and other medium size game in heavy cover. Designed with Ruger Integral Scope Mounts for telescopic sights. One inch Ruger rings included.

*Scope not included.*



## RUGER MINI-14® AND RANCH RIFLE®

The Mini-14 and Ruger Ranch Rifle (illustrated) are rugged, easy handling, lightweight semi-automatics. The Ranch Rifle is designed for use with telescopic sights. Both the Mini-14 and Ranch Rifle are available in full and folding stock models that are ideal for camping and boating. Offered in blued alloy and stainless steel. Caliber: .223 Rem.

*Scope not included.*



## RUGER 77/22™ RIMFIRE BOLT-ACTION RIFLE

The new Ruger .22 rimfire bolt-action is an elegant small game and target rifle. Unique new 3-position safety offers a new dimension in security. Ruger 10-shot rotary magazine provides smooth feeding. Receiver with integral scope bases accommodate Ruger rings.



## RUGER 10/22® AUTOLOADING CARBINE

The Ruger 10/22 offers light weight, short overall length, and mechanical dependability. A 10-shot rotary magazine handles .22 Long Rifle cartridges. The reliable Ruger 10/22 is an excellent choice for small game hunters, target practice or plinking. Standard model or Deluxe Sporter offered.



## RUGER® "RED LABEL" OVER & UNDER SHOTGUNS

A precision-engineered and manufactured shotgun of exceptional value and quality. Excellent balance and superb swing provide superior over and under performance. Offered with 3" chambers in 12 and 20 gauge with 26" or 28" barrels in standard choke combinations.



#### RUGER M-77® BOLT-ACTION RIFLE

Prized as a trophy rifle, this versatile bolt-action is used to hunt all sizes and species of game. Receivers incorporate integral scope bases that accommodate Ruger rings. Available in both magnum and short actions in calibers ranging from .22-250 to .458 Mag.



#### RUGER M-77® INTERNATIONAL BOLT-ACTION RIFLE

This high performance sporting rifle has a full-length, high grade American walnut stock. Short 18½" barrel, open sights, and Ruger Integral Scope Mounts are features. Calibers: (short action) .22-250, .250-3000, .243 and .308 Win., (long action) .30-06, .270 Win.

*Scope not included.*

**NEW**



#### RUGER M-77® ULTRA LIGHT BOLT-ACTION CARBINE

Weighing in at just 6 pounds this easy-to-handle carbine encompasses all of the traditional features and craftsmanship that have made the Ruger M-77 one of the most popular hunting rifles in the world. Short 18½" barrel with iron sights. Chambers include magnum and short action calibers: .270 Win., .30-06, .243 and .308.



#### RUGER® NO. 1 SINGLE-SHOT RIFLES

The Ruger No. 1 Light, Medium Sporter, and No. 1 Tropical Rifles are considered by many to be the ultimate development of a single-shot rifle. These classic rifles test the skill of the dedicated big-game hunter. Alexander Henry style forearm, adjustable folding leaf rear sight, gold bead front sight. Available in a range of calibers, barrel lengths and weights.



#### RUGER® NO. 1 STANDARD AND SPECIAL VARMINTER RIFLES

Standard model has a medium 26" barrel, semi-beavertail forearm, quarter rib with one inch Ruger rings. Varmint model with heavy 24" barrel is tapped for target scope blocks, one inch Ruger rings included. Available in a variety of sporting and varmint calibers.



#### RUGER® NO. 1 INTERNATIONAL RIFLE

Lightweight 20" barrel. Full length forend, adjustable folding leaf rear sight mounted on quarter rib with ramp front sight base and dovetail type gold bead front sight. Calibers: .243 Win., .30-06, .270 Win., and 7x57mm. Weight: Approx. 7½ pounds.



# RUGER® WORLD'S FAVORITE .22 PISTOLS



*Stainless steel model.*

## RUGER® MARK II STANDARD MODEL SEMI-AUTOMATIC PISTOL

These models are basically refinements of the original Ruger Standard and Mark I Target Model pistols, over one million of which have been produced. New 10-shot magazine. Choice of barrel lengths. Blued or stainless steel. Shoots .22 Long Rifle rimfire cartridges only, standard or high velocity.



## RUGER® MARK II TARGET MODEL SEMI-AUTOMATIC PISTOL

Competitive target shooters recognize the excellent handling and performance characteristics found in this version of the famous Ruger semi-automatic pistol, offered in tapered and bull barrel models in a variety of barrel lengths. Undercut front sight eliminates glare. Caliber: .22 Long Rifle only, standard or high velocity.



*Government Model*

**NEW**

## RUGER® MARK II GOVERNMENT TARGET MODEL

A limited supply of the Ruger .22 pistol used by the U.S. Military is now available to civilian sportsmen. This model is identical to the military version except for the "U.S." government markings. Each Ruger Government Target Model automatic pistol is offered targeted by use of a special laser sighting device (patent pending) to exacting military specifications.



**RUGER®  
OLD ARMY.**

## THE STAINLESS STEEL CAP AND BALL REVOLVER

Experienced muzzle loading shooters who have tested and used the Ruger Old Army revolver have been lavish in their praise of this fine cap and ball handgun, one of the finest percussion revolvers ever made. Available in blued finish or corrosion resistant stainless steel. Caliber: .44 Bore (.457").

Entire contents copyright 1987 by Sturm, Ruger & Company, Inc. RUGER is a U.S. registered trademark.

Printed in U.S.A.



WRITE US ABOUT FREE SAFETY CONVERSION FOR "OLD MODEL" (PRE-1973) RUGER SINGLE-ACTION REVOLVERS.

**STURM, RUGER & Company, Inc.  
35 Lacey Place, Southport, Connecticut 06490**

SEE RUGER FIREARMS AND OBTAIN A FREE CATALOG FROM YOUR LOCAL DEALER. FREE INSTRUCTION MANUALS FOR ALL RUGER FIREARMS ARE AVAILABLE ON REQUEST—PLEASE SPECIFY MODEL FOR WHICH YOU NEED A MANUAL.

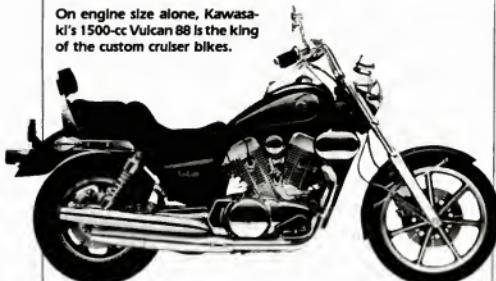
# Cycles

BY NORMAN MAYERSON



## Japanese Twins

On engine size alone, Kawasaki's 1500-cc Vulcan 88 is the king of the custom cruiser bikes.



**I**t's a miracle made in America: among the multitude of brands that once existed in domestic motorcycles, only Harley-Davidson's timeless V-twins have managed to thrive in the face of marketing assaults mounted by the Japanese manufacturers. But there's a second stage of landings coming to chip away at the world's most prestigious brand, hitting our shore with stylish cruiser bikes that out-cubic-inch even the big Harleys.

To lure the faithful away from Milwaukee's "real steel" machines, Suzuki has introduced a 1400-cc version of its Intruder, and Kawasaki is unleashing an awesome 1470-cc model known as the Vulcan 88 (pictured above). Harley's current big gun is the 1340-cc Evolution engine, which, until 1987, was the biggest V-twin in production.

Last year, Suzuki's Intruder 700 hit the Harley-clone mark so precisely that it turned out to be the best-

selling bike in the line. Naturally, its strong points carried over to the new 1400. All the right touches are there—a massive 45° Vee engine highlighted in chrome, a low seat, the classic teardrop gas tank and an enormous 170/80-15 rear tire. If there's any department where the improvement over the 700 Intruder is most apparent, it's in big brother's cleaned up, simplified lines. Every possible wire and cable is neatly tucked away, the carburetors hide under the fuel tank and seat, and even the sparkplugs are concealed by chrome covers.

In the stretching exercise, the 1400 left behind a few of the 700's features. Four-valve-per-cylinder heads have been replaced by three valves, and the cleverly disguised liquid-cooling system of the 700 has given way to an air-cooled front cylinder and oil-cooled rear jug, similar to the GSX-R sport models. The 5-speed gearbox has been trimmed to a 4-cog

transmission. Vibration control has been given minimal attention—there's no counterbalancer system and the crankpins, though offset, are only 45° apart, not 90° as would be needed for perfect balance. It's as though they've added vibration so that Harley fans will feel at home! Available with flat or pullback handlebars and wire spoke wheels, the VS1400 carries a \$5899 price tag.

Kawasaki's King Cruiser forsakes the "simpler is better" philosophy in order to live up to its intended role as the ultimate in this class. True, it has just a 4-speed transmission and carries no tachometer, but it does come standard with cast wheels, liquid cooling and an 8-valve, counterbalanced engine.

The emphasis, instead, is on finish, and everywhere you look the attention paid to outward sparkle is apparent. Polished castings, chromed covers and richly painted sheetmetal leave little room for improvement by the owner. And with hydraulic valve adjustment, a shaft drive and automatic compression release, the owner won't have much maintenance to worry about, either.

When the original prototype for the big bore Vulcan (Kawasaki sells a 750 version, too) arrived in the U.S., it was powered by a 1200-cc powerplant. Rumor has it that the 1470-cc displacement was specified when reports of Suzuki's Intruder 1400 hit the press; Kawasaki maintains that this was the intended size all along, of course. Either way, we can expect the next major volley in the battle for the biggest twin to come from Honda or Yamaha, now struggling along with mere 1100-cc cruisers.

Each year's new model launch seems to bring more clones intended to make inroads on Harley-Davidson's turf, yet the line between the original and its copies remains unblurred. Buyers

most interested in profile appearance go for the technologically advanced imports with their power advantages and modern conveniences.



At \$2899 the EX500 is a fully outfitted sport-bike steal.

The hard core purists still insist on Harley, paying a premium price for tradition and prestige, while appreciating the straightforward directness of the H-D approach. But with the release of these two behemoths, the temptation to go for the modern derivations gets ever greater.

### Spring's best buys

You know the dollar/yen exchange rates are upside down when the Honda automobile folks start to export Ohio-built Accords to the homeland, so you wouldn't expect any bargains to come from across the Pacific in '87. But for under \$2500 there are several machines fit to carry full-size riders on moderate-length journeys. Honda, Kawasaki and Suzuki all have 450-cc bikes that are tried and true friends; for the sportier types there's the Kawasaki 250 Ninja and Yamaha SRX 250, and you can even come up with the single-cylinder Suzuki 650 Savage within that modest budget.

Surprisingly, there are also two entirely new entries in the Very Affordable field, the cruiser-styled Yamaha 535 Virago (\$2699) and the canyon scratcher Kawasaki EX500 (\$2899). Both are 2-cylinder models, and at approximately 400 pounds each, are easier for new or small riders to wrestle around than the liter-size models. Best of all, they both

(Please turn to page 38)

# Your home workshop can PAY-OFF

## BIG...

Earn Extra Income  
Right At Home.

START  
YOUR OWN  
MONEY  
MAKING  
BUSINESS!



FOLEY  
BELSAW

3-IN-1  
Power Feed  
Power Tool.

SEND FOR  
FACTS TODAY!

## Planer Molder Saw

Three power tools in one —  
a real money-maker for you!

The Planer/Molder/Saw is a versatile piece of machinery. It turns out profitable precision molding, trim, flooring, furniture... in all popular patterns. Rips, planes, molds separately... or all at once. Used by individual home craftsman, cabinet and picture framing shops, lumber yards, contractors and carpenters.

Never before has there been a three-way, heavy-duty woodworker that does so many jobs for so little cost. Saws to width, planes to desired thickness, and molds to any choice of patterns. Cuts any molding pattern you desire. Provides trouble-free performance. And is so simple to operate even beginners can use it!

**30-Day FREE Trial!** SEND FOR  
EXCITING FACTS  
NO OBLIGATION—NO SALESMAN WILL CALL

**RUSH COUPON  
TODAY!** FOLEY-BELSAW CO.  
91083 FIELD BLDG.  
KANSAS CITY, MO. 64111

FOLEY  
BELSAW

Foley-Belsaw Co.  
91083 Field Bldg.  
Kansas City, Mo. 64111

FREE  
BOOK

YES, please send me the FREE Booklet that gives complete facts about my new Planer-Molder-Saw and full details on how I can qualify for a 30-Day Free Trial right in my own shop. I understand there is No Obligation and that No Salesman will call.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Zip \_\_\_\_\_

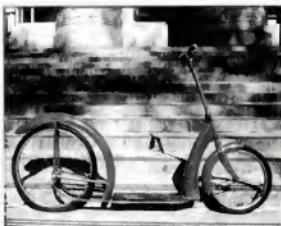
## CYCLES

(Continued from page 37)

offer performance far better than the bargain-basement prices would lead you to expect.

The EX500 redirects the recent trend in middleweight bikes from increasing weight and complexity toward the more rational and cost-efficient approach of reduced weight and greater simplification. The 498-cc parallel twin is derived from the 454 LTD engine, modified to produce 20 percent more power. With eight valves, a 10.8:1 compression ratio and an 11,000 rpm redline, the engine pumps out serious horsepower. Think of it as half of a Ninja 1000 powerplant and you won't be far off. However, with so much less weight to haul around, it's anything but half fast.

Chassis specifications further certify the EX500 as a full-blooded sport bike. The frame and swing arm are rectangular



Ingo scooter uses an offset rear hub.

lular steel tubing. An angular half fairing dresses up the appearance appropriately, and Uni-Trak rising-rate suspension components soak up bumps at the rear end. Wheel size is a fashionable 16 in. at both ends. New twin-piston brake calipers from the big K are so effective that the bike burns off speed rapidly with only a single disc up front.

The Virago 535 is similarly loaded with high-value components: shaft drive, an electric fuel pump and fine detailing of all the bits and pieces. The clever engineers responsible for this model have succeeded in pulling off a number of illusions that contribute to its visual appeal. There appears to be a stubby set of exhaust pipes to handle engine noise control, but closer inspection reveals tricky plumbing that conceals an intermediate silencer. The cylinder head covers atop each barrel hint of Harley-Davidson rocker gear, but in fact they just hide the sparkplug and its wire. Of course, the traditional gas tank is just a dummy cover, the real reservoir being located under the seat.

As a boulevard cruiser the 535 Virago offers a high profile at a very reasonable cost. With 45 hp on tap, it has muscle enough for the job, and the low 27.6-in.

seat height allows easy control at low speeds. The stretched out 59.5-in. wheelbase gives seating accommodations adequate for all but the biggest riders, though the short-travel suspension will likely keep your journeys short as well. As the lone V-twin populating the lower end of the cruiser class, the Yamaha is a remarkable bargain as well as a fully capable short-haul cruiser.

## Eccentric travel

The current boom in kid's scooters might well remind senior readers of homebuilt contraptions cobbled together in our earliest days of tinkering. One very clever 2-wheeler from the 1930s was inspired by just such scrap-heap engineering, and it resulted in a now-classic bit of history known as the Ingo. Patented by Phillip and Prescott Huysen in the early years of the Depression, the scooter used an off-center rear wheel hub and developed momentum by pulling on the steering bar and setting up a rocking-rhythm motion. Though it was produced for just three years before WWII, the Ingo made a memorable footnote in the annals of 2-wheel transportation.

In the initial prototype trials the Huysen brothers were obliged to test the scooter far from their Chicago neighborhood, lest the locals label them as crazies. After securing a patent, they had action movies shot and displayed their invention to buyers at the New York Toy Fair. Rather than manufacture it themselves, the brothers released the rights to the Borg Warner company, manufacturer of automotive equipment, which later passed it along to their Ingorsol division.

Something of a cult following resulted from the mass-production release. It made the rounds of newsreels and Hollywood fan magazines, and park rentals were common. Appearances in Three Stooges comedies and Ingo polo matches were overshadowed by a marathon 12-day ride from Chicago to Miami on one of the scooters by Phillip Huysen.

With the standing platform just a few inches off the ground, there's little chance of a rider getting hurt in a fall, and there's no chain and sprocket works to snag stray extremities. First sold under the Exercycle name, early advertising promised gentle daily exercise, though later pitches stressed the recreational aspect. The novelty of the vintage Ingo scooters has made them worthy of saving and restoring; don't be surprised when the propulsion principle of the eccentric rear wheel hub also makes another appearance in the current craze of unique scooter runabouts.

# Stop Taking Vitamins

If you think the vitamins you are now taking are doing you any good, wait until you hear the latest news on why they may not.

By Joseph Sugarman

This may come as a shock. But according to the latest research, those vitamins that you take every day may be doing you absolutely no good. For example.

**FACT:** Vitamins should be taken after a meal—never before. The body must first have protein, fats, or carbohydrates in the digestive tract to properly break down the vitamins for proper absorption.

**FACT:** Your body has a need for a natural vitamin balance. Too much of one vitamin may cause another vitamin to be less effective. For example, vitamin A should be taken with vitamin E but excessive iron should not.

**FACT:** If you take too much calcium, you may deplete the magnesium in your system. And you need magnesium to convert food into energy.

**FACT:** Some vitamins are best taken in the morning and others at night. For example, the trace element chromium helps break down the sugar in your food which in turn creates energy—perfect to start the day. But at night you should take Calcium which has a relaxing effect—perfect for the evening.

**FACT:** Athletes or people who exercise a great deal need vitamins more than people who don't exercise. Vitamins are depleted at a much faster rate during exercise than during any other period of time.

But there was a series of other facts that surprised me too. For example, despite everything I've just mentioned on the care in taking vitamins, there are those people who need vitamins because of the mental or physical activity that they undergo. People on a diet, under stress, those who smoke, women who take contraceptives and even those who take medication—all rob their bodies of some of the essential vitamins and minerals that they need to help combat the various habits or conditions they are under.

And with vitamins in the proper balance and at the proper times, you may have more energy and vitality. Little changes may take place. Your nails may become stronger, your hair may become lustrous and your skin may remain more elastic which will keep you younger-looking longer.

## DOCTORS HAD IDEA

About two years ago a group of doctors had an idea. They realized that many people were taking vitamins and not really noticing any difference in their health. They also realized that, based on the latest nutri-



Stop taking that innocent looking vitamin pill until you read this report.

tional findings, the vitamins people were taking may not have been doing them any good.

So they formed a group of advisors consisting of nutritionists, dieticians, dermatologists, biochemists and physicians, and developed one of the most effective combinations of vitamins and minerals, formulated four tablets—one for the morning and one for the evening—and one for men and one for women and then started a test program that lasted over two years. The results speak for themselves.

It was ideal for weight loss programs and it was ideal for people under stress. It helped many increase their energy levels. Smokers benefited. Some under medication benefited. And before long MDR Fitness Corp., the company that had developed the program, became one of the fastest growing vitamin companies in the United States. And no wonder.

## SEVERAL BENEFITS

With a fresh vitamin and mineral balance, taken in the right quantity in the right combination and at the right time, several obvious benefits occur. First, you may develop a better mental outlook because you've got the energy and the zest to accomplish more. As a result of the trace elements copper, zinc and manganese, your body is helped to make its own anti-aging enzymes that keep you fit. Improvements in your vitality translate into everything from better job performance to a greater sense of well being.

JS&A has been selected by the vitamin company to introduce their medically formulated vitamin program. Every two months we send you a fresh two month's supply of 120 fitness tablets—one to be taken after breakfast and one after dinner.

During the first two months, you will have ample opportunity to notice the difference in your energy level, your appearance and your overall stamina. You should notice small changes. Your complexion may even take on a glow. Some of you may notice all of these changes and others may notice just a few. But you should notice some of them.

If for any reason, you do not notice a

change, no problem. Just pick up your phone, and tell us not to send you any more vitamins. And if you're dissatisfied and ask for a refund, you won't even have to send the empty bottle back. It's yours free for just giving us the opportunity to introduce our vitamins. However, if you indeed do notice a difference (which we are confident you will), you'll automatically receive a two-month's supply every eight weeks.

## ONE MORE INCENTIVE

I'm also going to give you one more incentive just to let me prove to you how powerful this program really is. I will send you a bonus gift of a fitness bag with your first order. This beautiful bag will hold all your fitness gear and it's great too for short vacation trips. It's a \$20 value but it's yours free for just trying the vitamins. Even if you decide not to continue, you keep the fitness bag. I am so convinced that you will feel and see a difference when you take these vitamins that I am willing to gamble on it with this unusual offer.

Vitamins indeed are important. And with today's research and new nutrition technology, you have a greater chance to achieve the fitness and health levels that may have eluded you with the typical store vitamins or the poor advice we may get in health food stores or from friends. Here is a safe, risk-free way to get one of the best vitamin programs in the country, formulated by a physician, with the right combination of vitamins, minerals and trace elements, in a convenient program that assures you of delivery every two months. I personally take and highly recommend them. Order your trial quantity, today.

To order, credit card holders call toll free and ask for product number (shown in parentheses) or send a check and include \$2.50 for delivery.

Men's Vitamins (1155CBA) ..... \$24  
Women's Vitamins (1156CBA) ..... 24

# JS&A

One JS&A Plaza, Northbrook, Illinois 60062  
**CALL TOLL FREE 800 228-5000**  
IL residents add 7% sales tax. ©JS&A Group, Inc., 1986

N I S S A N   H A R D B O D Y

# BIGGEST. WIDEST. STRONGEST.

**A**ND FIRST! Here's the first truck ever to win the prestigious Industrial Design Excellence Award (IDEA). It's loaded with power. Loaded with performance. And all at our lowest sticker-price.

**BIGGEST CARGO SPACE.** Pack it up! With the most cargo volume of all leading compact trucks, it'll take all you can dish out. Double-wall bed construction means twin layers of steel insulate the steel outside from whatever you throw inside. And there's more between-wheel-well space than any other pickup in its class. A full 3.4 feet for those wide loads.

**WIDEST CAB.** Size it up. Sit three across with the most hip room of all leading standard compact trucks. Nissan's roomiest cab ever was



designed around you. The enormous windshield and side glass give you a commanding view. And there's more leg, shoulder, and head room than you ever thought possible.

**STRONGEST ENGINE.** Turn it on, it's made to perform. A 2.4-liter, fuel-injected engine sees to that. Twin-spark plugs and a hemi-head help crank out the most horsepower and torque of all the leading standard compact trucks. The 5-speed is standard.

Independent front suspension, steel-belted radials, and rear leaf springs combine to provide a smooth, easy ride without sacrificing payload. The rear brake's proportioning valve automatically adjusts to payload for improved braking under load. The Hardbody 4X2. Works tough. Plays rough. See your Nissan Dealer today.

**FOR TOUGHNESS AND VALUE**

**THE NAME IS NISSAN**



 NISSAN

# Freewheeling

BY WADE HOYT

## Technoid Of The Year



Lancia's ECV looks like and is based on last year's S4 rally car.

**J**an Norbye, our friend in Europe, reports that Lancia's Experimental Composite Vehicle just bristles with advanced thinking. Its unitized body/chassis is made of carbon fiber and Kevlar impregnated with epoxy, surrounding a foam and honeycomb core. The result is a body/chassis

the techno fringes, too—an intercooled, twin-turbo, 16-valve, 1.7-liter 4-cylinder that puts out 600 hp at a screaming 8000 rpm. Part of its secret is the "thermal symmetry" of its 4-valve cylinder heads.

In a conventional 4-valve design, the two hot exhaust ports are on one side of the head and the cooler intake ports are on the other side. Differences in temperature and metal expansion on opposite sides of the head can be harmful in a highly stressed, turbo race engine.

Lancia's solution is to cross-switch the ports, so that each side of the head has one intake and one exhaust valve. Doing so requires a fiendishly complex intake and exhaust system (see illustration at right) with manifolds splitting off in all directions.

Used in a high-performance road car, crisscross heads would allow a lightweight Four to produce the power of a V6 or V8 engine.



Composite chassis is light and strong.

that's 20 percent lighter, but it's just as rigid as the super-stiff S4 rally chassis on which the ECV is based. In less rigid street cars, the weight savings over a steel chassis could be 40 percent.

Even the wheels have hon-eycomb centers and carbon fiber-epoxy rims, making them 40 percent lighter than alloy wheels.

The engine is way out on

## Staff cars

From time to time we get a letter from a reader outraged over one of our evaluations (either we've loved a car he hates, or vice versa), and he suggests that we leave the road testing up to "magazines that specialize in cars."

I think we've got an automotive staff whose knowledge and enthusiasm matches that of our friends at any of the major "buff" magazines. A sure indication of that is the kinds of cars and motorcycles our staff members own.

In a survey of the Automotive Department's cars and bikes, I included the managing editor and editor-in-chief because they're both former presidents of the International Motor Press Assn.

The following list shows a range of auto enthusiasm to rival any "buff book":

### Cars and Trucks

- '87 Corvette Roadster
- Chevy Malibu
- '86 Honda Civic wagon
- Mazda B2000 pickup
- '85 Cadillac Eldorado
- '84 Fiero 2M4
- Jaguar XJ6
- Mazda 626
- Thunderbird
- '82 Mazda RX-7 Showroom Stock racer
- Pontiac Grand Prix
- '80 VW Scirocco
- Honda Accord
- Rover 3500
- '79 Cadillac Seville
- Saab 900 EMS
- VW Rabbit
- '78 Chevy Malibu
- '77 Honda Accord
- Pantera GTA
- '74 Ford F250 pickup
- Mercury Marquis
- VW Dasher GT
- '73 Porsche 914 1.8
- E-Production racer
- '72 Porsche 914 1.7
- '71 Porsche 914 1.7



Complex 1.7-liter twin-turbo Lancia Four churns out 600 hp.

### Lynx Formula Vee racer

Homebuilt Formula Vee

'69 Camaro Rally Sport conv.

'68 Firebird conv.

'67 Camaro conv.

Camaro Rally Sport

'65 Buick Riviera

Thunderbird conv.

'64 VW Microbus

Berkeley roadster

Kellison J4-R competition coupe

'58 Devin SS C-Modified racer

'57 Thunderbird conv.

'56 Porsche Speedster replica

'36 Ford V8

### Bikes

'87 Yamaha TZ 1000

'85 Puch moped

'78 Kawasaki KZ 400

Yamaha SR 500

'74 Yamaha TZ 350 road racer

'73 Yamaha RD 350 road racer

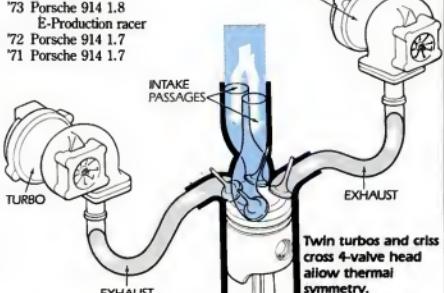
'72 Kawasaki H2 750 3-cyl.

'62 Norton Dominator 88 500

'56 Ducati 125 Grand Sport

factory formula racer

If that many wheeled toys spread around among nine guys doesn't qualify us as rabid car and bike nuts, you haven't talked to our wives!



# NEW/WORKSHOP

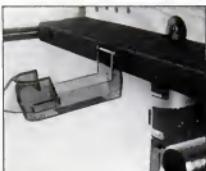
## Bolt-On Router Table



Router table bolts to saw table. Here, the saw fence is used to route a groove. Auxiliary wood fence comes with the router table.



Router is attached to an adapter plate which mounts to table underside with four wingnuts.



Clear-plastic guard pivots out of the way. Notch cut in wood fence permits partial edge routing.

The Bosch router table provides a way to increase your routing capabilities by using your table saw. The 10-in.-wide x 27-in.-long, heavy-gauge steel table (\$102) bolts to the saw table edge. It fits most Delta and Sears table saws and other 27-in. saw tables. Attach a router

to the adapter plate, which then mounts under the table with four wingnuts. Utilize the saw fence to rout precise dados, rabbets and grooves. The adapter plate will accommodate a sabre saw, too. For more information, contact Bosch Tools, 3701 Neuse Blvd., New Bern, NC 28560.



Thin-kernf saw blade produces fast, smooth cuts. This 10-in. blade has 40 carbide teeth.

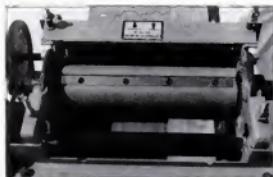
## Thin-kernf blade

The new 'Cuda' thin-kernf carbide saw blade reduces friction and waste for a faster, smoother cut. Horizontal carbide teeth and an ultrathin body produces a kerf that's about .095 in. wide. The American-made blade is available in sizes ranging from 6½ to 10 in. dia. Prices range from about \$12 to \$36. You can use 'Cuda' blades to cut softwood, hardwood, plywood and paneling. For more information, contact Credo Industries, 2765 National Way, Woodburn, OR 97071.

## Power sander

Here's a clever new tool that converts a planer into a high-speed power sander. Called Tri-Sand, it mounts onto the planer without removing the cutterhead. It fits Foley-Belsaw and Sears planers. The sanding pad consists of industrial-grade sandpaper bonded to a flexible, nonwoven pad. Tri-Sand comes with three 100-grit sanding pads, a reduction pulley and all necessary parts to make the conversion. It

costs \$89.95 postpaid from Foley-Belsaw, 6301 Equitable Rd., Box 419593, Kansas City, MO 64141. Extra sanding pads cost \$7.95 for three.



Turn your Foley-Belsaw or Sears planer into a power sander. Sanding pad mounts on without removing the cutterhead.

## Bench press

In an effort to save space, many home workshops are equipped with benchtop tools. In most cases, however, this means sacrificing power and features. A new line of Black & Decker benchtop drill presses boasts quality and performance usually found on floor-standing models. The 13-in., 12-speed tool shown (No. 9402), features a ½-in. chuck, cast-iron housing, ball-bearing construction and rack-and-pinion gearing. It's powered by a 7.4-amp motor.

The 13-in. model costs about \$309. Also, 8-in. (\$185) and 10-in. (\$228) models are available. For details contact Black & Decker, 10 North Park Dr., Box 798, Hunt Valley, MD 21030.



Compact, 32-in.-tall drill press has 12 operating speeds ranging from 250 rpm to 3100 rpm.

## Concrete buster



Powerful rotary hammer bores large diameter holes in concrete. Chipping feature breaks away bricks and concrete quickly.

Tackle tough concrete hole-boring and chipping jobs with the Skil model 1750 (\$460) rotary hammer/drill. A 6-amp. motor delivers 550 rpm and 3150 blows per minute. The heavy-duty chuck accepts bits from 3/16 to 1 in. dia. For details, contact Skil, 4801 West Peterson Ave., Chicago, IL 60646.

# AVOID COSTLY PROP REPAIR

**It costs more than you might think when you misjudge how shallow the water really is.**

Here's a reliable way to help you protect equipment and, more importantly, your passengers. A Lowrance digital sonar instantly displays the water depth under the boat, even at full speed. Use the 3400 to become familiar with the waters you boat in and set the alarm to help you stay in areas you consider safe.

The 3400 is scanning the bottom 100 times a second. A loud tone sounds the instant you encounter depths outside the range you've selected.

Steer clear of shallow water hazards. Look into a 3400. It looks out for you.



3400 Digital Depth Sounder  
Mounts in dash and is only 2.9" in dia.

For more information on the 3400 and other Lowrance depth sounders fill out the coupon below and mail to:

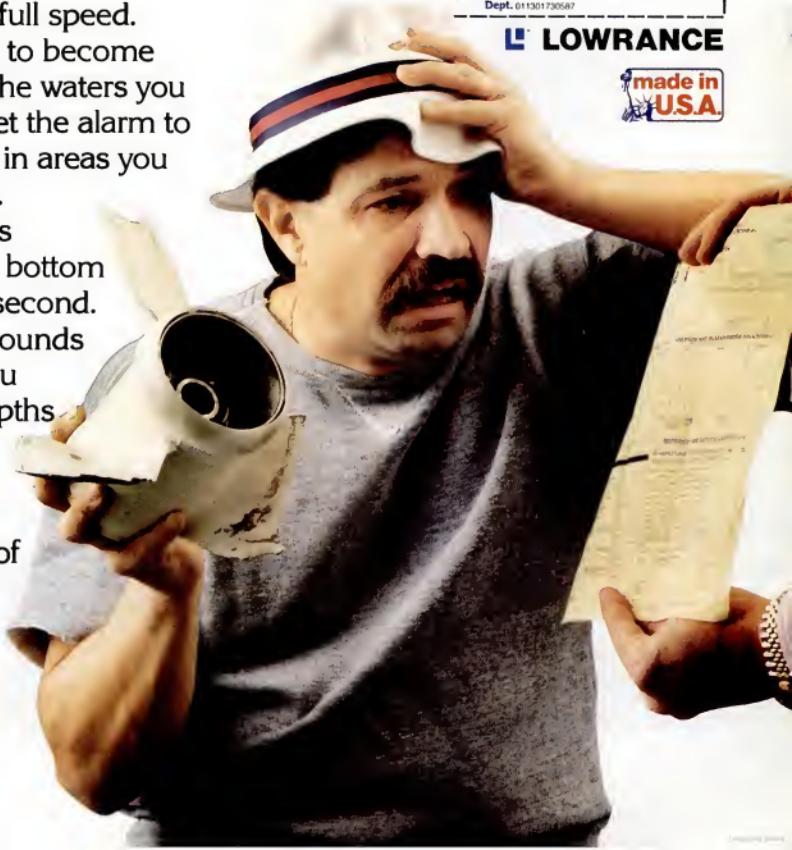
Lowrance Electronics, Inc.  
12000 E. Skelly Drive • Tulsa, Ok 74128

Name _____
Address _____
City _____

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

Dept. 011301730587

**LOWRANCE**



# Inside Detroit

BY JIM DUNNE



## GM's 1990 Fwd Minivan



Real-world derivative of the Pontiac Trans Sport that was on PM's October '86 cover is nearly as radical as the show car.

A sleek, minivan now under test at GM will make its appearance in the Chevrolet and Pontiac lineups in 1990. The radically styled vehicle is GM's answer to the new group of passenger vans—Chrysler, Toyota, Nissan, Mitsubishi—that are taking a big chunk out of the family station wagon market.

GM's van will be the first of its type from the company to offer front-wheel drive. Body construction will be similar to that of the Fiero, with a cage of steel covered by plastic panels. Engines will be taken from existing GM drivelines, with a 2.5-liter 4-cylinder as the base engine, and a 2.8-liter V6 as the performance option.

Styling is unusual. The windshield is slanted sharply, and the hood carries the angle forward to the top of the headlights. Front doors are set aft of the front wheels so there is no wheel hump to step over when entering.



Rear seat passengers enter via a sliding door on the passenger side.

The vehicle started GM's standard 60,000-mile prototype testing drive early this year. That test will take it over high-speed tracks, dirt roads, Belgian-block surfaces and other hazards to measure body integrity, engine reliability, brakes, transmissions and suspension life. Later, more testing will be done to refined prototypes, with some vehicles repeating the standard durability test.

### Not quite

Ford's design of the 1988 Lincoln Continental has been criticized as being too much like that of the Taurus/Sable. But the new luxury cars are quite a bit different in appearance. For one thing, the Lincolns rely less on the aero



Front-drive '88 Lincoln Continental is more formal than Taurus.

look. Instead, their lines are more stately and formal. Doors and side panels are more upright, show less tumblehome than the successful Ford and Mercury sedans. Up front, a standard grille dominates the styling.

Similarities between the Lincoln and the smaller cars are inevitable, though. Both use front-drive with V6 engines; window glass is mounted almost flush with the sheetmetal; plastic bumpers wrap around all the way to the wheel wells and are colored the same as the body.

The new Lincolns replace the rear-drive Continentals in showrooms next fall.

### GM fights back

A little late, but GM will have three completely restyled personal coupes to compete against Ford's highly successful Thunderbird and Cougar next year. The Olds Cutlass Supreme coupe will be the most radically changed of the three. By comparison, the Buick Regal and Pontiac Grand Prix will appear conservative.

Still, the Cutlass will be unmistakably an Olds. The front end features a split grille and small headlights. At the rear, the C-posts are covered by the side glass, imparting an open look to the

greenhouse. Underneath, the chassis and drivetrain will be all new, too. In place of the rear-drive, a front-drive setup similar to that of the Ciera will be used. Say goodbye to the V8 in this model. Olds will use a V6 as the standard powerplant. But in a switch from the normal way of doing things, the premium engine will be a 4-cylinder—Olds' 2.3-liter dohc Quad Four.

### Thunderbird Super Coupe?

That could be the name of Ford's top performer in the 1989 Thunderbird line. Plans are to replace the turbocharged 4-cylinder engine in today's Turbo Coupe with a supercharged V6.

Will Ford call the new model a Super Coupe? The V6 will have 3.8-liters displacement, a big boost from the 2.3-liter Four used in the Turbo Coupe, which will make for better low-speed performance.

The supercharger will increase low-speed engine output, since the device has no lag time—a major complaint against the turbo.

### Express delivery?

Chevrolet showed its turbine-powered Express dream car on the auto show circuit earlier this year, but delivery of the car to customers won't be for another 15

(Please turn to page 46)



Hot engine in '88 fwd Cutlass is a Four; base engine is a V6.

Buckle up — Together we can save lives.

With a quality  
record this  
good...

**1981.**

Nationwide quality survey  
shows, Ford Motor Company is  
making the highest quality cars  
and trucks designed and built  
in North America.\*

**1982.**

Ford does it again.

**1983.**

And again.

**1984.**

And again.

**1985.**

And again.

**1986.**

And again.

...we can offer  
a warranty  
this good:

**6 0 0 0 0**

Ford Motor Company's  
new 6-year, 60,000  
mile warranty.

With a quality record better  
than any other major American  
carmaker, we realized we could  
give you a better warranty than  
we ever had before.

A 6-year, 60,000 mile  
powertrain warranty on all our  
new Ford, Mercury, Lincoln  
and Merkur cars, our vans,  
and our light trucks.\*\*

With a warranty like that,  
and a quality record like  
ours, there's really no reason  
to go with anyone else.

Restrictions and deductible apply.  
Ask your dealer for a copy of this  
limited warranty.



**Quality is Job 1.**

Ford • Lincoln • Mercury • Merkur  
Ford Trucks • Ford Tractors

\*Based on an average of owner-reported problems in a series of surveys of '81-'86 models designed and built in North America.

## INSIDE DETROIT

(Continued from page 44)

years, if ever. Details are impressive: rear-mounted turbine engine, 150-mph cruising speed, 25-mpg fuel economy, three TV screens that tell the driver everything he wants to know about the car and his location, and an overall height of less than 4 ft. The body panels are made of plastic and, in the case of the rear deck lid, a balsa wood sandwich.

Express is designed as a high-speed, long-distance commuter car that will travel on special highways at over 125 mph. That's in the future. For now,

Chevy put Express together to see how a lot of futuristic ideas could fit together in a car that the GM division is working toward for the next generation.

### Stars and Stripes to intake manifolds

That seems like a long jump, but there may be a direct relationship. A drag reduction film made by 3M was applied to the hull of the America's Cup winner to give it more slipperiness through the water. The film has microscopic grooves in its surface that reduce turbulence as it passes through water.

Now, it has been suggested that the

same film can reduce air turbulence and drag in intake manifolds, acting on the intake stream of air in the same way it acts on water. Look for some type of grooving to appear on the inside of engine manifolds in the next year or so. Engines will take in more air, and efficiency (power output) will rise.

### New tires needed

Work on active suspension systems at Lotus Cars Ltd. in England will lead to a new type of tire. That's the word from Michael Kimberley, chief executive officer of the Lotus Group, who says that the tires on active suspension cars are subject to different forces than those on cars today. "We're working with two tire companies (one European, one American) to develop a new type of tire," Kimberley points out. "We need to soak up more road shock in the tire, and there is no need for an extreme footprint on the road surface."

Active suspensions are being planned for a number of high-performance cars in the next couple of years. Typically, the system eliminates springs and shock absorbers, and in their place uses computer-controlled hydraulic struts. The struts can control body roll to less than  $\frac{1}{2}$  of 1 percent in sharp curves. When the body stays level for virtually all modes of driving, the tires can be designed for less sidewall rigidity. On the test Lotus, the action of the struts can be varied by the driver, thus changing the ride or handling.

"Active suspensions can give you total and utter ride control," Kimberley says. "You can have either Cadillac Boulevard or Lotus Grand Prix with the same suspension."

### Dream truck

Aerodynamic shapes and advanced electronics are now spreading to those tough off-road vehicles. Chevy has a Blazer XT-1 concept vehicle that captures all the advanced features you see on many dream cars at auto shows.

While the XT-1's innovations admittedly are 15 years away from production, there are a few details of the 4-wheel-drive truck that will work their way into Blazers of the near future, like 4-wheel steer, steer-by-wire and 17-in. tires.

Other hints of what's in store for the 1990s are a steering wheel that turns only 90° to each side, radically variable steering ratios that range from lightning quick 3:1 at the low end, to a normal 16:1 for highway driving, and an instrument panel that presents information in a 3-dimensional picture. In the latter, the gas tank level, for instance, is shown as a block of fuel that gets smaller as gas is burned. The engine is an all-aluminum V6 of 90° that is much like the engines found in today's vehicles.

## NEW Breakthrough Design Adjustable Socket Kit

U.S. AND FOREIGN  
PATENTS PENDING



### This One Tool Replaces Twenty Sockets

No more need for a whole set of individual sockets. No more fishing around in your tool kit for the right size. This new CHANNELLOCK 906 Adjustable Socket does it all. Replaces 20 individual sockets. Fits 20 bolt or nut sizes, both metric and standard. Best of all —

- IT'S SIMPLE TO OPERATE. Just turn the knurled collar and the triple action jaws lock into a can't-slip grip on the bolt or nut as shown in illustrations.
- BUILT TO LAST. PRECISION MADE of high grade forged steel. Tough enough to withstand 1,200 inch lbs. of torque.
- COMPACT, EASY TO CARRY on your boat, car, truck, tractor, motorcycle.

- DOUBLES AS A NUT DRIVER. Just connect a 3/8" spinner handle onto the adjustable head.
- SIZE RANGES - Standard: 11 sizes 5/16 through 5/8 inches Metric: 9 sizes 8 through 16 mm.
- LIFETIME GUARANTEE



Place CHANNELLOCK 906 over nut or bolt. Rotate knurled collar to tightest fit. Triple action jaws close and lock into a can't-slip grip.

Send for catalog information.

**CHAN  
NEL  
LOCK**

For You Who Want The Best

© 1986 CHANNELLOCK, INC. Meadville, PA 16335

# *For the Way You Compete...*

You don't have to race to have a taste for competition. Or to drive the most race proven street tires on the road today. Firestone Firehawk performance radials. Street tires we've raced at America's toughest tracks, pushing them to the limit to prove and improve their performance in our own Firestone Firehawk Endurance Championship series. The same ones you can buy now at your Firestone retailer. Our V-speed rated Firehawk SV.<sup>™\*</sup> Our H-speed rated Firehawk GT.<sup>™\*</sup> Proven in endurance racing like no other street tires made. Because, like you, we're driven to win.

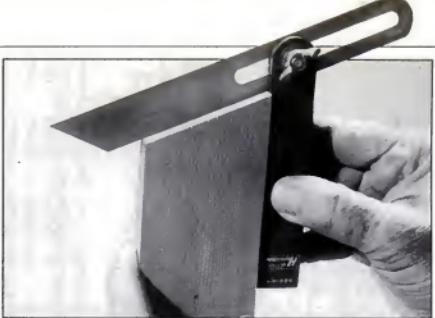
## *FIRESTONE FIREHAWK PERFORMANCE RADIALS*

Driven to Win.

\*In competition, Firehawk performance radials are modified by shaving their treads to racing depth. See your Firestone retailer for written speed rating and tire safety information.

# Workshop Minicourse

BY ROSARIO CAPOTOSTO



Use a T-bevel to check angle of a miter cut. Hold tool's handle, or stock, firmly against the workpiece edge. Sliding, pivoting steel blade adjusts up to 180°. Tighten wingnut to hold blade securely.

## Using A T-Bevel

This simple tool is indispensable for marking, transferring and checking angles. The sliding T-bevel, also called a bevel square, has a pivoting steel blade that adjusts to mark angles from 0 to 180°. It's particularly helpful when marking odd angles and dovetail joints.

Use a protractor to set the T-bevel to a desired angle. Hold the tool's handle against the base of the protractor, align the blade's edge with the protractor centerline and adjust the blade to the desired angle. Lock the blade by tightening the wingnut.

It's even easier to transfer an existing angle. Simply adjust the blade to match the angle and then lock it securely. You can now transfer the angle to a workpiece or read the degrees of the angle directly off a protractor.

Another useful application for a T-bevel is to check power tools when doing angular work. This includes setting exact blade angles on a table saw and radial-arm saw. Also, set the angle of the worktable on drill presses, band saws and jointer fences. Although power tools have angle indicators, these scales often are inaccurate. Use the T-bevel to check and reset the indicators.

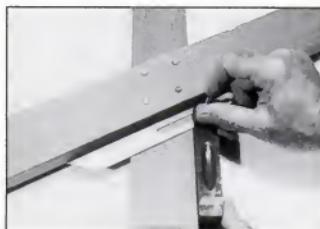
Sliding T-bevels are sold in hardware stores and through mail-order tool catalogs. Prices range from \$10 to \$20.—Rosario Capotosto



Adjust the T-bevel to a desired angle with the aid of a protractor. Hold the tool so that its blade aligns exactly with the protractor's centerline.



After setting the T-bevel to the desired angle, mark the workpiece using a utility knife. Hold the tool firmly against the work and keep fingers away.



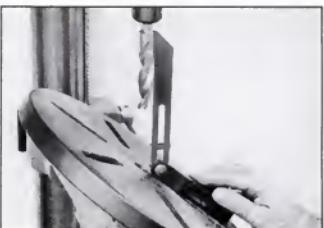
To transfer an existing angle, loosen the blade and slide the tool against the angle. Then, tighten the wingnut to lock the steel blade in position.



Sliding T-bevel is an excellent tool for checking bevels and chamfers, too. Here, the tool is adjusted to 45° and is being used to check a chamfer.



Use a sliding T-bevel to position blade angles exactly. Extend the sliding blade fully to allow the handle to rest flat on the saw table's surface.



Bore angular holes accurately with the help of a T-bevel. Adjust the tilting drill press worktable until the tool's blade is parallel with the drill bit.

**It's never too soon or too late  
to do something right for your deck...**

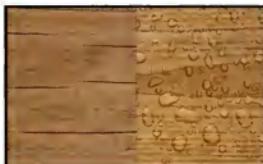


The right side of this deck was brightened quickly and easily in less than 30 minutes with a spray application of new Wolman Deck Brightener.

**...thanks to Wolman® Protection Products**



**Restore**



**Protect**



**Beautify**

Whether your pressure-treated wood deck is brand new or old and gray, you can do something right now to restore, protect, or beautify it. The *Wolmanized*® pressure-treated wood people have a complete line of products for total deck care. **Wolman® Deck Brightener** to restore old, weathered wood to a bright, natural look. **Wolman RainCoat® Water Repellent** to protect wood by minimizing warping, splintering, and cracking. **Wolman® Deck Stains** with water

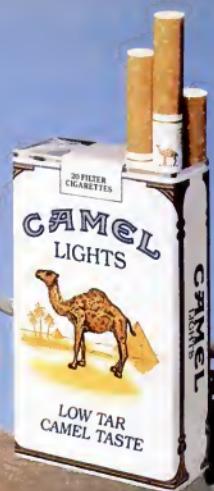
repellent to beautify and protect pressure-treated wood. You'll find them all in a *Wolman* Deck Care Center at quality building supply dealers, hardware and paint stores. For information about your deck problem, or the location of a *Wolman* Deck Care Center near you, call 1-800-556-7737. Or write to the Koppers Company, Inc., Protection Products Division, Pittsburgh, PA 15219.



From the *Wolmanized* Pressure-Treated Wood People

# CAMEL LIGHTS

Share a new adventure.



SURGEON GENERAL'S WARNING: Cigarette  
Smoke Contains Carbon Monoxide.

9 mg. "tar", 0.6 mg. nicotine av. per cigarette by FTC method.

# Audio

BY FRANK VIZARD



## Digital Dexterity



Kenwood amplifier had digital inputs for better CD sound.

If you thought "digital" was a word only to be used to describe a compact disc player, think again. In the near future, every component in an audio system will be able to bear the word "digital."

Toward the end of this year, for example, digital audio tape (DAT) players will arrive on store shelves. DAT decks promise the performance of compact discs with the convenience of cassettes. DAT offers recording capability while CD does not. Additionally, DAT's smaller size makes it even more suitable for personal, portable and car audio products.

While DAT is still some months away, some hi-fi amplifiers already sport the word digital. Two examples are the Kenwood KA-3300D and the Luxman LV-109 amplifiers.

At this point in time, the word digital used in connection with amplifiers means the amp is capable of receiving an input signal from a CD or DAT player in purely digital form. In the past, the digital signal would have to be converted to analog form before it could be routed through an amplifier.

Postponing the digital-to-analog (D/A) conversion stage so that it takes place within the amplifier prevents the slight degradation of the signal that would normally occur when the signal is transferred from the source unit to the amp. Having listened to the LV-109 on more than one occasion, the sonic benefit of a direct digital-to-digital connection is audible—although you do have to listen closely to appreciate the improved performance.



Sony's latest CD changer uses carousel arrangement for five discs.

To take full advantage of the digital connection, your CD or DAT player must have digital output jacks. Not every CD player on the market has digital outputs, but as you might imagine, Kenwood and Luxman both have such models. Kenwood, in fact, makes the connection between its DP-3300D CD player and the KA-3300D amplifier with a fiber-optic cable. This represents an effort to keep the signal as pure as possible, since fiber-optic cable is virtually free of distortion.

Both the Kenwood KA-3300D (\$1199) and the Luxman LV-109 (\$1500) are compatible with CD players that lack digital outputs. Undoubtedly, however, digital inputs and outputs will be common on many components as time goes on.

While digital amplifiers are sure to be commonplace in a few years, the digital format is spawning a few unusual items. Sony, for example, has developed a multiday CD unit. Its front-loading carousel resembles a pizza tray capable of holding up to five discs. The CDP-C5F (\$500) is an alternative for people who don't want to be bothered with magazine-loading multidisc players. The CDP-C5F offers six hours of continuous play and the programming of up to 32 selections. Disc-to-disc changes are made in about three seconds.

The CDP-C5F is also one of a number of new Sony CD players incorporating a new aspheric optical pickup lens. This single lens weighs a tenth of a gram and is about a fifth the size of previously used multiple-lens designs.

### Innovative speakers

If you ask most people to describe the appearance of a loudspeaker, they'll draw a rectangular box. The vast majority of speakers do have a box-like shape, but a few manufacturers have developed speakers that are anything but square.

A West German speaker company called Magnasphere, to name one example,

has three models (Beta, Gamma and Delta II) that use ball-shaped and baffle-free tweeters and midranges. Only the woofers are housed in traditional enclosures.

Winner of a number of audio awards in France, these ball-shaped drivers are designed so that the high and midrange frequencies emanate sound in all directions in much the same way a naked light bulb emits light. When the speakers are properly placed at least 2 ft. from a wall, you should not be able to perceive the direction from which the sound is coming. Magnasphere speakers are expensive, however. List price is \$895 each for the Beta model, \$1095 for the Gamma, and \$1495 for the Delta II. Magnat America Inc. of Marblehead, Mass., is the U.S. distributor.



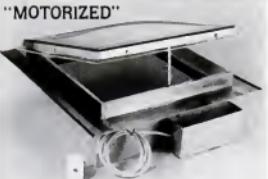
Sound cylinders from Ohm Acoustics—music-in-the-round.

A more unusual speaker shape comes from America's Carver, better known as an amplifier maker. The Amazing Loudspeaker is 6 ft. tall and weighs 145 pounds, but is only 1½ in. thick. The price is also amazing: \$1500 per pair.

Finished in black lacquer, the Amazing Loudspeaker uses a long ribbon driver to reproduce frequencies over 125 Hz to well beyond the audible range. This long, uninterrupted acoustic line is critical to delivering lifelike height, depth and width information, says Carver. The ar-

(Please turn to page 52)

# three great skylights from VENTARAMA



We have three quality built models which will give what you want in a skylight...

- attractive low profile domes—two layers of acrylic (25% better insulator than glass).
- removable screen—can be replaced with a third layer storm panel for extra insulation.
- and more...
- standard copper flashing of one piece design can be installed leakproof in less time than any other unit.
- NEW FOR 1986—Roller shade system featuring SUN SCREEN—energy efficient solar screening.

Send color brochure & complete info to: PM57

Name \_\_\_\_\_

Address \_\_\_\_\_

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

**VENTARAMA SKYLIGHTS**

## AUDIO

(Continued from page 51)

ray of six planar subwoofers for the lower bass frequencies uses dipole radiators, meaning they emit sound equally from their front and rear surfaces. The great weight of the speaker prevents the panel from moving in opposition to the subwoofers. When placed against a wall, the overall effect is of a large, 3-dimensional sound stage.

Less expensive but perhaps as unusual are the Sound Cylinders from Ohm Acoustics of Brooklyn, New York. Listing for \$549 per pair, these speakers utilize the unique Ohm Walsh driver, an inverted speaker cone mounted face down from the top of the cylinder. The sound radiates off the back of the cone in all directions. Treble response is supplemented with a tweeter mounted on top of the cone.

Like the Carver speaker, the Ohm model attempts to create a single sound wave emanating from one driver, a methodology both companies feel is superior to the sound pattern created by two or three drivers handling various portions of the audio spectrum. Magnaphone, by contrast, holds to a more traditional radiation pattern but uses its ball-shaped design to spread the higher frequencies over a greater area.

All three companies (and others using more box-like designs) are attempting to produce a sonic image that cannot be localized to a specific point of origin. Success means a 3-dimensional soundstage that allows you to sit anywhere in the room. For these companies, failure is defined as a flat stereo image which confines you to listening from a point equidistant between the two speakers. Ironically, and somewhat indicative of the direction speaker makers are headed, this very definition of failure would have been deemed the formula for success just a few years ago.

### GM goes digital

General Motors has followed Ford in offering a compact disc player for the car. The CD player is a floor-mounted model that also includes a 6-disc storage compartment as part of the arrange-



GM's CD player has jacks for hi-fi and video.

ment. The CD player is designed for dealer installation on the Chevrolet Celebrity, Oldsmobile Cutlass Ciera, Buick Century and Pontiac 6000. Plans call for the CD player to be offered as an option on the Buick Electra, Park Avenue and Cadillac De Ville in the near future.

After driving a Cadillac test car equipped with the CD player, I have to report that the sound is admirable. But having the CD player mounted on the floor makes operating the unit somewhat difficult, requiring you to take your eyes off the road more than you might like. The GM CD player is also a definite add-on, being linked to a separate in-dash cassette/receiver. One wonders how many people who are willing to listen to CDs will also listen to cassettes. A CD/tuner model might be a better option to offer.

GM's CD player does have one feature unique to the genre—a manually operated audio compression circuit. This circuit compresses on a 2:1 ratio. Assuming 100dB of dynamic range, for example, the compression button will reduce dynamic range to 50dB.

The audio compression circuit is designed to raise low volume information above the car's noise floor, and prevent high-volume passages from reaching the threshold of pain. The effectiveness of the compression circuitry may well depend on the type of music to which you're listening.

A good deal of rock 'n' roll may remain unaffected by the compression circuitry while classical music, with its typically greater dynamics, will be affected immediately.

### A/V honeymoon

Lots of receivers these days boast audio and video inputs that let you route the audio signal from your VCR through the stereo system. Many manufacturers say this simple connection constitutes a marriage of audio and video, but Nikko, one of the smaller Japanese hi-fi companies, says the marriage is far from consummated.

Nikko's AVR-65 might be the only true audio video receiver on the market in that it has a cable-ready 139-channel TV tuner as well as an AM/FM tuner. The remote control for the AVR-65 allows you to switch on the TV and change channels.

The 65-watts-per-channel receiver features an MTS decoder for stereo TV broadcasts, an SAP decoder for alternate language programs, and audio and video inputs for two VCRs that permit bi-directional video dubbing. Its list price is \$750.

Whether you're looking to upgrade to MTS, upgrade a monaural TV, retrofit a limited-channel TV, or simply upgrade to a new receiver, the AVR-65 audio video receiver fits the bill.

# NEW/HOME

## Long-Life Lawnmower

Jacobsen's new riding mower offers an attractive combination of power and convenient features. Power comes from a heavy-duty Briggs & Stratton I/C (industrial/commercial) 11-hp gas engine. The aluminum engine has a cast-iron cylinder liner that permits piston sleeve reborning. Hardened valves, rotators and valve seats, also add to longer engine life and less costly repairs, according to Jacobsen. Features include electric start, 30½-in.-wide cutting blade, rack-and-pinion steering and a 5-speed gearbox. A unique through-the-deck dis-



Riding mower has a powerful 11-hp, 5-speed engine with a 30-in. turning radius. Rear grass-catcher discharges into two standard 30-gallon trash bags (above).

charge system eliminates a side-mounted chute to permit close trimming. An optional twin-bag rear grass-catcher (\$200) accepts two 30-gallon

trash bags. The mower costs about \$1600 at Jacobsen dealers. For more information

and details, contact Home-  
lite/Textron, Box 7047,  
Charlotte, NC 28217.

## Letter-perfect message maker

The LetraGraphic lettering system lets you produce professional-quality newsletters, flters and signs quickly and easily. The typesetter's magnetic pad and transparent rule hold the paper securely to eliminate the No. 1 problem with using rub-on, transfer type—misaligned letters. A quick rub with the provided stylus transfers letters from a type sheet onto the paper or poster board. Type sheets come in various styles, sizes and colors. The system includes a typesetter, alignment bar, type sheet and stylus. It costs about \$80 at art supply shops and stationery stores. For details, contact Letraset, 40 Eisenhower Dr., Paramus, NJ 07652.



To produce professional-looking signs, posters and flters, simply position type sheet, rub letter with stylus (top) and gently lift type sheet (above). Typesetter's magnetic pad and transparent rule helps to keep the paper and type aligned (below).



## Quick-find organizer

This compact wall-hung cabinet provides neat storage for tough-to-find items such as postage stamps, pencils, tape, envelopes, coupons and spare keys. Called the Find-It Bits 'N' Pieces Organizer, it's made of plastic and measures 5½ in. deep x 14½ in. wide x 21¾ in. high. It's sold at home centers and department stores in brown, oyster white or almond for about \$37. For details, contact Essele Pendaflex, Clinton Rd., Garden City, NY 11530.



Wall-hung cabinet offers lots of storage for little items. It serves as a message center, too.

## Piggyback air blower

Blow away leaves and grass clippings from your driveway, sidewalk and lawn with the Solo backpack air blower (Model 412-B). This compact, yet powerful, air blower has a 4½-hp, 47-cc, 2-cycle gas engine with electronic ignition. It weighs about 20 pounds and measures 11 x 18 in. wide x 24 in. tall. The blower is sold at Solo dealers for about \$340. For details, contact Solo, Box 5030, 5100 Chestnut Ave., Newport News, VA 23605.



Solo's powerful backpack air blower comes with a flexible 3-in.-dia. hose and a 3-ft.-long removable plastic nozzle.



## Do household chores make a mess of your weekend?

Don't let weekend chores paint you into a corner. Take charge with Ingersoll-Rand's portable WorkBench Series air compressors, tools and accessories. Now you can power through your painting projects, or any other household task faster, easier and better than doing it by hand. And still leave time to enjoy the rest of your weekend.

WorkBench air compressors are available in 3/4-HP hand-held or tank mounted models that deliver years of high performance air power to do those jobs that make a mess of your weekend.

Take charge of your weekend with ChargeAir WorkBench Series compressors, tools and accessories from Ingersoll-Rand.

For your nearest retailer call 1-800-535-0505.



**CHARGE**  
**AIR**  
by Ingersoll-Rand

# Electronics



BY STEPHEN A. BOOTH

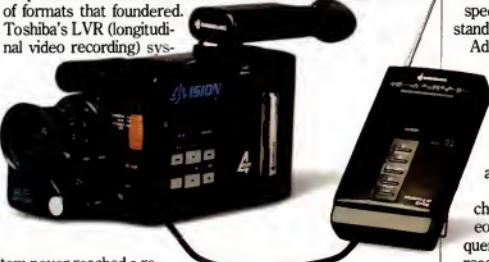
## Korea Ups The Ante

No one would describe the history of home video as dull—or orderly. Following the format battles of the past 10 years is almost as vexing as trying to keep score on the Thirty Years' War of 17th century Europe.

The technological scrap heap is littered with the bones of formats that founded. Toshiba's LVR (longitudinal video recording) sys-

—exactly the same as today's analog audio cassettes and tomorrow's digital audio tape (DAT). In fact, the 4mm system proposed by Samsung uses exactly the same metal-particle tape found in DAT, and it's housed in exactly the same cassette shell.

That's not all that 4mm



Samsung's 4mm camcorder can record from 2½-in. LCD color TV.

tem never reached a retail shelf. Technicolor's  $\frac{1}{4}$ -in. CVC (compact video cassette) system and the Philips  $\frac{1}{2}$ -in. V-2000 failed to catch on with the buying public. Beta, the first home VCR format, today defends a diminishing empire against the encroaching VHS system.

In the camcorder arena, 8mm, VHS and VHS-C are battling one another for dominance in home moviemaking—and yet another contender might weigh in. By this time next year, Korea's Samsung Electronics might join the fray with a video format of its own, called 4mm.

That's right—4mm! The name derives from the approximate width of the videotape used to record images and sound. That tape actually measures 3.81mm ( $\frac{19}{100}$  in.)

and DAT have in common. They share the identical VCR-like helical-scan system to store and retrieve signals on the tape. Helical scanning lays tracks diagonally across the tape width, to store more information.

A drum 30mm in diameter holds two magnetic heads spaced 180° apart, and rotates at 2000 rpm—slightly faster than the 1800 rpm of Beta and VHS. This is where the similarities between 4mm and DAT cease.

For DAT, the metal-particle tape passes by the rotating heads at a rate of 8.15mm per second. That's  $\frac{1}{3}$  in. per second (ips) in English. This

might seem slow compared to the 17 $\frac{1}{2}$  ips rate of today's analog cassettes, but the 2000-rpm helically scanning heads combine with tape travel for a "writing" or recording speed of 123 ips.

That writing speed is sufficient to cover the audio bandwidth of 20 Hz to 20 kHz (20 to 20,000 cycles per second) and yield two hours of digitally encrypted music. But the analog waveforms that constitute a video signal extend into the megahertz (millions of cycles per second) range. To achieve the faster writing speed video requires, Samsung has modified DAT's operating system.

According to Tae-Won Moon, chief of Samsung's Korea-based video research and development, video recording requires a near-doubling of tape speed, to 16,116 mm per second. That's between  $\frac{3}{5}$  ips and  $\frac{2}{3}$  ips—about half the  $\frac{1}{3}$  ips speed of VHS tape in the standard (SP) mode.

Additionally, Moon explains that Samsung's modification also calls for the tape to wrap 180° around the head drum. This is twice the "headwrap" needed for a DAT system.

The result of these changes is one hour of video recording time, with frequency response that reaches 2 MHz before dropping off by 6 to 7 decibels (dB). Horizontal resolution is about 230 lines. Signal-to-noise ratio hits 42 dB in video and 43 dB in audio. In case these specs seem unfamiliar to you, they represent about the same level of picture and sound quality you'd get from a VHS-C camcorder. The video specs are about the same as 8mm's, but the latter format yields much better sound.

You might wonder why anyone needs yet another video format—especially since Samsung's 4mm doesn't seem to offer much more than its competitors, except for smaller size. Samsung's response to this obvious question is that the 4mm format promises to unify audio and vid-

eo, once and for all. The company's ultimate goal is a dual-purpose home tape deck that would play and record both 4mm video and DAT music cassettes. The deck would have a single tape transport mechanism, and adjust its tape speed and headwrap according to whether video or audio is desired.

Regarding quality, Samsung's Moon says the video frequency response will improve a visible 3 to 4 dB when new, metal-evaporated tapes are available.

He adds that two hours of video recording time is also possible. Moreover, the audio can be enhanced by incorporating the same depth-multiplexed FM recording system used for 8mm, Beta Hi-Fi and VHS Hi-Fi equipment.

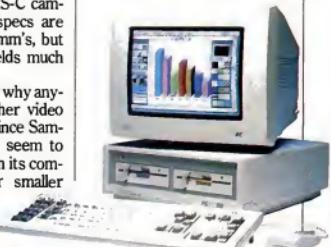
For the time being, Samsung will concentrate on 4mm camcorders only. The company plans to introduce a tiny 2-pounder, priced around \$1300, by the time the 1988 Summer Olympiad opens in Seoul, South Korea.

## Another clone

It's just as we predicted—1987 will be a banner year for computer discounts. The popular IBM PC continues to be flattered by a legion of imitators, all vying to deliver the most performance at the lowest price.

The latest PC clone to hit these shores hails from Great Britain's Amstrad and is distributed stateside by Longview, Texas-based Video. It's called the Amstrad PC 1512 and comes in a variety of bargain-priced configurations, six

(Please turn to page 60)



Another bargain brain: Amstrad PC 1512.

# INTRODUCING A FULL-SIZE

**It's a whole new animal.  
Built new from the inside out.**

Not just a greatly improved truck. Not just a lot of refinements. By every measure, the 1988 Chevy is an entirely new truck. Leaner outside for better performance. Tougher, roomier, more aerodynamic.

It gives you the heaviest base payload of any 1/2-ton pickup,\* the most standard power in 1/2-ton pickups.

Outside, there's two-sided galvanized steel protection to help make it last longer. Inside, there's more cab room than Ford. More shoulder room than Ford or Dodge.

Check out the new full-size Chevy Pickup today at your Chevy dealer's. And find out what it's like to drive a whole new animal.

\*Excludes other GM products.

Let's get it  
together...  
build up.



QUALITY COMMITMENT PLAN

See your Chevrolet dealer for terms and conditions of the new limited powertrain warranty.

Massive new frame  
that's bigger and  
heavier than before.

Most standard power  
in half-ton pickups:  
the fuel-injected 160-  
HP Vortec V6.

Most V8 power and  
torque available in  
pickups under  
8,500 lbs. GVWR: the  
fuel-injected 350 V8.

Standard rear-wheel  
anti-lock brake  
system for stable,  
smooth stops empty  
or loaded, on slick or  
dry pavement. A  
remarkable achieve-  
ment in control. Sys-  
tem operates in 2WD.  
Fully independent  
front suspension.  
Standard on 2WD  
and 4WD.

# LEANER, MEANER CHEVY.



More total cab room  
than Ford or Dodge.

Two-tier loading.  
Indentations in cargo-  
box sides let you  
build a platform of  
2x6s across top of  
wheelhousings.

Heaviest base pay-  
load rating of any  
half-ton pickup.\*

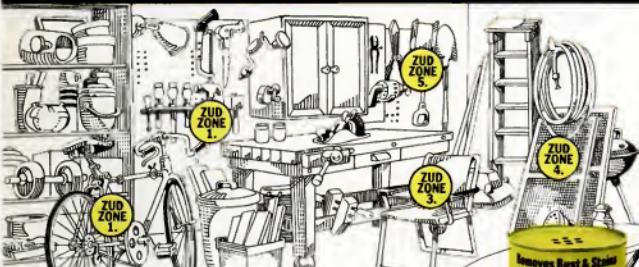
Highest highway gas  
mileage of any full-  
size pickup\*: EPA  
est. 23 highway MPG.

Two-sided galvanized  
steel on all exterior  
body panels except  
the cab roof.

New rear suspension  
with longer leaf springs  
for a smooth ride.

THE  
*Heartbeat*  
OF AMERICA  
 **TODAY'S  
CHEVY TRUCKS**

## Don't count on ordinary cleansers in the ZUD ZONE!



**Extra stain removing power where you need it most.**

- ① Removes rust from workshop tools.
- ② Oxidation marks from aluminum bike parts.
- ③ Rust from metal patio furniture.
- ④ Removes rust from window and porch screens.
- ⑤ And hard-water spots from stainless steel garden tools.

You'll find dozens of ZUD ZONES in the workshop, tool shed, garage and around the home. Zud even works where Comet® and Ajax™ fail on tough rust stains in baths, basins and toilet bowls. Its unique formula liquifies and dissolves tough stains so they rinse away.

Zud works where ordinary cleaners fail.

© 1987 Boyle-Midway Div.



*An outstanding watch value: on land, at sea, and underwater...*

## Navigator™ Watch

Now, with new ratcheted safety bezel, and still only \$49.95\*

*\*But read the ad for an even better deal!*

Wear this watch to work, to play, to swim and dive — and to rally. The Navigator™ Watch is steered by a sophisticated, ultra-accurate Japanese quartz movement that is powered by a tiny mercury cell. It should last at least 18 months before you need to replace it. The Navigator™ has both luminous analog dial and LCD display. It gives you dual time capability. The LCD display shows time continuously — in 12-hr or 24-hr mode. Push the button and you display day and date. There is a subtle yet insistent alarm and a switchable hourly time signal. The stopwatch/chronograph reads to 1/100 secs. and has "interrupt" and "lap" modes. A light switch illuminates the display.

The Navigator™ is totally executed in black metal, including the linked, stainless steel band. It is waterproof to 150 ft. The new, exclusive ratcheted safety bezel prevents you from staying underwater longer than you had planned. The crystal is "mineral glass"—it will never scratch.

We import these outstanding watches directly in large quantities and are able to offer them for just \$49.95. National catalog houses offer the identical watch for \$120 or more, and that's without the exclusive safety bezel. But here is an even better deal: **Buy two for \$99.90, and we'll send you a third one absolutely FREE, with our compliments.** Take advantage of this outstanding offer while it is available.

• Many successful products are being "knocked off" to the detriment of consumers. The Navigator™ is no exception. Look for similar looking imitations. There is only one genuine Navigator™ Watch!

FOR FASTEST SERVICE, ORDER  
**TOLL FREE (800) 621-1203**

24 hours a day, 7 days a week

Please give order #015 B990. If you prefer, mail check or card authorization and expiration. We need daytime phone for all orders and issuing bank for charge orders. We cannot ship without this information. UPS/Insurance: \$5.95 for one Navigator™ Watch, \$6.95 for three. Add sales tax for CA residents. You have 30-day return and one year warranty.

Note: For quantity orders (100+), with your company logo on the dial, call Mr. Ernest Gerard at (415) 543-6570 or write him at the address below.

since 1967  
**haverhills**

131 Townsend Street, San Francisco, CA 94107

## ELECTRONICS

(Continued from page 57)

models in all. Amstrad's line begins with an \$800 package that includes a monochrome display monitor and single 5 1/4-in. disk drive. Another \$100 buys a dual-disk system, and \$1100 gets you two disk drives with a color monitor. At the top of the line is a color system with 20-megabyte hard disk, for \$1500.

Common to all the PCs in Amstrad's lineup is 512 kilobytes of random access memory, expandable to 640K, and an 8-megahertz processor. Also standard is a built-color graphics adapter. Five software programs are packaged with the system, including the MS/DOS 3.2 operating system. The keyboard is full-size.

### Kid-vid

First, there was designer jeans for kids. Next came colognes for the lads and perfumes for the lasses. Obviously, what's been missing from the tough lives of today's upscale tots is a video camcorder just like the folks use. Wanna bet?

Get ready, Santa, because the elves at Fisher-Price Electronics are working overtime to deliver their PXL 2000 kiddie camcorder in time for Christmas.

The ingenious 2-pounder will sell for \$150—unless your kids demand the "deluxe" \$200 package with a 4 1/2-in. monitor to call their own. Why ingenious? Because F-P's PXL 2000 uses regular audio cassettes to record video and sound. Running at a superfast 13 1/2 ips, a regular C-90 cassette can hold 11 minutes of black-and-white video plus soundtrack. Playback comes directly from the camcorder when it's hooked to the antenna of any TV.

PXL 2000's quality is quite decent. The lens is prefocused from 4 in. to infinity, and rotates to adjust for indoor or outdoor lighting. All the junior videographer need do is peer through the viewfinder and press the record trigger. Six AA batteries yield five hours of record/playback time. The PXL 2000 comes in a high-tech anthracite gray and, says F-P, is appropriate for children 8 years and older. **PM**



Fisher-Price PXL 2000 camcorder uses audio tapes to record b&w video movies.

# Build This Beautiful Wooden Ship Model

Wouldn't you love to build this historic ship model? It's a true-to-scale, 21' replica of the 2-masted schooner *Swift*, a Virginia pilot boat of 1805. Well, now you can! And you don't have to be a skilled craftsman to do so.

## It really isn't hard

Even if you've never built a model before, you can experience the relaxing pleasure and pride of accomplishment that is offered by this fascinating hobby. You can build the *Swift*. The secret's in our kit, designed especially for the first time modeler, with pre-cut parts that make assembly easy. Clear, large scale plans and instructions that virtually take you by the hand and guide you every step of the way through hours of the most relaxing fun you'll ever have. And when completed - a museum quality model you'll display with pride, with gleaming brass fittings, walnut planked hull, delicate rigging - lifelike in every detail.

## Quality you can see and feel

The materials in our kit may be better than those used in the original *Swift*. The keel section and frames are pre-cut plywood, ready for quick assembly. The *Swift*'s hull is planked twice; once with thick, flexible limewood for strength, then overlaid with planks of African walnut for lasting beauty.

You don't have to make the fittings - we've done that for you. Our kit contains ready-to-use blocks and deadeyes of rare, yellow boxwood. We include eyelets, bracers and belaying pins - over 70 parts of solid brass! Even the cabin door hinges are brass, as are the 250 miniature nails you'll use to fasten the planking to the hull and deck. And, since the original wooden *Swift* had no plastic parts, our kit doesn't either - anywhere!

Creative? And how! Overwhelming? Not a bit! But be prepared for hours of the most challenging, engrossing, relaxing fun you've ever had.



## Miniature Cannon Kit Bonus!

Set of two solid brass cannon on walnut carriages to be mounted amidships. \$4.00 value, sent FREE with your order.

## Model Expo, Inc.

23 Just Road, Fairfield, N.J. 07007

## Visit our Stores!

2758 W. Sepulveda Blvd.  
Torrance, CA 90505

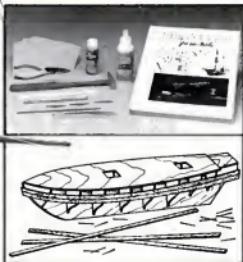
344 Ridge Road  
Wilmette, IL 60091

25 Just Road  
Fairfield, NJ 07007



**Special Offer for those who have never built a ship model before!**

*Now Only \$29.95!*



No. AL139TM.

An "everything you'll need" special offer, with free tools and handbook.

We want to introduce you to this great hobby, now! So we've made it easy for you to get started. Our special offer includes the *Swift* kit plus all the tools you'll need to build her: pliers, hammer, knife, file, tweezers, sandpaper, glue, wood oil, and more. You'll also receive a free copy of "Ship Models from Kits," a 110 page beginner's guide. You don't have to buy anything else. The tools normally cost \$17; the book retails for \$7.95. But they're yours, FREE when you buy the *Swift* kit at its regular low price of \$29.95 (plus \$3.00 for delivery).

Credit card holders order toll free. Call 800-228-5588. 24 hours a day. Or use the coupon below to send check or money order. Order kit No. AL139TM.



64 page full color ship model catalog sent FREE with your order.

Dept. PM-STW

## Model Expo Inc.

23 Just Road, Fairfield, N.J. 07007

Please send me \_\_\_\_ kits of the *Swift* (No. 139TM) at \$29.95 plus FREE tools, books and cannons. Check or money order enclosed. (Add \$3.00 for delivery, NJ, CA, and IL residents must add appropriate sales tax.)

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

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

If less than delighted, you may return your purchase within 30 days for a full refund.

©Model Expo, Inc. 1986

# NEW/AUTO

## Big Stick



Hold-It keeps your stuff from moving around in the back.

**H**old-It is a cross bar with neoprene-faced pads on both ends to hold cans or boxes, or whatever else, from sliding around in the back of your truck. Made of galvanized steel, it installs

and removes in seconds. Write to Hunt-Davis, Inc., 9500 Roosevelt Way N.E., Seattle, WA 98115, for the dealer nearest you. Depending on the size, it costs from \$24.95 to \$27.95.

## Soft touch

Irritating, too-tight seatbelts can be a real drag. Belt-Eze, covered in Ultrasuede (\$9.95) or luxurious mink (\$75), attaches with Velcro over the shoulder harness to provide padding and relieve pressure. Works for cameras or luggage, too. Try your auto parts store, car wash or write to Belt-Eze, Box 12465, Fort Worth, TX 76121, for information.



## Year-round sledding

The clever Bed-Sled will make it easy to get anything out of the back of your pickup or van, but most people will use it for tools or building materials, the things that need to go on or off the truck often. It bolts to the bed, and easily rolls 'way out, so all that stuff in the front of the truck is easier to reach. Saves lifting up heavy objects like toolboxes over the side of the box, too. Depending on the size, it costs from \$265 to \$440, from Davison-Wood, 5055 N. Harbor Dr., Suite H, San Diego, CA 92106; 619-226-0933.

FM

## Join the Club

If you worry a lot when you have to park the family Porsche in a nasty neighborhood, use the Club. It's an antitheft device that locks through the steering wheel spokes, effectively preventing the car from being driven. Bright red high-strength steel is highly visible, too. It's \$59.95 for cars, \$69.95 for trucks (plus \$4 postage). The



The Club will make this car tough to move very far.

manufacturer, Winner International, is at 1330 Kimberly Rd., Sharon, PA 16416; 412-981-1152.



Polished manifold is a finishing touch for your engine.

## Shine it!

If you want a nicely polished intake manifold to set off your engine compartment, try Eastwood's Aluminum Manifold Kit. It includes all the abrasives and polishes to pol-

ish the manifold or any other alloy casting. You supply the drill for buffing. It's \$49.95 from The Eastwood Co., 580 Lancaster Ave., Box 296-M, Malvern, PA 19355; 215-644-4412.



Bed-Sled makes it simple to get bulky items off your truck by easily rolling all the way out.

# TOYOTA

QUALITY PARTS  
AND SERVICE

## PROTECT YOUR TOYOTA QUALITY.

Only Toyota Quality can maintain Toyota Quality. Protect the reliability you bought in the first place, with parts and service designed for your Toyota. Genuine Toyota Parts. Authorized Toyota Service.

Only at your Toyota dealer.

Toyota Service Technicians are trained to do the job right the first time, with the finest diagnostic methods and service equipment available. The continued performance, quality and reliability of your Toyota depend on Genuine Toyota Parts and Authorized Toyota Service.



### ONLY THE BEST.

Your Toyota Dealer stocks quality parts designed specifically for Toyotas. They fit. They last. They protect your Toyota's quality.



WE'VE  
GOT MORE  
FOR YOU!  
**TOYOTA**  
PARTS AND SERVICE

© 1986 Toyota Motor Sales, U.S.A., Inc.



**"Light my Lucky."**



Lights: 8 mg. "tar", 0.7 mg. nicotine, Lights 100's:  
9 mg. "tar", 0.8 mg. nicotine av. per cigarette by FTC method.

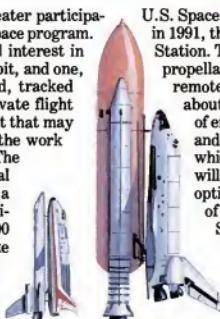
**SURGEON GENERAL'S WARNING: Cigarette  
Smoke Contains Carbon Monoxide.**

# PM TECHNOLOGY UPDATE 5/87



## Private Shuttle May Fly In The 1990s

President Reagan last year called for greater participation by the private sector in the future space program. Several companies already have announced interest in the launching of satellites into low Earth orbit, and one, Space Industries, has successfully launched, tracked and recovered a Conestoga rocket on a private flight from Texas down the Gulf missile range. But that may turn out to be small potatoes compared to the work planned by Third Millennium of Nevada. The company, which uses the Roman numeral MMI (2001) as its logo, is currently building a prototype Space Van, a fully reusable mini-shuttle with a payload of more than 6000 pounds to low Earth orbit. That would make it capable of delivering supplies to the planned Space Tugs of NASA for delivery to the Space Station in the 1990s. The Space Van also is designed to deliver satellites into low orbit. The Space Van will be just under one half the length of the



U.S. Space Shuttle and is expected to be ready for service in 1991, the year before construction starts on the Space Station. The Van would be launched on a reusable liquid-propellant booster, which would have wings and be remotely guided to a recovery site after separation at about 15 miles above Earth. It will also carry a set of engines in its rear to give it both orbital transfer and fly-down capabilities. Unlike the Shuttle, which returns to Earth as a glider, the Space Van will be able to rely on its engines for more landing options, and for a higher, and thus a cooler, angle of re-entry. The Van will not need weight-adding

Shuttle-type ceramic tiles for heat deflection. The rear engines are expected to be eight Pratt & Whitney RL10 rockets. The Space Van can be flown by a crew of three.

Editor: Dennis Eskow  
Contributors: Michael Fillion, Jack Hammond, Steve Eskow, Ted Francis, Richard Schrader

# TECHNOLOGY UPDATE

## AVIATION

### Cargo flies first class

McDonnell Douglas has produced a concept for a new version of the ultrahigh-tech MD-11. The Combi will fly passengers and extra cargo on the same



deck. A typical arrangement, shown in illustration, would provide room for 214 passengers forward and six

freight pallets aft. The MD-11 itself is being offered in two fuselage lengths, one 18.6 ft. longer than a DC-10 and the other the same length as the popular jumbo jet. All the new MD-11s car-

ry three powerplants, either the General Electric CF-6 or the Pratt & Whitney 4000. Additional winglets on the MD-11 wingtips and other advances in the airfoil design give the

MD-11 about 17 percent greater fuel efficiency than the DC-10. All computerized systems are redundant with major systems on mechanical backup. The cockpit is entirely computerized.

## MEDICINE

### Brace yourselves

The knee brace has become a common piece of medical equipment that allows sports enthusiasts and professionals to get back into the game quickly after a knee injury. The best of today's knee braces, like the Lenox Hill model, are using a lot of composite materials to keep the



weight low and the flexibility high. But a new brace

developed by Georgia Tech engineer Ray Vito and his

associates is made entirely of composites, and, depending on the configuration for a particular athlete, can weigh one-quarter to one-third less than the best of the existing knee braces. The Georgia brace is comprised of a set of rigid components which can be shaped in a variety of ways. Because of the composites, the brace can stretch to accommodate younger wearers who are still growing.



## AUTOMOTIVE

### Stick in the mud

A British firm, Power-House, has developed a rescue device for vehicles mired in mud or snow. It fits on a flatbed truck and is rolled to a stuck vehicle under the power of a small motor. A pallet rolls back from the rescue device and hydraulic jacks push up the front end of the stuck vehicle enough to get the pallet under the wheels. After the stuck vehicle is secured, its driving wheels turn the treads.

## MILITARY

**Future Hawkeyes**

The Navy currently places Grumman E-2C Hawkeye planes with radomes on aircraft carriers. The Hawkeyes can fly out of missile range and get a 360° view of the activities going on above and below the cloud decks. But there are a few things Hawkeyes can't do, and the Navy is shopping around for a next-generation "Multi-Mission Sensor System." Lockheed has shown us an early concept of two versions of the future Navy craft. One

is an Anti-Surface Warfare version (top in the illustration). The other is an airborne early-warning craft shown with the familiar radome. The future craft will be required to watch the skies for enemy aircraft and vessels, jam enemy radar, broadcast false radio messages and radar signals, and then some. In one configuration or the other, the new plane will drop mines at sea and carry out refueling missions for fighter planes. The planes are expected to have advanced aeronautical design, including winglets for lift and canards for greater maneuverability in flight.

**Hard wheels, hard warfare**

The first full-scale Small Intercontinental Ballistic-Missile Hard Mobile Launcher is undergoing tests. The 100-ft.-long, 200,000-pound vehi-

cle runs on a pair of 750-hp Cummins Diesel engines with all-wheel drive on 14 Goodyear military all-terrain steel radial tires. It will serve as a launcher for America's 30,000-pound single-warhead ICBM. The

**Globe-trotting wings**

Technology under development for America's stealth aircraft is being discussed as the wave of the future in moving air freight. Lockheed, under a grant from NASA Langley Research Center, is developing the initial design for a "global" transport plane. The technology being studied in laminar-flow experiments is the flying wing. Lockheed envi-

sions a stubby-bodied, rear-propfan-driven craft with winglets that could carry 150,000 pounds of cargo 6000 miles nonstop. The counter-rotating props could develop enough power to give the craft a mach 0.8 cruise speed. The wing design is the real key. Initial concepts call for a 227.2-ft. wingspan on a 125-ft.-long, 23.3-ft.-high body. NASA intends to test the wing concept on a C-141 test bed within the next two years.

small ICBM will have a range of 6000 miles when it undergoes test firing early in the next decade. The vehicle is being built by a consortium including Boeing Aerospace, Goodyear and Paccar Defense Systems. It must be

hard enough to withstand gamma-ray attack and fast enough to move out at 60 mph over rough terrain. In a crisis, the mobile launchers are supposed to disperse and await commands from a control center.



# TECHNOLOGY UPDATE

5/87

## INNOVATION

### The razor's edge

Razor companies around the world are doing computer simulations of future razors to make them fit in your hand better. And chemically treated heads will keep the razor from dragging on your skin. For instance, Wilkinson Sword is working on Kom-pact, which has a hollowed plastic handle that feels solid in your hand. Inside the hollow tube is an injector that carries four replacement blades. The body of the shaving system is topped with Polyox, chemically known as PTFE or Teflon. Another blade manufacturer says that a genetically engineered antifriction chemical has already been developed in Europe and will be on the market here by next year. The advantage over Teflon will be its ability to come off the blade a little at a time with each shave. That will provide greater lubrication to the face.

"Architecture" has become a buzz word in the industry. The Schick blade edge is bevelled gradually and uniformly to give it the appearance of a "gothic" roof. This translates into



closer shaves with minimum risk of cutting.

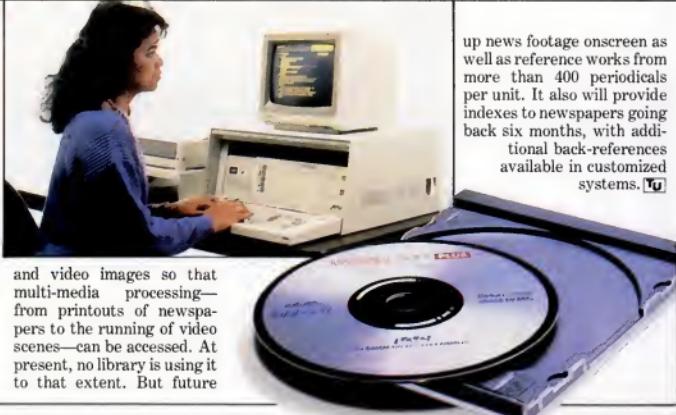
On the electric shaver front, Norelco leads the way with a rechargeable machine that can go without a charge for over a month. The battery technology is secret, but it is nickel-cadmium in chemistry and is based on battery systems designed for NASA. The charge is held so well that the shaver retains its speed almost down to the last trickle of electrons. What is the future

of shaving? "We are looking at skin and researching methods for handling specific skin problems in a shave," says Norman Prioux, president of Wilkinson Sword, U.S.A. Much of the research money is going into the development of a shaving system that deals with pseudofolliculitis, a skin disorder that causes tiny bumps to form on the skin of an adult, ingrown hair and other problems that can make shaving a painful experience.

## ELECTRONICS

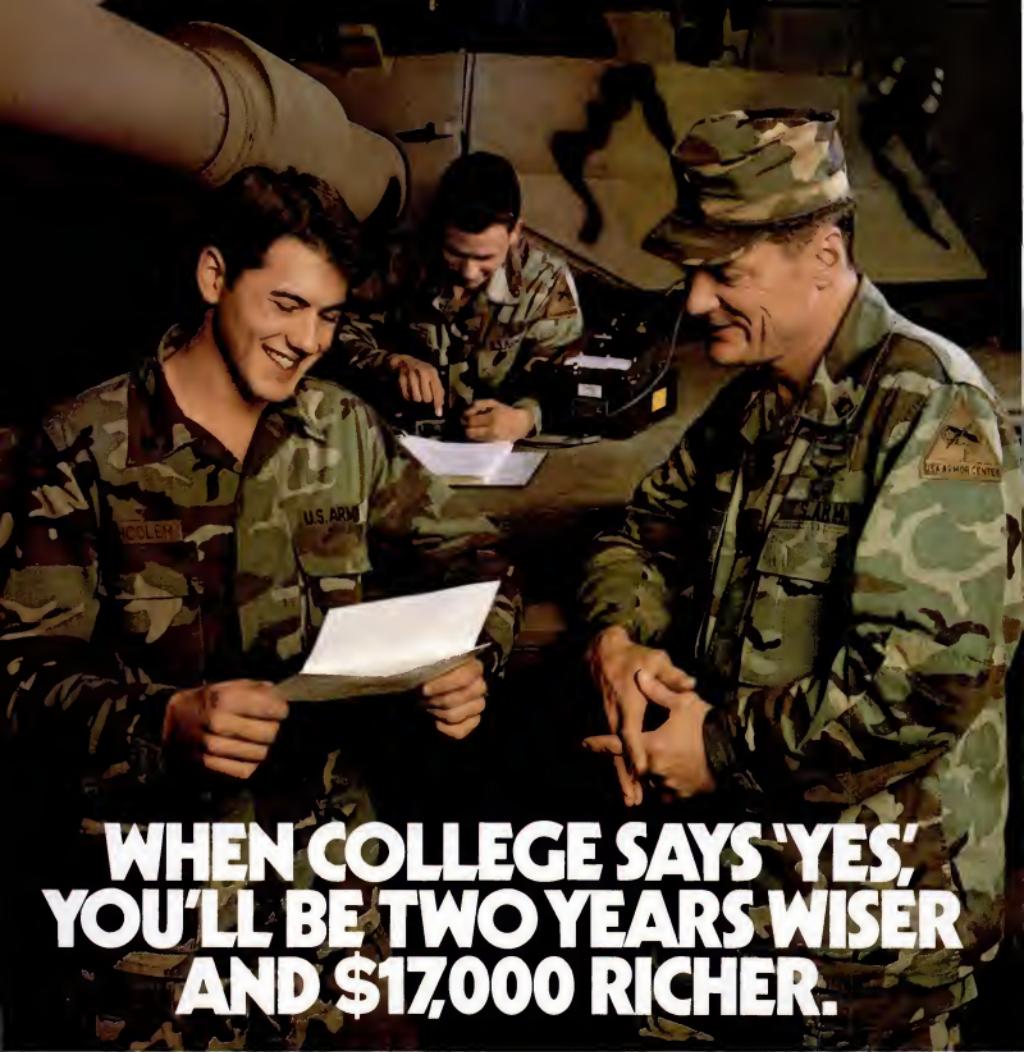
### Play it again

The video disc has been married to a computer in various settings to make incredible breakthroughs in information retrieval. The latest breakthrough may show up at your local library in the next year or two. InfoTrak II is a single-user data base and retrieval system. A computer disk is contained within the system's microcomputer. InfoTrak II can let you read hundreds of periodicals, and with some adjustments, can also run graphic



and video images so that multi-media processing—from printouts of newspapers to the running of video scenes—can be accessed. At present, no library is using it to that extent. But future

up news footage onscreen as well as reference works from more than 400 periodicals per unit. It also will provide indexes to newspapers going back six months, with additional back-references available in customized systems. **TU**



# WHEN COLLEGE SAYS 'YES,' YOU'LL BE TWO YEARS WISER AND \$17,000 RICHER.

If you're interested in college but wondering how you'll pay for it, the Army's special Two-Year Enlistment might be your answer.

Because, if you qualify, The G.I. Bill Plus The Army College Fund lets you put away up to \$17,000 to pay for college, with just a two-year enlistment.

You can qualify for training in a long list of exciting career fields like mechanics and communications. Challenging fields which build confidence and self-esteem. And while you're growing, your money grows, too. Save \$100 a month from your paycheck for just 12 months, and the Army will send you home with the full \$17,000 for college.

The Army's special Two-Year Enlistment. Money for college. Experience for life.

For more information, call, toll free, 1-800-USA-ARMY. Or see your local Army Recruiter.

**THE G.I. BILL PLUS THE ARMY COLLEGE FUND.  
ARMY. BE ALL YOU CAN BE.**

Seat belts save lives.

© SUBARU OF AMERICA, INC. 1987



# \$5,500. AND BUILT TO STAY THAT WAY.

Introducing the only \$5,500\* car engineered like a Subaru, the Subaru Justy. It's reliable, durable and built to last.

What's more, the Justy offers a range of standards including front wheel drive, a surprisingly roomy interior and a heri-

tage of customer satisfaction. Not to mention a 9 valve, 3 cylinder engine that's as powerful as it is economical (38 mpg city, 41 hwy).\*\*

Of course, we wouldn't be doing the Justy justice if we left out another reason

to buy one: the car is truly fun to drive.

So think about it. Why spend your disposable income on a disposable car when you can put your money into a much more lasting investment, the new Subaru Justy.

\*Suggested retail price. Dealer's actual price may vary. Price does not include dealer prep., ward transporation taxes, license and title fees.

\*\*Use EGR Model. Actual mpg may vary.

Your actual mileage may vary.

**SUBARU JUSTY**  
Inexpensive. And built to stay that way.

**ACURA  
INTEGRA LS****PM COMPARISON TEST:****DAILY DRIVERS**

We pit Chevy's new Corsica against nine new-wave family sedans.

**F**ifteen years ago the typical American sedan was a 2½-ton, rear-drive, 18-ft.-long 4-door with a 250-hp V8 and room for six big people inside. On a good downhill run it might get 15 mpg. Two energy crises, a dose of double-digit inflation, and considerable government regulation later, the family sedan of the late '80s looks

like a prime example of reduced expectations: a 4- to 5-seater about 15 ft. long, 2200 pounds, with front-drive and a 110-hp Four or V6 rated at 25 mpg. Its price is about the only thing that hasn't gone down—\$12,000 to \$15,000.

But are we really living in reduced circumstances? Ten years ago, Honda's innovative Accord was the first of these

**CHEVROLET  
CORSICA**



**PONTIAC  
GRAND AM SE**

new family sedans—a fun-to-drive 4-door that perfectly fit the trend toward smaller families and sportier lifestyles. Honda's design has become so right for the times that we were able to identify 10 Accord clones for our new family sedan test: six from Japan, three from America and one from Germany.

We took them all to Raceway Park in Englishtown, New Jersey, for our standard track testing. Then we spent two days driving back-to-back laps around our usual road loop outside Princeton, New Jersey. As always, our test results represent a consensus of eight different drivers' reports.

On paper, this could be the closest group we've ever tested. Not only are sizes, prices and specifications nearly identical, all 10 sedans posted similar performance figures at the track. They even look the same: an aerodynamic

wedge that couples maximum trunk capacity with minimal frontal area for better performance and fuel economy.

Despite their statistical similarities, these cars are remarkably different to drive. The group could be charted accurately on a bell curve. A couple are not very good at all, most are okay, and then there are a few that are not only practical, but enjoyable to live with. The top three are among the best cars you can buy, regardless of price or type. Few families *need* more car than these. The top half-dozen cars prove our long-standing belief that practical transportation doesn't have to be dull. But the two automobile manufacturers who tried to build ersatz sports sedans fell flat on their faces.

Produced by the PM Auto Dept  
Text by Rich Taylor  
Photos by Humphrey Sutton

## **Mazda 626 GT Turbo**

The Honda Accord is more refined. The Toyota Camry is more comfortable. But the Mazda 626 is more *fun!* Our fun-loving testers voted it their favorite, and it also finished in front at the track. The heart of the 626's appeal is a smooth and powerful turbocharged 2-liter Four. It's not technically exotic in any way, but it sure gets the job done. Mazda claims only 120 hp for this engine, but it acts like more.

For any 2-liter car to hit 16 seconds at 86 mph in the quarter-mile is excellent. For a fully equipped 4-door sedan, it's remarkable. The secret, of course, is the turbo, which Mazda is able to offer on a \$14,000 car while other manufacturers cannot. Take away the turbo package and you chop \$1500 off the Mazda's price, putting it far ahead in the value calculations.



**HONDA  
ACCORD  
LXi**



**SUBARU  
RX TURBO**



DODGE  
SHADOW  
TURBO



MAZDA  
626 GT  
TURBO



TOYOTA CAMRY L

Happily, the 626 is not one-dimensional. It also has the best brakes in this group, was second in the slalom, and near the top on the skidpad. It even returned a hair under 22 mpg in the hands of our enthusiastic test group. With better tires than the Japanese Goodrich 195/60R-15s fitted to our test car, its track performance would have been even more spectacular.

Our testers said the 626 interior is pleasant and tasteful, pretty and well-assembled, with high marks for comfort and convenience. As one enthusiast noted, "It's beyond ergonomics. Everything is in the right place and found without conscious thought. The seats have excellent support."

### Honda Accord LXI

The Accord is smoother, quieter and more refined than Mazda's 626. In fact,

it's so refined, it borders on being characterless. We suspect that Honda's clever marketing people have ordered the engineers to "soften" the Accord to appeal to traditional American sedan buyers. For our taste, they've gone too far. Everything about this car feels soft—the steering has little road feel, the brakes seem mushy, the clutch offers no resistance. It's unnerving.

The Accord was fifth in the quarter-mile. In all our other performance tests, the softly sprung Accord—fitted with inexpensive Michelin X radials—was at mid-pack. But our track tester praised its nice linear steering, precise shifter and excellent driveability. It feels like a much larger car.

Surprisingly, our testers found the Accord interior lacking in a couple of departments. The front seats need more support, the steering-wheel

spokes are inconveniently placed, and the dashboard controls are confusing and visually unmatched.

But we can see why Honda was voted first in a recent J.D. Power Customer Satisfaction Index, the first time any car has been rated higher than Mercedes-Benz. This car is beautifully finished and assembled.

Even more impressive, Accords for the eastern half of the country are American-built, in Ohio—proof that the quality deficiencies that plague many U.S. cars are not necessarily the fault of the guys screwing them together. Quality is a management decision.

### Toyota Camry LE

Its \$15,431 price tag makes the Camry the most expensive car in this group. Still, two testers ranked the Camry first, and none had it lower than fourth.



POPULAR MECHANICS • MAY 1987



## DAILY DRIVERS

Like previous Toyota sedans, the Camry is conservatively styled. Like all Toyotas, construction quality of the Camry is perfect.

On the road, our testers found the Camry a pleasant car to drive—one that won't wear you out as the miles and years go by. The monochromatic interior was especially praised for its tasteful good looks, straightforward ergonomics and easy adjustability to drivers of all sizes and shapes. Our only complaint is the electric front seatbelt, which wraps itself around you when the door shuts. "The darned belt knocked my glasses off," said one tester. "I like this car as well as the Accord or 626, but the automatic belts would keep me from buying it," said another.

At the track, the Camry was predictable, easy to drive and slow. Our test car was fitted with Toyo Z all-season radials, which surely helped accentuate its massive understeer. The 16-valve engine is smooth, but acceleration is lackadaisical compared to the 626 Turbo. All in all, we see the Camry as an excellent everyday sedan—not as much fun as the Mazda, not as stylish as the Accord, but safe, dependable and good for years of family transportation.

### Acura Integra LS

What a pleasant surprise! The Legend's Honda-built baby brother is a perky, cheerful little 4-door hatchback with all the personality that's missing from the Accord.

A 1.6-liter dohc engine that loves to rev to its 7000-rpm redline, a crisp 5-speed shifter, quick steering and excellent driving position combine to make Integra an absolute ball to drive.

Our testers were impressed by the Integra's obvious quality and its mod-

ern styling. The basic interior layout is so comfortable you never think about it. On the other hand, the "op art" seat upholstery was deemed a pain in the eyes, and the radio was criticized for inferior reception. More serious in a family sedan was a hatchback cargo area that won't hold shopping bags upright with the security panel in place.

The Integra's relatively low \$13,283 price is \$1500 less than the Accord and 626 and \$2000 less than the Camry. Overall, we thought the Integra pretty and exciting to drive, well-made and genuinely a good buy.

### Volkswagen Jetta GLI

Volkswagen claims the Jetta is the best-selling imported model in this country, and has positioned it as a half-price alternative to expensive German sports sedans from BMW and Mercedes. Soon, VW dealers will have a 16-valve version of the GLI, and in another year or two, one with full-time 4-wheel drive like the Audi 4000CS Quattro. Those additions should make the Jetta even more competitive.

The Jetta scored very well at the track, at least partially due to excellent Pirelli P6 60-series tires. Like all Rabbit/Golf derivatives, the Jetta lifts its inside rear wheel in really hard corners, but at normal speeds the handling is steady. Fuel economy is near the top, and a Jetta would make a practical, fun-to-drive commuter car.

Rough-road ride is choppy. The little VW engine produces more noise than power, and the shifter is inexplicably rubbery. Nearly everyone complained about the Jetta's lack of room, plain interior, inferior radio and "Golf-like" ambience. At more than \$13,000, the Jetta doesn't seem like a bargain, but our Wolfsburg Edition test model did have some expensive options such as

leather upholstery and a sunroof.

This is a sound car that's rewarding to drive, but it looks old-fashioned. The chassis is good, but it's about time for VW to revamp the interior and bodywork to bring it up to par with the Japanese competition.

### Chevrolet Corsica

The Corsica is Chevy's new-for-'87 replacement for the defunct X-cars, using a 2.8-liter V6. We think it's a reasonable alternative to the Japanese sedans. At 18 mpg, it's not especially economical, but at 16.4 seconds and 83 mph, the Corsica was second fastest at the dragstrip. It did extremely well in our handling tests, despite being shot with Firestone Supreme mud and snow tires.

Our testers found the Corsica quiet, easy to drive and—with the exception of its seats—comfortable. We also like the exterior styling, readable gauges and precise steering. This is the first car we've tested with GM's new Getrag-designed 5-speed gearbox, and it's the best GM manual ever.

But the Corsica needs totally different bucket seats, new controls to replace the silly little plastic buttons, and perhaps a more stylish interior. Happily enough, the chassis and engine are just fine, with great power and terrific handling. And the sound system is the best in this group, by far.

### Nissan Stanza GXE

Two words occur in every tester's Stanza report: *adequate* and *bland*. The Stanza has been "Maximized" to look much like its big brother, but what it really needs is the Maxima's 3-liter V6. Every tester complained about the Stanza's lack of power.

The Stanza was near the back of the  
(Please turn to page 172)

## SPECIFICATIONS AND DIMENSIONS

	BASE PRICE	PRICE AS TESTED	ENGINE	TRANSMISSION	WHEEL-BASE (in.)	LENGTH (in.)	WEIGHT (lb.)
<b>Acura Integra LS</b>	\$12,159	\$13,283	114-hp DOHC 1.6-liter Inline-4	5-speed manual	99.2	171.3	2450
<b>Chevrolet Corsica</b>	8995	13,171	125-hp OHV 2.8-liter V6	5-speed manual	103.4	183.4	2609
<b>Dodge Shadow Turbo</b>	8169	11,704	146-hp SOHC 2.2-liter Inline-4 Turbo	3-speed automatic	97.0	171.7	2500
<b>Honda Accord LX</b>	14,800	14,800	110-hp SOHC 2.0-liter Inline-4	5-speed manual	102.4	178.5	2600
<b>Mazda 626 GT Turbo</b>	13,149	14,849	120-hp SOHC 2.0-liter Inline-4	5-speed manual	98.8	177.8	2650
<b>Nissan Stanza GXE</b>	12,549	14,644	97-hp SOHC 2.0-liter Inline-4	4-speed automatic	97.2	173.4	2400
<b>Pontiac Grand Am SE</b>	12,899	15,134	125-hp OHV 3.0-liter V6	3-speed automatic	103.4	177.5	2750
<b>Subaru RX Turbo</b>	13,833	14,559	115-hp SOHC 1.8-liter Flat-4 Turbo	5-speed manual, full-time 4wd	97.0	174.6	2605
<b>Toyota Camry LE</b>	10,798	15,431	115-hp DOHC 2.0-liter Inline-4	4-speed automatic	102.4	182.1	2734
<b>Volkswagen Jetta GLI</b>	11,690	13,240	100-hp SOHC 1.8-liter Inline-4	5-speed manual	97.3	171.7	2350



# INDY

## ENGINE SPOTTER'S GUIDE

**S**peed has always been the essence of the Indy 500. But never have we seen the distance-over-time equation yield such numbers as recently: Last year the slowest qualifier ran 207 mph while pole-sitter Rick Mears set a record average of nearly 217 mph for his four qualifying laps. While a race car's chassis and tires obviously play a part in these phenomenal speeds, it's the engine that has the key role.

Ever since the first Indianapolis 500 in 1911, auto manufacturers have shown a keen interest in competing in the famed Brickyard's annual Memorial Day 500-mile race.

In those early days, the leading cars were modified road cars much as NAS-

Who's running what at The Brickyard this year.

BY JOHN RETTIE

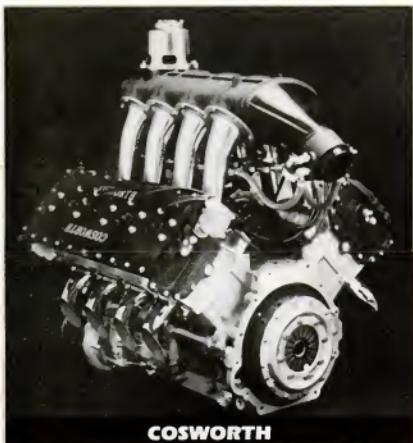
**Bobby Rahal's March (above) and another 20 Cosworth V8s will have serious competition from other engines this year.**

CAR stock cars are today. Then, in the early '20s, pure race cars took over and auto manufacturers lost interest when they could not compete effectively. Despite this, engines from some major auto companies such as Ford and Chevy have been used in Indy race cars over the years.

However, since 1935, most Indy 500s have been dominated by two purely racing engines: the 4-cylinder Offenhauser from 1935 onward and, since 1978, the V8 Cosworth DFX.

With carmakers' renewed emphasis on performance, racing participation by auto companies is now greater than it has been since the early days of Indy. Last year, 29 of the 33 cars that made the field were powered by Cosworth engines. This year, it looks as though Cosworth may only power 21 cars. The other 11 will be powered by Chevrolet, Buick and Honda. Next year, Porsche (see *The Germans Are Coming!*, page 77) and Ferrari or Alfa-Romeo will likely join the fray with new engines.

Basically three types of engines are



### COSWORTH

Type: 90° V8, 32 valves, dohc  
Capacity: 2642.7 cc  
(161.27 cu. in.)  
Bore & stroke: 3.373 x 2.256 in.  
Compression ratio: 11.2 to 1  
Max. rpm: 11,500 to 12,000  
Power: 720 hp @ 11,000 rpm

Max. Torque: 350 lb.-ft.  
@ 10,000 rpm  
Turbocharger: Cosworth  
Ignition: Cosworth  
Fuel system: Cosworth Electronic  
Engine Management  
Cars with engine at Indy: 21

**Teams and drivers:** All teams except the seven using the other three engines (Drivers include Bobby Rahal, A.J. Foyt, Al Unser Jr., Michael Andretti, Johnny Rutherford and others).

In 1975, Roger Penske approached Cosworth, the British racing engine manufacturer, to see if its 3-liter Formula One DFV V8 could be turbocharged. But it was Vel's Parnell Jones racing team that first installed a Cosworth engine in an Indy car later that year. The following year Al Unser won the Pocono 500 race in this car, and other teams began to take note. Within a couple of years, the Cosworth DFX, as the turbocharged DFV is known, became the dominant Indy car engine. The original DFV was designed by Cosworth in 1967 for the Ford Motor Co. in England. It won first time out and went on to win more than 150 races and 12 World Championships before being outclassed by the present turbocharged 1.5-liter F1 engines. Cosworth is the world's largest manufacturer of race engines, and has also designed cylinder heads for Mercedes-Benz and Chevrolet among others.

allowed to run in the Indianapolis 500:  
■ Pure race engines restricted to 2.65 liters.

■ Turbocharged stock-block, non-overhead camshaft engines restricted to 3.43 liters.

■ Normally aspirated stock-block, non-overhead camshaft engines restricted to 5.878 liters.

Other important rules include:

■ Only one turbocharger is allowed with no intercooler, unlike the wild 1000-hp, twin-turbo Formula One engines.

■ A maximum of eight cylinders is permitted.

■ A pop-off valve restricts turbo boost to 47 in. on a race engine or 57 in. on a stock-block.

■ Engines must run on methanol instead of gasoline.

■ Fuel tank capacity is restricted to 40 gallons.

■ During the race, fuel consumption must not exceed 1.8 mpg.

Most teams have up to five or six engines available at any given time, and they cost around \$50,000 each! Top teams have engines rebuilt after every race to ensure they are running at peak performance. Some teams do their own engine rebuilding, others have the manufacturer rebuild them, but most rely on independent shops such as VDS Engines in Texas. Nearly every team uses slightly different parts in an attempt to gain extra horsepower. Teams are very secretive about technical details of their engines, which makes it difficult to know the real power output of an engine. Official figures issued by engine builders can appear to be lower



### CHEVROLET

Type: 90° V8, 32 valves, dohc  
Capacity: 2646.9 cc (161.5 cu. in.)  
Bore & stroke: 3.465 x 2.142 in.  
Compression ratio: 11.0 to 1  
Max. rpm: 11,600  
Power: 720 hp @ 10,750 rpm  
Max. Torque: 365 lb.-ft.

@ 8500 rpm  
Turbocharger: Holset  
Ignition: electronic capacitor discharge  
Fuel system: mechanical multipoint fuel injection  
Cars with engine at Indy: 6

**Teams and drivers:**  
■ Penske Racing (Rick Mears, Danny Ongais and Danny Sullivan)  
■ Patrick Racing (Emerson Fittipaldi and Kevin Cogan)  
■ Haas Racing (Mario Andretti)

In 1984, Chevrolet announced it was designing a race engine with Penske Racing and a newly formed British company called Ilmor Engineering. Ilmor's two founders, Paul Morgan and Mario Illen, both used to work for Cosworth, which led many skeptics to describe the engine as "a new Cosworth with different cam covers." Last year was the first time the engine raced and it took two pole positions and finished in the Top 10 three times. Due to limited production, only two extra teams will be able to run the engine this year. It will be powering six cars in the Indy 500. Without a doubt, it will be the toughest competition Cosworth has faced yet. Illen says they designed the engine so it could run well on high-speed oval tracks such as Indy as well as on tight road courses like Long Beach and Miami.

than those quoted by teams, but the variation from one engine dynamometer to another usually accounts for the discrepancy. Or, sometimes, someone is just blowing smoke to confuse the competition.

Ten years ago the first-ever 200-mph lap was set by Tom Sneva in a Cosworth-powered car. His pole position, with an average speed of 198.884 mph, sounded the death knell for the venerable Offy engine, although it was A.J. Foyt who won the '77 race in his Ford V8-powered Coyote special. Since 1978, every Indy-winning car has been powered by the Cosworth. Could 1987 be the year Cosworth loses to a new force in Indy engines? You'll have to wait until the 71st running of the oldest auto race in the world, on May 24, to find out!

**BUICK**

Type: 90° V6, 12 valves  
Capacity: 3400 cc (209 cu. in.)  
Bore & stroke: 4.00 x 2.75 in.  
Compression ratio: 9.5 to 1  
Max. rpm: 9000  
Power: 800 hp @ 8600 rpm  
Max. Torque: 550 lb.-ft.

@ 7200 rpm  
Turbocharger: Garrett  
Ignition: Buick heavy-duty  
Distributorless Power Source  
Fuel system: mechanical fuel  
injection  
Cars with engine at Indy: 3

**Teams and drivers:**

- ARS (Jim Crawford)
- Curb Racing (Tom Snea)
- Hemelgarn Racing (Rich Vogler)

Buick's racing engine is different from all the others at Indy because it's based on a stock-block. USAC allows a stock-block engine to use 10 pounds more boost at Indy. CART gives them the same boost as other engines, which is why Buick engines are not used in any other races. It was first used in the 1983 Indy 500, and Buick engineers took it over as a company project the following year. In 1985, everyone was really surprised when the two Buick-powered cars set fastest times during qualifying. Since then, the cars have suffered from niggling problems and have yet to finish a race. Although the Buick powerplant is based on a production engine it doesn't mean it costs any less, as it uses a specially made block with thicker and higher grade iron plus many Cosworth components, such as pistons, pumps and fuel injection.

**HONDA**

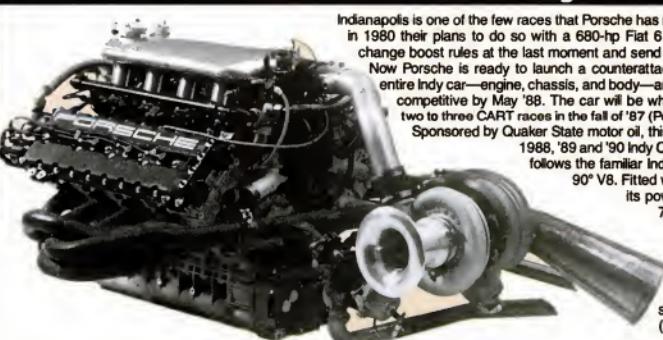
Type: 90° V8, 32 valves, dohc  
Capacity: 2642.7 cc  
(161 cu. in.)  
Bore & stroke: 3.622 x 1.956 in.  
Max. rpm: 12,200  
Power: 740 hp  
@ 11,500 rpm

Max. torque: 350 lb.-ft.  
@ 9500 rpm  
Turbocharger: IHI  
Ignition: Honda Electronic  
Fuel system: Honda Electronic  
Management System  
Cars with engine at Indy: 2

**Teams and drivers:**

- Gales Racing (Geoff Brabham and Jeff MacPherson).

Honda started building Formula One racing engines as long ago as 1964. Its current turbocharged 1.5-liter V6 won the manufacturer's portion of the World Championship last year and led the driver's championship right up until the last race. Honda's Indy engine program started in 1985 when John Judd of Engine Developments in England built a V8 based on an engine that was originally planned as a nonturbocharged 3-liter Formula One powerplant. Gales started using the engine at the end of 1985. Last year, the team had troubles with its Lola chassis, coupled with the inevitable new engine teething problems. Brabham hopes one of the benefits of the Honda engine will be better fuel consumption. Thanks to the electronic engine management system, the Honda gets about 2.1 mpg versus 1.8 for the Cosworth. So the Honda should be able to race 500 miles with fewer pit stops than the six or seven needed by the competition. It's also less likely to run out of fuel during a race.

**The Germans Are Coming!**

Indianapolis is one of the few races that Porsche has never officially entered, although in 1980 their plans to do so with a 680-hp Fiat 6 Turbo scared USAC enough to change boost rules at the last moment and send the German firm away in a huff.

Now Porsche is ready to launch a counterattack by designing and building an entire Indy car—engine, chassis, and body—and have it sorted out in time to be competitive by May '88. The car will be whipped into shape during the last two to three CART races in the fall of '87 (Pocono, Laguna Seca and Miami).

Sponsored by Quaker State motor oil, this Indy Porsche will run the entire 1988, '89 and '90 Indy Car seasons. The Porsche engine follows the familiar Indy format of a 2.6-liter, 32-valve, 90° V8. Fitted with a single German KKK turbo, its power is given only as "more than 700 hp." Designed by the same

team that created the successful TAG-Porsche Formula One V6, it's likely to share many of that engine's World Championship-winning speed secrets, including excellent (for racing) fuel efficiency.—W.H.



# TOW IT

Choices are few, payloads are downsized, but you can still tote that Airstream.

BY JIM DUNNE, Detroit Editor

**F**ew holiday weekend sights are sadder than that of an undersized car with trailer parked on the shoulder of the freeway, obviously in need of mechanical help. As you speed by, you get the feeling that the problem is a major one. Weekend service usually is spotty, and that means the trailer owner's holiday is off to a rocky start.

Those problems will never be part of your vacation experience if you take a few minutes to figure out what type of vehicle you should buy in order to pull your boat, or snow sleds, or travel trailer.

Luckily, the technique of choosing a good towing vehicle is a fairly simple one. Car and truck makers, through long experience, have worked out a system to match trailer to towing vehicle easily. They specify four separate classes of towing vehicles, in ranges that cover just about any weight of rig you want to tow:

**Class I:** Light-duty work pulling a trailer that weighs up to 2000 pounds.

**Class II:** Medium-duty goes up to 3500 pounds.

**Class III:** You need special equipment to meet this limit for trailers weighing up to 5000 pounds.

**Class IV:** Anything above 5000 pounds probably calls for a truck or van with heavy-duty chassis features.

**Tongue weight** limits are the maximum weight that can rest on the car's trailer hitch. They run about 10 percent of the total trailer weight.

Just about any standard car will pull a 1000-pound trailer without breaking down. However, some cars—mainly tiny imported econoboxes and turbocharged types—are not recommended for trailer towing under any circumstances.

Most folks can't afford to buy both a new car and a new trailer at the same time. What they do, according to Dave Tarrant, Ford's expert on recreational and specialty vehi-



For heavy towing duties, a full-size V8 is the only automotive choice.

Vans and utility vehicles are a popular towing solution.

# TOW IT

cles, is to match an existing car to a new trailer, or vice versa.

"That's why the towing classifications are so important," Tarrant points out. "It's easy to match an older vehicle with a new trailer—just a matter of matching the weights. Buying a new car for your old trailer works the same way."

There are some additional facts you should keep in mind about why certain vehicles are good trailers, while others are not:

- The heavier the tow vehicle, the better it is at holding a trailer on a straight track. Too light a car can cause "tail-wagging" from side to side.

- Powerful engines and heavy-duty drivetrains not only are easier to drive with a trailer in tow, but will last much

longer. However, turbos usually are not recommended since the turbo often is overworked keeping a steady highway speed with a trailer.

- Automatic transmissions get the nod over manuals because clutches in manuals get a lot of wear while towing. The newer 4-speed automatics have a great advantage. They can be driven in THIRD during heavy pulling, then shifted to overdrive when the highway is flat or the trailer is unhooked.

- Rear-wheel drive is better than front-drive, and 4-wheel drive is best of all for heavy-duty towing. Front-drive suffers because the trailer shifts weight off the front wheels, robbing them of driving and steering traction.

- A car with a separate frame is better

for towing than a unit-body car. The frame keeps the trailer's drag forces off of the body, preventing pulling and twisting on the sheetmetal.

- Underhood heat can become a problem because the engine runs hotter during towing. Extra cooling systems for radiator, transmission and oil are recommended for Class II vehicles and up. Equalizing hitches put more weight on the front wheels, so that setup may call for a power-steering pump cooler as well.

Just about any trailer expert will tell you to get all your towing equipment from the new car dealer when you buy your new vehicle. It is all custom designed at the factory, and covered with the same warranty as your car. **PM**

## CARS (AND TRUCKS) YOU CAN STILL TOW WITH

Use this table to find the maximum trailer weight a 1987 model is able to pull safely without damage to the vehicle or the trailer. Trailer weights are listed in pounds.

If one weight is given, that is the maximum weight the car can pull when it is not equipped with a special trailer towing package.

Where two weights are given, the first weight is for a non-equipped car, the second weight for a car equipped with all the

towing equipment offered by its manufacturer. That may include automatic transmission, heavy springs, special hitch and heavy-duty cooling systems. It may also indicate that a bigger engine is needed to let you pull a heavier rig.

In some cases, primarily with the imports, the higher weight limit is possible when the trailer is equipped with its own brakes. Note: Car warranty may be voided if towing limits are exceeded.

<b>CHRYSLER<sup>1</sup></b>						
Omni/Horizon	1000;1500	Monte Carlo	2000;4100	<b>ACURA</b>	Pulsar NX	1000;2000 <sup>2</sup>
Aries/Reliant	1000;1500	Corvette	Not recommended	Integra	Maxima	1000;2000 <sup>2</sup>
LeBaron Coupe/K	1000;1500	Sprint	Not recommended	Legend	Stanza	1000;2000 <sup>2</sup>
Caravelle SE/ New Yorker	1000;1500	<b>AMERICAN MOTORS</b>	2000SX	2000SX	300SX	1000;2000 <sup>2</sup>
5th Avenue/Diplomat/ Gran Fury	2000	Trucks (including comparable GMC badge)	2000;5000	Comanche	Pathfinder	1000;2000 <sup>2</sup>
Shadow/Sandance	1000;1500	Astro	2000;5000	Jeep J-10;J-20	Van	1000;2000 <sup>2</sup>
Liner/LeBaron GTS	1000;1500	Eldorado	2000;5000	Grand Wagoneer	Pickups	1000;2000 <sup>2</sup>
Dodge 600	1000;1500	K Blazer (full size)	2000;5000	Wangler		
Daytona	1000;1500	Chevy Van/Sport Van	2000;8000	Cherokee/Wagoneer		
Colt	900;1000 <sup>2</sup>	S10 Pickup	2000;5000	Eagle		
Caravan/Voyager	1000;2750	S10 Blazer	2000;5000			
Conquest	1000;2000 <sup>2</sup>	Suburban	2000;8000	<b>AUDI</b>	<b>PEUGEOT</b>	
<b>Dodge Trucks</b>		Full-Size Pickup	2000;10,000	4000S	Pulsar	1000;2000 <sup>2</sup>
Mini Ram Van	1000;2000 <sup>2</sup>	(Fifth Wheel trailers to 13,500 on certain full-size pickups.)		5000S	Maxima	1000;2000 <sup>2</sup>
PowerMaster Ram 50	1000;2000 <sup>2</sup>	Pontiac		5000CS	Stanza	1000;2000 <sup>2</sup>
Ramcharger	3500;6500	Fiero	1000	Turbo	300SX	1000;2000 <sup>2</sup>
Wagon/Van	2500;7500	Fiero	1000;2000	2000	300SX	1000;2000 <sup>2</sup>
Full Size Pickups	2500;8000	Grand Prix	1000;3500	2000	Pathfinder	1000;2000 <sup>2</sup>
Raider	1000;2000 <sup>2</sup>	Bonneville	1000;2000	2000;3500	Van	1000;2000 <sup>2</sup>
Dakota	2500;5500	Grand Am	Not recommended	4000CS Quattro	Pickups	1000;2000 <sup>2</sup>
Van	2500;8000	Sunbird	1000 <sup>1</sup>	5000CS Turbo		
Vista 2X4	1500	6000	1000;2000	1499;2000 <sup>2</sup>		
Vista 4X4	1000;2000 <sup>2</sup>	Safari	3500;5000	<b>BMW</b>	<b>PEUGEOT</b>	
<b>FORD</b>		Bulck		Towing not recommended with any car in the BMW lineup.	<b>PORSCHE</b>	
Tracer	1000	Skyhawk	1000 <sup>1</sup>		924S	1100;2640 <sup>2</sup>
Taurus/Sable	1000;2000	Century	1000;2000		924S	1100;2640 <sup>2</sup>
Mustang	1000	LeSabre/Electra			944	1100;2640 <sup>2</sup>
Crown Victoria	2000;5000	Wagons	2000;5000		926S, 911	"Not listed for towing."
Lincoln Town Car	2000;5000	LeSabre/Electra				
Escort/Lynx	1000	Coupes and Sedans	2000	<b>RANGE ROVER</b>		
Tempo/Topaz	1000	Riviera	2000	Range Rover	1650;7700 <sup>2</sup>	
Thunderbird/Cougar	2000	Somerset/Skylark	1000	<b>HONDA</b>	<b>SAAB</b>	
Granada/Tempo	2000	Regal	2000;3500 <sup>1</sup>	Towing not recommended with any car in the Honda lineup.	900 <sup>1</sup>	1000;2000 <sup>2</sup>
Mark VII/Continental	2000				9000	1000;2000
Full-size van	3500;10,000	<b>HYUNDAI</b>		<b>SUBARU</b>		
Club Wagon	3100;10,000	Oldsmobile		Towing not recommended.	Towing not recommended.	
Super Van	3200;10,000	Frenza	1000			
Super Wagon	5300;10,000	Cutlass Ciera	1000	<b>ISUZU</b>		
Ranger	1100;5000	Cutlass Supreme	1000;4000	PUP	TOYOTA	
Aerostar	1500;4900	Custom Cruiser	2000;5000	I-Mark	Tercel	700;1500
Bronco II	1600;5200	Toronado	1000;2000	Not recommended	Camry	2000
<b>GENERAL MOTORS</b>		Calais	1000	Trooper II	Cressida	2000
Chevrollet		Cutlass Cruiser	1000;3000	Impulse	MR2	1000;1500
Chevrollet	Not recommended	Ninety Eight	1000;2000		Corolla	1500
Nova	1000;1500	Mazda			Colica	2000
Camaro	1000;3800	Merge	900;1000 <sup>2</sup>	B2000 Pickup	Supra	2000
Caprice	2000;5000	Targa	1000;1500 <sup>2</sup>	Pickup	Van	2000
Spectrum	Not recommended	El Dorado	1000	Towing not recommended for any car in the Mazda lineup.	Land Cruiser	2500
Camaro	1000;2000	Alante	Not recommended		Pickup	2000;5000
Corsica/Beretta	2000	Brougham	1000;5000		4Runner	2000;3500
Cavalier	1000;2900	DeVille	1000	<b>MERCDES</b>		
Celebrity	1000;3200	Seville	1000	Towing not recommended with any car in the Mercedes-Benz lineup.		
		Series 75	Not recommended			
1. Towing not recommended with convertibles or turbocharged engines; 2. When trailer is equipped with brakes;				<b>MITSUBISHI</b>	<b>VOLKSWAGEN</b>	
3. Diesel engine not recommended for towing.				Mirage	Golf, Fox, Jetta, Scirocco	"We have no recommended towing weight."
				Treda	Quantum	1300;2000 <sup>2</sup>
				Starion	Vanagon	1300;2000 <sup>2</sup>
				Montero		
				Cordia		
				240		
				1000;2000 <sup>2</sup>		
				Galant	740	3300
				Pickup truck	760	3300
					780	3300
				<b>NISSAN</b>	Towing with all car models must be with frame-type hitch sold by Volvo.	
				Sentra	1000;2000 <sup>2</sup>	



# CAR TUNES

America's automakers are developing high-octane mobile music systems. We evaluate the latest highway hi-fi from Detroit's Big Three.

BY FRANK VIZARD, Contributing Editor; Photos by Bill Ashe

**T**urn up your radio! That old rock 'n' roll war cry is the new anthem of America's Big Three carmakers. General Motors, Ford and Chrysler have all married into the hi-fi business, giving birth to autosound systems tailored to individual cars.

Whether it's the full sweep of a symphony orchestra or the intimate rhythms of a jazz quartet, the "premium" sound systems available from Motown's carmakers represent their best efforts to date in music reproduction.

The success of the car companies in audio rests in part on newly formed relationships with old-line American hi-fi companies. GM, through its Delco Electronics division, made the first deal when it approached the respected audio brain-trust called Bose Corp. The result was sound systems acoustically tailored to specific cars but installed on GM assembly lines. The success of the Delco/Bose marriage shotgunning Ford into a liaison with JBL while Chrysler raced to the altar with yet a third speaker maker, Infinity.

Bose, JBL and Infinity are honored names in home audio,

where each company takes an individual approach to the subject. Predictably, no two companies travel the same route to highway hi-fi, although each developed sound systems well-suited to the car. The differences in methodology, price, features and acoustic characteristics are substantial enough to warrant test driving a representative car from each of the three automakers. So PM's best ears went on the road with GM's Pontiac Bonneville, Ford's Lincoln Continental and Chrysler's LeBaron GTS. Here's what we heard.

## Chrysler LeBaron GTS

The sound system in Chrysler's LeBaron GTS utilizes eight speakers: two  $\frac{3}{4}$ -in. tweeters mounted in the dashboard, two  $\frac{5}{4}$ -in. woofers in the front door cavities, and a pair of  $5\frac{1}{2}$  x  $7\frac{1}{2}$ -in. coaxials (tweeter mounted on top of a woofer) in the rear deck. The front and back tweeters reproduce music's higher treble frequencies while the woofers in the doors and the rear deck handle the bass.

The Chrysler/Infinity system uses an unusual bi-amplification

**Watts and wheels from Chrysler, Ford and GM (left to right): LeBaron GTS, Lincoln Continental, Pontiac Bonneville.**



Chrysler's cassette receiver has 5-band equalizer (lower left), joystick-type balance and fader control (lower right).

tion scheme. Bi-amplification generally means separate amplifiers are used for the front and rear treble and bass speakers. Chrysler/Infinity varied the traditional definition by powering the front and rear tweeters with four amps built into the in-dash cassette/receiver. The woofers are independently amplified by amp modules attached to the back of each speaker. This amp arrangement greatly reduces the amount of space required for the autosound system. All told, 32 watts power the tweeters and 56 watts drive the woofers.

The Chrysler-brand cassette/receiver resembles its competitors, boasting tape auto reverse, Dolby-B tape noise reduction, and DNR noise reduction for tape and radio. AM stereo is also featured. The cassette/receiver sports some unique features, but the absence of others was felt.

Unlike its competitors, Chrysler's cassette/receiver comes equipped with a 5-band graphic equalizer and a sliding lever marked "ambience." The equalizer proved useful in that the system seemed to benefit from a slight boost at the 3.5kHz mark. The ambience control, designed to impart a "concert hall" effect, should be used judiciously, if at all.

Although the cassette/receiver performed well, the inclusion of seek feature on the radio and a tape search feature (which allows you to advance or rewind to the next song on a cassette) would have made it easier to use. Other shortcomings of Chrysler's cassette/receiver include:

- Slight lag in the identification of AM stereo stations, an inconvenience which makes blindly searching for an AM stereo station more time-consuming.



Ford radio/tape unit has electronic tuning, mechanical push-button tape controls, rotary bass, treble, balance, fader.

- Poorly visible tape direction indicator.
- Hair-trigger auto reverse, prompted by pressing the volume control knob, that often leads to its inadvertent use.
- Unduly complicated procedure needed to defeat the clock function so that radio frequencies are displayed constantly.

On the plus side, Chrysler's cassette/receiver offers the most radio presets (10 AM and 10 FM). A joystick balance-and-fader control made adjustment of the left-right/front-rear soundstage very simple. With the exception of the tape direction indicator, all the controls were adequately lighted and displayed for day or night. Controls were laid out well.

Overall, sound quality was very good with nice definition of musical instruments. The dashboard-mounted tweeters maintain a realistic soundstage in front of the listener. But the system does seem slightly underpowered for sustained listening at maximum volume, since distortion was quickly apparent with all types of music played at full throttle.

The Chrysler/Infinity sound is a \$600 option. Potential buyers should note that the Dodge Lancer is the same body type as the LeBaron, so the same conclusions apply.

### Ford Lincoln Continental

The Ford/JBL system in the Lincoln Continental uses the same number of speakers as the Chrysler LeBaron but the actual number of drivers (tweeters, midranges and woofers) is greater. The dashboard houses two 5-in. coaxial speakers (concentric tweeter and woofer). Each front door contains a 5½-in. woofer. And two 6x9-in. speakers mounted in the rear

## MOTOWN SOUND: NOTEWORTHY SPECIFICATIONS

System And Automobile	CHRYSLER/INFINITY LE BARON GTS	FORD/JBL LINCOLN CONTINENTAL	GM/DELCO-BOSE PONTIAC BONNEVILLE
Number of speaker drivers	8 <sup>1</sup>	12 <sup>2</sup>	4 <sup>3</sup>
Total Amplification	88 watts	140 watts	100 watts
Tone Controls	5-band graphic EQ	Bass/Treble	Bass/Treble
Front/Rear Fader	Yes	Yes	Yes
Left/Right Balance	Yes	Yes	No
AM Stereo	Yes	No	Yes
Number Of Presets (FM/AM)	10/10	4-4	5/5
Radio Seek/Scan	No/Yes	Yes/Yes	Yes/Yes
Radio Noise Reduction	DNR	DNR	DNR
Tape Noise Reduction	Dolby-B/DNR	Dolby-B/DNR	Dolby-B/DNR <sup>4</sup>
Tape Search	None	Forward/Reverse	Forward/Reverse
Tape Autoreverse	Yes	Yes	Yes
Tape EQ (120/70)	Manual	Automatic	Manual
Total Cost	\$600	\$856 <sup>5</sup>	\$1500 <sup>6</sup>

1. Two tweeters, two midranges, two coaxials. 2. Two coaxials, two full-rangers, two 3-ways. 3. Four full-rangers. 4. Automatic operation. 5. Comprised of \$506 option price added to the \$350 cost of the standard system. 6. Comprised of \$1300 option price added to the \$200 cost of the standard system. Option price includes stereo control pod on leather-wrap steering wheel, plus automatic power antenna.



**■** Delco's electronically tuned radio displays time except when selecting stations. Red-illuminated controls are easy to find.

deck each have a tweeter, midrange and woofer combination. The JBL speakers are powered by four separately mounted amplifiers delivering a total of 140 watts.

The Ford-made cassette/receiver mounted in the dashboard is best described as a hybrid. The radio section is electronically tuned while the cassette section uses mechanical transport controls. The "mechanical" aspect of the cassette section is hardly a drawback: The auto reverse mechanism, for example, is perhaps the fastest and smoothest on the market. Another plus for Ford's cassette/receiver is its ability to automatically adjust for either 70-EQ (metal/chrome) or 120-EQ (normal bias) tape. Like its competitors, Ford's cassette/receiver has Dolby-B and DNR noise reduction. Seek/scan for the radio and automatic music search for the tape section are also included.

On the down side, the Ford cassette/receiver lacks AM stereo, and the number of presets is limited to four AM and four FM stations. Display of the controls is adequate except for two instances: Tape controls do not light up, and there is no visual indicator that DNR is operating.

It's not unheard of for new-car buyers to return their vehicles to the dealer for fine-tuning. And in what's possibly the first case of a "Monday morning stereo," we had to return the Continental to Ford because of excessive rattling from the right-door speaker. Once repaired, the system performed superbly, though with the "bright" California sound characteristic of JBL.

Adjusting the treble control downward compensated for this

perceived brightness. Bass response was awesome—to a point. In the Ford/JBL system, an "excursion control computer" prevents the speakers (primarily the bass woofers) from overloading—and thereby distorting sound—under high-volume use. (The Boss system also prevents overloads, though differently.) To our ears, JBL's overload control is overly cautious.

At loud but listenable levels, bass would taper off in relation to the midrange and treble sounds. The individual beats of a kettle drum, for example, would emerge less distinctly than they might on an adequately powered home hi-fi system. Though the excursion control prevents the system from producing unlistenable distortion, such manipulation of the music's normal frequency distribution is a form of distortion itself. It doesn't sound bad—it just doesn't sound correct.

One final criticism of the Ford/JBL sound system has nothing to do with its components, but concerns its installation. The Lincoln Continental had a tendency to resonate more than its competitors. This suggests that the speaker mounting and internal damping should be improved.

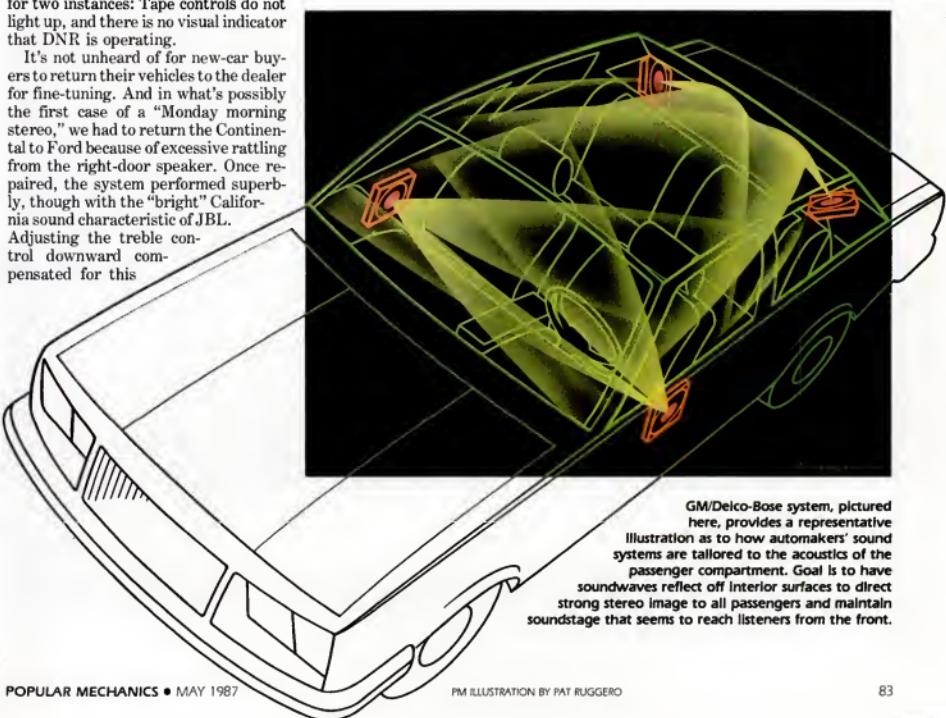
The Ford/JBL system in the Lincoln Continental has an overall cost of \$856. The option lists for \$506, but this is tacked onto the base sticker price of \$350 for the car's standard sound system.

### Pontiac Bonneville

The Delco/Bose system in Pontiac's Bonneville differs from its competitors in that it uses only four 4½-in. full-range speakers. This means that each speaker reproduces the full bass-to-treble range of the music spectrum instead of dividing the chore among tweeters, midrangers and woofers.

One pair of speakers is assigned to the front doors while

(Please turn to page 174)



GM/Delco-Bose system, pictured here, provides a representative illustration as to how automakers' sound systems are tailored to the acoustics of the passenger compartment. Goal is to have soundwaves reflect off interior surfaces to direct strong stereo image to all passengers and maintain soundstage that seems to reach listeners from the front.

# RAD WHEELS

Bicycles gear up for the 21st century with radical aerodynamics and lightweight aerospace materials.

BY NORMAN MAYERSON, Contributing Editor

**S**ensual and curvaceous though it may be, the Italian beauty captured by PM's camera for these pages really deserves notice more for the braininess of its construction technique than its captivating eye appeal. The basic diamond-frame form of bicycle design has been a constant for 100 years now, acclaimed for its versatility, strength and ease of production. From this point on, however, the fruitful marriage of two sciences—materials technology and aerodynamics—is making possible outrageous new bicycle shapes that will give riders a leg up on the forces of wind drag and inertia.

The Bottecchia Kronotech derives its shapely chassis from two mirror image carbon-fiber shell halves that sandwich a honeycomb core section. But this bike is far from the first to use a composite material skin as the supporting structure—the Bowden Spacelander (see *Cycles*, page 46, Sept. '86) incorporated this plan 40 years ago. And fiber components can be traced back as far as the bamboo-framed models and

Aerodynamic! The exotic Kronotech is a working design exercise that showcases carbon fiber monocoque construction technique in an elegantly styled \$20,000 package. Inspired by the pursuit of maximum aero advantage for competition use, the bike's key elements take today's most advanced features years into the future.



 **Selle Royal**

**modolo**  
**KRONOTECH**





Even the pedals get the aero treatment, thanks to a Kevlar shroud that does double duty as a footstop. Belt-like, quick fasteners are adapted from ski equipment.



Airfoil handlebar offers less wind resistance than a round tube and incorporates a trip computer at the center. Grips house levers to actuate hydraulic brakes.



Without aero headgear the Kronotech rider would be incomplete. Designed to rest flush against your back in the riding position, the helmet smooths airflow.



hickory-based cycles that were sold before the beginning of the 20th century. What is new, though, is the adaptation of the bike's shape to work with the peculiar properties of carbon fiber materials while reaping the additional advantage of aerodynamic advances.

Compared to conventional 4130 alloy chromemoly steel, carbon-fiber composites can be five times as strong, twice as stiff and one fourth the weight, but all of that impressive might is in withstanding tension, or stretching force. Compression strength comes entirely from the resin that binds the fibers into a useful building material shape; its limits are far lower.

There are a number of conventional design bicycles built of carbon fiber tubing, but in the past they've been plagued with tube separations at the metal lugs used for junction points, and a vague road feel that results from the tubing's shock-damping qualities. They do offer the advantage of light weight, but at a high cost.

The Kronotech approach is based on the thinking of a pool of Italian manufacturers including Carnielli, Modolo and Selle Royal.

The clamshell chassis is itself the load-bearing unit. Like the tub of a Formula One Grand Prix car, the monocoque is well suited to coping with the various forces applied to a bicycle frame, making up for the properties carbon fiber tube alone doesn't possess. To deal with areas of high localized loading, such as the axle dropouts and bottom bracket, structural inserts of carbon wire are positioned according to the axes of stress.

By now the disc wheels on the Kronotech surprise

## RAD WHEELS

no one, though these are the latest bubble shape intended to reduce sensitivity to crosswinds and provide some streamlining for the rider's legs. It's the frame shell itself, though, where the aero slick-up gets serious. The pedal cranks are incorporated into sleek discs that keep airstream disturbance to a minimum, and the wind-cheating footstops feature Kevlar shrouds with a ski-type quick fastener. Carbon-fiber handlebars with the cross section of an aircraft wing have built-in levers for operating the hydraulic brake system; a multifunction tri-computer is flush mounted.

At present there are but a handful of Kronotech samples in existence, being used mostly for development work. Some features, like a



Cinelli Laser Kronos is a road-going time trial machine that displays racing posture with sloped top tube and competition wheels.

composite fork assembly, are already available to aficionados, and it's easy to see that details like the bellows that keep the saddle section wind-wise are bound to show

up on road machines. All told, the NASA-like Kronotech would take the better part of \$20,000 to pry from the consortium of innovators who built it.

Using monocoque construction and carbon-fiber materials can sometimes run a builder afoul of the racing regulations. By the 1938 ruling of the sport's governing body, Union Cycliste Internationale (UCI), devices installed solely to reduce air resistance are disallowed from competition. Disc wheels are permitted because the discs are a structural element; simply covering a spoked wheel with a smooth fairing is illegal.

Though the UCI has no reservations about permitting the disc wheels in competition, they have drawn the line at Huffy's partial monocoque framework on the successors to 1984's Olympic funny bikes. The original multi-medal winners (see *Breakthrough Bike*, page 74, June '85) used teardrop section frame tubing for superior windsanship. The latest generation machine shown here, an outlaw by UCI regulations, can



Outlawed! Now illegal for UCI events, the Huffy Olympic hopeful for 1988 gained an aero edge with a carbon-fiber and aircraft foam seat tube section. New design is already in the works.





**Bottecchia track bike (right) has fixed gearing, delta aero handlebar, webfoot frame gussets. Road racer (left) looks more familiar.**

compete only in National races and triathlons. In team time trial trim as shown, the aluminum frame members are wrapped with fiberglass, Kevlar and graphite material. Most striking is the wide and controversial seat tube, which extends all the way back to the rear tire.

In the Cal State Long Beach wind tunnel, improvements up to 20 percent were realized over the '84 Olympic bikes by cleaning up the airflow in this area. That's precisely what the UCI objected to, even though builder Mike Melton of Huffy was on hand with X-rays to show that the seat tube would collapse without the wide carbon-fiber skin structure and foam-insert support section.

With no choice but to step back and redesign the U.S. cycling team's 1987 hardware, Mike Melton reverted to a more standard 3-tube framework which is lighter, though not as aero-efficient as the outlaw bikes. The plan: curve the seat tube forward and tuck the rear wheel up against it to shorten the wheelbase. That way, the team pursuit riders can bunch closer together in an optimum drafting formation.

One possibility for other aero gains is in the realm of rider gear. At a 30-mph pace, the rider himself is the cause of two-thirds of the total aero drag. Small advances in the rubberized

synthetic skinsuits add up to seconds on the track, and the new helmet size regulations have caused trips back to the wind tunnel to determine the best shape.

Monocoque cycle-crafting doesn't only come from Italy and America, and it's not always done in carbon fiber. Japan's Fuji factory has

more widely known, this design offers a potential advantage in cost.

It may be a while before outrageous designs like the Kronotech are adapted for everyday road use, but already the rub-off of racing prototypes has made its mark. Witness the Cinelli Laser Kronos. At \$4300, it's

output. As a time trial machine, it is designed to compete on sections of open road and carries all top-of-the-line accoutrements—Cinelli disc at the back, Ambrosio 26-in. wheel up front, Campagnolo components, Shimano drop-outs. No one would call it a practical everyday machine.

The racing lineage in Bottecchia's production models is more apparent. In the pair pictured above, a road race model on the left looks positively tame up against the track bike on the right. With fixed gearing and no free-wheel mechanism to allow coasting, it's apparent that we're talking 100 percent business here. Carbon fiber is used in the disc wheels and the aero-styled delta handlebar. Frame junction points are webfooted, or gusseted, for strength and a slight advantage against the wind. This is the shape that street frames have begun to assume as the style of aerodynamics takes hold.

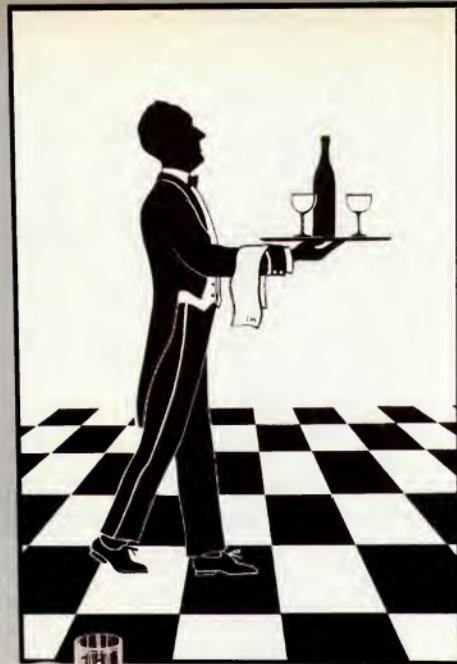
For most purposes, there's little to really be gained in slicking up road-riding bicycles. But as sure as aerodynamic racing sleekness has defined today's look in 55-mph automobiles, so it will in the world of people-powered 2-wheelers. And when it arrives full force, the trend will leave its mark far past the styling of the exoskeleton, all the way to the backbone of the beast. **FM**



**Fuji's one-of-a-kind semimonocoque bike gets high strength with low weight from an aluminum honeycomb downtube skinned with sheet alloy. The technique is less costly than carbon fiber.**

shown a track prototype that uses an aluminum-sheathed honeycomb downtube with conventional top and seat tubes. Because the material is more readily available and the construction process

not the sort of vehicle you leave leaning against a tree while you shop for groceries. Still, it is accessible to the serious enthusiast willing to sacrifice some cash and comfort for that final 2 mph of



# SOCIAL GRACE

This butler's table of solid mahogany is an unusually versatile piece of furniture. It not only functions as a coffee table, but the top lifts off the base for use as a spacious serving tray.

Start construction by jointing and surfacing all 4/4 stock to  $\frac{3}{4}$  in. Select the pieces to be used for the tabletop and leaves by matching for color and grain pattern. Crosscut all the pieces to rough length and use the jointer to true one edge of each piece. Rip the pieces selected for the tabletop panel  $\frac{1}{4}$  in. oversize and joint the sawn edges. Rip the rails, stiles and aprons about  $\frac{1}{16}$  in. oversize and remove this excess with one pass on the jointer.

Check for good contact between the mating surfaces of the panel pieces and spread with glue. Assemble the panel on a flat surface and use bar clamps on both the top and bottom to keep the panel flat and provide equal clamping pressure. Double-check that the clamped panel has no twist. After the glue has set for about 20 or 30 minutes, scrape off any excess with an old chisel.

Next, crosscut the rails and stiles to finished length. Plough a  $\frac{1}{4}$ -in.-wide  $\times \frac{1}{2}$ -in.-deep groove centered in the rail and stile inside edges. This groove will house the top panel and serve as a mortise for joining the rail tenons.

Using a dado blade in the table saw, cut the tenons on the rail ends. Use a stopblock to ensure accurate repetitive cuts. Try the cuts on scrap wood first

Here's a classic mahogany butler's tray table you can build yourself.

BY NEAL BARRETT



and test-fit with the ploughed groove.

Scrape or plane the glued-up panel as necessary to achieve a smooth, flat surface on both sides. Rip the panel to finished width and crosscut to length. Be careful to make the cuts square.

Next, rout the panel tongue using an edge guide and  $\frac{1}{8}$ -in. straight bit. Cut a  $\frac{1}{2}$ -in.  $\times \frac{1}{4}$ -in.-deep rabbet around the panel edges on both sides. Prepare the tabletop pieces for assembly by softening the sharp corners along the edges of the rails, stiles and panel with 120-grit sandpaper. Avoid this sanding where the rails and stiles join. Apply furniture wax to both sides of the panel tongue at the corners. This will prevent any ex-

cess glue from bonding the panel to the frame at these points.

Apply glue to the tenons and those portions of the stile grooves that act as mortises, and put a drop of glue in the center of each rail groove. This glue tucks the middle of the panel in place while allowing the sides to move with changes in humidity. Center the panel in a stile groove and place each rail in position. Then place the opposite stile in position and clamp the joints tight. Center the panel to create a uniform  $\frac{1}{16}$ -in. reveal and check opposite diagonal measurements to determine if the frame is square.

Using the drawing as a guide, make full-size templates for each size leaf and transfer the outlines onto the selected stock. Cut the curved edges on the band saw, following the waste side of the line. Clean up the saw marks with a belt sander or spokeshave. Set up the router table with a  $\frac{3}{8}$ -in.-rad. rounding-over bit and ball-bearing pilot. Clamp a fence to the router table to shield the bit, and round the outside edges of each leaf.

Using a marking gauge held against the outer leaf edge, lightly mark the inner and outer lines for the finger-holes. Cut the circular ends of each cutout with a  $1\frac{1}{4}$ -in.-dia. hole saw or spade bit mounted in the drill press. Complete the cutouts with a handheld jigsaw and smooth with 120-grit sandpaper. Then round the cutout edges with a  $\frac{1}{16}$ -in.-rad. rounding-over bit.

Following the plan, lay out the position of the butler's tray hinges (Paxton No. 4041) on the leaves and tabletop. Using a sharp chisel, first cut the hinge

Color photo: Bill Ashe  
Black-and-white photos: Neal Barrett  
Technical art: Eugene Thompson  
Photo stylist: Gabe Herrick



1 With the dado blade set for a  $\frac{1}{4}$ -in.-wide cut, plough a  $\frac{1}{2}$ -in.-deep groove on one edge of each rail and stile.



2 Cut the tenon cheeks on the rails using a dado blade. A stopblock on the miter gauge ensures identical repetitive cuts.



3 Cut the panel tongue by routing around the top and bottom of the tabletop panel. Use a straight bit and edge guide.

## SOCIAL GRACE

mortises in the tabletop and then in each leaf. Note that these hinges require an additional recess in the leaf mortises to accommodate both the hinge barrel and tensioning leaf. This allows the table leaves to remain upright when desired. Check each hinge for fit and adjust as required.

Rip and dress the 10/4 stock for the table legs to size and crosscut to finished length. Lay out the mortises as shown in the plans. Clamp a fence to the drill press table so that the drill bit is centered over the mortise centerline, and drill overlapping  $\frac{3}{8}$ -in. holes  $1\frac{1}{16}$  in. deep to remove most of the waste from each mortise. Then use a sharp chisel to square the mortise ends and remove the ridges left by the drill bit.

Crosscut the aprons to finished length and set the table saw and dado blade for cutting the tenons. Make a

trial tenon with scrap wood and test fit with the leg mortises. After the apron tenon cheeks are cut, mark the tenon shoulders and cut them with a dovetail saw. Test-fit each mortise-and-tenon joint. Adjust where necessary.

Begin assembling the base by gluing each long apron to two legs. Clamp these assemblies and check for square. When the glue has cured, finish the base assembly by joining each pair of legs with the short aprons.

Cut the alignment strips for the tray bottom to finished dimension and bevel the bottom edges with a chamfer bit mounted in the router table.

Turn the tabletop upside down and center the inverted base on it. Trace the inside of the base on the tabletop to mark the positions of the alignment strips and then remove the base. Place the strips in position and bore and

countersink the pilot holes for fastening the strips to the tabletop. Fasten the strips with  $1\frac{1}{8}$ -in. No. 8 fl screws.

Carefully sand all table parts with 120-grit sandpaper. Thoroughly brush off each part and sand with 220-grit paper. Again brush off and lightly burnish with 4/0 steel wool.

We finished our project with a mixture of equal parts Watco Oil and McCloskey's Clear Gloss Varnish. Liberally brush on the mixture and allow it to soak in for about five minutes. Then wipe off and let it dry overnight. Repeat this procedure three or four times to build up the finish. After the final coat has dried, burnish lightly with 4/0 steel wool and apply a coat of Watco Satin Wax.

Finally, complete the table by drilling pilot holes for the hinge screws and then attach the hinges.

PM



4 Use bar clamps on the tabletop assembly to bring joints tight. Compare opposite diagonals to ensure square.



5 Cut a bullnose on the outside curved edge of the leaves with a  $\frac{1}{2}$ -in.-rad. round-over bit mounted in the router table.



6 After boring the circular ends of the fingerholes, support the stock on blocks and complete the cutout with a sabre saw.



7 Mark hinge positions and use a sharp chisel to cut each hinge mortise. Note extra recess required for hinge barrel.



8 Clamp a fence to the drill press table and bore overlapping  $\frac{3}{8}$ -in.-dia. holes to rough out the mortises in each leg.



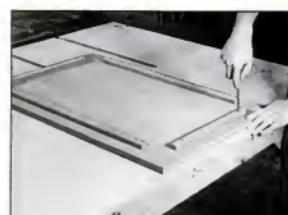
9 Clamp the table leg to the bench and use a sharp chisel to clean up the sides and square the ends of the mortise.



10 After cutting the apron tenon cheeks, mark and cut the shoulders using a dovetail saw. Check fit in leg mortises.



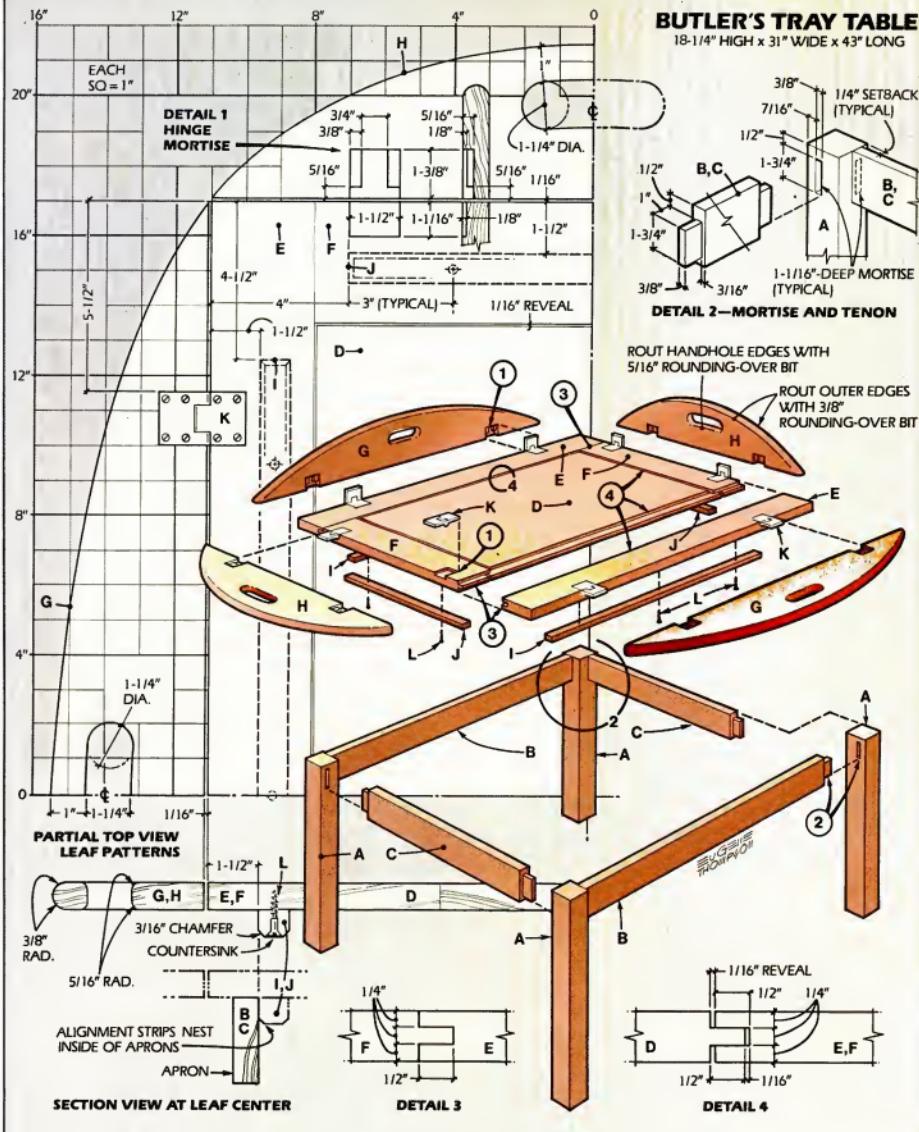
11 Assemble the table base by first gluing the legs to the long aprons. Then glue and clamp the short aprons in place.



12 Bore pilot holes through the alignment strips into the underside of top. Fasten with  $1\frac{1}{8}$ -in. No. 8 fl screws.

## BUTLER'S TRAY TABLE

18-1/4" HIGH x 31" WIDE x 43" LONG



### MATERIALS LIST—BUTLER'S TRAY TABLE

Key	No.	Size and description (use)
A	4	2 x 2 x 17-1/2" mahogany (leg)
B	2	3/4 x 2-1/2 x 31" mahogany (long apron)
C	2	3/4 x 2-1/2 x 19" mahogany (short apron)
D	1	1/4 x 16% x 27-1/2" mahogany (tabletop panel)

E	2	3/4 x 3 x 34" mahogany (stile)
F	2	3/4 x 3-1/2 x 34" mahogany (rail)
G	2	3/4 x 4-1/16 x 34" mahogany (long leaf)
H	2	3/4 x 4-1/16 x 22" mahogany (short leaf)
I	2	3/4 x 3/8 x 23" mahogany (long strip)
J	2	3/4 x 3/8 x 14" mahogany (short strip)
K	8	Butler tray hinges Paxton No. 4041

L 10 1-1/2" No. 8 ft screws

Misc: Carpenter's glue, 120- and 220-grit sandpaper, 40# steel wool, Watco Oil, McCloskey's Clear Gloss Varnish, Watco Satin Wax.

\*Available from Paxton Hardware Ltd., 7818 Bradshaw Rd., Upper Falls, MD 21156

# DOUBLE DECKER

This large, family-size deck is loaded with great features, including a special area for the safety of young children.

BY AUGUST AND SUSAN CAPOTOSTO



A steeply sloping back yard made it very difficult for us to define a safe playing area for our young children. And the small deck we did have we felt could be bigger to suit our growing family. That's what led to our idea for a bi-level design: a spacious main deck with a lower level especially for the children's enjoyment.

The children's deck is totally enclosed and includes other safety features as well, such as rounded corners on steps, table, bench and sandbox. Also, the table folds down when not in use to discourage young climbers, and the benches can be bolted down so they won't tip over or be moved to the railing and used as a launch pad. A child safety gate can also be installed between the levels. And, with 460 sq. ft. total, there's plenty of room for everyone else.

We built this deck with pressure-treated lumber throughout, including the lattice work, because of its high resistance to rot and insect decay. After all this planning, we wanted to make sure this deck was going to last for many years.

Upper level of deck (above) features built-in planters and seating bench with movable dining table and bench. Lower deck (right) has child's sandbox and folding table.





### Upper deck

Lay out the perimeter of the main deck using string and batter boards. Level the strings with a line level and check for square at the corners using a 3 x 4 x 5-ft. triangle, constructed from 1x4 lumber. To check the entire layout, measure diagonally from corner to corner with a tape measure. If the layout is square the measurements should be equal.

Next, establish the location of the ledger boards on the house wall. Snap a chalkline on the wall that corresponds to the top of the ledgers. Then locate the post holes. Do this by measuring out from the house wall the required distance for the first set of posts. Run a string between batter boards exactly parallel to the house wall. Spot and dig the four holes 12 in. in diameter by 24 in. deep, or below the frost line for your area. Pour 8 in. of gravel in the bottom of each hole.

Nail square blocks cut from 2x8 stock to the bottom of the 4x4 posts and place them in the holes. Align each with the string as shown. The posts should be left slightly long to

**Lower deck was completely enclosed for safety of young children. Kitchen window (left) has clear view of child's deck and can be equipped with simple pass-through shelf.**



**Color photos:** Joann Sieburg-Baker. **Black-and-white photos:** August Capostro. **Technical art:** Eugene Thompson. **Wolmanized Pressure-Treated lumber:** Koppers Co. Inc., Forest Products Group, Pittsburgh, PA 15219. **Furnishings:** Carolina Pottery, Fort Mill, SC 29715



**1** Lay out perimeter of deck using mason's string and batter boards. Check corners for square with 3 x 4 x 5-ft. triangle.



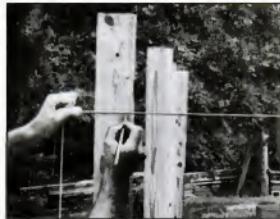
**2** When all strings are in place, check for square by comparing diagonal measurements. The diagonals should be equal.



**3** Dig holes at proper locations, then nail a 2 x 8 block to the bottom of each 4 x 4 post. The blocks help distribute deck weight.



**4** Slide each post into proper hole and align side with layout string. Plumb the post, then back-fill the hole with gravel.



**5** Locate top of ledger on house wall and attach string with line level at that point. Pull string tight, level it and mark post.



**6** Tack-nail ledger boards to house wall and lay out position of joists on surface. Then bore pilot holes for lag screws.

permits trimming to finished height.

Plumb and brace the posts then backfill with gravel to within 4 in. of the top of the holes. Pour a concrete cap over the gravel.

Run a string with a line level from the bottom of the ledger board to the posts, level the string, then measure down from the string the width of a 2x8, which is usually  $7\frac{1}{4}$  in. Mark and cut the posts to this height. Nail post-to-beam connectors to the tops of the posts, then fabricate the beam by nail-

ing together 2x8 stock. Use 8- and 12-ft. stock, offsetting the butt joints. Cut the beam to the required length, place it on the posts and secure by nailing through the connectors. Repeat this entire operation for the second set of posts, then fabricate the beam by nail-

Tack-nail the ledger boards to the house wall then lay out the position of the joists and the lag screws on the face of the ledger boards. Bore pilot and shank holes for the lags then remove the ledgers from the wall of the house.

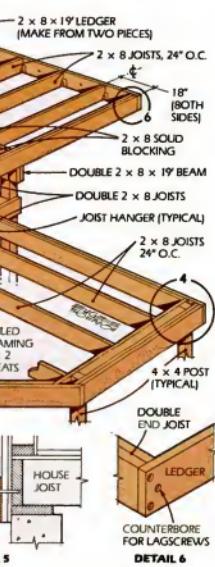
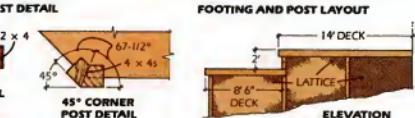
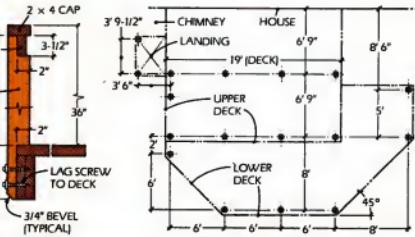
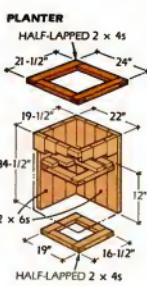
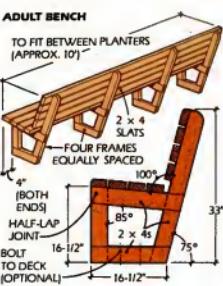
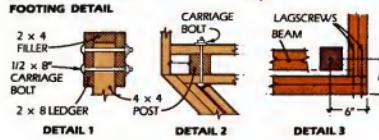
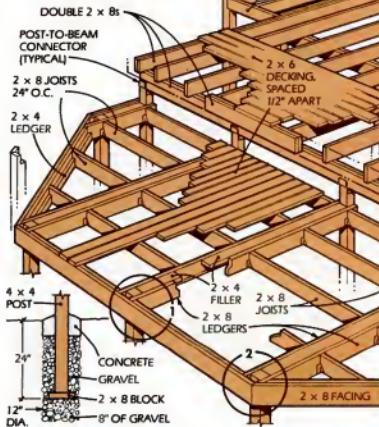
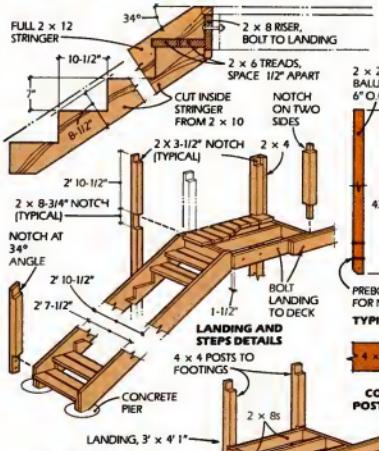
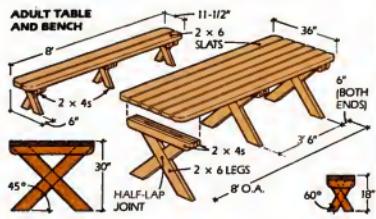
Prefabricate the end joists by nailing together two 2x8s. Attach these end doublers to the ledger boards with lag-screws. Note that the lag-screw holes in the rear of the ledger board are counterbored to recess the heads. This assembly is done on the ground, forming two L-shaped units which are then individually lifted into position. The ledger boards are secured with lag-screws and the end joists are toenailed into the beam. A doubled 2x8 header is cut to length and attached to the for-

**DECK-TO-DECK STEPS**  
2 x 6 TREADS, 43-3/4" LONG

**CHILD'S BENCH**  
2 x 4s SPACED 1/2" APART

**SANDBOX**  
2 x 6s  
48" x 36" x 12" O.C.  
1/4" DIA. HOLES, 12" O.C.  
2 x 8s  
2 x 4 WEDGE (3 PER SIDE)  
1/4" TEMPERED HARDBOARD  
1/4" RABBIT

**CHILD'S TABLE AND BENCH**  
ADULT DECK  
TABLE  
CLEAT  
SUPPORT  
TAPER END OF WEDGE  
2 x 6s  
2 x 4s  
2 x 4  
1 x 4  
HALF-LAP JOINTS  
11-1/2"  
13-1/4"  
31-1/2"  
18"  
24"  
2 x 5" NOTCH  
BUTT HINGE  
STRAP HINGE  
3/4" WEDGE  
HALF-LAP JOINTS  
18"  
OVERALL LENGTH OF TABLE AND BENCH TO SUIT  
11-1/2"  
15"  
60"



ward end of the joists with lag screws. Next, nail joist hangers into the ledger board and header. Cut the joists to length, set into the joist hangers and nail in place with the nails supplied with the hangers. Make sure to sight down each joist and install it with the crowned edge pointing up.

### Lower deck

The posts for the children's deck are located using batter boards and string as before. Measurements are taken from the outer posts of the adult's deck. Plumb and brace the posts, then fill in the holes as described earlier. To determine the height of the children's deck posts, mark the adult deck posts 24 in. below the top of the joists. Run a level line from these marks out to the lower deck posts. Mark the posts and cut them off.

With 2x8 ledgers tack-nailed to both sides of the posts, locate and bore carriage-bolt holes. To determine where to make the mitered cuts on the angled ledgers, place a 2x8 on top of the nailed ledgers and mark the angle directly by tracing along the edge. Cut the angled ledger, then nail the smaller 2x4 ledgers against the face of the 2x8 ledgers. The 2x4s help support the joists along the angled side where joist hangers won't work. Bolt all ledgers to the posts securely.

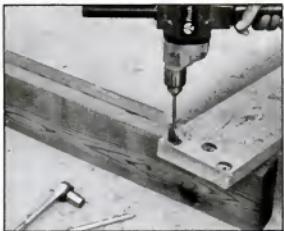
Attach joist hangers to the ledgers that define the center sections. Cut the joists to size and nail in place. Add the joist hangers to the straight sides of the angled sections then scribe the joist to fit between. To mark the angle of these end miters, the joists are positioned above the joist hangers and aligned perpendicularly with the aid of a car-

penter's square. The cutoff can now be marked directly by tracing against the ledger. Notches are cut on the mitered ends to enable the joists to rest on top of the 2x4 ledger. Nail these joists in place, then construct the section of the lower deck that wraps around the upper deck using the drawing as a guide. When all ledgers and joists are in place, nail 2x6 decking onto both decks as shown in photos 14 and 15.

### Landing

The stairway landing frame is constructed separately of 2x8s and is then mounted to the end joists of the upper deck with carriage bolts. Level it and brace it temporarily from below. Then, place two 4x4 posts into holes dug to receive them and mark where they touch the bottom edge of the landing

(Please turn to page 180)



7 Remove ledgers and bore pilot holes at end for lag screws that hold double end joists. Counterbore to accept socket wrench.



8 Attach ledger to end joists then support assembly and attach to house wall as a unit. Tighten ledger lag screws securely.



9 Attach joist hangers to ledger boards using nails provided. Then cut joists to length, slide into hangers and nail in place.



10 Tack-nail ledgers for lower deck to both sides of posts. Then bore clearance holes through parts for carriage bolts.



11 First install all ledger boards and facing boards on lower deck. Then lay out joist positions in center sections.



12 To keep joists aligned, use a framing square to transfer the position of joists in center sections to the angled sections.



13 Install hangers, then cut joists to fit and nail in place. Ends of joists must be notched where they meet angled 2 x 4 ledgers.



14 Maintain even spacing between decking boards by using wood spacer. Ends of boards must always fall over middle of joists.



15 Install 2 x 6 decking bark side up and attach at each joist with two hot-dipped galvanized nails driven at a slight angle.



# INSTANT COLOR

Basic techniques for applying the ever-popular plastic laminate—including special edge treatments.

BY ROSARIO CAPOTOSTO, Contributing Editor



The post-war housing boom introduced American homeowners to a new building material—plastic laminate. This inexpensive sheet material quickly became the overwhelming choice for use on kitchen countertops. It provided a durable, easy-to-clean surface. But best of all, laminates were available in various colors and patterns.

By the 1950s, decorative laminates seemed to be everywhere. They were applied to cabinets, desks, tabletops, shelving units and bathroom vanities, to name a few common uses. Laminates became a popular material for remodeling projects, too. Then, during the late 1960s and into the '70s, the popularity of plastic laminates started to wane. The reason: overuse, most probably.

Today, however, decorative laminates are enjoying a renaissance of sorts. Manufacturers are offering lami-

nates in an incredible number of colors, patterns and textures. For example, Wilsonart brand decorative laminates offers more than 100 colors in more than 90 patterns with a choice of 13 different textures. Nevamar brand laminates boasts more than 200 colors and patterns. With this profusion of laminates came, not surprisingly, a growing interest by do-it-yourselfers. Plastic laminates are readily available at lumberyards and home centers and they're easy to work with. No special skills are required, so you can achieve satisfactory results in your first attempt—simply follow the procedures shown here.

**Photos:** Rosario Capotosto

**Plastic laminate:** Wilsonart, Ralph Wilson Plastics Co., Temple, TX 76501

# INSTANT COLOR

## Laminate grades

There are five basic grades of laminates available: standard, vertical, solid color, backing and postforming. Standard, or horizontal, grade is  $\frac{1}{16}$  in. thick and recommended for use on horizontal work surfaces such as a counter, table, desk and bar top.

Vertical-grade laminate is about  $\frac{1}{32}$  in. thick and, as its name implies, is used on vertical surfaces such as cabinets, cabinet doors and wall applications.

Solid-color laminate is a relatively new, and expensive, grade. Unlike the other laminate grades that consist of a brown core topped with a decorative face, solid-color laminates have no brown core—they feature solid-color construction. Solid-color laminates eliminate the familiar dark edge lines caused by the core material used on regular laminate grades.

Backing laminate is the least expensive grade. It's about  $\frac{1}{20}$  in. thick and has no decorative face. Backing grade is used on the back side of a large panel that has decorative laminate applied to its front surface. The backing sheet will offset the decorative laminate to prevent warping.

Finally, there's postforming laminate. This special-grade laminate is designed to be heat-formed to a very small radius. It's used in specially equipped shops to make wraparound countertop/backsplash assemblies. Postforming laminate isn't recommended for home shop use. However, you can form small areas of vertical-grade laminate using a heat gun (see photos on page 100).

Besides the wide variety of colors and decorative patterns available, there are a few other interesting laminates worth mentioning. These include the many different wood grain, leather, marble and quarry patterns. Chrome, aluminum, brass and copper laminates with polished or brushed surfaces are also available. Realistic-looking, deep-textured laminates come in wood grain, leather and slate patterns.

Another recent innovation is tambour laminate. Use this flexible product as a tambour door for a rolltop desk or apply it to curved walls, doors and columns. Tambours come finished in various color laminates, metallic laminates, wood veneer and solid wood.

Most laminates come in sizes ranging from  $2\frac{1}{2}$  ft. to 5 ft. wide and 8 ft. to 12 ft. long. Solid-color laminates are generally sold only in 4 x 10-ft. sheets. Laminate prices vary greatly depending on grade, texture, pattern, manufacturer and geographic region. But, standard (horizontal) laminate, in a stock color, costs about \$1 per sq. ft.

Therefore, a typical 4 x 8-ft. sheet will cost about \$30 to \$50.

## Core material

A successful plastic laminate job depends heavily on using the proper core material—the substrate that the plastic laminate is bonded to. Particleboard is the most popular core material. It has a smooth, flat surface and is dimensionally stable and inexpensive. Lauan- or birch-veneer plywood are more expen-

sive than particleboard, but they are much easier to work with. Avoid using low-grade plywood that has a rough, uneven surface, knots and voids in the veneer and edge. Also, don't apply decorative laminate to gypsum board (drywall), plaster, concrete or large pieces of solid lumber.

## Applying laminate

There are five basic steps to applying plastic laminate: cut the laminate; apply



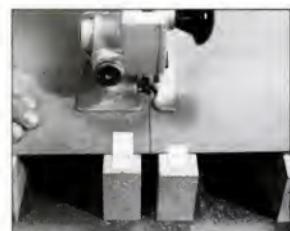
A simple hand-pressure test reveals that vertical-grade laminate (left) has more flexibility than thicker standard grade (right).



Flexible tambour laminates make it easy to cover round and curved surfaces. Tambours come in various colors, shapes and sizes.



Inexpensive scoring tool will cut laminate. Clamp down a straightedge, score laminate a few times, and then lift it up to snap.



To prevent chipping the decorative surface, place the laminate facedown when cutting with a sabre saw or portable circular saw.



Cut laminate face-up on a table saw. Long board clamped in place keeps laminate from sliding under fence. Small holdown block near blade keeps laminate from fluttering.

adhesive to the core and to the back side of the laminate; bond the laminate to the core; trim off the overhanging laminate; file the edges smooth. See the step-by-step photos showing a typical countertop lamination.

Always cut the laminate slightly oversize so that it extends beyond the core's surface at least  $\frac{1}{4}$  in. on all sides. There are several tools you can use to cut decorative laminates, but for the best results, use a table saw fitted with

a carbide-tipped blade that has at least 16 teeth. A small-tooth plywood blade will give satisfactory results, too. You could also use a radial-arm saw, sabre saw or portable circular saw. If power tools aren't available, use a scoring tool, hacksaw or a 10- or 12-point handsaw. To avoid chipping the laminate's decorative surface, cut it *face-up* when using a table saw, radial-arm saw, hand-saw, scoring tool or hacksaw. Position the laminate *facetedown* when using a

portable circular saw or sabre saw.

Use contact cement to bond plastic laminate to the core material. Conventional woodworking glues can also be used, but contact cement is much easier and quicker since it doesn't require clamping. Be sure that the core's surface and the back side of the laminate are free of dust and chips. Fill and sand any holes or gouges with wood putty. Apply contact cement with a natural bristle paint brush or, for large areas, use a short-nap roller sleeve designed for use with contact adhesives. Spread a uniform cement coat on *both* surfaces and allow it to dry according to the manufacturer's recommendation—usually about 10 to 15 minutes. Edge-band surfaces require a second cement coat after the first coat has dried.

Note that contact cement is available in two types: flammable and nonflammable. *Caution:* Never use flammable contact cement near a sparking electric motor or an open flame such as a gas pilot light. Regardless of which type you use, be sure to provide adequate ventilation. Read the container's label for specific instructions.

Once the cemented surfaces are dry, you're ready to apply the laminate. Since a permanent bond is made the instant the two surfaces come in contact with each other, it's important to align the laminate carefully prior to bonding—there's no final adjustment once contact is made. An easy way to align the laminate to the core surface is with the slip-stick method shown. Arrange several wood sticks between the two cemented surfaces. Position the laminate to cover the core's entire surface. Then, slide out the sticks one at a time. After removing all the sticks, press down on the laminate with a J-shaped laminate roller. The more pressure you can apply, the better the bond will be. Now work over the entire laminate surface with a hammer and wood block.

Next, trim the overhanging laminate flush to the core's edge using a router fitted with a ball-bearing piloted flush-trimming bit. The excess laminate can also be trimmed using a block plane and smooth mill file.

After trimming the laminate with a router, file the edges smooth and perfectly flush. Now apply the next, adjoining laminate piece. When making a countertop, always apply the edge band first. Then, apply the top-surface laminate. This will protect the edge band and make the joint line least visible.

Once the top-surface laminate has been trimmed, file its edges smooth to the adjacent laminate surface (edge band). File on the down stroke only to avoid lifting and chipping the top laminate. The edge can also be finished using a router fitted with a bevel trimming bit. Check the router's depth-of-



Apply contact cement to laminate and to the edge of core. When it's dry, apply a second coat. To brush on the contact cement neatly, tape the laminate strip to a narrow wood stick.



Start at one end and apply edge band. If you have to remove laminate, squirt lacquer thinner behind it to dissolve cement.



Use a J-roller to press down the laminate over its entire length. Then, tap the laminate down with a hammer and wood block.



Be careful not to roll off end of countertop or you'll break the laminate. Instead, use hammer and wood block to secure it.



Trim off the overhanging edges of the laminate with a router fitted with a flush-trimming bit. Be sure to wear goggles.

## INSTANT COLOR

cut carefully. If the bevel is too deep, it will expose the core and the piece will be ruined.

### Edge treatments

There are various easy-to-make edge treatments that will complement a plain-

tic laminate countertop, tabletop or shelf (see the photo on page 176). Some of the more attractive edges combine laminate with hardwood. Wide hardwood edge strips also provide strength and rigidity to the countertop.

Here's how to make a chamfered edge with a hardwood reveal. First, glue a hardwood strip to the edge of the

core. Next, apply the plastic-laminate edge band followed by the top-laminate surface. Then, use a router with a 45° chamfering bit to cut into the edge to expose the hardwood.

Make an attractive pin-stripe edge using solid-color laminates. Start by applying a strip of laminate to the core's

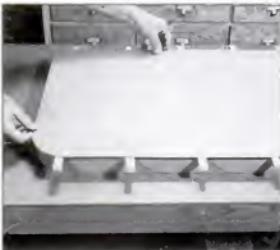
(Please turn to page 176)



File the laminate's edges perfectly flush with the core's surface. Lift the file on the back-stroke to avoid chipping laminate's face.



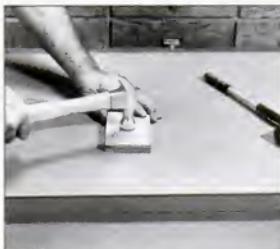
Next, apply contact cement to the laminate and to the core's top surface. Apply cement with a brush or, on large areas, a roller.



Place several narrow sticks under the laminate to permit exact positioning. Be sure laminate covers core's surface completely.



Slide out the sticks one at a time making sure the laminate doesn't shift out of position. Press down the laminate as you go.



Apply pressure first with a J-roller and then with a hammer and wood block. Tap the block over the entire laminated surface.



Trim the excess laminate with a ball-bearing piloted flush-trimming bit. The pilot rolls against the edge band to guide the cutter.



Bend vertical-grade laminate to a 1½-in. radius using a heat gun. Apply heat between 313° and 325°F. Too much heat will blister the face of the laminate. Be sure to wear heat-resistant gloves.



Once the laminate bends around the radius, hold it down until the contact cement cools. The wood block clamped in place prevents the laminate from lifting as the heat softens the adhesive.

**Popular  
Mechanics**

# CAR CARE

## HOW TO TUNE UP YOUR WHOLE CAR

KEEP YOUR CAR RUNNING  
AND LOOKING LIKE NEW

**STEP-BY-STEP GUIDE  
FOR TUNING UP YOUR:**

- **ENGINE**
- **CHASSIS**
- **INTERIOR**
- **EXTERIOR**

**PLUS:**

- **TOOLS  
OF THE  
TRADE**
- **GREAT NEW  
PRODUCTS**



# AMERICA It Still Works.



# DICKIES

## The Brand It Works In.

Dickies famous matched work sets  
made with  
65% Celanese Fortrel® polyester /  
35% cotton.  
Fortrel® is a trademark of Celanese Corporation

Dickies, for a complete line of work clothes,  
jackets, jeans, shirts, thermal underwear,  
socks, work boots, gloves, caps, belts  
and leather goods.

© 1987 Williamson-Dickie Manufacturing, Inc.

# CAR CARE GUIDE

## CONTENTS



### HOW TO TUNE UP YOUR WHOLE CAR

PM's guide to keeping your car running and looking like new.

**104 WHOLE-CAR TUNEUP** To get the best out of any car, do more than change the oil, filter and plugs.

**108 ENGINE TUNEUP** Get maximum power, economy and durability to keep your engine humming along.

### 128 TUNE UP YOUR CHASSIS

For safety, take proper care of brakes, tires and suspension.

### 138 TUNE UP YOUR INTERIOR

Modern chemistry rescues interior fabrics and plastics.

### 146 TUNE UP YOUR BODY

Careful inspection and quick action stave off rust's ravages.

### 150 TOOLS OF THE TRADE

You can't do good work without good tools.

### 168 WHAT'S NEW?

Clever new products make tuneups easier and faster.

Chevy's sleek 1988 Corsica typifies the sophistication challenging today's Saturday mechanic.



Cover: Reliable tools and new parts are just a portion of what it takes to keep your car forever young. Knowledge and know-how are just as important. Photo by Bill Ashe.

Car Care Guide produced by the PM Auto Dept.

PM Contributors: Mort Schultz, Paul Stenquist

Color photography by Bill Ashe

Illustrations by Mario Ferro, Hank Iken, Ed Lipinski

### FIX THAT SCRATCH



### WITH AN EXACT MATCH



### FROM DUPLI-COLOR®

All Dupli-Color® touch-up paints are computer-matched to the original factory finish! And a wide array of colors are available for both domestic and import vehicles.



**SCRATCH-FIX®**—For touching up nicks, dings, minor stone damage and scratches on late model vehicles. Easy-to-use brush-in-cap.



**AUTO SPRAY®**—As the scrapes and scratches get larger...Auto Spray® is the answer. Dries quickly to a durable, high-gloss finish.



**TRUCK & VAN PAINT**—Perfect for touching up large areas on pick-ups, vans and RVs. Also ideal for custom painting tool boxes and other accessories.

**FREE!** For a step-by-step "You Can Do It" guide to expert auto touch-up, send self-addressed stamped envelope (4" x 9 1/4") to: Dupli-Color Products Company, Dept. PM, 1601 Nicholas Blvd., Elk Grove Village, IL 60007.

### THE DUPLI-COLOR DYNAMITE DUO REBATE/SWEEPSTAKES

Purchase any two cans of Dupli-Color® or Original® brand aerosol products and receive a \$1.00 rebate check.

**PLUS** Enter to win a matching pair of ATVs or one of hundreds of other prizes.

See your favorite Dupli-Color retailer for complete details. Rebate and sweepstakes offer valid through July 15, 1987.

# DUPLI-COLOR®



# CAR CARE GUIDE

# TUNE UP YOUR WHOLE CAR

To get the best out of any car, you've got to do more than just change the oil, filter and plugs.

**C**ars, nowadays, are *supposed* to run as long as 15,000 miles between services. The manufacturers have spent a lot of effort increasing that interval from the 1000 miles between lube and oil jobs needed on cars only a generation ago. Better oils and additives, improved metallurgy and design in engine and transmissions—even so simple a thing as better seals on ball joints and tie-rod ends—have made owning and driving a car less of a hassle. Unfortunately, not having your car up on the grease rack every six weeks means nobody looks at the bottom of the car for as long as a year. And in spite of the best efforts by those who screwed your car together, sometimes that's too long.

The friendly guy who worked at the corner gas station in the B.O. era (Before OPEC) and who checked your oil at every fill-up also had a weather eye cocked for loose belts, leaks, corroded battery terminals or any other problems under the hood. But in today's \$4.95-all-you-can-eat, please-pay-first, self-serve, maintenance-free world, he's been replaced by a cashier who

knows and cares nothing about the state of your car's health. For that pre-OPEC style of service today, you have to pay plenty extra for gas—or pay a mechanic just to open the hood.

Don't let your investment in a car, new or old, suffer from lack of preventive maintenance. For example, replacing a worn fan belt yourself might take only 10 minutes on a Saturday afternoon—if you catch it before it gives up the ghost. But if that belt breaks on the road, you might be looking at a bill for towing, or even a new engine.

For even light maintenance, you'll need the usual simple tools, and probably one or two special tools. The days of fixing your car with a pair of Vise-Grips and a Boy Scout knife are over. You just can't do much today without a starter set of combination wrenches, sockets and a torque wrench.

Cars aren't all the same mechanically any more—with the engine in front, transmission in the middle and drive axle in back—so you'll need the proper manual that details the procedures for adjustments or reassembly.

In this Car Care Section, we've covered not only preventive maintenance and tune-up procedures, but also the scheduled maintenance items that you can do yourself. Just remember that the manufacturer's recommended intervals are *maximums*—very few drivers should consider them appropriate for the way most cars are really driven. Stop-and-go urban service, high-speed freeway cruising, short-tripping or any kind of trailer towing all come under the category of "severe" service, so reduce the mileage between oil changes and other maintenance to match. **PM**

INTERVAL	WHAT TO DO
When filling the fuel tank	<ul style="list-style-type: none"><li>Check engine oil level.</li><li>Check coolant level in coolant recovery tank.</li><li>Fill windshield washer fluid container, if necessary.</li></ul>
Once a month	<ul style="list-style-type: none"><li>Check tire pressure (include spare); examine tires for cuts and abnormal wear.</li><li>Check that all lights work.</li><li>Check ground beneath parked car for fluid leaks.</li></ul>
Twice yearly (spring and fall)	<ul style="list-style-type: none"><li>Check power steering fluid level.</li><li>Check brake fluid level.</li><li>Check automatic transmission or manual transmission fluid level.</li><li>Check fluid level of hydraulically operated clutch.</li><li>Check fluid level in rear axle.</li><li>Check protection level strength of coolant.</li><li>Inspect drive belts.</li><li>Inspect radiator, heater and air-conditioner hoses.</li><li>Inspect exhaust system components for rust-through; relighten clamps.</li><li>Rotate tires if mileage traveled since last rotation conforms with tire manufacturer rotation recommendation (usually after the first 7500 miles and every 15,000 miles thereafter).</li><li>Examine fwd axle boots for cracks, leaks.</li><li>Examine battery and starter motor cable terminals for corrosion.</li></ul>
Yearly	<ul style="list-style-type: none"><li>Inspect brake lines for cracks; inspect brake pads/linings for wear (do this twice a year if most driving is stop and go).</li><li>Lubricate all lock cylinders.</li><li>Lubricate body points: door hinges, hood hinges and latches, trunk hinges and latches, fuel door hinges.</li><li>Lubricate door weatherstripping.</li><li>Test ability of parking brake and PARK position of automatic transmission to hold.</li><li>Flush underbody with water and clean off mud and salt buildup.</li></ul>

# We'd like to bring up the rear.



Who said never look back? It's where you'll find some of the Civic 4-Door Sedan's best features.

The trunk, for example. Pop it open with a remote release. Then fill 'er up. Groceries for a week or luggage for a week's vacation are an easy fit.

You'll also be happy to know that our backseat doesn't take a backseat. There's plenty of room for adults. Honest.

If your passengers happen to be just a bit younger, you'll find special child safety

features the next best thing to eyes in the back of your head.

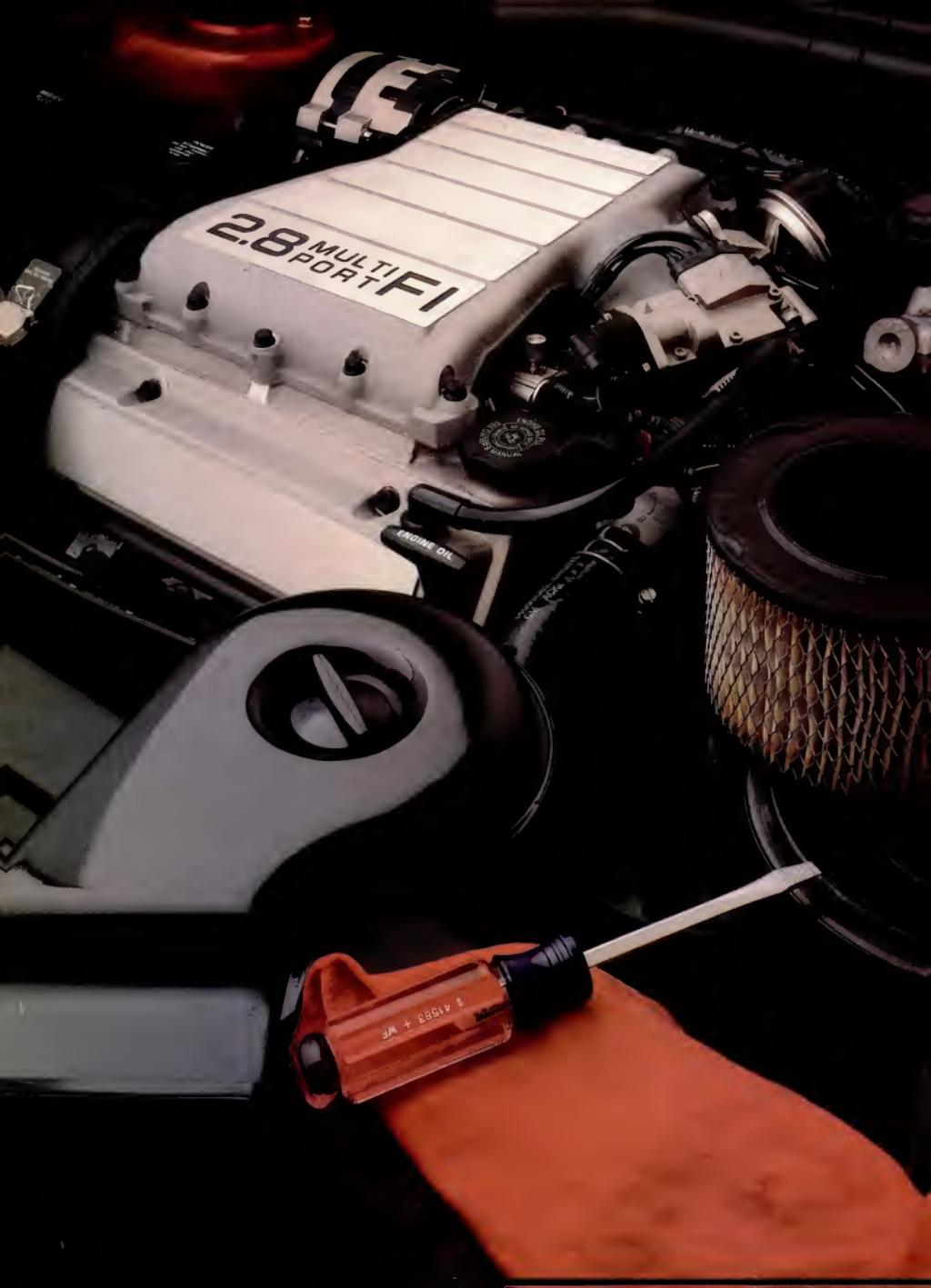
Of course, we haven't put everything worth mentioning behind you. The steering wheel is adjustable. The instrument panel is neat. Logical. The view forward is great.

And with a peppy 1.5 liter 12-valve engine, the Civic Sedan is fun to drive. Now that gives you something to look forward to.

**HONDA**

Civic 4-Door Sedan





2.8 MULTIPORT FI

ENGINE OIL

8 11583 + MF

# CAR CARE GUIDE

# TUNE UP YOUR ENGINE

Get maximum engine power, economy and durability. Here's how to keep your engine humming along.

**T**uneup" is a word that may very well have contributed to the premature failure of thousands of automobiles. Somewhere back in the early days of motoring history, tuneups consisted of little more than replacing the sparkplugs and the contact points. A modern tuneup should be a plan for comprehensive care of all vehicle mechanical systems, including inspection, adjustment and replacement procedures that can eliminate problems before they become serious enough to cause widespread damage.

## Changing the oil

The more dirt and combustion by-products that you can eliminate from your oil the better. We recommend changing oil at 3000 miles, and we know a number of mechanics who swap their lube when 2000 miles roll by. Use SF, SF/CC or SF/CD oil. Use only SF/CC or SF/CD for diesels. Drop by your dealer and pick up a dozen or so oil-pan drain-plug gaskets if your car uses replaceable ones. That way you'll have a new one on hand every time you change your oil.

Drive your car for at least 20 minutes to warm the oil. Then, park it on a level surface. It may be necessary to use ramps to get the car high enough to

gain access, particularly if the oil filter must be removed from the bottom. If your driveway slopes enough, fine, but at least be sure that the drain plug is at the very bottom of the pan when you drain the oil. Use a drain pan that is big enough to hold about twice as much oil as the engine sump holds. Then unscrew the drain plug using a box wrench (Fig. 1), so you won't round off the drain plug's hex. For some cars, you may need a square drive or socket drive (Allen wrench) tool. While the oil is draining, remove the old oil filter (Fig. 2) and drain it into the drain pan.

Once the oil has drained completely, reinstall the drain plug by hand. Tighten it with a wrench no longer than 10 in. (so you don't overtighten) and don't muscle it down.

If your oil filter mounts in an upright vertical position, partially fill the new filter with some of the fresh engine oil. Lube the filter's gasket with this oil as well. Install the filter, tightening it by hand according to the directions printed on it or  $\frac{3}{4}$  of a turn after the gasket makes contact with the flange. Add the rest of the oil, start the car and make sure you have oil pressure. Then run the engine for five minutes and check for under-car leaks. Turn off the engine, allow it to sit for five minutes, then check oil level and adjust if necessary. Take the old oil to a local service station for recycling.

## Under the air cleaner

Continue your maintenance procedure by removing the air cleaner. Unscrew the hold-down wingnut, remove the cover, then lift the snorkel and detach the heat riser tube. Now lift the base of the air cleaner, detaching the PCV hose and the vacuum line joining it to the

engine (Fig. 3). Wipe out the base and replace the PCV filter, which, on most air cleaners, is held in place with a spring clip (Fig. 4). Install a new air filter, but don't reinstall the air-cleaner base on the engine until you've completed the entire maintenance tuneup. On some cars, the PCV filter is in the oil filler cap.

Replace the PCV valve. It may be in a valve cover or intake manifold, or connected to the intake by a large vacuum hose, which should also be replaced if damaged, cracked or brittle.

Some cars with computerized engine-control systems have an EGR solenoid filter that should be replaced at tuneup time. On engines with carburetors, make sure the choke snaps closed when the engine is cold and you open the throttle. If it doesn't close, it's binding or needs adjustment. On fuel-injection throttle bodies, make sure all wire connectors are properly joined and are not cracked or corroded. If necessary, clean them with a small knife and some electrical contact cleaner.

Replace the fuel filter at every maintenance tuneup. If your engine is carbureted, the filter is either in the fuel line between the pump and carb or behind the carb's inlet fitting. Use a rag to catch spilled gas when removing the fuel filter.

To replace a filter behind the inlet fitting, disconnect the fuel line using two wrenches to hold the inlet fitting and fuel-line fitting. Some engines have a neoprene-hose fuel line that is attached to the inlet fitting with a spring or screw clamp. Replace inline filters by disengaging the neoprene hose from each end. The new filter should have an arrow stamped on its housing to indicate direction of flow.

# SMART AUTO ADVICE

The #1 way to smooth your rough-running engine.



So before you think tune-up—think Gumout®. The #1 selling Carburetor & Fuel Injector Cleaner in America.

Gumout is one powerful detergent gasoline additive, yet it won't harm catalytic converters or oxygen sensors. And just one bottle in your gas tank—just once a month—will keep your fuel system clean. Remove harmful moisture and contaminants that accumulate in your gas tank. Cut through and dissolve deposits of dirt and gum from your carburetor. Help keep fuel injectors from fouling. Help keep intake valves, ports, manifolds, and PCV valves performing right. Turn your hard starts into easier ones. Help prevent stalling. And, make your rough-running engine run a lot smoother.

Gumout's so effective, it'll work on any age car—with any type gasoline. There's even a tested-tough Gumout Diesel Fuel System Cleaner. It's ideal for cold weather driving conditions. And it'll clean your diesel system like new.

If you think you need a tune-up, think Gumout first. For better starts, better gas mileage, better highway performance, and a smoother-running engine.

## GUMOUT. The Between Tune-Ups Tune-Up.

AMERICA'S #1 BEST SELLER.

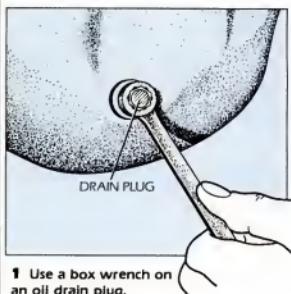
Quality Products of the Pennzoil Products Company.



Check your vehicle service manual for specific instructions on relieving fuel pressure and changing the filter of fuel-injected cars. It's extremely important that instructions for relieving pressure be followed, as gasoline under high pressure remains in the lines for days after the engine is shut off. Even if you're working outdoors with little danger of fire, gasoline could spray into your face as you open a fitting. In-tank filters are replaced only if they fail.

### Sparkplug R & R

Sparkplugs are the most critical of the wear parts, and they can tell you quite a bit about the rest of the engine. To replace plugs on an engine with limited access, such as a transverse-mounted V6, you'll need a high-quality spark-plug wrench. But for any engine you'll need at least a proper-sized plug socket and ratchet, and perhaps an extension and universal. Use pieces of masking tape to number each wire. Once you're certain that you'll be able to reconnect



1 Use a box wrench on an oil drain plug.

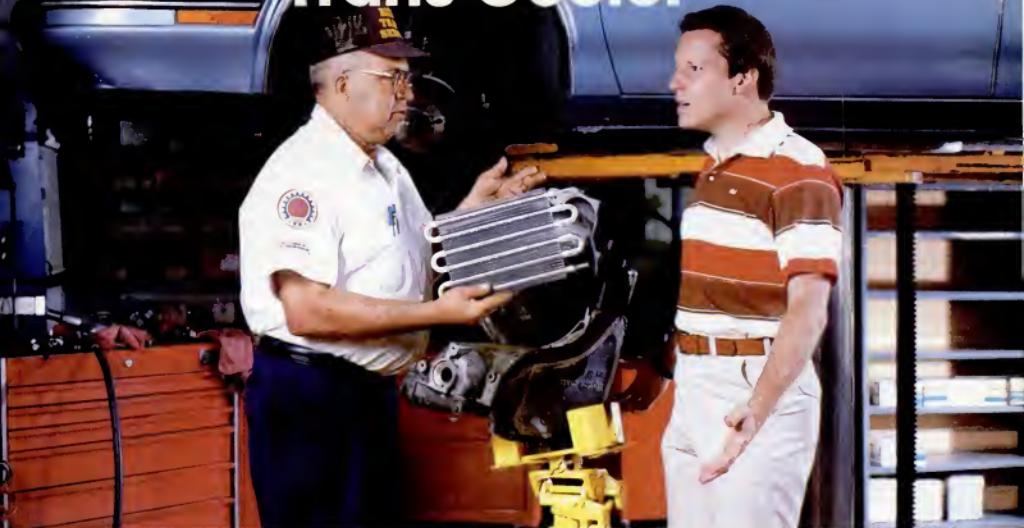
all of the plug cables accurately, remove them from the plugs with care. Hold the rubber boot and twist it back and forth until it releases from the plug insulator. Then pull off the connector.

After removing all of the cables, unscrew the plugs with your ratchet and socket (Fig. 5). Don't hold the tool at an angle or you'll crack the insulator. As each plug is removed, keep it in cylinder order and examine it carefully. Check to see that all the plugs are approximately the same color, ranging from gray or brown to white or tan, depending on the type of fuel used and the engine calibration.

Some symptoms, particularly a plug that is somewhat black and/or wet with fuel, could indicate that the plug had stopped firing. If the engine still misfires after the tuneup is complete, the plug or the other tuneup parts that you replaced were not the problem and further diagnosis is necessary.

If you have an old car with breaker-point ignition, replace each plug at the

# Shoulda-Had-A-Hayden Trans-Cooler



## Over 13 million people didn't last year —and paid the price.

**If you delay, you pay.** Fact is, over 13 million\* transmissions failed last year. Nine out of ten failures were caused by overheating. A small investment in a Hayden Trans-Cooler can save \$500 to \$1200 on repairs. Remember, each 20°F drop in temperature doubles oil and equipment life.

\*Courtesy ATRA (Automatic Transmission Rebuilders Association)

**Quick do-it-yourself installation.** If you can change the oil in your car you can make this installation yourself.

**Free Road Atlas and \$5 rebate coupons on the purchase of Hayden Products.** Check with your local retailer for details on how to receive a free Rand McNally Road Atlas and Travel Guide. Plus rebate coupons for \$5 on the purchase of any Hayden Trans-Cooler, Electric Fan and Thermal Fan Clutch and up to \$300 worth of travel discount coupons good nationwide at major motel and amusement centers with your purchase of a Hayden Trans-Cooler.



**1. Typical Hayden Trans-Cooler kit with everyday household tools.** **2.** Place clamps on end of hose and push hose onto oil cooler fittings. **3.** Attach adhesive cushion pads to oil cooler. **4.** Insert Hayden's patented Quik-Mounts through radiator and cooler. Install locking fastener and cut off excess. **5.** Install Hayden's patented Quick-Connect coupler into radiator. **6.** When completed your Hayden Trans-Cooler installation will look like this.

**Don't delay.** Purchase a Hayden Trans-Cooler today at your local auto parts store, automotive chain store, RV dealer, mechanic or installer. The car's life you save may be your own.

**Hayden Trans-Cooler. If you have money to burn . . . you don't need one.**

Write today for a free product brochure.

 **HAYDEN INC.**

1531 Pomona Road • P.O. Box 848 • Corona, CA 91718-0848

To receive direct ordering information call toll

**FREE outside CA 1-800-854-4757 or 1-800-443-2665**

**NOW! Get in on the PROFITS in**

# SMALL ENGINE REPAIR!



Start your own money making business!

Work part time, full time—right at home—we help you every step of the way.

No doubt about it... as a small engine pro, you can cash in on the huge demand for qualified men in one of America's fastest growing industries. You'll be able to command top dollar rates of from \$25.00 to \$30.00 per hour and that's just for labor. A simple tune-up earns as much as \$49.95 for less than an hour's work, and parts, engines and accessories will add even more to the profits.

#### Plenty of business waiting for qualified men.

#### 65,000,000 Small Engines Are In Use Today!

That's the official count from the Engine Service Assn., and one-million new engines are being built each month. With fully accredited Foley-Belsaw training, you can soon have the skills and knowledge to make a money serviceing these engines. People will seek you out and pay you handsomely for their lawnmowers, tillers, edgers, power rakes, garden tractors, chain saws, minibikes, snowmobiles, generators, go-carts, paint sprayers, snowblowers... the list is almost endless.



Professional Tools and Equipment, PLUS 4 H.P. Engine  
ALL YOURS TO KEEP! All At No Extra Cost.

#### NO EXPERIENCE NECESSARY!

You don't need previous experience or have any prior experience. You can master this profitable trade right at home in your sparetime. Lessons are fully illustrated... so clear you can't go wrong, and with our famous "learn-by-doing" method you get practical hands-on experience. We also show you how to get business, what to charge, where to get supplies wholesale, all the inside tricks of the trade you need to assure success right from the start.

#### Send for FREE Facts—Do It TODAY!

#### NO Obligation—NO Salesman Calls!

You risk nothing by accepting this offer to see how easily you can learn the skills you need to increase your income in a high-profit business of your own. Just fill in and mail coupon below (or send postcard with name and address) to receive full information by return mail.

**RUSH COUPON TODAY**  
Foley-Belsaw Institute  
51167 FIELD BUILDING  
Kansas City, Mo. 64111



FREE  
BOOKLET!  
Send for your  
copy today!

**FOLEY-BELSAW INSTITUTE**  
51167 FIELD BUILDING  
KANSAS CITY, MO 64111

**FOLEY-BELSAW**

YES, please send me the FREE booklet that gives full details about starting my own business in Small Engine Repair. I understand there is No Obligation and that No Salesman will call on me.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

STATE \_\_\_\_\_

ZIP \_\_\_\_\_



2 Oil filter wrench will be needed to remove a tight oil filter.

10,000-mile interval, regardless of condition. If you have high-energy electronic ignition, check each plug for excessive wear. If the edges of the plug's inner and outer electrodes are noticeably eroded, replace it. If the plug is merely coated with light deposits of the proper color and otherwise looks brand new, it can be cleaned and reused (Fig. 6).

When you buy replacement plugs, make sure they're of the heat range recommended by the manufacturer. For the most part, don't experiment with hotter or colder plugs, even if the old-timer at the corner gas station thinks you should. The plugs used today have a broad heat range to cope with all normal driving conditions, and use of a hotter or colder plug could adversely affect engine calibration. If, however, your plugs were running exceptionally cool, showing very dark gray or brown color, or exceptionally hot, showing blistered insulators and melted electrodes, the bad color is probably the result of some other problem, such as incorrect fuel mixture or engine operating temperature, that you should track down and repair.

Find the manufacturer's specification for plug gap in your owner's manual or on the Vehicle Emission Control Information label, located somewhere under the hood. Check the gap of the plugs with a wire gauge, using the tool at the end of the gauge to bend the outer electrode if you have to change the gap.

When installing the plugs, try to screw them in with your fingers as far as possible. Never start the plugs with a ratchet; it's easy to cross-thread them. Once they're in most of the way, finish

up with the socket and ratchet. A length of hose that fits over the end of the plug makes a good starting tool, especially when access is restricted.

A hose is flexible enough to reach in oddball places, yet permits your other hand to spin the plug in, without applying enough torque to cross-thread anything. If space permits, use a torque wrench and tighten the plugs to 20 lb.-ft. Otherwise, just make them snug.

#### Plug-cable service

Once you've replaced the plugs, don't just reconnect the cables without giving them a good once over. Look for brittleness, cuts, cracking, burns or excessive corrosion of the terminals on both ends. If the wires are three years old or more, replace them. If they've been exposed to severe doses of road salt, they might fail sooner. If one of your sparkplugs showed that the cylinder wasn't running, replace the cables. If they're almost brand new, replace just the one cable.

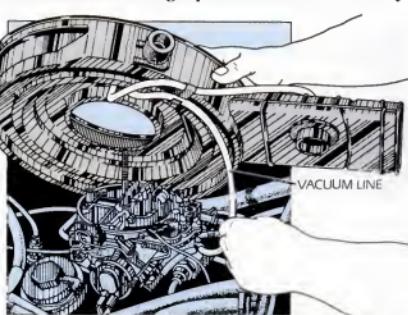
For cars with high-energy electronic ignition, use the more expensive silicon-jacketed cables for replacement. These are standard on most cars with this type of ignition, but some of the early high-energy systems used conventional plug wires. To upgrade to the high-quality cables is worth the extra money. We use them on all our cars, high-energy and conventional. If the plug-cable terminals were coated with dielectric silicone grease, replace the greases when you install new cables.

To install new cables, remove one old wire at a time and match it to a new one. Use all looms and separators and route the wires exactly as the old ones.

#### Cap and rotor

Replacement of cap and rotor depends primarily on their condition, but don't expect more than 30,000 miles.

On GM cars with the big high-energy distributor, release the plug-wire retaining cap and move it out of the way



3 After disconnecting the PCV hose and hot-air hose, invert the air-cleaner base and mark and remove the vacuum hose.



## "ANYTHING THAT CAN FIRE 30 TIMES A SECOND I WANT ON MY SIDE."

—Test Pilot Chuck Yeager

AC Copper-core Spark Plugs deliver the kind of fire power today's high-revving engines need.

That's because AC's copper-cored electrode provides improved heat dissipation and fouling resistance over conventional electrodes. And the hot-tip insulator heats fast and fires hot, burning away fouling deposits. The result: fast starts, smooth performance. For up to 30,000 miles\* of peak performance.

As you can see on the left, AC makes plugs for more than domestic and imported vehicles. We're also the spark in motorcycles, boats, snowmobiles, lawn mowers, chain saws and industrial engines.

For the AC-Delco retailer nearest you, just give me a call, toll-free, at  
**1-800-AC-DELCO.**



**Stay ahead of trouble  
with AC-Delco.**

\*See your owner's manual for recommended change intervals.

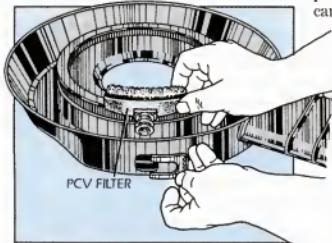


GENERAL MOTORS CORPORATION

to remove the cap (Fig. 7). On most late models you'll have to remove at least three or four cables from the cap to obtain enough room to lift it off the distributor and turn it over.

Remove the distributor cap by releasing the spring clip latches or unscrewing the screws. Some GM caps have what appear to be screws, but they're really latches that are released by pushing down with a screwdriver, and then turning a quarter-turn (Fig. 8). Spring clip latches can sometimes be disengaged by hand. If not, pry gently with a screwdriver under the center of the clip until it pops open. Label the wires and matching cap terminals.

Once you've maneuvered the cap into a position where you can see inside it, check the inside of the cap for cracks, fractures or evidence of carbon tracking between terminals. If in doubt as to its condition, replace it. Light surface corrosion on the terminals can be scraped off with a knife blade. If you hit bright metal under the surface corrosion, the cap is okay. But if the metal is eaten away or can't be scraped clean, replace the cap. On many new cars, the terminals are coated with silicone grease. Replace the grease with an equal amount—don't overdo it.



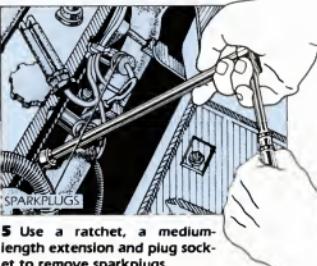
**4** PCV filter is frequently attached to the air cleaner base by means of a spring clip.

Check the rotor for corrosion and clean it up with knife blade or file (Fig. 9). Replace it if it's severely corroded. Inspect the rotor for burns or cracks.

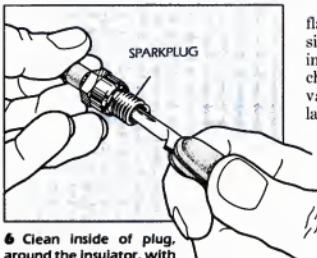
### Points and condenser

Although an American car hasn't been equipped with a contact breaker-point ignition for many a year, we know many of you are still tuning these older models.

The points and condenser should be serviced while the distributor cap and rotor are off for inspection. Before removing the points, turn the engine until the rubbing block of the points rides on the high portion of the distributor cam. Disconnect the wires attached to the point set. If you have to remove the screws com-



**5** Use a ratchet, a medium-length extension and plug socket to remove sparkplugs.

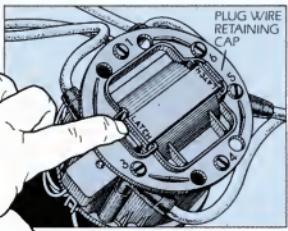


**6** Clean inside of plug, around the insulator, with small, sharp knife blade.

pletely to remove the point set, be careful not to drop them.

To remove the condenser, loosen the retaining screw until the condenser slides out of its bracket. If the condenser is spot-welded to the bracket, you'll have to remove the screw completely.

Install the condenser and point set and make sure that the rubbing block touches the high point of the distributor cam. If not, turn the engine as necessary. Attach the wires to the point set terminal. Finally, adjust the point gap to the specification recommended for your vehicle. Use a feeler gauge to measure the gap, and adjust the point set either by moving the breaker plate or—on GM cars—by turning the socket head screw adjuster. Once the adjustment is complete and the distribu-



**7** Remove the plug-wire retainer ring from a large GM distributor. **8** Then, release the spring clips that secure the cap to the distributor base.

tor cap and rotor have been reinstalled, check the adjustment with a dwell meter (the carmaker supplies a spec for both dwell and gap), and readjust if necessary.

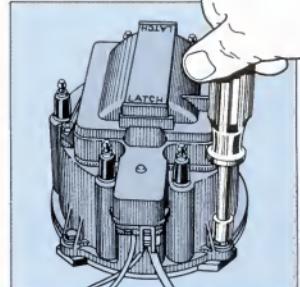
### Spark-timing check

After the distributor has been serviced, ignition timing should be checked, particularly on cars with breaker-point ignition. You'll need a timing light, and unless you have access to one of the more expensive powered ones, you'll need a shaded or indoor spot to be able to see the flash clearly. Check your Vehicle Emission Control Information label for timing specs and to determine if timing is checked with the engine's vacuum advance disconnected and plugged. This label explains what must be done to check timing. If you have an early-model car with no information label and are without a shop manual or other instructions, check a general service manual for specs and special instructions.

The timing light will enable you to see the firing position of the No. 1 cylinder in respect to the crankshaft. First, however, fully warm the engine and check idle speed with your tachometer to make sure it is at spec.

Turn off the engine and attach the light to the No. 1 plug cable, and the vehicle battery if you are using the powered type of light. Then start the engine and aim the light at the scale or pointer on the front of the engine or flywheel bellhousing. The flashing stroboscopic light will indicate where, in relation to crankshaft rotation, the No. 1 cylinder is firing. To change spark timing on most cars, loosen the distributor clamp bolt and rotate the distributor slightly as you watch the timing mark. You may want a special wrench to turn the clamp bolt easily, but a little perseverance and an occasional busted knuckle may be all that is necessary.

After adjustment, you



# KMART NATIONAL CAR CARE SALE

America's favorite  
truck stop has it all  
for less.

SALE  
**69.97**



**Delta D**

**TRUCK TOOL BOX.**  
High-impact plastic. Lockable.  
Hinged lid. For most pickup  
trucks.

Tools not included.  
Also available in metal.



**BUG DEFLECTOR.**  
Clear. For many pickup  
trucks and vans.  
Smoke or red colors. Sale 24.97

SALE  
**21.97**

**Deflecta-Shield**

**STUDDED TRUCK WINDOW.**  
Clear glass, extruded  
aluminum frame. For most  
pickup trucks.

SALE  
**34.97**

**KENCO**  
**ELKIR**



**KENCO**  
**ELKIR**

SALE  
**7.97**

**PICKUP TAILGATE  
GUARD\***  
Provides protection and  
adds style. Aluminum. For  
most pickup trucks.



**KENCO**  
**ELKIR**

**RUNNING BOARDS.\***  
56" running boards in  
choice of diamond or  
extruded styles. For  
many trucks.

SALE  
**49.97**

\*Style and manufacturer may vary.

On sale April 27 through May 9 at  
most K mart stores across the U.S.A.



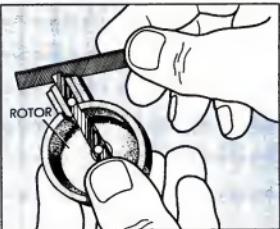
America's Favorite Store  
**KMART**  
The Shopping Place

should tighten the bolt and check again. On cars with vacuum and centrifugal advance mechanisms (most of those built before 1982 or so), rev the engine while watching the timing marks and with the vacuum hose still disconnected. The timing should advance.

If the timing does not advance, the centrifugal weights may be stuck. Then attach the vacuum line with the engine at 1200 rpm. The timing should change. On most engines with computer-controlled spark, timing should advance when the engine is revved. For more specific information about timing, consult your service manual.

### EGR inspection

A lot of mechanics tell us that failure of the exhaust gas recirculation (EGR) valve is so common that they give it a quick once-over at every tuneup. Unfortunately EGR systems differ widely from one vehicle to the next, so you should consult directions for EGR system checks in your service manual. We can point out, however, that any test should answer three questions. First: Is EGR control vacuum present at the specified level? Second: Does the EGR valve open when control vacuum is supplied during cruise conditions? And third: Are the exhaust-gas passages in



9 File corroded metal from the edge of the rotor's contact, and make sure current hasn't burned the plastic.

the valve and engine allowing the flow to reach the combustion chambers?

### Hot air/cold engine

Most cars are equipped with a heated-air system for cold driving. This should be checked after reinstalling your air cleaner assembly. The system provides heated inlet air during warmup, drawing it from a stove that surrounds the exhaust manifold.

Most of these systems are regulated by a vacuum motor that opens or closes a hot-air duct leading to the air cleaner. The vacuum is turned on and off by a thermal switch in the air cleaner. The vacuum hose that you disconnected when removing the air cleaner is the supply for this system.

Start the cold engine and use a flashlight and mirror to make sure the door is in the heat-on position when the engine is cold. If ambient temperature is above 70°, apply an ice cube to the thermal switch before conducting the test. Watch the door as the engine warms up to see if it moves to the heat-off position.

### Cooling system

Check all the belts and hoses at your 15,000-mile tuneup and replace any that are in poor condition. Belts should be free of excessive wear, glazing,

## GIVE THE BOOT to Combustion Chamber DEPOSITS!

### with NEW RISLONE UPPER CYLINDER TREATMENT

#### REMOVES COMBUSTION CHAMBER DEPOSITS

Specifically formulated to remove carbon, varnish and other deposits from the upper cylinder area.

#### REDUCES ENGINE PING AND DAMAGING RUN-ON

Used regularly, helps keep the engine clean and free of harmful power robbing deposits.

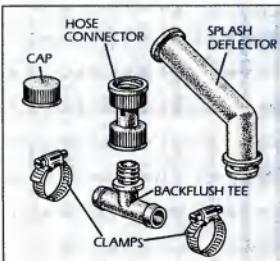
#### EASY TO ADD TO THE GAS TANK

Long neck bottle means no spills or mess. 11 oz. treats up to 20 gallons of gasoline and can be used in vehicles with carburetors or fuel injection systems.

from the makers of  
**RISLONE ENGINE TREATMENT**



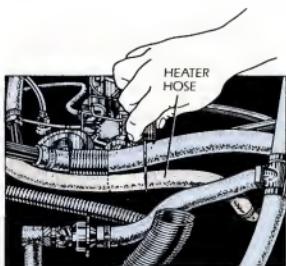
THE **SHALER**  
COMPANY  
WAUPUN, WI 53963



10 Tee is inserted into the heater hose. Connector is attached between the tee and garden hose to flush system.

cracking on the bottom or frayed cords. Check tension and adjust as necessary.

Hoses should be free of soft spots, cracking, swelling or oil and grease contamination. The best advice for both belt and hose maintenance: replace them before they wear out. We recommend replacing all belts and hoses every three years. Some mechanics recommend 4-year replacement, but that's stretching the limit. Of course someone will tell us they have a hose that lasted 23 years, but we'd rather not take a chance on being left by the side of the road with a busted hose or belt.



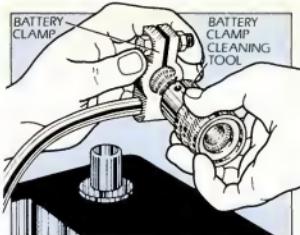
11 To keep your heater hose layout neat, slice a couple of inches out of the hose when inserting the tee.

A regular cooling system flush every 15,000 miles or every two years—whichever comes first—is just about right.

Complete backflushing kits are available at auto parts stores. One of these includes the tee (in several sizes), a garden hose connector, clamps and a tube to prevent the radiator overflow from splashing all over (Fig. 10).

To install the tee, make sure the engine is cold. Remove the radiator cap to relieve pressure, then replace it. Find the heater hose that runs from the heater core to the top of the engine—not to the water pump. Cut the inlet hose, place the screw-type hose clamps over the hose ends and install the correct-size tee. To preserve your neat-looking hose arrangements, shorten the hose by an inch or two to make up the length of the tee (Fig. 11).

To backflush, remove the radiator cap from the cold engine, and unscrew the flushing tee's cap. Install the connector on the tee and insert the splash deflector device into the radiator neck. Attach your garden hose to the connector and open the radiator petcock drain. Turn on the water supply. It should start running out of the radiator if you have everything hooked up right. Once you see the water overflowing, turn on the engine and let it idle. Turn the



12 Battery post cleaning tool is easy way to clean battery posts and terminals.

heater control to high heat. Keep the flow on until the water runs clear, but not for less than five minutes.

When you've finished backflushing, remove the hose, connector and deflector and close the radiator petcock. Cap the tee. Then fill the cooling system with a 50-percent mixture of coolant and water. There'll be some plain water left from the flushing, so start filling with pure antifreeze. Look in the manual for the capacity of the system, add half this amount of antifreeze, then top up with water. For cars with aluminum engine parts—almost all cars—use only antifreeze intended for use with aluminum. Flush the coolant recovery system and fill it to the FULL COLD mark.

# HARD GLOSS

NEW FORMULA  
POLISHES OUT  
MICROSCRATCHES  
FOR A DEEPER  
CLEARER SHINE



**kit** CAR WAX.  
PROTECTS AS HARD AS IT SHINES.

# BANKS TURBO POWER Flattens Out Those Hills

## BANKS DIESEL TURBO SYSTEMS



FORD 6 9L TURBO  
GM 6.2L TURBO ALSO AVAILABLE

- EMISSIONS LEGAL IN ALL 50 STATES
- UP TO 50% MORE HORSEPOWER
- EXCELLENT HIGH ALTITUDE POWER
- DEALERS NATIONWIDE
- YOUR POWER SOURCE "SINCE 1958"

# banks™

Gale Banks Engineering  
546 Duggan Avenue, Dept. 650  
Azusa, Ca. 91702 (818) 969-9605  
© 1987 GALE BANKS ENGINEERING

## Save Time! Save Money! Mill Supply Sells Over 1,000 Different Top Quality **STEEL** **REPLACEMENT** **PANELS**

To Repair Rust or Collision Damage  
on Many American Cars, Pick-up  
Trucks and Vans and Most Imports

73-85 Chevy-GMC Pick-up Rocker Panel-Original Equipment Style Part #50-43	32.95
Left or Right	
73-85 Chevy-GMC Pick-up Front Fender Part #50-73-41	21.95
Left or Right	
Panel Between Driver's Door and Rear Wheel Part #50-71-53	40.95
Left only	
75-79 Nova, Apollo, Skylark, Chevy II, Malibu, Cheve Arch. 6" around wheel sporing	43.95
75-79 Nova, Apollo, Skylark, Chevy II, Malibu, Cheve Arch. 6" around wheel sporing	43.95
73-79 Ford Pick-up Front Fender Arch Part #50-73-00	38.50
Left or Right	
(Other resins added at 5% sales tax) (FMS products are shipped business day(s) of receipt of order)	
136 Page, 1987 Mill Supply Catalog.	<b>\$4</b>

Lots sheet metal parts available for most popular U.S. and import cars, vans and pick-ups. (\$5.00 Canada, U.S. Funds) Add \$1.00 per part. Minimum order \$10.00. Payable by VISA. Mastercard accepted. ON PARTS ORDERS ONLY. Free Info! Send self-addressed, stamped long envelope for free information on any American or import car, truck or van (specifications).

Nationwide Toll-Free 1-800-321-1782

Ohio Call (216) 241-5072

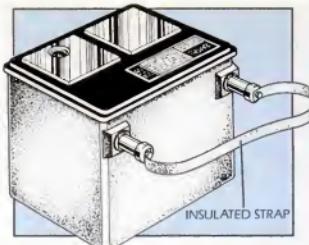
**Mill Supply** Dept. PM-705  
3241 Superior Avenue • Cleveland, OH 44114

Then cap off the radiator, warm the engine fully, allow it to cool and check coolant level again—both at the radiator and the coolant recovery tank.

### Battery care

You should give your battery a good bath at tuneups. First, remove the negative terminal, then the positive, and finally the hold-down clamps. Wash the whole unit with a mixture of baking soda and water, scrubbing with a brush. Rinse with water.

If it's not a maintenance-free battery, check electrolyte level and add distilled water if necessary. Warning:



13 Side terminal charging adapters have a tether to keep them from getting lost.

## Getting A Full Life From Your Battery

Why is it that some maintenance-free batteries last for years while others are junked in a year or less? Notice that the question says "are junked"—not "have to be junked."

Tents on "dead" maintenance-free batteries that were returned to the manufacturer show that most were buried alive, because professional as well as do-it-yourself mechanics didn't know how to resuscitate them. How can you avoid this trap?

Here are five facts about maintenance-free batteries that will help:

1. Cars of the '80s have electronic devices that can draw 8 to 20 millamps from a battery continuously. This parasitic load, plus a battery's normal self-discharge rate, can result in a deep enough discharge to fool you into replacing a battery that seems dead after the vehicle hasn't been driven for a while. To guard against this, disconnect the negative cable from the battery to avoid a drain if your car's not going to be used for 30 days or longer. Or, use a trickle charger. There are even solar-powered trickle chargers available that plug into the cigarette lighter.

2. You probably know that if a green dot is visible in the "eye" (built-in hydrometer) of a maintenance-free battery, the battery is charged; if only darkness shows (no green dot), the battery is undercharged and should be recharged; and if the eye is clear or light yellow, fluid level is low and the battery should be replaced. But don't be fooled if your battery has a translucent case. Daylight passing through the case may make a dark hydrometer appear clear or light yellow, thereby deceiving you into replacing a sound battery. One way to be sure that what you're seeing really exists is to block light by taping cardboard to the sides of the battery. Then, look the battery in the eye.

3. If a dead battery you've turned over to a garage for charging is returned with the comment, "It's a goner," ask if the battery charger that was used has a polarity protection circuit,

which keeps the charger off if the battery isn't connected correctly. To activate the charger when polarity is correct, the charger requires a small amount of current output from a battery. A discharged battery, however, may not emit even that minimal voltage—and the charger won't switch on, making it appear as if the battery is too far gone to accept a charge. Try again, this time following charger manufacturer's instructions on how to bypass the polarity protection circuit.

4. If you don't have the proper adapter available when you have to charge a battery with side terminals, be careful: Bolts alone aren't a suitable substitute—they may produce resistance that's too high for the charger to overcome. You can make an adapter with two  $\frac{3}{8}$ -in. bolts that are  $1\frac{1}{2}$  in. long or longer and two  $\frac{3}{8}$ -in. nuts having standard threads. Run a nut all the way up to the head of one of the bolts and screw the bolt into a terminal by hand until it bottoms. Don't use a wrench!

Turn the bolt back out one full turn; then, as you hold it steady, screw the nut down until it rests against the battery. Finally, use a wrench to turn the nut until it's just snug, but don't ram it so hard that you crack the case. Do the same thing at the other terminal. Now, connect the battery charger to the  $\frac{3}{8}$ -in. nuts—not to the bolts.

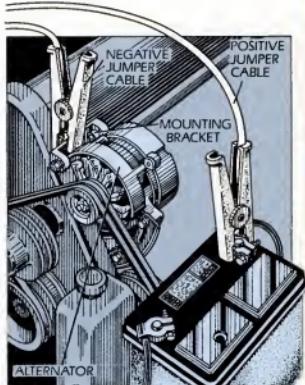
5. Batteries should provide four, five or even more years of service. If your battery runs down, tests okay, is recharged and runs down again, it's probably not the battery's fault. Here are several "killers" to look into:

- A loose or slipping drive belt, sick regulator or alternator, or a short circuit.
- Driving at very low speeds for extended periods of time.
- Installing so many aftermarket accessories that they place an electric load that exceeds what the alternator can generate.
- Clocks and burglar alarms both draw small amounts of current even when the key is off.

Batteries that look like maintenance-free batteries may not necessarily be maintenance-free. "Low maintenance," "easy care" or other similar terms do not mean maintenance-free. A regular battery can explode with enough force to buckle the hood if it runs dry.

Once the battery case has been scrubbed, clean the terminals and posts with a post and terminal cleaning tool (Fig. 12). If you have a side-terminal battery, clean terminals with a knife. Make sure cables are free of corrosion and tightly secured at the opposite end, away from the battery. If your cables are the clamp-on terminal type that aren't soldered onto the wires, be aware that the clamped joint can be a problem if corrosion builds up. Either clean them regularly, or better yet, replace them with the better type.

If you're forced to jump-start your car, make sure all the electrical accessories of both cars are turned off. Make sure the vehicles are not touching. For



14 To jump-start a car with a dead battery, follow directions in the text.

side-terminal batteries, special adapters are available to facilitate the attachment of a charger or jumper cables (Fig. 13). Connect the positive cable to both batteries first. Now connect one end of the negative cable to the negative post of the booster battery. Connect the other end of the negative cable to the alternator bracket of the car with the discharged battery (Fig. 14). Do not connect the cable to the negative post of the discharged battery. Never lean over a battery, and do not attempt to jump or charge a discharged maintenance-free battery with an indicator eye that's turned yellow.

After jumping, disconnect the negative cable from the alternator bracket first; then the negative cable from the booster battery. Finally, disconnect the positive cable.

## You get 'em dirty... GO-JO gets 'em clean.



Whether it's grease, grime, paint, oil, tar or putty, GO-JO's hand cleaners are the last step in any job. GO-JO Heavy Duty with its grease dissolving action removes most soils. Deep scrubbing GO-JO with Fine Italian Pumice removes more stubborn ground-in soils.

go-jo

## Astounding stories

Monumental misunderstandings  
in car care



Some car owners don't realize a radiator cap is more than just a plug—it's a vital part of the cooling system. Don't let an inferior or worn-out cap turn your next trip into an overheated nightmare. Test your cap before the summer driving season begins. If necessary, replace it with one of the quality radiator caps from Stant. For testing information, write for our new Cooling System Fact Book. For help in selecting the proper Stant cap for your car or truck, see a Stant retailer near you.



# Stant.

Stant Inc.  
1620 Columbia Avenue  
Connersville, Indiana 47331-9990  
A Purolator Company



# CAR CARE GUIDE

# TUNE UP YOUR CHASSIS

For comfort and safety,  
take proper care  
of your brakes, tires  
and suspension.

**T**aking care of your car's engine is important, but it's not enough. Most Saturday mechanics don't mind popping the hood once in a while and making sure all is well, but working under the car isn't quite so appealing. However, it's every bit as important—perhaps even more important—since those undercar parts determine whether your car will stop and steer. Furthermore, the underside of the car is subjected to a constant barrage of salt, water and mud, not to mention damage from road hazards.

What we recommend is that you get on your creeper and slide under the greasy side every 3000 miles. At 15,000-mile intervals, make your tune-ups "whole-car tuneups." Do your 3000-mile lube job but add a safety inspection and replace any parts that don't make the grade.

While you're making sure that the vehicle is safe, don't forget about your own personal safety. Use only high-quality jackstands or ramps for supporting a car. Never work on a car that is supported by a lifting jack of any type. Don't use ramps or jack stands to lift more than one end of the car at a time and chock both of the opposite wheels with concrete blocks or similar objects that are large enough and heavy

enough to prevent movement. Locate jackstands only in the manufacturer's approved jacking positions. Before crawling under the raised car shake it vigorously to make sure that it can't slip off the supports.

Make sure you wear safety glasses under the car. When you beat on an undercar part, you'll probably be showered with debris.

#### **Topside lube service**

Since there are a number of areas that require lube on the topside, attend to these before raising the car.

First clean all linkages with aerosol carburetor cleaner. Then lubricate with a light machine oil, Teflon spray or silicone spray. Apply engine oil to the door hinges, hood hinges and hood spring anchor. Use light machine oil or one of the spray lubes on the door locks. Use chassis grease on the hood latch. Clean the power antenna mast and apply a thin coating of spray lube. Check the windshield washer reservoir and add windshield washer fluid—no substitutions allowed save in climates where the temperature never dips below 32° F. In these areas, you can use water. Check fluid level in the power steering reservoir and add power steering fluid as required. Don't use automatic transmission fluid unless your owner's manual says it's okay. If your owner's manual says the power steering fluid has to be hot for an accurate reading, check it when you check the automatic transmission's fluid level.

Check the brake master cylinder level and fill to the full mark or to within  $\frac{1}{2}$  in. of the top with fluid that meets DOT 3 specifications. Fluid must be fresh; don't use fluid that has been stored in an open container as it could be contam-

inated with moisture. Don't use fluid if you can't find an indication of its DOT specification on the can. If your car loses fluid at a significant rate, you must locate the cause immediately. The fluid level of disc brake pads will drop gradually as the pads wear, but a sudden and substantial drop is definitely abnormal.

If your car is equipped with a hydraulic clutch, check fluid level. If it needs topping off, consult the carmaker's recommendations for fluid replacement. Most hydraulic clutch systems require DOT 3 brake fluid.

#### **Automatic trans lube service**

You'll remember that in our engine tuneup article we recommended driving the car for 20 minutes before changing the oil. With most cars this would be an excellent time to check the automatic transmission, automatic transaxle or manual transaxle fluid level and top it off if necessary, but make sure that the manufacturer recommends that transmission fluid be checked hot. (Some manual transaxes use ATF; others are filled with engine oil. Check your owner's manual.) When your car is new, check transmission fluid every time you check oil, which should be every time you fill the gas tank. If after a couple of months you see that the transmission never loses fluid, you can check at 1000-mile intervals.

When adding fluid take care not to overfill, as too much fluid can cause seal damage, fluid foaming, and leakage through the dipstick tube and other areas. Most dipsticks have a "safe range" indicated. Usually the transmission will take a pint of oil when the level reaches the bottom of the range. You

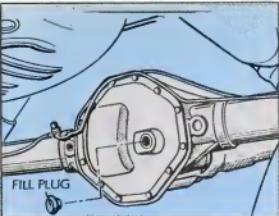
don't have to try to hit the top line of the safe range. Slightly below the maximum limit is better than slightly above.

We recommend changing the automatic transmission or transaxle fluid and filter every other time you do your chassis tuneup; which should be about every 30,000 miles.

Some carmakers agree, others say every 100,000 miles is often enough. If you use your car to tow a trailer, drive in 90° F heat more than half the time, drive in dusty or mountainous areas or do short-trip delivery work, swap fluid and filter at every chassis tuneup.

Make sure the transmission has been warmed to operating temperature before draining the fluid (you can do it when you change the engine oil). After making sure the car is securely raised, place a drain pan under the transmission. If it is equipped with a drain plug, simply remove it. Then, once the fluid has drained, remove the transmission's oil pan to gain access to the filter.

If your transmission is not equipped with a drain plug, locate the drain pan



**2 Add lube to the level of the differential's filler hole, then replace the plug.**

support the pan and remove the last bolts. Carefully lower the pan and pour the remaining fluid into the drain pan. An accumulation of clutch material and even some brass powder in the bottom of the pan is normal.

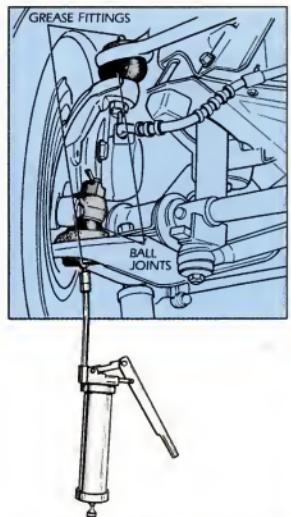
The filter is probably secured to the bottom of the transmission by one or two bolts or screws. Remove it and replace it with a new filter, taking care to properly insert any O-rings or gaskets. Remove the old oil-pan gasket, clean the pan and make sure its gasket surface is flat.

If the flange bulges around the bolt holes, flatten it using a ball-peen hammer and a block of wood under the flange. Attach a new gasket to the pan with a small amount of fast-drying adhesive. Use just enough adhesive to hold the new gasket in place. Carefully place the pan and gasket against the transmission case and start all the bolts by hand. Using a wrench, tighten bolts snugly. Work your way from side to side in an alternating pattern.

Refill with the type of fluid recommended in your owner's manual. Don't substitute. Take care not to overfill. The cold fluid level will be much lower than the hot level. If your dipstick doesn't have a cold fluid level indication, as some do, measure the amount of fluid you drained and add new fluid accordingly.

### **Chassis lube**

After you've changed oil and, when necessary, automatic transmission fluid, make sure every moving part under the car is lubricated. Begin by lubing all grease fittings in the suspension and the steering linkage (Fig. 1). Some new cars may have plugs installed in place of grease fittings. If so, purchase the grease fittings at an auto parts store and install them yourself. Remove the plugs with a box wrench or



**1 Lubricate all Zerk fittings. Pump grease into the fitting until rubber boot over the ball joint swells slightly.**

under one rear corner of the oil pan and remove all pan bolts except three in the corner opposite the point from which you want the fluid to drain. Slowly remove these bolts, allowing the fluid to drain gradually as the pan corner drops lower and lower.

When you can't drain any more fluid without removing the bolts completely,

socket wrench and install the fittings with the same tool.

Check your owner's manual or service manual to locate all grease fittings. Your car may have as few as four or as many as 20. Some cars with independent rear suspension even have a few grease fittings on the rear suspension parts. Others have fittings on drive-shaft U-joints.

The important thing is to make sure you locate all of them. Hand-operated grease guns and chassis grease are available through auto parts stores.

When applying grease to parts with a rubber dust cover, pump grease in only until the cover of each joint swells slightly. When applying grease to components without a rubber dust cover, keep pumping until old grease comes out of the joint.

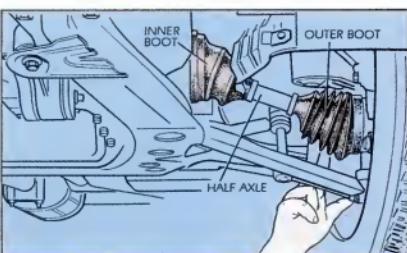
Next, apply a small amount of chassis grease to the parking brake cables at every point where they move through guides. Fill a squirt can with engine oil and lube all transmission or transaxle shift linkage parts, the clutch linkage pivot points, and all floor shift linkage moving parts.

Remove the press-in filler plug or screw plug from the differential carrier of rear-drive cars to check the level of the rear-end lube. The housing should be full to the level of this plug. If it isn't, top it off with the lube recommended in your owner's manual—SAE 90 hypoid type for many cars. Most cars with limited-slip differentials require a special lube. If the differential carrier is equipped with a rubber press-in filler plug (Fig. 2) make sure it is fully seated in the housing when you reinstall it.

Most rear-wheel-drive cars with manual transmissions require a lube similar to or the same as that used in rear differentials. Again, a filler plug is provided on the side of the case and the oil level should be up to the plug hole.

### **General undercar inspection**

A detailed examination of all undercar components should be a part of every 15,000-mile whole car tuneup. Check



**3 On front-wheel-drive cars, examine all CV-joint boots for tears or signs of deterioration. Don't wait to fix problems here.**

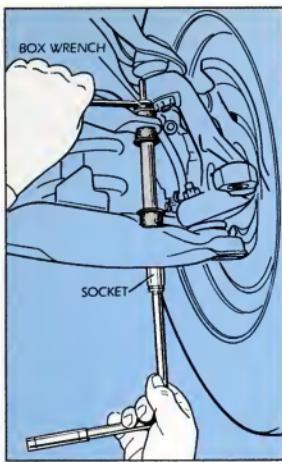


# Motorcraft spark plugs. THE LIGHTNING BEHIND ITS THUNDER.

It stormed onto the American performance scene. The Thunderbird Turbo Coupe, moved by a sophisticated four-cylinder turbocharged engine that's as powerful as a V-8. And the lightning behind its high-revving thunder: Motorcraft extended-tip spark plugs. Their nickel-chromium-alloy electrodes are designed to cope with the intense heat of today's high-performance engines. There's a Motorcraft spark plug, as well as a full line of quality-made Motorcraft parts, available for all makes of cars and trucks.



**Motorcraft from Ford**  
**EXCEEDS THE NEED**



**4 Check every bolt on the chassis and suspension for tightness.**

the complete exhaust system first. If exhaust fumes find their way into the passenger cabin they can kill you. Make sure all hangers are sturdy and firmly attached to both the exhaust parts and the chassis. Examine each pipe joint for smudges of carbon that signal leaks. Pay particular attention to the seams of mufflers or resonators. Look for small rust holes forming near the lower rear of mufflers.

Examine each shock absorber. If there are indications of a fluid leak, the shocks should be changed. If your car undulates up and down after hitting a bump, the shocks should be changed. On most medium- or full-size cars shocks rarely last more than 30,000 miles, so renewal at every other maintenance tuneup is a good idea. On light-weight machines they may last 45,000 miles.

If your car is equipped with MacPherson struts (the strut/damper unit is surrounded by a spring and serves as a suspension support member), leave the job to a professional unless you have the proper type spring compressor, experience doing this type of work and the correct service manual.

With conventional shock absorbers, replacement is simply a matter of unbolting the old ones and installing new ones. On shocks where the upper shaft is inserted directly into the mount and retained with a single nut, you'll have to hold the shaft with a square drive socket or a pair of locking pliers while you turn the nut with a box wrench. In many cases, however, you'll find that some of the retaining nuts have frozen with rust. So if you can't loosen them

with a wrench, chisel them off or use a nut splitter.

Check the steering box and power-steering lines for leaks or physical damage. On front-wheel-drive cars, clean and inspect the CV joint boots (Fig. 3). On cars with rack-and-pinion steering, check the bellows boots that cover the inner tie-rod ends for cracks, splits or other physical damage. On cars with power rack and pinion, fluid in the boot can be a sign of leaking seals. Lubricant in the boot of a manual rack is normal. If a boot is slightly torn or shows signs of deterioration, it should be replaced. Using the proper wrench, check all chassis part bolts for tightness (Fig. 4).

### **Chassis part checkup**

Examine all suspension joints. The most practical way to check the four tie-rod ends of a car with parallelogram steering or the two outer rod ends of a rack-and-pinion system is to simply grab the tie rods and shake them vigorously. The rod ends shouldn't show signs of sloppiness or looseness. Even a brand-new joint allows some horizontal movement against its internal spring loading, but a good joint should not show unrestricted vertical movement. Joints that are loose should be replaced, as should those with missing or torn dust boots.

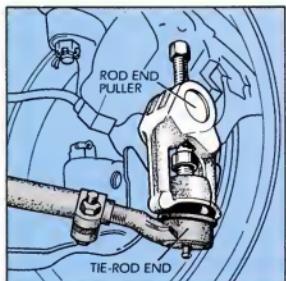
To replace a tie-rod end, remove the cotter pin from the rod end stud and unscrew the nut. Then use a "pickle fork" with a narrow slot between the tangs (as opposed to a ball-joint pickle fork, which has a wide slot between the tangs) to remove the joint from its mount. Drive the fork in between the joint and its mount. Position the fork so that its flat side faces the rod end and its sloped side faces the steering arm or center-link mounting position (Fig. 5). In lieu of the pickle fork, you can use a rod-end puller (Fig. 6). Since it is not as likely to tear the dust boot, this tool is particularly handy if you intend to reuse the rod end and are just removing it to gain access to another part.

Before unscrewing the rod end from the tie rod, measure from the center of

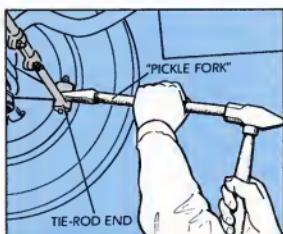
the tie rod's other rod end to the center of the rod end you plan to replace (Fig. 7) and record this figure. On cars with rack-and-pinion steering, measure from the center of the outer rod end to the boot retaining groove on the inner rod end. When you install a new rod end, you can position it correctly to avoid changing toe adjustment. Once you have your measurement, loosen the locking bolt on the tie-rod collar and unscrew the worn-out rod end.

Check the idler arm on cars so equipped by pushing the end of the arm that is attached to the center link up and down. It should not show vertical movement. This part frequently is the offender on cars with a bad case of steering-wheel shimmy.

Examine the sway bar frame-mount bushings and the bushings and links that join the bar to the control arm. If any are worn, broken, deteriorated or missing, they must be replaced. A missing or worn sway bar bushing is frequently the cause of a loud clunk heard when hitting a bump in the road or when cornering.



**6 Tie-rod end puller will squeeze apart reusable rod ends when bolt is turned.**



**5 Use sledge and "pickle fork" rod-end separator to release tie-rod ends.**

Checking ball joints is a simple matter if your car has wear-indicator ball joints, as most now do. The check should be made while the wheels are resting on ramps or on the ground. Most wear-indicator joints have a collar that protrudes from the lower surface of the joint and encircles the grease fitting. As the joint wears, this collar sinks below the surface of the joint. When this happens, replacement is necessary. A second type of wear-indicator joint is found on other vehicles, including late-model Chryslers. With this type, you attempt to wiggle the grease fitting. If it moves, the joint is worn.

To check ball joints on cars without wear-indicator joints, you have to relieve the load on the load-carrying joint—the one that frequently wears out first on cars with upper and lower control arms.

# Lead the way.



You come out ahead  
when you head out on  
**General Grabber AT®**  
radials.

General Grabber AT vs. Goodyear Wrangler®		
	GRABBER AT	WRANGLER
Dry Slalom 700 ft. (in seconds)	12.80	12.91
Dry Braking 60 - 0 mph (in feet)	189.3	209.8
Wet Braking 40 - 0 mph (in feet)	107.1	113.1
Drawbar Pull in sand (lbs. force)	3245	3248
Drawbar Pull in clay/sand/loam (lbs. force)	3647	3548

Comparative testing conducted by a recognized independent testing service on a standard-equipped 1985 Chevrolet K-10 Blazer and K-10 Pick-up. Results will vary based on driver, conditions and vehicle. Test results available upon request.

Dial 1-800-255-2550 for  
the General Motorsports  
dealer nearest you.

For all the right reasons,  
you need Generals.

## GENERAL TIRE G

© 1987, General Tire, a GENCOPP Company



On cars with dual control arms, the arm that carries the spring is the arm with the load-carrying ball joint. To relieve the load on a loaded upper joint, wedge a block of wood between each upper control arm and the frame, with the wheels resting on ramps or with jack stands under the lower control arms. Then lift the car, locate the jack stands under the frame and lower the car to rest on them, following all precautions in respect to location of the stands and chocking the wheels.

The joints are worn out if they permit too much sideways movement or too much up and down movement. To measure up and down movement, mount a dial indicator with its stem resting against the bottom surface of the steering knuckle. The stem should be parallel to line through the center of the ball joints. Lift the wheel with a pry bar and watch the indicator. Compare the amount of play to the tolerance figure in your service manual.

Check sideways movement by mounting the indicator on the edge of the wheel. For an upper joint, locate it at the top edge of the wheel, and at the bottom edge for checking a lower joint. Push the wheel in and out and watch the indicator. For most cars the maximum radial movement is  $\frac{1}{4}$  in. at the edge of the wheel. Make sure any movement is not due to an improperly adjusted wheel bearing.

Cars with MacPherson strut suspensions have only one ball joint. To check it the wheel should be off the ground. Grab each wheel at the top and bottom and shake it in and out while watching for movement of the steering knuckle relative to the ball joint. Any noticeable movement calls for replacement of the joint. Play seen at the wheel bearing will be discussed later in this article.

A loud clunk when shifting from DRIVE to REVERSE indicates a possible U-joint failure. Check all cross-type universal joints by grasping the shafts and twisting them back and forth as hard as you can while pushing up and down. Any looseness is grounds for replacement. Front-wheel-drive CV joints are checked most easily by listening for failure symptoms while driving. A clunk during acceleration usually indicates a worn or damaged inboard joint. Shudder or vibration and/or a clicking noise when turning frequently indicates a bad outboard joint.

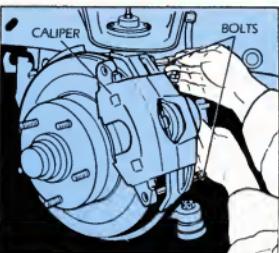
### Brake-system maintenance

While our instructions below can serve as a general guide to brake maintenance work, you should also check your shop manual carefully for any specific information or procedures that relate to your brake system. The brakes should be inspected at every 15,000-miles, with parts replaced as necessary. In most cases front pads will last 30,000 miles, while rear pads or linings will last 45,000 miles. But if you drive aggressively or use your left foot for braking, they may not last nearly that long. Wheel bearings should be repacked at 30,000-mile intervals or sooner.

Begin the brake inspection by checking the master cylinder, calipers, wheel cylinders and various junctions in the hydraulic system for leaks. If there is a leak, it must be fixed before the car is driven again. Master cylinder, wheel cylinder or caliper leakage requires rebuilding or replacement of the part. Line or fitting leakage is grounds for replacement. After repair or replacement of a hydraulic system component, the brakes must be bled.

Most disc-brake-equipped new cars have wear indicators that contact the

brake disc when the pads have worn out. If you see that an indicator is within  $\frac{1}{16}$  in. of the brake disc or if it has contacted the disc and squeals when you drive the car, the pads must be replaced. For cars that have disc brakes without wear indicators and with bonded brake pads, you can inspect lining thickness through the hole in the top of the caliper. The thinnest part of the pad material should be thicker than the backing plate.



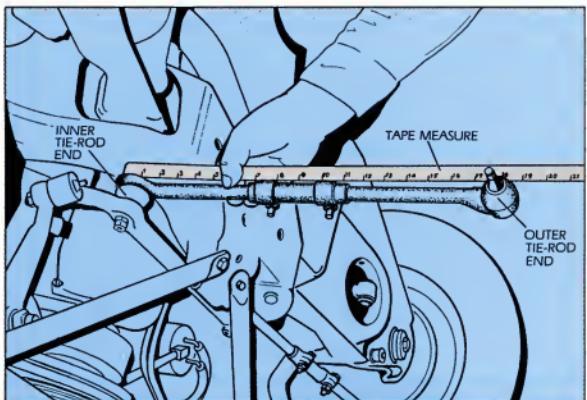
**8** Some calipers must be partially removed to inspect brake pads for wear.

If there are no inspection holes in the top of your caliper or if you're not sure whether your pads are riveted or bonded, you'll have to remove the caliper to check the pads. On GM cars and most Chryslers, the calipers are removed by extracting the two bolts (Fig. 8). On most Japanese imports, just remove one caliper bolt and swing the caliper off of the disc. Fords usually have a retaining key that must be removed to disengage the caliper.

Volkswagens and most German cars require that you remove one or more pins and clips to pull the pads clear of the caliper. If you have a car with rear disc brakes, consult a shop manual. These brakes, which incorporate a parking brake, vary widely and are sometimes complex.

Examine the material on the pads. Nonmetallic pads should have more than  $\frac{1}{16}$  in. of friction material above the rivets. With semimetallic pads, the material should extend at least  $\frac{1}{32}$  in. above the rivets. If everything looks okay, bolt it all back together after repacking the wheel bearings as described below. (While you're servicing the wheel bearings or performing additional brake service, hang the caliper from a suspension part with a wire coat hanger, taking care not to stretch the brake hose.)

If the rotors show any discoloration or heat cracking, they'll have to be replaced. If you've noticed a pulsating pedal or if the rotors are more than just a little bit scored, they will have to be resurfaced at your auto parts store or automotive machine shop.



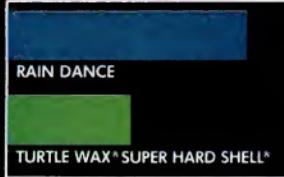
**7** Measure tie-rod length from center to center before replacing a bad rod end.



**AFTER  
1700 HOURS  
OF RAIN,  
HEAT, AND WIND,  
ONLY ONE  
CAR WAX WENT  
THE DISTANCE.  
RAIN DANCE.**



## Tests prove Rain Dance® lasts up to twice as long as the leading car wax.



Punishing rainstorms. Blistering sun. Repeated detergent washings. We put the leading car waxes to the test in Florida to find out which brand lasts longest. The winner: Rain Dance by a mile.

In fact, water beading measurements showed Rain Dance lasted more than twice as long as the other leading brand. Which means with Rain Dance, you can wax a lot less often.

So if you want the longest-lasting car wax, get Rain Dance. The wax that polished off the competition.

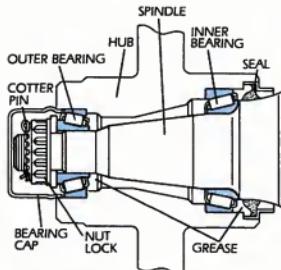
Borden Inc 1987

Water beading tests after 1700 hours.  
Rain Dance holds up after other  
leading car waxes fall flat.

**RAIN DANCE. INTENSIVE CARE FOR YOUR CAR.**

If the pads are to be replaced, remove them from the calipers and wipe all caliper surfaces clean. Check carefully for fluid leakage around the bleeder screw, piston and seal. If any is evident, replace the caliper with a new or rebuilt unit. Some mechanics rebuild the caliper every time they change pads. It's a good way to ensure that relocation of the piston inside its bore won't provoke a hydraulic leakage problem. If you decide to rebuild your calipers, follow the instructions in your shop manual exactly. If there's any part of the job you can't do or don't understand, purchase rebuilt calipers from your auto parts store.

On cars with drum brakes, the drums must be removed to check the linings.



**9** Lube front or rear wheel bearings with grease recommended by the carmaker.

You should wear a breather mask while doing this to prevent the inhalation of asbestos particles. On some fwd cars and on rear-drive cars with drum brakes in front, you'll have to remove the wheel bearings to remove the drums. On most other cars, a rear drum is simply pulled off of the lug-nut studs, but you'll probably have to retract the shoes with an adjustment tool first. On cars that have not been serviced previously, you'll usually have to cut a retainer washer off one stud on each drum. Use a pair of side-cutter pliers.

### Wheel bearing service

While you might think this section belongs with the lube service described previously, we've moved it to the end of the procedure because, on rear-drive cars, it's a job you'll want to do at the same time you remove the front brake rotors for machining, should that be necessary. On front-drive cars with conventional wheel bearings on the rear axle, you'll want to service them while the drums are off. Virtually all fwd cars have sealed front bearings.

If you use your car for delivery work or drive primarily in stop-and-go traffic where brakes are applied frequently,

repack the wheel bearings every 15,000 miles. If your use is less severe, 30,000-mile repacking is sufficient.

After removing the bearings from the drum or rotor with a brass drift and a hammer, thoroughly wash all the old lube from the bearings and from the hub cavity with nonflammable solvent. Check the rollers for signs of pitting or other surface distress and replace the entire wheel set of bearings if necessary. Light discoloration is normal.

Repack with the grease recommended in your owner's manual. Purchase a bearing packer if you don't have one, as this tool makes the job much easier and it's not very expensive. In any case, make sure you push grease all the way through the bearing cage, completely surrounding each roller. Add a small amount of new grease to the hub cavity before installing the rear bearing and a new seal (Fig. 9). Use an old brake piston or similar object to drive the seal into the back of the rotor or drum.

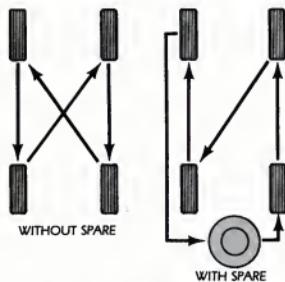
Install the hub assembly on the wheel spindle along with the outer bearing, washer and nut. Tighten the nut to about 25 ft.-lb. with your torque wrench while turning the hub. Then back off the adjusting nut about  $\frac{1}{4}$  turn and retighten it with your fingers. Install the nut retainer lock and cotter pin, then the grease cap.

### Tire care and rotation

Don't put those wheels back on the car just yet. First make sure all of your tires show normal wear patterns. Abnormal tire wear is a sign that something is wrong. If a tire wears only at the edges, it has either been running underinflated, it hasn't been rotated regularly, or you tend to zip around corners. If a tire wears on one side and not the other, wheel alignment is incor-

rect, the tire is bad, or—if it's on a rear driving wheel—you tend to accelerate aggressively. If a tire shows scuffed or feathered edges on one side of tread ribs or blocks, wheel alignment should be checked.

In any case, tires should be rotated as soon as they start to wear uneven-



**10** Rotate tires as soon as they begin to show wear, as early as 7000 miles.

ly—as soon as 7000 miles on some short-wheelbase, front-drive cars. At the very least, the tires should be rotated while the wheels are off the car for your 15,000-mile interval. Use a cross-rotation plan (Fig. 10) for all tires, radial or bias, and tighten wheel lug nuts with a torque wrench, working from side to side. Check your owner's manual or shop manual for the right torque figure. If you can't find a spec, torque  $\frac{1}{2}$ -in.-dia. lugs to 85 ft.-lb. and  $\frac{1}{4}$ -in. lugs to 70 ft.-lb.

Check tire air pressure every time you check oil. This practice will add thousands of miles to the life of your tires and, perhaps, numerous years to your own.

### New Brake Linings

Due to health concerns about asbestos dust, several new brake pad materials have been introduced. So-called semimetallic brake pads and linings use steel wool, wool slag or glass fibers in the lining material, along with metal chips and finely ground metal powder. They offer excellent fade resistance, but tend to squeal. Some combinations (see chart) also wear out drums and discs faster than others because the linings are so abrasive.

### Offer A Wide Choice

Aramid fibers (Kevlar is one brand name) are the newest brake material. They're quiet and last a long time, but tend to fade more in hard use.

Asbestos is still found in some brake materials. Unfortunately, few packages reveal what specific materials are found in a given brake lining. You often have to write to the manufacturer or rely on an unusually knowledgeable salesperson to find out this information.

### BRAKE MATERIAL CHARACTERISTICS

	Steel Wool Fiber	Glass Fiber	Wood Slag Fiber	Aramid	Asbestos
Heat Stability (Fade Resistance)	Excellent	Good	Good	Fair	Fair
Noise Generation (Squeal)	Poor	Poor	Poor	Good	Good
Rotor/Drum Protection	Good	Fair	Poor	Excellent	Good

# MICHELIN INTRODUCES THE TIRE THAT LETS YOUR PICKUP, VAN AND 4X4 RIDE LIKE A CAR AND WORK LIKE A TRUCK.



Big loads aren't a big deal for the XCH4 radial. It gives you the carrying capacity of a light truck tire. With the comfort of a Michelin passenger tire.



The XCH4 is proof that a light truck tire can work hard for you without being hard on you.



Bad weather is good weather for a Michelin. The XCH4 all-season radial's special tread design and compounds provide excellent traction and performance in rain and snow.



The XCH4 is designed to wear slowly, and just as important, evenly. Which prevents premature wearout. And gives you the kind of mileage Michelin is famous for.



The crisp handling and precise response you expect from a Michelin. Now your vehicle can achieve all the driving excitement and fun it was designed for.



**MICHELIN**  
BECAUSE SO MUCH IS RIDING ON YOUR TIRES.



**Ford installs the spark plug they make.**



**G.M. installs the spark plug they make.**





**American Motors, BMW, Chrysler,  
Citroën, Ferrari, Fiat, Hyundai,  
Jaguar, Lamborghini, Maserati, Mazda,  
Nissan, Peugeot, Porsche,  
Renault, Rover, Saab,  
Subaru, and Volkswagen install  
the spark plug we make.**

MORE PEOPLE RELY ON CHAMPION THAN ANY OTHER SPARK PLUG IN THE WORLD





# CAR CARE GUIDE

# TUNE UP YOUR INTERIOR

Modern chemistry comes to the rescue of interior fabrics and plastics.

**W**hen you've made a living cleaning cars for 23 years, you must be good. Doug Wilson fits that description. He works in Fort Lauderdale, Florida, a part of the country that's tough on vehicles: lots of sun and salt air. Doug's a professional "detailer" and the tips he gave us could help make your car the envy of the neighborhood.

The order in which you clean your car is important—you don't want to mess up one part of the car when you clean the next area.

Open the trunk to begin cleaning the inside of your car. Wash all metal with a solution of mild liquid soap and water. If the trunk is carpeted, give the rug a going-over with a vacuum. Then, sharpen up the spare tire with tire dressing. The final step in the trunk is to spray silicone on the weatherseals around the rim of the opening. This is not done to make seals look pretty, but to help keep them from drying and cracking.

## Heads up

Use the vacuum inside the passenger compartment. Hit hard-to-reach spots such as the floor under the seats and crevices between cushions. Remove floor mats and clean them outside the

car, on a clean surface so they don't pick up grit.

Once all loose debris and dust have been vacuumed, look at the headliner. If it isn't stained, the only treatment it needs is a rubdown with a wet cloth. But if the kids put jellied fingerprints onto the headliner, or you sit so tall in the car that your hair has left a stain, use a fabric cleaner or mix up a solution of liquid detergent and water, and give that headliner a good scrubbing. Follow it with a clear water rinse. Clean stains from carpet with a foaming cleaner meant for automotive carpeting, which is different from household carpet due to the fire-retarding properties it has.

## Selective cleaning

Next, clean hard-plastic components such as the console, steering column shroud, kick panels and rear deck. They can be cleaned with liquid detergent and water, but don't stop there. When the plastic has dried, apply liquid furniture polish to give these components a nice shine.

Use a liquid detergent and water solution or a fabric cleaner to wash blended cloth, including velour, upholstery. Give the seatbelts a going over, too, as well as fabric on the floor and on door panels. Unless upholstery is stained (see below), this is all that's needed to get it clean.

If your car has leather upholstery, Nissan recommends you wash it with mild liquid soap and water. Ford and GM recommend their own brand leather cleaners. After leather has dried, a coating of old-fashioned saddle soap, Neatsfoot oil or a commercial leather conditioner will make it shine and keep it supple. Follow container directions.

Incidentally, avoid using auto body

wax on leather. It may cause leather to dry and crack.

The one soft-plastic (vinyl) part of a car that should get the most attention is the dash. If you leave it to fate, in time the sun's rays, intensified as they come through the windshield, will dry out vinyl and cause it to crack. Remove surface dirt with soapy water and then rub vinyl dressing into the dash. Give vinyl seats, vinyl armrests and vinyl door panels similar treatment.

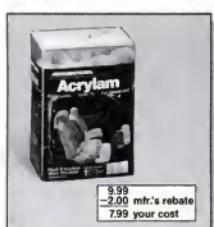
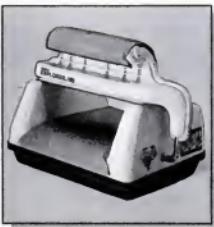
## Wrapping it up

In addition to what's been suggested, consider doing the following on the inside of the car:

- Wash simulated chrome. If it doesn't come out sparkling, use a piece of extra-fine steel wool that's been saturated with auto-body liquid polish, but be careful—employ a gentle touch or you'll leave scratches.
- Apply tire dressing to brake, clutch and accelerator pedals, and to rubber kick pads.
- Wash rubber floor mats in a sink filled with liquid detergent and water solution; then, rinse them with clear water and hang them up to dry. Vacuum carpet mats and use the stain removal techniques discussed below if necessary.
- Give door and window weatherseals a shot of the same silicone spray you used on trunk weatherseals. Be sure to use a piece of cardboard as a mask to keep silicone off the paint. Some brands leave behind a greasy stain.
- Wash door jambs and frames with a sponge and dry with chamois or paper towels. These are the parts car washes always miss.
- Clean glass inside and out with a commercial glass cleaner or ammonia

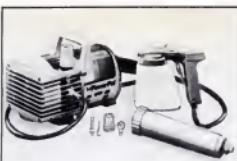


# Savings set



**Starlite Acrylam Seat Cover** of plush simulated sheepskin fits high or low bucket seats. Beige. **REBATE** **9.99**

**Master Mechanic® Oil or Air Filter.** Rugged construction and excellent filtering performance protect your engine! **1.99**

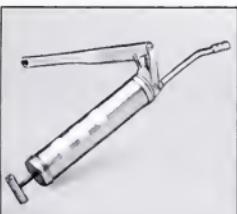


**Campbell Hausfeld PowerPal®**  
Air Compressor includes an 8-pc. tool kit, ½ HP. mfr. \$99.99



**GE® Help Compact Emergency**  
CB Radio. Stores in a sturdy  
case. 40 channels. 5.99

# the pace!



**Lubrimatic Lever-Action**  
Grease Gun features 3-way  
loading, 10,000 psi. mfr. \$68.98  
Grease, 14 oz. mfr. \$9.99



**Armor All®** Protectant with  
trigger sprayer beautifies  
vinyl with ease! 16 oz. mfr. \$39.99  
64-Oz. Refill. mfr. \$12.99

Because participating stores vary in size and merchandising policies, some may not stock all items shown and prices may vary. Prices are subject to change without notice and may be higher in Alaska and Hawaii. Prices expire June 6, 1987.



**Westley's® Concentrate™ Car**  
Wash or Bleche-Wite™  
Whitewall Cleaner.  
½ gal. mfr. \$2.99 Each

12.99 -4.00 mfr.'s rebate  
5.99 your cost

3.99 -1.00 mfr.'s rebate  
2.99 your cost



**Turtle Wax® Super Hard Shell™**  
Car Wax for shine and protection! Choose 9.5-oz. paste or  
16-oz. liquid. 12.99 Each

12.99 -4.00 mfr.'s rebate  
5.99 your cost



**Clean-Rite®** Brushes for white-  
walls, vinyl top or wheels and  
grille. 2.29 Each



**Master Mechanic®** 70-Pc. ¾-In. Drive Socket Set is designed to  
fully equip the serious do-it-yourselfer. Includes an assortment of  
standard and metric sockets, quick-release ratchets, extensions,  
universal joint and more in a handy toolbox. 59.99

12.99 -4.00 mfr.'s rebate  
5.99 your cost



**Casio®** 2.6-In. LCD Color  
Television locates nearest  
broadcast with one-touch  
channel changes. Built-in  
antenna, speaker. 110-volt  
AC for tabletop, 12-volt  
DC car adapter sold below.  
Car Adapter plugs into  
auto lighter. 19.99



**Custom Accessories** Foot  
Pump. 100 psi. mfr. \$14.99



**TDK®** Video Cassette. VHS or  
Beta. mfr. \$19.99

\$3.00 Mfr.'s Rebate  
With Purchase of Four

Charge it with your  
True Value Charge Card,  
Visa or MasterCard!



There are more than 6,000 True Value Hardware  
Stores in 50 states. Look under "Hardware" in the Yellow Pages.



# 29 Crane Means Reliable Power... on the Street or Off!

If your car or truck lacks the power or responsiveness you need for work or fun, Crane camshaft technology can add some real sizzle to your V-6 or V-8 engine. We make special street and off-road cams that add significant power and torque to stock engines without sacrificing a smooth idle or good fuel economy. And if your engine is modified, we've got a cam profile that will help you get the most from your other performance accessories.

For example, on the Dyno (see chart) our mild HMV®/260 Hydraulic cam made 33 additional horsepower in our stock 305 Chevy engine while significantly broadening the torque peak. It means you'll have a much more powerful vehicle for fun on a twisty road, pulling a heavy load or "four-wheeling it" to your favorite hunting spot.

Crane cams are precision built to exacting standards that far exceed your original equipment camshaft. Most carry a limited, lifetime warranty and they can be easily installed by any competent mechanic or experienced do-it-yourselfer. And it won't cost you any more than a stock replacement—plus, you'll get thousands of miles of added performance and driving pleasure. There is a quality Crane camshaft available for virtually any street or off-road application. Contact your local auto parts professional or call our Tech Help Line at 904-258-6174. We'll help you get the horsepower, torque and crisp throttle response of yesterday with the Crane technology of tomorrow.

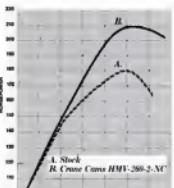
## Crane Max Velocity™ Cams Matched Set now available at a great price—and warranted for life!



hardware kit and installation instructions. You get everything you need to bolt in one serious Crane performance at a price that saves you more than 15% over the same components purchased separately. Plus we back the Matched Set with a Limited Lifetime Warranty. (See package for full details.)

Consumer direct — Matched Set Camshaft & Lifters pn 113902 — suggested resale — \$180.32. Add \$10.00 handling. Send certified check or money order to Crane Cams, Inc., Dept. PM, 530 Fentress Blvd., Daytona Beach, FL 32014. Tech help: 904/258-6174. "Not legal for sale or use in California on pollution-controlled motor vehicles."

**CRANE**  
**Cams®**  
If we build it, you know it's right



305 Chevy Dyno Engine



Crane Cams powered  
Bill Elliott's record setting  
Thunderbird to Daytona 500 victory.

and water. If you use vertical cleaning strokes inside the car and horizontal strokes outside, you can tell immediately which side of the glass any remaining streaks are on.

### Treating stains

The "problem" part of getting an interior clean is removing stains from cloth upholstery.

Tough stains are those made by food or beverages. Tougher stains are those made by petroleum (grease, oil or tar) and by almost-indelible products such as lipstick, ink and crayon.

To get out a tough stain, use furniture upholstery cleaner. You get this in a supermarket. Pour some of it on a soft-bristle brush or sponge and apply cleaner using a circular motion until the stain disappears. Start in the center of the stain and increase the diameter of the swirl you make until the brush or sponge overlaps the outer edges of the stain. Then rub the area with a water-dampened cloth. If some stain remains, repeat the procedure.

To treat tougher stains, buy a spot-lifter or stain remover in a supermarket, auto parts store or new-car dealer. Read the label to make sure it will handle the kind of stain you want to get out. Most products come in spray cans. Hold the can 8 to 10 in. from the stain and give it a spritz. Leave it alone for five minutes. Most spot-lifters form a white residue when they've done their job and are ready to be brushed off with a bristle brush or vacuumed.

If any of the stain stays, take more drastic action. Saturate a cloth pad with the spot-lifter and press it on the stain. Then, using circular motion, rub the area to work the cleaner into the cloth. Rinse the spot with clear water.

### Repairing velour

Car owners may be faced with cigarette burns or tears in upholstery. Vinyl repair kits have been available for a few years. They'll let you copy the "grain" from an undamaged area of vinyl and use it for matching the repaired area. You can even match colors. Now companies are coming out with kits to meet a growing demand for patching velour. One huge kit is sold to professional upholstery repairmen by Auto Velour Inc., Box 553, Ozona, FL 34265.

As this was being written, a small-size kit to make a 1-shot repair was not available—only the large version (cost, about \$300), which contains a variety of colors. The president of Auto Velour Inc., however, indicated that his company would have small 1-color kits for do-it-yourselfers in auto supply stores by the time this article appears. The intended price is under \$10. You might want to check this out before going to a professional shop.

# America's New Symbol Of Toughness.

One look at Cub Cadet and you'll discover, like millions of other homeowners, why a Cub Cadet lasts so long.

Cub Cadet's durability starts with a powerful direct drive transmission that's designed tough, like a farm tractor, to tackle the demands of plowing, tilling, mowing, snowthrowing and more.

There's also a cast-iron front axle that absorbs stress and strain, a twin channel steel frame for solid support, and your choice of single and twin cast-iron cylinder engines ranging from 12 to 20 horsepower.

Cub Cadet goes a long way on convenience, too.

Hydrostatic drive provides an infinite speed range without clutching. Hydraulic lift and electric PTO operate attachments effortlessly. And power steering makes maneuvering around trees and shrubs easier.

You'll also find a wide variety of optional attachments including smooth cutting 38", 44", 50" and 60" decks, grass baggers, snowthrowers, tillers and carts.

See for yourself what makes a Cub Cadet garden tractor America's new symbol of toughness. Take a test drive today. Simply check the Yellow Pages for the Cub Cadet dealer nearest you.



**Cub Cadet**

**Power Equipment**

**One Tough Tractor**

Cub Cadet Corporation, P.O. Box 36930, Cleveland, Ohio 44136



# CAR CARE GUIDE

# TUNE UP YOUR BODY

Careful inspection and quick action is the key to staving off the ravages of rust.

**B**elieve it or not, you should start cleaning the outside of your car by letting the engine run for five minutes, then turning it off. Now, hose down the body—not to wash off dirt, but to get the body slick so dirt that may accidentally splatter as you degrease the engine won't stick. Wet the windshield, too. That's the first thing that professional detailers do before they start sprucing up the exterior of your car.

Now, remove the battery and air cleaner, if the engine has a carburetor or throttle body. Cover the carb or throttle body with plastic wrap. Also cover the distributor and sparkplug cables, electrical connectors and wires.

## Forward march

Working from the rear of the engine compartment forward, spray engine degreaser on the firewall, fender wells, battery tray, warm engine block, hood hinges and underside of the hood (remove the hood insulator if possible—if not, skip the hood). Let the cleaner do its work for the length of time recommended in the instructions, usually at least five minutes. Then, hose it all down.

If a second treatment is necessary, fine; but chances are only a film will

remain. That's where a wash mitt comes in handy. Mix a liquid dishwashing detergent with water, saturate the mitt in the solution and wash down the engine compartment. This will get rid of the film. Then rinse again. To really make that engine compartment sparkle, do one or both of the following:

- Repaint the engine to its original color with a fire-resistant paint that you can buy in an auto parts store.
- Give fender wells and firewall a high gloss by treating them with a liquid furniture polish. That's how Doug Wilson gets his customers' engine-bay sheetmetal to sparkle.

## Dealing with wheels

Use mag-wheel cleaner if you have mag wheels, plain wheel or an all-purpose cleaner if you don't. Spritz the stuff into recesses you can't get your fingers into. Then, wipe off the wheels with a rag and use a toothbrush to reach into cavities.

Incidentally, watch it with mag-wheel cleaner. Avoid getting it on plastic, such as wheel emblems, or paint or a polished wheel rim. It's a lot stronger than most other cleaners and may cause discoloration.

Finish up down below by cleaning tires with an all-purpose or whitewall cleaner. Don't apply tire dressing yet; save that for last. Otherwise, soap and wash water may undo the dressup work you've done.

## Bugging out

Give the body a walk-around, looking for spatters of tar, road grit and bugs. Remove with bug and tar remover. Bug splats often look like chipped paint, so don't be fooled into ignoring them. To be sure, treat everything that looks

suspicious. If the cleaner removes the stuff, it's bug residue—if not, it's a chip you should touch up with paint.

Wet the body again and use a mild liquid dishwashing agent mixed with lukewarm water to wash it. This time concentrate on getting off dirt. Then, let the car air dry or hasten the process with a chamois. Either way, the tops of body-side molding strips, window frames, taillight housings and any place else where water may be lying in a puddle needs special treatment. Make sure to wipe these areas dry. If you don't, the body cleaner you apply will become gooey muck when it mixes with water.

## Calling Dr. Clean

Now comes the major operation, and it requires good judgment as well as muscle. You have to select a polishing agent. Agents fall into three categories:

1. A liquid polish or cleaner—This is mildly abrasive and should be used if paint isn't chalky.
2. A polishing compound—This is moderately abrasive and should be used if the paint has a chalky glaze.
3. A rubbing compound—This is highly abrasive and should be used on badly chalked paint as a last resort to restore gloss. If this fails, the choice is to ride around in a car that looks like a school blackboard at the end of the day, or to repaint the car.

## Selective treatment

You may find that a liquid polish is adequate for parts of the car not subjected to direct rays from the sun (doors and sides of fenders), while a polishing compound has to be used on the roof, tops of fenders, hood and trunk lid. The point is to use the least



**YOU MIGHT SAVE \$2.00 TODAY BUYING AN  
OFF BRAND VALVE COVER GASKET...  
AT 3,500 MILES IT COULD COST YOU A BUNDLE!**

The money you might save buying an off-brand gasket now, could cost you a bundle in as little as 3,500 miles... in lost oil and possible engine damage. Look for the Blue Stripes on FEL-PRO Valve Cover Gaskets. Your assurance of superiority.

**Do the job right, do it once—buy where FEL-PRO quality sealing products are sold.**

**FREE!**

"Get the complete story from the #1 gasket manufacturer on how the value of brand name gaskets benefits you".

**MAIL TO: FEL-PRO INCORPORATED**

7450 N. McCormick Blvd., Box C 1103, Dept. No. PM-587, Skokie, IL 60076

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Zip \_\_\_\_\_

**Train for the Fastest Growing Job Skill in America**

## Only NRI teaches you to service all computers as you build your own fully IBM-PC compatible microcomputer

Now you get it all... training for America's fastest growing career opportunity... training to service all computers... training on the newest total computer system, the Sanyo 880, yours to keep.

### Get inside the newest, fully IBM-PC compatible Sanyo Microcomputer

As an NRI student, you'll get total hands-on training as you actually build the latest model Sanyo 880 Series computer from the keyboard up. It's fully IBM PC compatible and, best of all, it runs programs almost twice as fast as an IBM PC. As you assemble the Sanyo 880, you'll perform demonstrations and experiments that will give you a total mastery of computer operation and servicing techniques. You'll do programming in BASIC language—even run and interpret essential diagnostic software.

### Learn at home in your spare time

You train in your own home at your convenience, backed at all times by your NRI instructor and the entire NRI staff of educators and support people. They're always ready to answer your questions and to give you guidance and special help wherever you need it.

### 100-page, free catalog tells more... send today

Send the coupon today for NRI's 100-page catalog that gives all the facts about computer training plus career training in other electronics fields.



**Send Coupon Today for Free Catalog!**

**NRI School of Electronics**

McGraw-Hill Continuing Education Center  
3939 Wisconsin Ave., Washington, D.C. 20016

Name \_\_\_\_\_ (Please Print) \_\_\_\_\_ Age \_\_\_\_\_

Address \_\_\_\_\_

City/State/Zip \_\_\_\_\_ 100-057

abrasive agent you can get away with on each individual body panel to avoid removing more paint than necessary.

There's danger when using a polishing or rubbing compound of cutting through the paint and into the primer. Once this happens, the car is a candidate for repainting. If you don't repaint, moisture may seep through a porous primer and start rust that will eventually cause the paint to blister and, if ignored long enough, to perforate the sheetmetal.

When you do polish, it's best to do the job by hand or to use a buffer/polisher, also called an orbiter. The orbiter is a power tool designed to provide the safest way to polish a car—safest in the sense of maintaining the integrity of the paint. The tool, which costs about \$150, has a thick (about 3 in.) rotary buffering pad with a large diameter (about 12 in.). The tool is designed to practically force you to apply the entire flat surface of the buffer to the car body with relatively light pressure.

The problem with using an electric drill or any rotary tool as a buffer is that many who work with them hold these tools at an angle to the car or use too much force, "burning" the paint or rubbing through to the primer.

You can also polish by hand, which is a long afternoon's work and not as consistent as using an orbiter. You may find orbiters at tool rental stores that carry automotive tools. When the polishing phase is done, look for polish residue caught in cracks around moldings, lamp housings and gutters. Remove residue with a soft-bristle toothbrush, then apply wax to the body.

The best kind is a paste wax. Only one application is necessary—two won't get you any greater protection than a single coat, which brings up another point. Wax doesn't give paint a gloss—the polishing agent does. The job of wax is to protect the finish. Water forms nearly spherical beads on a newly waxed car. As the wax wears down, beads flatten out and get bigger. When water forms quarter-size "puddles," it's time to re-wax.

### Final touch

Give dressy exterior parts their special treatments. Use a vinyl cleaner on vinyl tops, vinyl moldings, and urethane or polypropylene bumpers. After cleaning black plastic bumpers, try a coat of black, wax-type shoe polish to really make them stand out.

Sharpen up the black parts of tire sidewalls with tire dressing. Clean simulated chrome with an all-purpose cleaner. If "chrome" doesn't come out sparkling, it may need a stronger treatment. Try extra-fine steel wool that's saturated with a liquid body polish, but apply it gently to avoid scratches. ■

**NOT A WAX . . NOT A POLY . . NOT A POLISH . . BUT AN ACRYLIC**



**PROVEN BEST  
BY MILLIONS OF CAR OWNERS!**

ORIGINAL PLASTIC COATING  
**GLO-SHIELD™**  
MAKES WAXES AND POLISHES  
OBSOLETE

AS  
SEEN  
ON  
**TV**

NOT SOLD  
IN STORES

# Plastic Coat Your Car In Less Than 1 Hour

NEW CAR DEALERS CHARGE UP TO \$200

FOR ONLY  
**\$9.95**

MIRACLE POLYMER ACRYLIC FORMULATION ACTUALLY RESURFACES  
AND RESEALS IN ONE SIMPLE STEP. GIVES YOUR CAR "SHOWROOM"  
BRILLIANCE THAT LASTS FOR THREE YEARS—GUARANTEED!

Put an end to corrosion, chalking, rusting, dulling, and pitting of your car's finish. GLO-SHIELD protects your car's finish and restores it, too! You can bring back that new car look in less than one hour with hardly any effort at all! GLO-SHIELD revitalizes and restores dull, oxidized finishes... just wipe on—wipe off! Do away with compounding... dead paint is chemically removed. GLO-SHIELD removes old waxes, tar stains, tree sap, road film, dirt, bird deposits, grime, grease, gasoline streaks, rusting, even tarnish. It deposits a plastic film that fuses to the surface and fills the pores to give your car a hard, high lustre, mirror-like finish.

**NOTHING LIKE ANYTHING  
YOU'VE EVER USED BEFORE**  
Don't confuse GLO-SHIELD with any wax or polish. It is a clear, transparent liquid that, after stripping old wax and grime, deposits a film similar to the acrylic lacquer with which your car was originally painted. And, it works even if your car was painted with enamel. **AND... NOTHING STICKS TO ACRYLIC...** not tree sap, not road salts, not grime or dirt, not bird droppings, grease or gasoline...not even paint or acid rain.

All you do to keep the finish beautiful is a light hosing... even a light rain, and road dirt, salt and grime roll right off, and dries streak-free. GLO-SHIELD is detergent proof (OK in car washes), contains no abrasives, invisible, non-yellowing, peep-proof and crystal clear.

**BONUS!** GLO-SHIELD works its magic on all painted and plated surfaces... chrome bumpers, mag wheels, appliances, motor cycles, fiberglass boats, formica, marine hardware, brass, plexiglass, stainless steel, aluminum, etc.

© 1987 NC Corp.

**WHY WE'RE NOT SOLD IN STORES**  
Retailers don't want products guaranteed for 3 full years—They want car products like polish and wax, that shine good for a few weeks at best... so that you... the consumer... will come back and spend again & again....

## A CHALLENGE

We challenge... SIMONIZ, TUR-TLE WAX, RALLY, or any other car finish company to match our 3 YEAR GUARANTEE... They won't. They need quick sales—turnovers—not items that last up to 3 years—like GLO-SHIELD. Remember... GLO-SHIELD is not a wax... not a polish... But the only true acrylic shield... that's guaranteed for 3 FULL YEARS!... We've made this claim for over 6 years... to over 2 million satisfied customers... Ask your friend or neighbor who's used it, and you'll get the same answer. "GLO-SHIELD IS IN A CLASS BY ITSELF."

SELF... IT'S THE BEST... WE GUARANTEE IT!

**— ACRYLIC IS THE SECRET! —**  
• DON'T CONFUSE GLO-SHIELD ACRYLIC PRODUCTS WITH IMITATIONS!  
• NO RUBBING... NO BUFFING!  
• CLEANS, COMPOUNDS, POLISHES, SEALS!  
• USE ON ANY PAINT FINISH  
• FAST, ONE STEP WIPE-ON, WIPE-OFF!

**ACCEPTED & PROVEN FOR BOATS, TOO!**  
Desert Sunshine Labs reports—especially effective in salt water environment—highly recommended for use on all boats.

## 3 YEAR GUARANTEE

If after using GLO-SHIELD you are not delighted, return unused portion, anytime up to 3 years, for a pro-rata product refund.

CREDIT CARD BUYERS, CALL: (718) 784-4005

— SATISFACTION GUARANTEED OR MONEY BACK —

**GLO-SHIELD, Dept. 323**  
10-10 44th Ave., L.I.C., NY 11101

Please rush me GLO-SHIELD. I understand that if I am not delighted in every way, I can return the unused portion for a pro-rata refund, exclusive of postage & handling.

- One bottle only \$9.95 plus \$1.00 pp. & hdg.  
 **SAVE!** Two bottles only \$18 plus \$1 pp. & hdg.

Enclosed is \$ \_\_\_\_\_ check or M.O.

OR, charge to my  VISA  MASTERCARD

Acct. # \_\_\_\_\_ Exp. \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

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

— N.Y. RESIDENTS ADD SALES TAX —

#### 7-44 LEADING/TRAILING DRUM BRAKE ASSEMBLY

- 7. Spring washer (5) with the concave side against web of adjuster shoe and lining (9).
- 8. Adjuster actuator (4) so that its top leg engages the notch in the adjuster screw (13), view C.
- 9. Spring connecting link (3) and hold in place.
- Important**
  - Do not over stretch the upper return spring (2). The spring will be damaged if extended length is greater than 133.5 mm (5.27 in).
  - Upper return spring (2).
  - Insert angled hook end of spring and lining (9) into park brake lever (13) and shoe and lining (10), view A.
  - Grasp long, straight section of spring across with J 8057 pliers. Pull spring straight across on spring connecting link (3).
- 10. Important
  - Do not over stretch actuator spring (1). The spring will be damaged if the extended length is greater than 50.0 mm (3.27 in).
  - Adjuster spring (1) with suitable pliers, view B.

#### WHEEL CYLINDER

See Figure 1 and 7

##### Clean

- Dirt and foreign material around wheel cylinder assembly.
- Remove or Disconnect tube nut and line.
- Remove or Disconnect opening in line to prevent fluid contamination.
- Clean cylinder bores (19).
- Reinstall components.
- Reconnect line.
- Reinstall cylinder assembly with bolts.

1. Adjust the rear brakes as described in this section.  
2. Apply the park brake six times to release the parking brake pedal.  
3. Check parking brake assembly for free movement by turning "Brake" warning lamp "ON".  
4. If the "Brake" warning lamp is illuminated, release the parking brake cable and pull downward on the parking brake lever to release the parking brake assembly.  
5. Raise car and suitably support, see Section 1.  
6. Remove access hole plug (32).  
7. Adjust parking brake cable until a 1/8 in (3.17 mm) drill (34) can be inserted through access hole into the space as shown in Figure 6. Set parking brake lever as cable adjustment is achieved.  
8. Replace access hole plug (32).

9. Lower car.

10. Tighten wheel nuts. See Section 3E WHEELS AND TIRES.

11. Torque hub bearing bolts.

12. Install or Connect backing plate.

13. Reinstall wheel assembly with bolts.

#### LEADING/TRAILING DRUM BRAKE ASSEMBLY 5C45

- 1. ACTUATOR SPRING
- 2. PARKER RETURN SPRING
- 3. SPRINGER RETURN SPRING
- 4. ADJUSTER ACTUATOR
- 5. ADJUSTER SHOE & L
- 6. SHOE & LINING
- 7. SPRINGER SPRING
- 8. ADJUSTER SPRING
- 9. ADJUSTER NUT
- 10. ADJUSTER HUB
- 11. PARKER NUT
- 12. SPRINGER SPRING
- 13. ADJUSTER SPRING
- 14. ADJUSTER NUT
- 15. PARKER NUT

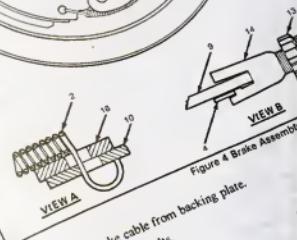
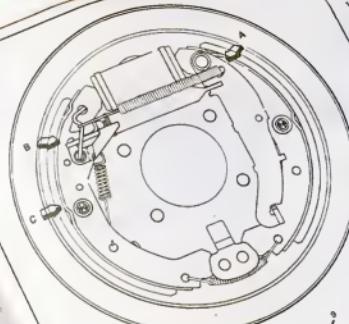


Figure 4 Brake Assembly

Figure 5 Brake Assembly

Figure 6 Brake Assembly

Figure 7 Brake Assembly

Figure 8 Brake Assembly

Figure 9 Brake Assembly

Figure 10 Brake Assembly

# CAR CARE GUIDE

## TOOLS OF THE TRADE

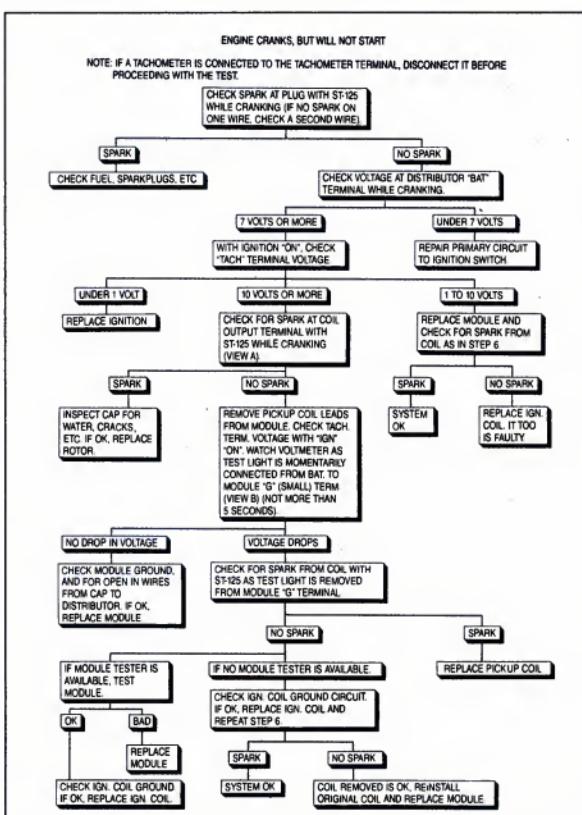
You can't do good work without good tools. One of them is a service manual.

To a mechanic, "tools" fall into two important categories: "hardware" tools, the implements that actually do the job, and "software" tools, the books and other publications that provide the information necessary to do the job. To work on your own car with any measure of success, you'll have to stock your garage with some of both.

### Strategies and Instructions

There's no good excuse for a driveway mechanic to be without the factory service manual for his automobile. General auto repair manuals that cover a variety of makes are less expensive than several factory manuals if you have more than one car to work on. *Motor Auto Repair Manuals* are available for domestic (\$21.50) and imported (\$25.50) cars and for light trucks and vans (\$27.50) in bookstores or from Motor Publishing, 555 West 57th St., New York, NY 10019. You can usually buy the factory manual through your car dealer's parts counter. For some cars, more than one instruction book is necessary to fully cover drivetrain as well as body and electronics.

1 "Trouble tree," found in service manuals, takes you to problem in fewest steps.



# .22 CAL. PELLET FIRING TARGET PISTOLS

**COLT**  
"LONG RIFLE"  
TARGET  
PISTOL

The full-size model of the COLT target pistol fires all 50 pellets as fast as you can pull the trigger.

"TARGET MAGNUM" REVOLVER

Extra long target barrel and hi-man grips combine to give unusual accuracy. The realistic cylinder reloads quickly with 10 pellets.

**MAGNUM .44**

**MODEL-100**  
This semi-automatic handgun has pellets as fast as you can pull the trigger. Load at 50 pellets and fire away.

**THE WALTHER P38**

This WWII German classic is a full-sized accurate replica of the real WWII German Army workshop. Comes with 8-shot magazine.

**INGRAM M-11**  
SEMI-AUTOMATIC

The first choice of Special Forces S.W.A.T. Teams and Police. With this realistic action model you can fire the pellets as fast as you can pull the trigger.

**LUGER-S7**  
SEMI-AUTOMATIC  
MACHINE  
PISTOL

**THE LUGER**

Ful-sized, accurate reproduction of Germany's legendary combat weapon. Comes with 8-shot magazine.

"COMPETITION CLASSIC"  
SEMI-AUTOMATIC TARGET PISTOL

**SPLINTER-8**

**SNUB-Nosed REVOLVER**  
This accurate target pistol looks and feels like the famous snub-nosed revolver in use by most detectives. The cylinder swings out to take eight pellets.

Ful-size version of the world famous target pistol can fire all 50 pellets as fast as you can pull the trigger.

**GUARANTEED DISTRIBUTORS, Dept. 646AGB3**  
County Road 667, Hartford, Michigan 49057

**YES,** please rush me the 22 cal. pellet firing target weapon(s) I've checked below. Also include my FREE targets and 50 reusable pellets with each weapon. I'm enclosing \$4.95 plus 95¢ for postage and handling for each target weapon I'm ordering. If I'm not completely satisfied you'll refund my money right away.

Name \_\_\_\_\_

Address \_\_\_\_\_

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

\$ Total enclosed \_\_\_\_\_

NO PERMIT REQUIRED. MICHIGAN  
STATE RESIDENTS ADD SALES TAX

- SEMI-AUTOMATIC
- "TARGET MAGNUM" REVOLVER
- SNUB-NOSED REVOLVER
- WALTHER P38
- LUGER
- "COMPETITION CLASSIC" SEMI-AUTOMATIC TARGET PISTOL
- INGRAM M-11 SEMI-AUTOMATIC
- "TARGET" SEMI-AUTOMATIC
- COLT LONG RIFLE SEMI-AUTOMATIC
- LASER SEMI-AUTOMATIC

Each of these .22 cal. pellet firing target weapons looks and feels like the real thing. Each comes with targets and 50 reusable pellets. No permit is required.  
Purchase price promptly refunded if you are not completely satisfied. Just \$4.95 each plus 95¢ each for postage and handling. Michigan State residents add sales tax.

**GUARANTEED DISTRIBUTORS, Dept. 646AGB3**

County Road 667, Hartford, Michigan 49057

**NON-GUN FUN**  
**FREE: TARGETS AND 50**  
**REUSEABLE HARMLESS PELLETS**

## The service manual

Most factory service manuals begin with a general information section, usually with charts that tell you how to interpret your car's VIN number. You'll be able to pinpoint the specs of the engine installed, the plant at which the car was built, and similar data. Other charts interpret body ID plates with paint and interior color codes as well as trim levels. Other general information will include overall specs, fluid capacities of the various systems and even data on bolt ID and torque. This chapter should also show the correct jack and lift points for raising and supporting your car.

The general information section is often followed by a maintenance and lube chapter. Use this material in conjunction with our car care plans to tailor the maintenance routines to your specific vehicle.

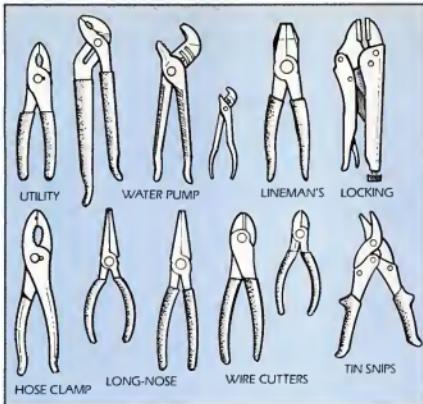
The rest of your service manual is divided into chapters, each of which covers one specific system, such as heating and ventilation, or a group of systems, such as emissions controls.

Most manual chapters include three types of information. First, where applicable, many chapters begin with a short explanation on how a particular system operates. This information can help when it comes to making logical decisions about the possible causes of a given problem.

Next comes diagnostic information. This troubleshooting material can be very general and somewhat brief or it can be incredibly specific and detailed. Typical of the first kind of diagnostic directions are those for engine mechanical diagnosis. Here you'll find lists of possible causes that relate to a symptom. For example, in the 1985 Celebrity manual there are eight potential problem areas listed under the heading "Excessive Oil Loss."

Much more complicated are the diagnostic procedures for drivability problems. Some makers, such as GM, instruct you to begin the diagnosis of a drivability problem by triggering the diagnostic mode of the computer system. You progress from there to troubleshooting individual systems with test lights, ohmmeters and the like, and sometimes finish up checking symptom-organized lists of possible causes.

Other manufacturers, notably Chrysler, begin diagnosis of computer-controlled engine drivability problems with visual checks. In either case, you have to read the manual material carefully and do things in the right order.



2 Pliers are handy for many specialized jobs. Just don't use them when what you really need is a wrench or socket.

The procedures work on a process of elimination basis. If you don't begin at the beginning, you throw the whole diagnostic plan out of whack.

At some point, the troubleshooting of complex systems is sure to include a diagnostic "tree diagram" (see Fig. 1). To follow our example of this type of diagram, you obviously begin by performing the test in the box at top. Then, depending on whether you find "spark"

or "no spark" you proceed on to one of several "branches." Notice that every path eventually concludes with a repair or with a "system ok."

The third type of information, usually at the end of a service manual chapter, is on repairs. It often doesn't include tasks considered simple by professional mechanics.

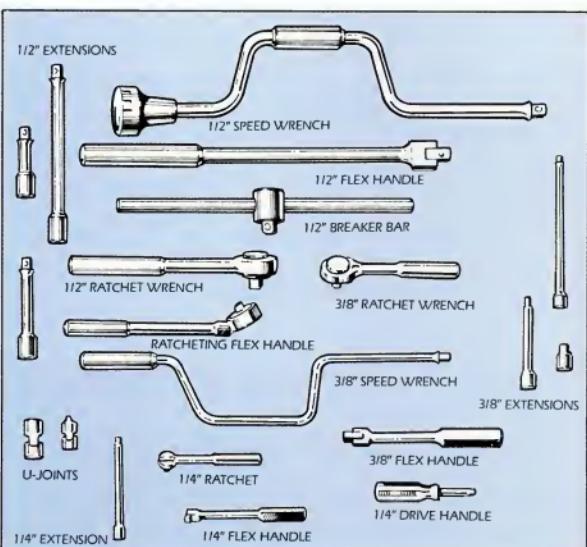
## The toolbox

How many tools do you need to service your car? Frankly, as many as you can afford. Realistically, however, you can get by with a fairly basic set if you intend to do only maintenance jobs. But if you're going to perform complicated repairs you'll need a lot of special tools, many of them designed to do just one specific job.

### Plier tools

From among the vast number of plier tools, you'll need at least three basic types: a conventional slip-joint plier, a pair of side-cutters for cutting and stripping wire and—among many other uses—prying out cotter pins, and a pair of long-nose or needle-nose pliers.

Once you have the basic three you'll eventually want to expand your plier drawer (Fig. 2). You might first add a



3 Whether you need to turn sockets fast, really tight, from an odd angle, or from far away, there's a special ratchet, extension or handle to do it.

# What's New at AMERICAN DESIGN COMPONENTS?

"The Source" of the  
electro-mechanical components  
for the hobbyist.

We warehouse 60,000 items at American Design Components — expensive, often hard-to-find components for sale at a fraction of their original cost!

You'll find every part you need — either brand new, or removed from equipment (RFE) in excellent condition. But quantities are limited. Order from this ad, or visit our retail showroom and find exactly what you need from the thousands of items on display.

Open Mon. - Sat., 9-5

## THERE'S NO RISK.

With our full 90-day warranty, any purchase can be returned for any reason for full credit or refund.

**PC 8300 HOME COMPUTER**  
(Advanced version of the Timex 1000)



42 key membrane keyboard and membrane Contarix 2K x RAM Reviver videoed, Z80A, 6.5 MHz processor ROM 8K BASIC Graphics capability standard music, TV or monitor output, standard inputs & outputs, 115 VAC, including AC adapter, power cord, and pair of cassette tapes. Will run all pre-recorded tapes for Sinclair Timex 1000 ZX1 ZX1 Mtr. Power 300W. In original boxes. Item #10336 \$29.95 New

**ADAM COMPUTER KIT**  
(less printer & w/o cabinet)



Build it yourself from Schussmanns. No warning, just plug together! Hook up diagram included. Includes: Keyboard, 1 cassette digital disk drive, 2 game controllers, 1 monitor, 1 keyboard, 1 cassette tape, and one cassette. Capable of running CPM. Has built in word processor. Item #7410 Complete \$99.00

**Composite Video Monitors . . .**



**12" Monitor**  
(Controls front panel mounted)  
12" green phosphor high resolution CRT monitor and front-panel front panel. 110V to 30Hz. 3dB Opt. volt. 1.25" x 3.5" x 10.5" 60Hz. 65VA max. Controls front panel. 500Mtr. Matra-Schiltz Alpha Series. Item #10043 \$29.95 New

**15" Monitor**  
15" screen. Same specs as above. Item #10044 \$34.95 New

**3 1/2", 10Mb HARD DISK DRIVE**  
(IBM® Compatible)



Fits standard 5 1/4" drive bay. Shock mounting. High speed. Impact proof. Mfr. Price \$179.00 New. Item #10151 \$179.00 New. Controller Card for drives. Item #9984 \$99.00

**12/24 VDC MUFFIN-TYPE FANS**  
55/60 CFM  
8 W. Can be mounted for blowing or exhaust. Aluminum housing, bearing, ball-bearing type.

**1" Thin:** 5 plastic blades with feathered edges.

**1 1/2" Standard:** 5 plastic blades. Mfr. Contarix #CDC24KA4 601 Item #8541 \$19.95 New

**1 1/2" Standard:** 5 plastic blades. Mfr. Contarix #CDC24KA4 601 Item #12109 \$14.95 RFE

**PC 8300 Accessories**  
**RAMPACK UPGRADES**  
16W  
Item #10337 \$9.95 New

**# 32K —** Item #12148 \$19.95 New

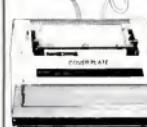
**COLOR PACK**  
Allows you to use your PC 8300 computer with a color TV or monitor. Plugs directly into back of computer and has connection for additional Rampack. Item #12147 \$19.95 New

**WATER/CHEMICAL PUMP**  
115VAC 60 Hz. 3 amps. Low head, max flow 50 ft. Pump is supplied w/ 1" HP motor. 115 x 1260V 50/60 Hz. Thermally protected. Max. head: 10' 6" dia. 5" x 5" x 6" H Mfr. SEI #12985 002 Item #9983 \$59.50 New

or 2 @ \$29.95 New  
Item #5327 \$39.95 New

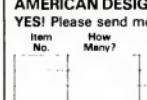
**PUMPS — COMPRESSORS — BLOWERS — MOTORS — POTENTIOMETERS — COUNTERS — TIMERS — RELAYS — VOLTAGE REGULATORS — POWER SUPPLIES**

**ADAM PRINTER**



Complete less top cover plate. Friction test. Takes standard paper 8" x 11". Controler returns, tested operational! Item #8839 \$69.50

**COLECOVISION TO ADAM EXPANSION KIT**



This expansion module just plugs into your ColecoVision. With printer power supply and data drive (both included). You will have a working Adam Computer + ColecoVision keyboard. Use Smart basic cassette and hook up diagram also included. Item #9918 \$59.50

**AMERICAN DESIGN COMPONENTS, 62 JOSEPH STREET, MOONACHIE, N.J. 07074**

**YES! Please send me the following items:**

Item No. How Many? Description Price Total

Total

Shipping & handling, we ship UPS unless otherwise specified. Add \$3 plus 10% total Canadian \$3 plus P.O. cost. Charge only

Sales Tax NJ residents only, please add 6% of total

ORDER TOTAL

**FREE 1987 CATALOG sent with every order.**

ORDER TOTAL

**5 1/4" FULL HT. DISK DRIVES**



**48 TPI (IBM® Compat.)**  
Double-sided double-density full height drive. 48 TPI. 80 tracks Mtr. Mfr. Price \$79.95  
2 for \$150.00

**96 TPI, DS/DQ Density**

Mfr. CDC #14097 Item #1893 \$99.00

**CORDLESS**



**TELEPHONE**  
700 ft. Range.  
Wall or Base Mount

Full duplex talk & listen simultaneously. Auto redial, last number recall. Comes with attachments for both types of phones. AC power.

Adaptor & battery indicator light.

Color brown w/ cream. Makes mfr. Item #8997 \$29.95 New

**NICKEL CADMIUM 'D' CELLS — Dual Pack**  
2.4 V.  
1.2 Ahr.



Pack of 2 size D cells, stacked & series connected. Covered, with welded tab terminals for connections (can easily be ganged into strips for carrying purposes). Rechargeable. 1.2 Ahr. 2.4 V. Overall dim.: 1 1/4" dia. x 1 1/4" L. Major mfr. Item #12142

(Pack of 2) \$15.95 RFE

5 packs — \$25.00 RFE

**AIR COMPRESSOR**



Produces up to 33 PSI. For air brush, paint spray gun, etc. & meat-trimming gun. 115VAC, 50-60 Hz. Capacitor-run motor. Dimen.: 4 1/4" dia. x 8 1/4" long. Mfr. Fasco 7082-0124

Item #64 \$29.95 RFE

**COMPUTER GRADE POWER SUPPLY**



Other uses — runs CB car radios. Comes ready to plug in.

**DC Output:**  
— 5V @ 5 amp.  
+ 5V @ 3 amp.

+ 12V @ 6 amp.  
Input 115V (60Hz). Dim.: 9 1/4" W x 3 1/4" H. Rubber feet. Item #19501 New

Item #19501 \$24.95 New

**HEAVY DUTY, PLATE MOUNT SWIVEL CASTER SETS**  
2 1/2" Dual Wheel

Heavy cap. easy swivel, lockable, made especially for business. Set includes 4 casters, 2 1/2" diameter, 2 1/2" plate mounts of 4 swivel casters. 125-140lb load capacity. 2 1/2" full bearing swivel. Plate dimen.: 3 1/4" x 4 1/4". 3 1/4" dia. x 3 1/8". Mfr. Bascom. Item #10540

Set of 4 \$19.95 New

**3" Set**  
Set of 4 casters, 2 w/ wing brace & 2 w/o, & end. mount. espec. for industrial use. 500lb capacity per caster, full bearing swivel. Plate dimen.: 3 1/4" x 4 1/4". 3 1/8" dia. x 3 1/8". Mfr. Bascom. Item #8229

Set of 4 \$24.95 New

**YES! Please send me the following items:**

Item No. How Many? Description Price Total

Total

Shipping & handling, we ship UPS unless otherwise specified. Add \$3 plus 10% total Canadian \$3 plus P.O. cost. Charge only

Sales Tax NJ residents only, please add 6% of total

ORDER TOTAL

**ALL INQUIRIES AND FREE CATALOG REQUESTS CALL 201-939-2710.**

**For all phone orders, call TOLL-FREE 800-524-0809.** In New Jersey, 201-939-2710.



8-POINT



12-POINT



4-POINT



6-POINT

4 Twelve-point sockets will fit hex and square nuts. However, they have a tendency to round off tight hexes.

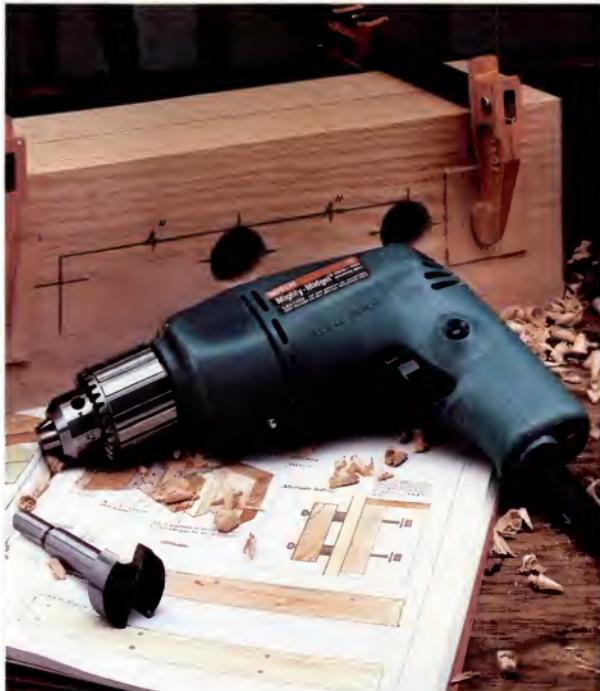
locking-plier, the most common type is sold under the Vise-Grip trademark. Among many other possible uses, this tool can be clamped tightly around a stripped bolt for removal or it can be used to hold parts in place for welding. Lineman's pliers with insulated handles are useful for various electrical-system chores. Water-pump pliers offer nearly parallel jaws and lots of leverage. A second pair of long-nose pliers can be sharpened for service on snap rings, or special snap-ring pliers are available as well. Small side-cutters can be of use when working with delicate components. Hose-clamp pliers are grooved to grab the spring-type hose clamps that are standard equipment on many cars. Wire strippers/terminal crimpers (not pictured) are very useful pliers with a row of split circles on the jaws for stripping wires of various gauges and a special crimping area behind the jaws for attaching solderless wire terminals. Tin snips, available for cutting left-hand curves, right-hand curves and straight cuts, are a necessity if you're going to do serious bodywork.

### Screwdrivers

For servicing today's cars, you'll need an assortment of flat-blade and Phillips screwdrivers in various sizes. You'll ruin a lot of screwheads if you use the wrong-size driver. In addition to various-sized tips, you'll need some variety in handle lengths. Cheap screwdrivers are not well suited to driving screws, so buy high-quality tools that will not distort the screwheads.

For most cars you'll also need a couple of Torx-style screwdrivers, distinguished by their 6-point drives. On some cars, you'll need this type of screwdriver to replace a headlight bulb or seatbelt housing.

Our favorite screwdriver is a high-quality, flexible-shaft ratchet job with interchangeable bits of tool steel. The extra bits fit in the handle, and are



## Take Our High-Performance Compact For A Spin.

It gives you everything a high-performance compact should: abundant power, smooth handling, superior maneuverability—you can even shift into reverse. And it's almost impossible to stall.

A Bosch Mighty-Midget® variable speed reversing drill is the one tool you need to take on every drilling job around your home.

Its unique permanent magnet motor puts out far more hole-drilling torque than the wound field coils of regular drills. More torque not only makes drilling easier for you, it requires less gearing-down. So all that power can come in a compact, light-weight, easy-to-handle package. And heavy-duty armature windings let you push your Mighty-Midget drill hard—without the worry of burning it out.

Of course, a  $\frac{3}{8}$ " or  $\frac{1}{2}$ " Mighty-Midget drill will do a lot more than drill holes for you. Add Bosch accessories to grind, sand, drive screws, strip paint, even wire-brush rust.

Get professional quality performance and the value of a Mighty-Midget drill, from Bosch. Ask for them where pro tools are sold—see the Yellow Pages under "Tools—Electric" for your nearest Bosch Power Tool Distributor. He can let you test-drive other Bosch Tools, too: sanders, routers, saws and lots more to complete your power tool line-up.



# BOSCH

*"Quality You Can Hold On To."*

©1987 Robert Bosch Power Tool Corporation

# MAKE YOUR CAR'S ENGINE WORK BETTER- LAST LONGER-WITH Tufoil<sup>®</sup>

SPECIAL:  
THREE  
FOR  
TWO  
OFFER

-you'll spend less to  
run the car you now own.

Here's How Patented Tufoil Technology, using  
PTFE increases engine life . . . does much more!

How? By dramatically reducing your engine's internal friction and operating temperature. Now you can get much longer life from your car's engine and save hundreds on gas. Many Tufoil customers are reporting astonishing performance results!

**JUST WHAT IS TUFOIL?  
AND HOW DOES IT WORK?**

TUFOIL is an exacting formula of synthetic and mineral oils—combined with friction modifiers and particles of PTFE—the slipperiest substance known to man. Commonly called Teflon or Fluon, its particles are so small they'll pass right through your oil filter—to form a protective coating over all your engine parts. TUFOIL will mix with, and improve the performance of any motor oil you are presently using, cutting friction to the lowest level of any known lubricant! The U.S. National Bureau of Standards tested TUFOIL on their 4-ball tester and found it has a surface friction of .029. The published value for Teflon is .04 so TUFOIL is testing slipperier than Teflon!

**Tufoil® technology works . . . here's more proof!**



Home Mechanix says, "One PTFE additive, TUFOIL, has undergone field tests and has scientific evidence backing its claims for easier cold weather starting and improved lubrication and fuel economy. Others do not."

Tufoil turns your motor oil into a super lubricant, protecting all internal engine parts.

## SPECIAL THREE FOR TWO OFFER

We wanted to say "Thank You" to our old TUFOIL customers. Here's the best way we know how.

Just check the box and mail in your order for 2 8 oz. bottles. We'll send you one free.

I'm an old TUFOIL customer and  
 love it! Please send one free  
bottle with my order for two.

FLUORICM INC. is reg. T.M. of ICI Americas Inc.  
TEFLON<sup>®</sup> is reg. T.M. of DuPont Corp.  
TUFOIL is reg. T.M. of Fluoramics  
U.S. Patent No. 4,224,173  
U.S. Patent No. 3,653,856  
Other U.S. Patents issued  
and pending

U.S. Patent No. 4,224,173  
U.S. Patent No. 3,653,856  
Other U.S. Patents issued  
and pending

© FLUORAMICS INC.



**HERE'S PROOF!**

. . . that Tufoil<sup>®</sup> is better than other lubricants . . . the list keeps growing.

1. Read test for the National Bureau of Standards data.
2. Six major oil companies have been awarded to Fluoramics for Tufoil<sup>®</sup>. Many are pending.
3. Independent laboratory tests throughout the country and throughout the world have proven Tufoil's claims of making your car's engine run better, smoother, cooler.
4. In California, government tests show a big improvement in low temperature starting for gas and diesel engines with Tufoil<sup>®</sup> (5% just save 10%).
5. In Australia, researchers at the University of New South Wales reported fuel savings of up to 7%.
6. In Great Britain, scientists at the Technical Research Institute found Tufoil<sup>®</sup> a reliable lubricant for protecting desert driving. Save fuel too!
7. In Texas, stationary engines used to pump natural gas are lasting more than twice as long and running cooler on hot sunny days when Tufoil<sup>®</sup> is used.
8. In New York State, the maintenance engineer at a major automobile manufacturer reports in-plant propane fueled lift trucks' engine is doubled when Tufoil<sup>®</sup> is used.
9. More and more police departments and racing drivers are switching to Tufoil<sup>®</sup> for better performance and fuel economy.
10. We've had many customers tell us Tufoil<sup>®</sup> gives astonishing improvements to their engines. Over the life of your car, this translates into thousands of dollars saved and tens of thousands of extra miles added.

Most engine wear and damage occurs during starting. This is where Tufoil makes a gigantic difference.

Driving causes only a small percentage of the wear on your car's engine; much occurs during starting—that crucial "oil-less" period before your oil has circulated sufficiently to work. With Tufoil, internal engine parts are protected even while the rest of your car's oil is still settled down in the sump.

Tufoil protects your engine best. It's the most sophisticated engine lubricant ever developed for your car.

You'll feel your car respond better, start quicker, accelerate faster, climb grades more easily, idle smoother . . . and you'll notice the results the first time you use it. Tufoil is the next best thing to engine insurance!

In any weather, throughout their entire performance range, engines with Tufoil run easier.

Tufoil's remarkable friction reducing formula will keep your engine temperature lower to prevent overheating.

**SEND FOR FREE BROCHURE — 30 ANSWERS TO TUFOIL QUESTIONS!**

**YES**

rush my Tufoil order:

- ONE 8 oz. bottle . . . treat one car for \$14.25 (plus \$3.50 shipping and handling). See money back guarantee.
- TWO 8 oz. bottles . . . treat two cars for \$25.00 (plus \$4.00 shipping and handling) **SAVE \$6.00**.

### Special Offer

After you've tested TUFOIL, and like it, buy a gallon of TUFOIL to share with your friends & save \$159<sup>®</sup>!!

ONE GALLON . . . treat 16 cars for \$125.00 (plus \$6.00 shipping and handling).

\*over the single bottle price



**Fluoramics, Inc.**

PMS7

My check or money order for \$\_\_\_\_\_ is enclosed.  
Charge my credit card:

Am.Express     MasterCard     Visa

Card No. \_\_\_\_\_

Exp. Date. \_\_\_\_\_

Signature \_\_\_\_\_

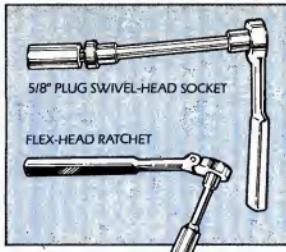
Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip. \_\_\_\_\_

N.J. residents please add 6½¢ sales tax. Orders in Canada. Send check or money order in U.S. currency. Add \$4 extra shipping charges.



**5 Swiveling wrenches with sparkplug sockets fit cramped engines.**

available in every size and style you might need. Angle screwdrivers, with a tip mounted perpendicular to the shaft, are useful for screws that can't be reached with anything else.

### Socket tools

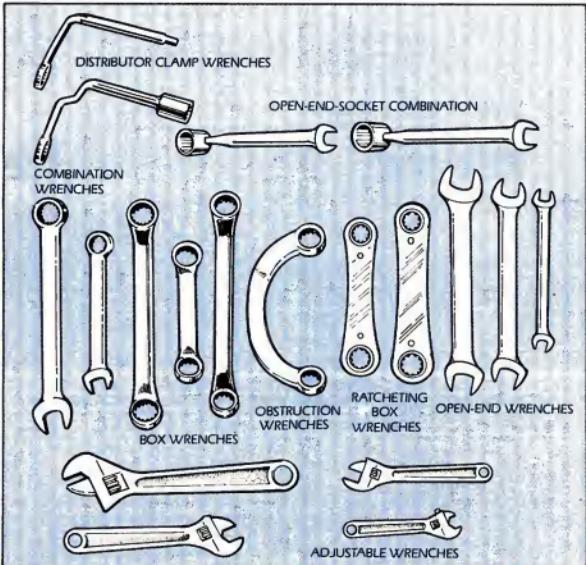
Square-drive tools are probably the most important for someone who intends to service automobiles. To begin, you'll need both  $\frac{3}{8}$ -in.-drive and  $\frac{1}{2}$ -in.-drive ratchets and breaker bars (Fig. 3), at least one short and one long extension for each drive and a complete set of standard sockets for each. If your car is fully metric, you may want to purchase just metric sockets at first. If your car includes both metric and inch

sizes, you'll need a set of each.

You'll need a sparkplug socket of either  $\frac{13}{16}$ -in. or  $\frac{5}{8}$ -in. size. Don't just use a deep socket for this purpose. Sparkplug sockets have a special rubber insert to hold the insulator, helping prevent breakage while giving you a means to lift the plug away from the engine without dropping it.

A torque wrench is also a necessity, as it should be used for everything from installing wheels to tightening cylinder head or manifold bolts. The most common and least expensive type has a pointer attached to the drive head that rests against a scale near the handle. More expensive types replace the scale and pointer with a dial. A style used by many mechanics has a rotating handle with a scale of torque figures on the tool. You dial-in the torque figure you want by turning the handle. Then, when you tighten the bolt, the wrench will click to signal you when you reach the specified figure.

Eventually, you'll want to add universal joints, which can be fitted at the end of an extension; speed handles; T-handles; additional extensions; and a  $\frac{1}{4}$ -in. ratchet, extension and screwdriver handle for smaller capscrews. Adapters that allow the use of  $\frac{3}{8}$ -in.-drive sockets on  $\frac{1}{2}$ -in.-drive ratchets (or various other combinations) can also be handy at times. You'll want to expand your socket set to include hex or Allen drive



**6 Use adjustable wrenches as a last resort—they're hard on both the bolt head and your knuckles. Use the box wrenches whenever you can for the same reason.**

## 30 Ways to Help You Qualify for the Job You Want

### Free Facts about Career Diplomas and Degrees

Now at home in your spare time, without any previous experience, you can train for a money-making career...even get a Specialized Associate Degree. Call or send for free information on the career field that interests you most and how to train for it.

**CALL TOLL FREE** **1-800-228-5300** Ext. PS57  
CALL ANYTIME—24 hours a day, 7 days a week  
No cost. No obligation. No salesman will visit.

—**OR MAIL COUPON TODAY**—  
**ICS** International Correspondence Schools  
SINCE 1891 Dept. PB57,

Send free facts on how I can study at home for the career I have chosen. No obligation. No salesman will call. **MAIL TODAY** CAREER IN SPECIALIZED TECHNOLOGY DEGREE PROGRAMS

- Business Management
- Accounting
- Business Management
- Business Management
- Business Management with option in Finance
- Computer Programming
- High School
- Catering/Gourmet Cooking
- Household Repair
- Auto Mechanics
- Bookkeeping
- Food/Restaurant Management
- Drafting
- Air Conditioning & Refrigeration
- Electronics
- Auto Body Repair
- Welding
- Diesel Mechanics
- Motorcycles
- Motorcycle Repair
- Surveying & Mapping
- V/VCR Repair
- Veterinary Assistant
- Travel Agent

**CAREER DIPLOMA PROGRAMS**  
These courses are offered by ICS and North American Correspondence Schools  
AGE \_\_\_\_\_

**ADDRESS**  
CITY/STATE/ZIP \_\_\_\_\_  
PHONE NO. ( ) \_\_\_\_\_



### PREVENTIVE MAINTENANCE

Every roof rises and falls with every gust of wind up to  $7/8$ ths of an inch cracking seals and caulking causing serious damage.

Just slip a lifetime Black Max vent shield over it and forget it. Available at substantial suppliers.

If no local supplier is available, mail order direct: 14.95 each.

- Endorsed by many Insurance Companies
- Guaranteed for 20 years

Also available with a SEARS installed roof within the Detroit Region in Michigan, N. Ohio and N. Indiana.

**Nevco Inc. (313) 399-7977**  
904 E. 11 Mile Rd., Royal Oak, MI 48067  
**HY-C Company, Inc. (314) 241-1214**  
2107 North 14th St., St. Louis, MO 63106



# THREE WIPING EDGES INSTEAD OF ONE!

2 Cleaning Edge  
3 Squeegee Edge



• The first edge removes the bulk of water or winter snow.

• The second edge removes bugs, road film, dirt.

• The third edge squeegees the glass completely clean.

## GUARANTEED FOR THE LIFE OF YOUR CAR.

**THE WORLD'S FIRST SYNTHETIC WIPER.** Triple-edge blades are made from DuPont Nordan—the same material used in 50,000 mile radial tires. Triple-edge wipers will never tear, crack, split, rot, dry out or stick. Not affected by ice, snow, blazing sun, smog or road chemicals.

**EASY, DO-IT-YOURSELF INSTALLATION.** Includes 2 complete units: High Quality Black Metal Superstructures complete with Triple-edge Lifetime Wipers. They snap on in seconds.

**CUSTOM FIT** for virtually every U.S. and import car, van or truck.

**CALL TOLL-FREE 1-800-847-0653**

PA residents please call 1-215-638-8008 or send check, money-order or card number and expiration date of your Visa or MasterCard. Credit card numbers handled with strict security.



**TRIPLEEDGE WIPER CORP.**, Dept. 9244 3165 Tucker Road, Bensalem, PA 19020

**YES!** Send me \_\_\_\_\_ pair of Triple-edge Lifetime Wipers—the only wiper GUARANTEED for the life of your car.

Name \_\_\_\_\_

Address \_\_\_\_\_

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

VISA/MC# \_\_\_\_\_

Car #1: Year \_\_\_\_\_ Make \_\_\_\_\_

Car #2: Year \_\_\_\_\_ Make \_\_\_\_\_

Car #3: Year \_\_\_\_\_ Make \_\_\_\_\_

Car #4: Year \_\_\_\_\_ Make \_\_\_\_\_

1 pr. \$12.95  
2 pr. \$23.90 Save \$2.00  
3 pr. \$34.85 Save \$4.00  
4 pr. \$45.80 Save \$6.00  
(Single Blades \$6.50 ea.)  
Shipping \$1.95 first pair  
(Shipping 2nd, 3rd, & 4th pair,  
only \$1.00 each)

Amt. Enclosed:  
Pa. Residents Add Sales Tax

Exp. Date \_\_\_\_\_

Model \_\_\_\_\_

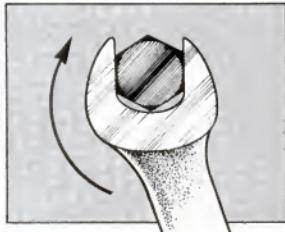
Model \_\_\_\_\_

Model \_\_\_\_\_

Model \_\_\_\_\_

sockets, sockets for large slotted screws, deep-well sockets, universal-joint "swivel" sockets, and  $\frac{1}{4}$ -in.-drive sockets, all in both inch and metric sizes.

You'll also want to supplement your standard 12-point sockets with some 8-, 6- and 4-point sockets (Fig. 4). Six-point sockets are needed when you have to loosen a bolt with rounded corners where the 12-point might slip. Our  $\frac{3}{8}$ -in.-drive deep-well sockets are of the 6-point type. Thick-wall 6-point sockets (usually black for identification) are available for use with impact wrenches. Eight- and 4-point sockets are for removal of square plugs. If you have the 8-pointers, you really don't need the fours.



7 Turn one flat, pull back, turn again, and you can really move!

If you can't reach the sparkplugs on your engine with a conventional plug socket, extension and ratchet, you may need either a swivel-head plug socket or a  $\frac{3}{8}$ -in.-drive ratchet with a jointed hand that can be rotated to a different angle in respect to its handle (Fig. 5).

## Wrenches

A basic set of combination wrenches—box at one end and open end on the other (Fig. 6)—will get you started in this department. Use a box wrench when you don't have clearance for a socket. Open-end wrenches are really only suited to running down a bolt or backing it out, as they slip quite easily, ruining both the bolt-head and your knuckles.

Fig. 7 shows how an open-end wrench should be used, handle angled away from the direction of rotation. Once the bolt is rotated, the wrench is slipped off, slid around in a counter-clockwise direction and reinserted. Once you've practiced this technique, an open-end can be used to turn a bolt very quickly. When loosening a fastener with a combination wrench, break it loose with the box end, then flip the wrench around and run out the bolt with the open end.

Once you have a basic wrench set, you'll want to expand with some other



Your guide to everything that's new in electronics, computers and technical education. Over 400 items. Discover fascinating kits to build, enjoy and learn with, as well as assembled high tech products for home, business and hobby.

## Get our famous High Tech Catalog

# FREE

**Heathkit®**  
Heath  
Company

A subsidiary of Zenith Electronics Corporation

Heath Company  
Dept. 017-534  
Benton Harbor, Michigan 49022

MAIL COUPON TODAY and receive the latest issue of the Heathkit Catalog free of charge

Name \_\_\_\_\_

Address \_\_\_\_\_

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

CL-783DR3 Zip \_\_\_\_\_

# PSSSSSST!!!

SEE The Most Affordable  
Helicopter in the World!  
ON VIDEO!!



Just imagine yourself in the cockpit of your own personal helicopter! A helicopter that you can actually **AFFORD** to OWN & FLY! The **Rotary Exec** is revolutionizing the design, incorporating state-of-the-art features found in helicopters costing 10 times as much, yet it sells for less than the cost of a new car! Call today for your free updated information packet or "THE EXEC EXPERIENCE" video tape. It's an action filled hour long production packed with information, education and entertainment and flight maneuvers along with a dynamic sound track!

In our beautifully illustrated information packet you'll find an exciting full color brochure, a step by step definition of the helicopter, a 3-page history, a great set of cut-out wall posters, pricing details and a special offer! At last...your own affordable helicopter!...order your Video Tape or Information Packet today!

Credit Card Customers—To Order Package—  
MAIL TO: THE ROTARY EXEC, INC.

U.S. (Alaska, Hawaii, and the Virgin Islands)  
1-800-345-9080, Operator 169 TELEX 683-5059  
Charge to MC, Visa, Am Ex, Exp. Date

# Send me the items checked below:  
"Video tape available overheat."

- |  |         |
|--|---------|
| <input type="checkbox"/> 1 HOUR VIDEO TAPE & INFORMATION PKG.                    |         |
| <input type="checkbox"/> Specify: VHS Beta                                       | \$59.95 |
| <input type="checkbox"/> Video Tape Only   | \$49.95 |
| <input type="checkbox"/> Information Package Only                                | \$12.00 |
| Arizona residents add 6 1/2% sales tax.<br>(Overseas orders add \$10.00 postage) |         |

NAME \_\_\_\_\_  
BUS. OCCUP. \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_  
**ROTOR WAY AIRCRAFT, INC.** 7PM5  
7411W Galveston, TX 75226

DATSON • SAAB • MERCEDES BENZ

## FACTORY REPLACEMENT TURBOCHARGERS



UP TO 55% BELOW FACTORY LIST  
(Exchange)

NEW OR REBUILT

### ALSO AVAILABLE: REPLACEMENT CARTRIDGES

Bearing Housing • Bearings  
Seals and Rotation Parts

REBUILD KITS  
Bearing • Seats • Gaskets

HOP UP KITS

Boost Regulator • Water Injection  
Boost Gauge

### INTERCOOLER KITS

Intercooler • Four Silicon Turbo Hoses

### DEALER INQUIRIES WELCOMED

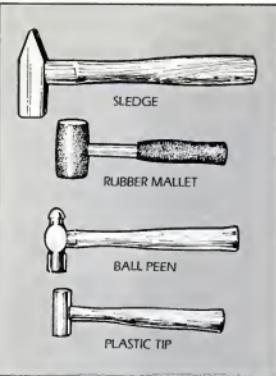
Not legal for sale or use on any pollution-controlled motor vehicle in California.  
CATALOG AVAILABLE, SEND \$3.00 TO:

### TURBO CITY INC.

1201 W. Katella Dept. PM  
P.O. Box 61010 • Orange, CA 92667

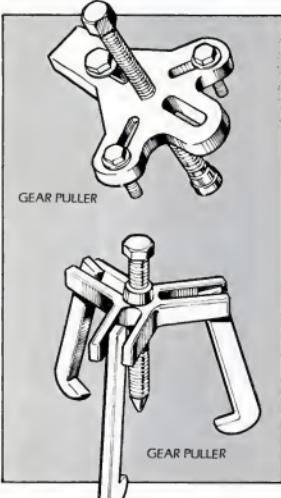
**(714) 639-4933**

DATSON • SAAB • MERCEDES BENZ • FORD • MERCURY • CHEVY • DATSON



• If you're looking for a claw hammer, it belongs in the woodshop, not the garage.

types. Those that have a box on both ends generally have a greater offset than the combos, making them useful for certain problem areas. Both box and open-end wrenches are available in a variety of lengths. You'll also find box wrenches shaped like a crescent for inaccessible bolts, box wrenches that ratchet, and sockets attached to a handle with an open-end opposite. We frequently use a very thin open-end "tapp-



• Don't even think of prying off a pulley or harmonic balancer with a screwdriver—use a puller. Nut splitter is great for exhaust nuts. Ball-joint tool is affectionately known as a "pickle fork."

pet" wrench for any double-nutted bolt or stud or in tight spots.

You'll also want tubing wrenches (not pictured) which are like a 6-point open-end with one side missing. Once slipped over a tube, the five remaining points of the wrench can loosen the soft nut on the end of the tube without rounding it off. Special L-shaped box wrenches that can be driven with a ratchet are available for loosening hard-to-reach distributor clamp bolts.

You might be better off without adjustable crescent wrenches, as these tools are most likely to round-off a hexhead. But it's good to have a couple of them around in different sizes for those times when you have to turn a simple-to-reach, not-very-tight bolt, the size of which you are not sure.

## Hammers

Hammers must be used with great restraint when working on a complicated machine like an automobile. But you will need one from time to time (Fig. 8). Begin with a ball-peen for tapping your drift or making a center-punch mark, and supplement it with a rubber mallet for banging things into position. Eventually, you'll want to add a brass hammer for driving lugs into hubs and similar tasks. A plastic-head hammer is useful for dislodging somewhat delicate parts. Finally, you'll want a good hand sledge to drive a large chisel into a large rusty nut.

You'll want to have some chisels, punches and drifts that you can hit with your hammers. If you work on cars regularly, you'll undoubtedly have to chisel off a rusted nut or bolt before long, probably on a shock absorber. Drifts are used for removing pins from shafts, studs or hubs. A center punch is necessary to provide a spot to start a drift bit in steel or aluminum.

You'll need only a couple of files at first. A small ignition-point file is good



# The PRO 520e

When the End of the Road is just the Beginning.



## High Performance Communications, The Pro Series by Uniden.

From the company that leads the world in radio communications technology comes the next logical step in the evolution of the CB radio, the Pro Series by Uniden.

The Uniden line of Citizens Band Radio Transceivers is the most extensive in the industry today. Melding today's lifestyle with the latest audio features, precise engineering and contemporary styling,

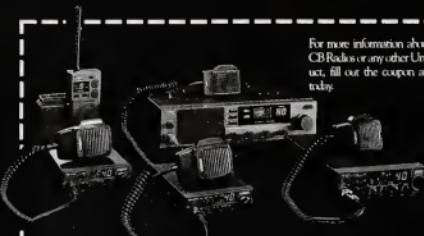
Styled to compliment other mobile audio equipment, the Pro series renders all other CB's obsolete. From the feature packed PRO 540e to the 310e handheld there is no better Citizens Band Radio on the market today.

Uniden Pro Series, a new generation of radio transceivers to ensure that when you're out, you're never out of touch.

For more information about Uniden CB Radios or any other Uniden product, fill out the coupon and mail it today.

Uniden Corp. of America  
Consumer Products Division  
6345 Castleway Ct.  
Indianapolis, IN 46250

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
 Scanners    CB Radios  
 Home Satellite Receivers    Radar Detectors  
 Telephones    Marine Electronics



The Chance of Professional  
Golfer Jack Nicklaus  
Winner of 20 Major Championships  
© 1987 Uniden Corporation of America



**uniden®**  
A New Generation of Communications

for cleaning up sparkplugs or even repairing the threads on a small screw. One medium-size flat file will also come in handy for smoothing rough edges or flattening slightly distorted surfaces. Later, you'll want to add a rattrail for smoothing out holes and a 3-sided file for getting into corners. A hacksaw and a couple of high-quality, fine-tooth blades will come in handy if you have to shorten a bolt or fabricate a bracket.

An assortment of tool-steel high-quality drill bits and a  $\frac{1}{2}$ -in. or  $\frac{3}{8}$ -in. chuck electric drill is also necessary.

#### Pullers and pluckers

Hub pullers, nut splitters, gear pullers, pickle forks and other devices of this ilk probably won't be purchased until you need them. Sooner or later you will undoubtedly want them, however.

A good 3-pronged gear puller (Fig. 9) can be used for removing a variety of hubs and gears. This tool is available in several sizes to suit various applications. A puller with slots through which bolts can be inserted is useful for removing any type of hub with threaded holes, such as a steering wheel hub or engine damper pulley. Various other pullers, including slide-hammer devices for removal of rear-drive axles, are also available. Some of them can be rented for one-time use.

A nut splitter is a good substitute for a chisel when you have to remove a rusted nut. A ball-joint spreader and rod-end separator, commonly known as pickle forks, are necessary for suspension-system work. The ball-joint spreader has the wider slot between its prongs.

#### Oil change and lube tools

An oil filter wrench is, of course, an absolute necessity for any driveway mechanic. Before you buy, make sure you get one that will work on your car, as there are numerous types available (Fig. 10).

Most of the long-handled metal-band jobs work great where there's room for them, but on most cars there isn't. The best of these are adjustable for different type filters.

A handy oil filter wrench is the type that has a sturdy nylon strap attached to a piece of square tubing with a  $\frac{1}{2}$ -in. hole down the center. The strap is placed over the filter and the tubing is rotated counterclockwise until the strap snugs up. Then a  $\frac{1}{2}$ -in. square drive extension and ratchet are used to continue rotating the tubing until the filter is loosened.

In addition to a filter wrench, you'll want an oil-can spout, if you can't get oil in plastic bottles with built-in spouts.

#### Precision tools

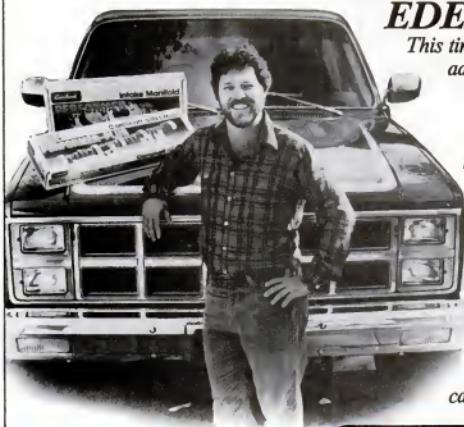
Every home mechanic should have at least a good pair of vernier calipers for determining the size of pins, bolts and other similar items as well as a set of feeler gauges and a wire gauge for checking sparkplugs. If you're going to rebuild engines, you'll need much more, including micrometers, snap gauges, a dial indicator and magnetic base, a depth micrometer, and—ideally—a dial-bore gauge. A good ring compressor will also be needed for engine work. The best type is a tapered sleeve for each bore size. If you plan on assembling cylinder heads, you'll need a valve-spring compressor.

The dial indicator and magnetic base are probably worth having even if you never touch the inside of an engine as it is useful for gauging a lot of different things, such as ball-joint wear and even wheel-bearing adjustment.

#### Other good stuff

Sooner or later you'll want to invest in a battery charger. A small, 10-amp job can bring a partially discharged battery to full charge in a few hours. You'll need at least a 6-amp model for decent performance. In addition, you'll need a battery post and terminal cleaning tool. You can use a knife for this job, but the special cleaning tool is inexpensive and

## "IF YOUR VEHICLE'S PERFORMANCE NEEDS A BOOST, I'D SUGGEST EDELBROCK."



*This time go a step beyond your usual tune up. Go after the added power and better mileage you've always wanted.*

*Go for an Edelbrock Performer intake manifold.*

*Swapping your stock manifold for an Edelbrock manifold is a simple bolt-on conversion. Performer manifolds are perfect for most kinds of daily driving, off-roading and towing. They're stock replacements that work in the street rpm range, off-idle to 5500 rpm, where your engine spends most of its time! I've been telling my customers about Edelbrock since I put one on my Suburban. The manifold gives my engine power to accelerate when it's towing. It climbs hills willingly now in 3rd gear with pedal to spare. I like the mileage it's getting too. I just added Edelbrock's dyno-matched Performer-Plus camshaft. Works even better! So this spring, step up to better performance with Edelbrock."*

All Edelbrock products are available by mail. Performer manifolds start at \$154.95 plus tax, shipping and handling.

**Edelbrock**

*Send \$2 for your catalog & price list to:  
Edelbrock Corp., 411 Coral Circle, Dept.  
PM587, El Segundo, CA 90245.*

# OVER 20,000 SOLD!

## New Stitch Welder Tames Sheetmetal Distortion



### *Our Customers Write:*

*"Before buying your Stitch Welder I was ready to throw my electric welder in the trash. No matter how hard I tried, the amps could not be set low enough to prevent burning holes in the sheetmetal. I now have a usable piece of equipment thanks to your Stitch Welder."*

*J. Wright, Penna.*



*Featured in  
Hot Rod,  
February, 1986*

### Simplifies Home Bodywork

With a little practice anyone can weld automotive sheetmetal with virtually no distortion or burn-through. The Stitch Welder makes it easy to run a continuous weld bead on quarter panels, body patches, floor boards, etc. If you've ever tried arc welding body panels you know the high amperage output plays havoc on thin gauge metal. Our new Stitch Welder controls amperage to produce professional, uniform welds similar to those made by expensive wire-fed MIG machines.

### Special Circuits Control

#### Arc Welding

By directing the arc welder's current through a copper wound solenoid and diode the Stitch Welder creates a unique pulsing action. This pulsed current produces an easy-to-control arc necessary for clean, uniform weld beads on sheetmetal. There are no buttons or triggers — the pulsing action is automatic! All you do is guide the electrode.

Welding with the Stitch Welder is faster and easier than conventional stick welding. The arc's self-starting, so there's less chance of rod sticking. Once you strike an arc lay the rod on the metal and let the machine do the work. After some practice you'll produce welds requiring little grinding or filling. Remember, as with any welding tool the Stitch Welder requires practice to produce good results. We've included complete detailed instructions.

### Attaches to Any A.C. Welder

The Stitch Welder's five-foot power cord attaches to the electrode holder on any A.C. arc welder (must run at 80 amps or less). Uses standard arc welding rods up to 3/32" and will weld down to 22 gauge steel and stainless. The tool body is cast aluminum with a vinyl insulated grip for positive control. Electrodes held with a set screw and can be easily replaced. Tool designed for years of trouble-free service. **ALWAYS USE PROPER SAFETY PRECAUTIONS WITH ANY WELDING EQUIPMENT.**

### 30 Day Shop Trial

Try the Stitch Welder for 30 days in your shop or garage. If you are not completely satisfied, simply return it for a full refund. Order your Stitch Welder now for a head start on body work projects. The Stitch Welder is only \$59.00 plus shipping. Available only through Eastwood.

**TO ORDER CALL TOLL FREE:  
1-800-345-1178**

For fastest service call toll-free 1-800-345-1178 (in PA, 215-644-4412) and charge your Stitch Welder to Visa, MasterCard, or C.O.D. (\$2.75 additional fee on C.O.D.) Mail orders use coupon.

© Copyright 1985 The Eastwood Group

# Eastwood

CODE: 1D37PM57

- Send me \_\_\_\_\_ #4369 Stitch Welders at \$59.00 plus \$4.95 shipping & handling
- #4372 Arc Welding Rods Designed for Sheetmetal. 2mm dia., special flux, 3 lb. pkg (approx. 120 rods) — \$9.95
- Send Free 80 Page Tool Catalog
- Check Enclosed       C.O.D. (\$2.75)
- VISA       MasterCard

Card # \_\_\_\_\_

Expiration Date \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

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

Px Residents, Add 6% Sales Tax

#### The Eastwood Company

147 Pennsylvania Avenue

Box 296

Malvern, PA 19355

does a better job. You'll need a timing light to perform tuneups. If you're willing to suffer, you can use the cheap kind that attaches only to the plug wire. A power timing light, which provides much more illumination and is immeasurably easier to use, costs about three times as much.

And you can't get by without a miniature analyzer, which includes a tachometer, ohmmeter, voltmeter, ammeter and dwell meter. Use it for tuneups, charging-system troubleshooting, general electrical-system troubleshooting, and a wide variety of other jobs.

A good set of taps and dies is expen-

sive but necessary when you have to straighten out the threads on a mangled bolt or clean the threads in a rusty cylinder block. Finally, don't forget to be nice to your tools. You don't have to get into public displays of affection, but you should wipe off the grease each time you use one. And you should have an organizational plan for keeping everything in its place, whether you have a 12-drawer top-and-bottom tool chest or a 2-drawer mini toolbox. Knowing where something is when you need it can cut your creeper time in half. It also makes it easier to tell when something is missing.

PM

## THE DEPENDABLES.

Sharp turns or gentle turns; big bumps or little bumps; you can depend on KYB Gas Shocks to take them all in stride... mile after mile after mile.

So join the demanding drivers in over 60 countries who depend on the quick response, exceptional control and world renowned quality of KYB Shock Absorbers.

You'll drive with more confidence! You'll find driving is more fun!

Just choose the shock that's right for you:

- **KYB Gas-a-just**—the high-pressure gas shocks for unsurpassed road control, or
- **KYB/GR-2**—the low-pressure gas shocks for riding comfort you can feel at a price you won't... even in a compact or mid-size car.

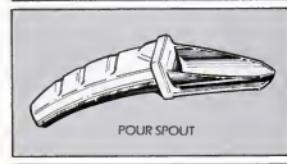
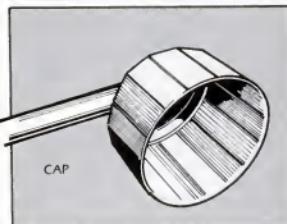
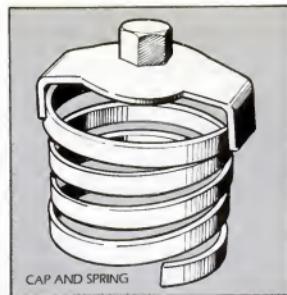


ASK  
FOR THE  
DEPENDABLES  
—FROM

**KYB**

KYB CORPORATION  
OF AMERICA  
901 Oak Creek Drive.  
Lombard, IL 60148

PIONEERS IN  
GAS SHOCK TECHNOLOGY.



10 Get the filter wrench that fits your car.  
Pour spout is optional nowadays.



# Save Gas, Save Engine with "POLY"

The following introduces one of the most fully tested and proven gas saving, friction-reducing engine treatments ever to reach the market!

## The Secret is "Poly"

"Poly" is short for polytetrafluoroethylene (TFE), the slipperiest substance known to man. (1981 Guinness Book of World Records). Petrotron Corporation, makers of Slick 50, invented a way to permanently bind this slippery chemical to your engine with one treatment. Just one quart of Slick 50 can reduce engine friction, increase gas mileage and horsepower and reduce engine operating temperature, causing your oil and engine to last longer . . . plus it reduces metal wear, defraying costly overhauls.

## Years of Testing and Use Have Proved It True!

Slick 50 has been thoroughly tested in independent laboratories and out on the road:

The March/April 1982, p. 35 issue of "Consumer Digest" magazine stated, "Slick 50 does reduce engine heat and ordinary wear, and our informal tests indicate that it will improve gas mileage by about 2 or 3 miles per gallon."

One of the country's most respected research institutes reported applying a powerful ultrasonic cleaning process to a Slick 50 treated engine and were surprised at its permanence. "We actually expected the Petrotron Slick 50 TFE Resin coating to also be removed, but later found it was still there!"

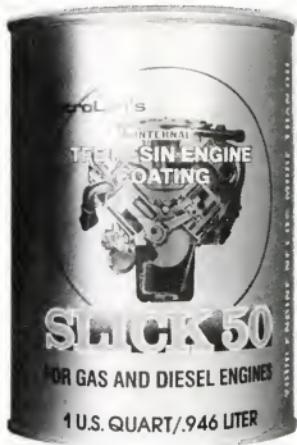
"Dune Buggies & Hot VWs" magazine April 1983 issue records the results of their one year testing of Slick 50. "We can indeed say scientifically that Slick 50 does work, and that it does reduce engine wear! . . . for the price of one treatment when compared to engine rebuild, we feel that you'd be money ahead using Slick 50."

The Federal Aviation Administration has fully accepted a similar product for aircraft—Slick 50 Aircraft Piston Engine Treatment (F.A.R. #33.49). This FAA endurance test simulated 1400 hours of engine use.

The power technology laboratory at a leading southwestern university stated, "Slick 50 does increase horsepower and decreases fuel consumption in tests done at the university."

The Space Shuttle Columbia uses the chemical "poly" in its gears and bearings because it is the only chemical lubricant which can withstand the heat and corrosive elements of space.

Perhaps most dramatic of all is a torture test overseen by the Automotive Services Council for Pennsylvania and shown on WTVE television. Three cars with 75,000 to 129,000 miles on them were treated with Slick 50. Six months later the oil was drained from each vehicle, and the cars driven without the oil plugs for about a half hour. The water temperature never rose and the engines sustained no apparent damage.



There isn't room here to tell you about the dozens of other tests proving that Slick 50 is everything we say. However, if you're still skeptical, send \$2.00 to cover printing and postage costs, and we'll send you detailed test results plus actual letters from users who report how Slick 50 saved their engines and saved them money!

## It's Easy to Treat Your Engine

A few minutes before oil and filter change, add the engine flush you get free with each order to clean out the engine. Let the engine idle for 5 minutes. Then drain the oil, change the filter and add the proper amount of oil, less one quart. Add one quart of Slick 50, drive for 30 minutes, and leave it in the crankcase for at least 3,000 miles. As the engine operates, the oil carries the "poly" between the parts where it is burnished into the pores of the metal.

## Only One Treatment Necessary

It's permanent, so you do it only once, not each time you change oil. One quart of Slick 50 will treat all standard 4, 6 and 8-cylinder gasoline and diesel engines.

## Works with Most Oils

Slick 50 will work with all petroleum-based oils and all synthetics compatible with petroleum-based oils with the exception of graphite oils. However, once an engine is treated, you can go back to a graphite type if desired.

## 4 Ways Slick 50 Saves You Money

Your actual percentages may vary depending on your driving, vehicle condition, weather and geographic location, but no matter what your conditions, Slick 50 can:

- Increase mileage
- Increase horsepower (small economy cars and large RV's really need this)

3. Reduce operating temperatures, thus increasing the lubrication and life of the oil and engine

4. Minimize or eliminate costly overhauls by reducing engine wear

Up to 90% of the engine wear on a car can be caused by lubrication starvation cars experience when first started before the oil begins to circulate. Slick 50 can eliminate this problem for less than the cost of two tanks of gas.

## Slick 50 Will Not Affect Your Warranty

Slick 50 is suspended in an excellent grade of petroleum oil which meets or exceeds every manufacturer's engine warranty requirements. In addition, this oil carries an American Petroleum Institute service classification SF-CC-CD.

## There's No Risk with Our Money Back Guarantee

Use Slick 50 for 3000 miles. If you don't notice an improvement in engine performance, return your invoice with a short note telling why, for a prompt full refund — no questions asked.

## Profit from Selling Slick 50 Yourself

Here's an opportunity to make handsome profits. Having such solid test results from major institutions make Slick 50 easier to sell than many other products. Free dealership information is sent upon request.

For purchase or further information call toll-free 1-800-525-8624, ext. 5 (in California 1-800-233-9559) or send to: Progressive Energy Corporation, 255 South Bent Avenue, #B-1, Dept. PM587, San Marcos, California 92069.

Yes, I want to improve my car's performance and save my engine — rush me risk free

One Slick 50 at \$39.95 + \$4.00 shipping and handling. Calif. Residents add 6% Sales Tax.

Give me free shipping and handling for my order of 2 or more at \$39.95 each.

Check     C.O.D.     Visa/MasterCard

Card # \_\_\_\_\_

Exp. Date \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_  
(Give street address if possible for UPS delivery)

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



Progressive Energy Corporation

255 South Bent Avenue, #B-1, Dept. PM587  
San Marcos, California 92069

CALL NOW! TOLL FREE 1-800-525-8624.

IN CALIFORNIA TOLL FREE 1-800-233-9559.

\*1987 Progressive Energy Corp.

# CAR CARE GUIDE

## WHAT'S NEW?

Clever new products make it easier and faster to tune up your whole car.

### Stick 'em up, partner

Tired of losing sockets and all those itty-bitty parts that always roll off the air cleaner when you're working under the hood? Or grabbing for a wrench you left on top of the battery, only to realize that it shorted the battery and is now really hot? Try the \$12 Tool Partner. Its two magnets won't mar the hood, and the tray keeps those elusive parts from disappearing. Your wrenches stay nice and cool, and easy to reach, too. It's not recommended for use with running engines, but then, the air cleaner won't work as a tray when the engine is running, either. Contact SM Products, 7928 Bacadi Dr., San Diego, CA 92126; 619-586-0016.



### Huff, puff

Those little 12-volt air pumps are neat, but rigging out the cable from the cigarette-lighter plug is a pain, especially if you want to fill the wheelbarrow tires when the wheelbarrow is flat down in the garden. Air Shot has its own internal battery, inflates a car tire in about four minutes, can be used as a 12-volt power pack and recharges from your cigarette lighter or 110-volt outlet. You can also use the Air Shot to inflate bicycle tires, basketballs, soccer balls and other kid stuff. In fact, you may have a hard time wresting it away from the kids to adjust your air shocks. Keep it in the garage or carry it in the car. About the size of a lunchbox, Air Shot weighs 7½ pounds. It's \$89.95 from Airshot Inc., 4530 South Berkeley Lake Rd., Norcross, GA 30071; 404-263-8346.

### Good day, sunshine

You say the burglar alarm in your motorhome keeps the battery discharged? And when you carry the cabin cruiser battery home in the trunk for charging, it leaks acid all over your golf clubs? Not to mention the ignominy of having to start your airplane by yelling "Contact!" and spinning the prop yourself? Atlantic Solar Power's G-33 Solar Charger can provide a maintenance charge to any 12-volt battery. Just set the \$50 unit on the dashboard in the sun, and plug it into the lighter socket. If your lighter doesn't work when the key is off, you'll have to make a minor wiring change. It's sure simpler than jumpstarting, and much better for your battery, too. Stores easily in the glovebox. Atlantic Solar Power, Dept. PM, 6455 Washington Blvd., Baltimore, MD 21227; 301-796-8094.

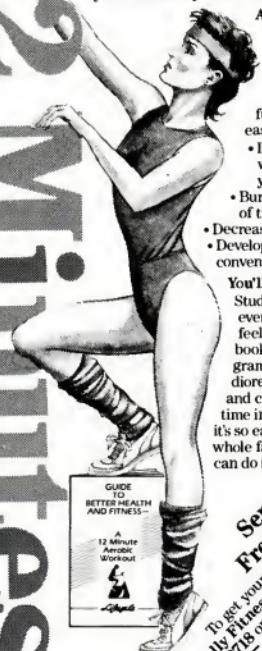




# 12 Minutes

## Free Facts That Can Cut Your Exercise Time In Half

Find out how you can exercise your entire cardiorespiratory system with the **GUIDE TO BETTER HEALTH AND FITNESS** —A 12 Minute Aerobic Workout from Lifecycle.\* This booklet is yours absolutely FREE when you mail in the coupon below.



**Send for the Free Facts Today**

To get your Free Booklet, 960 Jeronimo Road, Irvine, CA 92718 or call toll-free 1-800-LifCYCL Dept. 7E089

**Lifecycles** Send for your **FREE Booklet Today!**

Please send me my FREE copy of the **GUIDE TO BETTER HEALTH AND FITNESS**. A 12 Minute Aerobic Workout by Lifecycle.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Telephone ( ) \_\_\_\_\_ 7E089

### A Challenging Workout in Only 12 Minutes

You can get an extensive cardiorespiratory workout for a longer, healthier life just by doing a special 12 minute routine a few days a week. This 16 page, fully-illustrated booklet tells about an easy, proven method that can help you:

- Improve your cardiorespiratory system without causing severe stress or strain to your heart
- Burn off calories in a minimum amount of time
- Decrease your permanent body fat
- Develop a trim, fit body from the privacy and convenience of your own home.

### You'll Look and Feel Better

Studies show aerobic fitness helps alleviate everyday stress. It also helps you look and feel really good. Now, through this special booklet you'll learn all about a workout program that will significantly improve your cardiorespiratory system and cut your exercise time in half! And it's so easy, your whole family can do it.

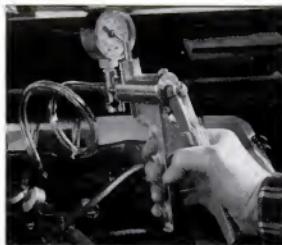
## Gets you home



Late at night, in the rain, and after you've removed three belts to get to the broken one, you discover that the spare belt you kept in the trunk is the wrong size. But Victor's Emergency Fan Belt (\$5.99) can be installed with the tools included in the kit without removing any other belts, and one size fits all. For temporary use only. It's made by Victor Automotive for auto parts stores.

### Handy little devil

Mityvac is a mighty handy little source of vacuum or pressure for any kind of diagnosis on vacuum switches, ignition advance curves, pollution devices and vacuum a/c controls. Models cost \$27.95 to \$59.95. Neward Enterprises Inc., 9251 Archibald Ave., Cucamonga, CA 91730; 800-MITYVAC.



### Ultimate self-serve

Mityvac's Liquid Transfer Accessory Kit (\$7.95) will easily transfer liquids from a tank to another vehicle or can with just a few strokes on the pump. Mityvac pump is also great for testing any vacuum system. From Neward Enterprises Inc., 9251 Archibald Ave., Cucamonga, CA 91730; 800-MITYVAC.



## What Is He Doing?

Hes making a concrete flower pot... and so can YOU!



Only \$700

**CONCRETE MACHINERY CO., INC.**

P.O. Box A-99 Hickory, NC 28603

PICNIC PATIO



TABLE PLAN

Imagine if you will, this exclusive piece of art made of 2x4's! A functional picnic table. Everyone seated is in visual and voice contact. Octagon seats 6 adults. Lazy Susan, umbrella holder. 7'1" across. Fully illustrated for cutting, assembling plus a material list. Patented. \$1000 check or money order USA \$5. Money Back Guarantee.

**THOM'S, INC. Dept. 8**  
2012 Wilkins • Laurel, Montana 59044



### Tough breaks

Maybe we're getting older, but even we don't appreciate wrestling with lug nuts tightened by an impact wrench. Lug-Breaker uses your weight to break them loose, and even the lightweight of the house can use it easily. It's \$15.95 postpaid. Jetty Industries, 1006 Jetty Blvd., Box 272, Hamburg, NY 14075.



### Rust never sleeps

Some cars don't justify rechroming the chrome parts that 'ol Mr. Rust has eaten. Instead of painting them to match the body and then convincing the neighbors that you've got an AMG Volkswagen, try some Instant Chrome, which almost looks like the real thing when it dries. It's made by Dupli-Color and sells for \$5.16.



### Hot stuff!

Yup, that's right, we're showing a silicone gasket sealer being used on a header pipe. Permatex (division of Loctite Corp., Cleveland, OH) says its new Ultra Copper is suitable for really high-temp uses. It's available in can, tube or power cartridge (from \$5.81) at local auto parts stores.

# THE ORIGINAL POLYMER SEALANT!

Still Available ONLY Through Car Dealers @ \$250...  
OR DIRECT BY MAIL @ \$11.95!

The First and Finest Polymer Car Care Product Offered To The Public, 5 years ago. Then and now it has been used by new car dealers for their professional \$250 polymer applications THE EXACT SAME PRODUCT they use in their showrooms and service shops today is STILL AVAILABLE to you directly for \$11.95 (16 oz. bottle; enough for 2-3 cars) by calling the number below or writing.

**Not Carried In Stores.** Thousands of customers have asked us WHY this outstanding product is not available in stores? Despite the fact hundreds of thousands of bottles have been sold through ads and mailings by oil companies to their credit card holders, and customers keep coming back for more, the retail stores refuse to be impressed. They've seriously told us our product quality is too good...that we should put our money into slick, expensive display boxes and TV advertising, rather than worry about what goes

inside our bottle. Frankly, we don't know how to deal with retail stores very well. But we DO know how to make the best car-care product you or your car dealer can buy...and we guarantee you'll agree, or we'll refund your money upon receipt of your returned bottle (at least half full).

**Starshine's Original Polymer Sealant Is Not A Wax, Nor Is It A Weak Polymer Imitation.** It is a genuine PROFESSIONAL Auto Finish Sealant. It actually bonds to your car's finish for months, protecting it from fading, chalking, dulling. On a car where some oxidation already exists, this product will bring it up and out, for easy removal.

**Absolutely No Rubbing or Buffing Needed.** No hard "work" is required to apply Starshine's Polymer Sealant. Simply wipe it on, wait 25 minutes, and wipe it off. After you experience how easy and completely effective this product is to use, YOU'LL NEVER USE WAX AGAIN!

DETACH COUPON AND MAIL WITH ORDER

### SHOP FASTER BY PHONE 1-805-966-7187

Or send a check or credit card to: Diner's Club, VISA, MasterCard, American Express, for one Polymer Sealant, #100 @ \$11.95 (plus \$2.00 shipping) ea. SAVE \$4.00—Order 2 or more bottles @ \$9.95 (plus \$1.00 shipping) ea. SAVE EVEN MORE: BUY BY THE CASE—12 bottle case #134 @ \$99.95 (plus

\$12.00 shipping per case). ALSO AVAILABLE: STARSHINE POLYWASH #132. Glass Cleaner/Detergent that rejuvenates your Polymer Sealant finish, \$6.95 for a 16 oz. bottle, (plus \$2.00 shipping) ea.

**STARSHINE GROUP**

802 ANACAPA STREET, DEPT. P5407  
SANTA BARBARA, CALIFORNIA 93101  
Celebrating our 10th Year as  
America's Premium Direct Mail House

### Avoid costly C.V. repairs with do-it-yourself boot kit!

If you own a front wheel drive car or light truck, you can save from \$100 to \$600 in repairs by checking the CV boots -- and replacing them yourself!

**Check those boots regularly!** According to *Popular Mechanics*, fwd axle boots should be inspected periodically for cracks, tears, loose clamps or other damage. Even minor cracks and tears can lead to loss of lubricant or entry of dirt and water into sophisticated CV joint, causing rapid failure -- and professional repair bills of more than \$600!

**Revolutionary new breakthrough in C.V. boot repair** makes outer boot replacement as easy as changing your oil and takes about the same amount of time. No disassembly or special tools required!

**Cosmos Quick Boot Kit** comes complete with 2 boots, packing grease, sealant, boot bands and easy-to-follow instructions. If joint grease has been exposed to water or dirt, a thorough flushing with

specially formulated C.V. Joint Cleaner may be necessary. Check your boots -- and order today.



Only \$49.95  
plus shipping  
and handling

To order: Return completed form below with payment to STI Products, 6603 Queen Ave. So., Suite 1, Minneapolis, MN 55423. Or call 612-887-0900 (credit card orders only).

**STI Products**

6603 Queen Ave. So., Suite 1,  
Minneapolis, MN 55423

Send the Quick Boot Kit indicated below at \$49.95 each plus \$2.50 each for shipping and handling.

Make \_\_\_\_\_ Model \_\_\_\_\_ Year \_\_\_\_\_

For Chryslers Only:  A  B  C

Also send \_\_\_\_\_ C.V. Joint Cleaner at \$4.95 each. (Minnesota residents add 6% sales tax. Credit card orders shipped within 72 hours. Sorry, no C.O.D. orders.)

My check or money order is enclosed.

Charge to my  Mastercard  VISA

Acct. No. \_\_\_\_\_ Exp. \_\_\_\_\_

Signature \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

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

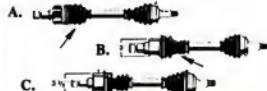
Phone ( ) \_\_\_\_\_

PMI

### SELECTION GUIDE

**Boot Kits available for** • MOST imported and domestic front wheel drive cars • GM (thru 1984) • Ford (thru 1986 except 5 spd and turbo) • Chrysler (thru 1986).

**Important Note For Chrysler Owners** -- Look under your car to determine if the inside boot (arrow) looks like Diagram A, B or C.



## DAILY DRIVERS

(Continued from page 74)

pack in every handling test, no doubt due to its Bridgestone SF-402 all-season tires, which allow lots of understeer and don't stick very well. Conversely, it has an excellent ride on both smooth and rough surfaces.

We like the Stanza's driving position. Everything adjusts, and the seats are especially comfortable. The controls are well thought out, and the conveniently mounted overdrive switch was singled out for praise.

There's nothing very exciting about the Stanza, but there's nothing wrong with it, either. It's just a bit dull compared to the competition.

### Subaru RX Turbo

We had trouble coming to grips with this Subaru. Some testers ranked it as high as fifth, others had it last. The problem is that the RX is equipped like a sports sedan with new-for-'87 full-time 4wd, overhead cams, turbocharger, 5-speed, power mirrors and door locks, full instrumentation, etc. At \$14,500, it also has a price to match.

But the car simply doesn't work like a sports sedan. The RX feels like an optioned-up economy car that's rough and noisy. The interior is cramped and uncomfortable, the engine is whiny, the shifter is balky, and the Bridgestone RE86 Pontezas are not enough to straighten out this car's steering and handling woes.

Our testers called the interior "vacuum-formed plastic" and the exterior

"tepid." The turbocharger and 4-wheel drive teamed up to deliver a mediocre 16 mpg over the road. Other track test numbers are middle of the pack.

Subaru buyers are among the most loyal on the road. All we can figure is that they're sold on the advantages of 4wd, and oblivious to the car's other deficiencies. Our test RX seemed well-built and sturdy, but its semi-agricultural ambience turned off our testers.

### Dodge Shadow Turbo

The Dodge Shadow and its sibling Plymouth Sundance are brand-new cars for 1987, and two of the new family sedans that inspired us to assemble this road test in the first place. We got the hottest version, with 2.2-liter turbo, Goodyear Eagle VR50 205/50VR-15 tires and all Chrysler's go-fast goodies. The Shadow was fourth fastest in the quarter-mile, fastest in the slalom, and right near the top on the skidpad.

Unfortunately, it lost points for old-time, 15-mpg fuel economy, weak brakes, a tiny trunk and cramped interior. That's how it ended up next to last in our track testing. For less than \$12,000, the Shadow is something of a bargain hot-rod, but our test procedure rightly rewards the all-arounder rather than the one-dimensional specialist.

Our testers criticized the "too-close" seat/wheel, and cited "lots of gaps" fit and finish. Handling limits are high, but a lot of effort is required to get there. Turbo lag and torque steer are intimidating, while the steering is abrupt and darty. Not the best combination for everyday driving.

### Pontiac Grand Am SE

Since this car was fitted with every high-performance option from Eagle GT tires and 3-liter V6 to rocker panel moldings and driving lights, we expected it to be even better than our relatively plain Corsica. Imagine our disappointment when this Grand Am was a full second and 4 mph slower in the quarter-mile, more than 1 mpg thirstier, and significantly slower in the slalom. Only on the skidpad, where its sticky tires pulled it into first, was the Grand Am better than the Chevy. The 165-hp 2-liter turbo engine from the Sunbird should soon be available to boost its performance—and price.

Driving the Grand Am is not a lot of fun. Our group criticized the high-effort, low-feel steering, numb brakes and harsh suspension. Pontiac engineers obviously wanted to build a high-performance sports sedan, but the go-fast gizmos keep tripping over each other to produce a car that's slower and less fun than many less radical sedans.

Everyone had harsh things to say about the Grand Am's ergonomics. As one tester complained, "The interior is almost willfully bizarre: window switches on the console, radio equalizer switch on the driver's door, upside-down mirror adjusting switch, minuscule gauges, power-seat switch that fouls the door handle, steering wheel angled to the left, and so on."

Summed up one disgruntled tester, "This car has lots of electronic gimmicks, at the expense of solid chassis and drivetrain engineering. At \$15,000? They must be kidding." ■

## TEST RESULTS

	GAS MILEAGE (EPA city/ PM test)	1/4-MILE (sec. @ mph)	BRAKING (ft.) (60-0 mph)	SLALOM <sup>1</sup> (mph)	SKIDPAD <sup>2</sup> (c/w/cw)	TRUNK SPACE <sup>3</sup>	INTERIOR SPACE INDEX <sup>4</sup>	TEST TRACK RANKING <sup>5</sup>	ROAD TEST RANKING <sup>6</sup>	OVERALL RATING <sup>7</sup>
<b>Acura Integra LS</b>	29/25.25	16,500 @ 82.11	135	60.67	.79/.83	10	131.30	4	4	4
<b>Chevrolet Corsica</b>	19/18.48	16,406 @ 83.02	131	60.14	.75/.78	14	135.62	6	6	6
<b>Dodge Shadow Turbo</b>	23/15.24	16,621 @ 81.74	136	62.23	.79/.81	13	131.30	10	9	9
<b>Honda Accord LXI</b>	27/22.87	16,755 @ 82.11	137	59.34	.73/.75	16	132.51	2	2	2
<b>Mazda 626 GT Turbo</b>	22/21.83	16,032 @ 86.28	120	60.97	.77/.77	17	134.66	1	1	1
<b>Nissan Stanza GXE</b>	26/21.54	18,671 @ 71.94	130	57.40	.77/.78	17	127.90	8	7	7
<b>Pontiac Grand Am SE</b>	19/17.12	17,389 @ 79.01	128	59.71	.83/.87	15	127.54	9	10	10
<b>Subaru RX Turbo</b>	24/16.28	16,841 @ 79.50	127	60.94	.73/.79	18	137.79	7	8	8
<b>Toyota Camry LE</b>	29/23.07	17,803 @ 77.51	141	56.60	.75/.78	19	137.72	3	3	3
<b>Volkswagen Jetta GLI</b>	27/22.24	17,002 @ 80.21	126	58.48	.79/.82	17	131.65	5	5	5

1. Best speed while weaving through seven cones placed 100 ft. apart; the higher the speed, the better the transient handling.

2. G-forces generated during steady-state cornering around a 200-ft.-dia. circle; cw = clockwise, ccw = counterclockwise.

3. The number of standard-size 7" x 12" x 17" grocery bags that will stand upright (1-in. crush space permitted) in trunk with rear seatbacks up.

4. Front-seat width x headroom + rear-seat width x headroom x legroom + 1000.

5. Points are awarded from best (1) to worst (12) in each category. Fewest total points ranks first, and so on.

6. Subjective ranking on the road by a team of testers; cars are graded by "feel," independent of test track results.

7. Average of Test Track and Road Test ratings. Road Test score breaks ties. Bold numbers show best performance.

# Vision Break-through

*When I put on the pair of glasses what I saw I could not believe. Nor will you.*

By Joseph Sugarman

I am about to tell you a true story. If you believe me, you will be well rewarded. If you don't believe me, I will make it worth your while to change your mind. Let me explain.

Len is a friend of mine who has an eye for good products. One day he called excited about a pair of sunglasses he owned. "It's so incredible," he said, "when you first look through a pair, you won't believe it."

"What will I see?" I asked. "What could be so incredible?"

Len continued, "When you put on these glasses, your vision improves. Objects appear sharper, more defined. Everything takes on an enhanced 3-D effect. And it's not my imagination. I just want you to see for yourself."

## COULDN'T BELIEVE EYES

When I received the sunglasses and put them on I couldn't believe my eyes. I kept taking them off and putting them on to see if indeed what I was seeing was indeed actually sharper or if my imagination was playing tricks on me. But my vision improved. It was obvious. I kept putting on my cherished \$100 pair of sunglasses and comparing them. They didn't compare. I was very impressed. Everything appeared sharper, more defined and indeed had a greater three dimensional look to it. But what did this product do that made my vision so much better? I found out.

The sunglasses (called BluBlockers) filter out the ultraviolet and blue spectrum light waves from the sun. You've often heard the color blue used for expressions of bad moods such as "blue Monday" or "I have the blues." Apparently, the color blue, for centuries, has been considered a rather depressing color.

For eyesight, blue is not a good color too. There are several reasons. First, the blue rays have one of the shortest wavelengths in the visible spectrum (red is the longest). As a result, the color blue will focus slightly in front of the retina which is the "focusing screen" onto which light waves fall in your eye. By eliminating the blue from the sunglasses through a special filtration process, and only letting those rays through that indeed focus clearly on the retina, objects appear to be sharper and clearer.

The second reason is even more im-

pressive. It is harmful to have ultra-violet rays fall on our eyes. Recognized as bad for skin, UV light is worse for eyes and is believed to play a role in many of today's eye diseases. In addition, people with contact lenses are at greater risk because contacts tend to magnify the light thus increasing the sun's harmful effects.

## SUNGLASS DANGER

Finally, by eliminating the blue and UV light during the day, your night vision improves. The purple pigment in your eye, called Rhodopsin, is affected by blue light and the eyes take hours to recover from the damage.

But what really surprised me was the danger in other conventional sunglasses. Our pupils close in bright light to limit the light entering the eye and open wider at night—just like the aperture in an automatic camera. So when we put on sunglasses, although we reduce the amount of light that enters our eyes, our pupils open wider and we are allowing more of the blue and ultraviolet light into our eyes.

## DON'T BE CONFUSED

There are a few companies making similar claims as BluBlocker with some models selling for over \$100 but without the same blocking ability. Be careful. Each pair of BluBlockers is guaranteed to perform exactly as described and uses the latest in optical science. I'm often asked by people who read this, "Do those Blu-Blockers really work?" They really do and please let me prove it.

BluBlocker sunglasses use the CR-39 lens which most eye doctors will tell you is one of the finest materials you can use for glasses and each lens comes with an anti-scratch coating.

The black light-weight frame is one of the most comfortable I have ever worn. The nose rest will fit any nose. The hinge causes the frame to rest comfortably on your face and can be adjusted for almost any size face.

We also have a clip-on pair that fits



They look like sunglasses.

over your regular glasses and weighs less than one ounce and a plastic model that costs only \$39.95. All models include a padded carrying case.

I urge you to order a pair and experience your improved vision. Then take your old sunglasses and compare them to the BluBlocker sunglasses. See how much clearer and sharper objects appear with the BluBlocker pair. And see if your night vision doesn't improve as a direct result. If you don't see a dramatic difference in your vision—one so noticeable that you can tell immediately, then send them back anytime within 30 days and I will send you a prompt and courteous refund.

## DRAMATIC DIFFERENCE

But from what I've personally witnessed, once you use a pair, there will be no way you'll want to return it.

Astronomers from famous universities wear BluBlocker sunglasses to protect their night vision. Pilots, golfers, skiers, athletes—anyone who spends time outdoors will find BluBlocker sunglasses indispensable.

Our eyes are very important to us. Protect them and at the same time improve your vision with the most incredible breakthrough in sunglasses since they were first introduced. Order a pair or two at no obligation, today.

To order, credit card holders call toll free and ask for product by number shown below or send a check plus \$3 for postage and handling.

BluBlocker Deluxe (0029KB) . . . . .	\$69.95
Clip-On Model (0028KB) . . . . .	29.95
Plastic Model (0031KB) . . . . .	39.95

# JS&A

One JS&A Plaza, Northbrook, IL 60062  
**CALL TOLL FREE 800 228-5000**

IL residents add 7% sales tax. ©JS&A Group, Inc., 1987

## WOODWORKING MACHINES

### 5 in 1 Combination

WITH ELECTRIC MOTOR WHICH  
DEVELOPS 3 HP.

- 34" LATHE
- 10" TABLE SAW
- 11½" DISC SANDER
- 16½" VERTICAL DRILL PRESS
- HORIZONTAL DRILL PRESS

NEW MODEL  
CENTURY XXI



#### VERY IMPORTANT

The only machine built with:  
 A. ALL CAST IRON TABLES  
 B. INDUSTRY DESIGN  
 C. DEVELOPS 3 HP MOTOR  
 D. BUILT AS AN INDUSTRIAL MACHINE

ONE PLACE FOR ALL YOUR NEEDS...

Toll Free 1-800-421-2467

IN CALIFORNIA CALL COLLECT (213) 549-0761  
 VISA    MASTERCARD    MONEY ORDER

### MASTER WOODCRAFT MACHINE CO.

DEPT. PM, P.O. BOX 669  
HARBOR CITY, CA 90710

(A Republic-Lagun Group)

## Got a Minit? Make a Button!

with Badge-A-Minit

In just a "minit" you can enter the fast and easy, fun and profitable world of button-making with Badge-A-Minit.

These 2½" plastic coated buttons are fun to make, fun to wear and easy to sell at flea markets, fairs, conventions or sporting events. Supply buttons for community events, businesses or churches.

For \$26.95 you get a hand held press, a set of 5 assembly rings and enough designs and metal parts to make 10 buttons. To order additional button parts see the catalog included with every order.

Order today or send for a FREE catalog and idea book. GUARANTEED.

\$26.95

Badge-A-Minit, Dept. PM-587, 348 North 30th Rd.,  
Box 800, LaSalle, IL 61301, Phone 815-224-2090

Send me the Basic Equipment Starter Kit for only \$26.95 plus  
4.75 shipping (IL residents add \$1.68 tax)

Visa    MasterCard

Card No. \_\_\_\_\_

Exp. Date \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

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

Phone ( ) \_\_\_\_\_

I am not ordering now, but please send me a FREE catalog

## CAR TUNES

(Continued from page 83)

the other pair is installed in the rear deck. A 25-watt amplifier resides in each speaker enclosure, which is larger than the speaker/amp modules in the Chrysler LeBaron. Its total power is 100 watts.

The Delco cassette/receiver offers many of the same features as its competitors, including AM stereo, auto reverse, radio seek/scan, automatic music search for tape, five AM and five FM presets, Dolby-B and DNR noise reduction. Uniquely though, Dolby is engaged automatically once a cassette is inserted into the system. The Dolby circuitry cannot be defeated.

Delco's cassette/receiver had the best organized control layout of the three systems under review. Tape controls are grouped together, and the same is true for the radio section. Push-buttons were conveniently large, and their red backlighting made the controls easy to find at night. A small negative, however, was the inability to defeat the clock and display the radio frequency full-time—which is desirable since the Bonneville already sports a clock in the dashboard.

Absent by design is a left/right balance control (present in the Ford and Chrysler systems). Bose claims its system is equalized to the car to a degree which makes left/right balance control unnecessary—and our audition confirms that claim. The system maintains a good stereo image even with the front/rear balance controls set at extreme positions.

This particular sound system, at high volume, was flawed by a persistent clicking akin to the sound of a movie-film projector. The noise, audible even over the music when the volume's cranked to 75 percent or more, is caused by a new electronic ignition module built into the Bonneville. This module emits radio frequency interference that the Delco/Bose system picks up and amplifies. GM says it will correct this as a "running change" in the production line. If you bought one of the first Bonnevilles off the line, and encounter this noise problem, see your dealer about corrective service.

Overall cost for the Delco/Bose system in the Bonneville is \$1500. Normally, the cost of a Delco/Bose system in other GM cars is \$905. In the Bonneville, though, the system includes auxiliary radio controls mounted in the steering wheel, a leather steering wheel cover and a power antenna, bringing the total to \$1300. Add another \$200 to cover the cost of the standard equipment to be replaced if you exercise the Delco/Bose option.

## Conclusion

Compared to aftermarket systems installed by independent car stereo retailers, the Chrysler, Ford and GM packages should have the advantage of being physically, cosmetically and acoustically tailored to the interior of a specific car. This advantage is evident in the generally good sound of each system, but the physical and cosmetic aspects are not exploited so well.

Chrysler does the best job of integrating the sound system to the passenger compartment. In fact, Infinity's assignment was to design a system that would fit into Chrysler's existing speaker cavities—to be heard but not seen. The Ford and GM speaker systems have an "added-on" look—more so in GM's case where the large Bose speaker/amp modules protrude from the Bonneville's front doors (Bose says its new "wafer" speakers will streamline future installations.)

Though all three Motown systems boast Dolby-B circuitry for tape noise reduction, they lack the superior Dolby-C system. This feature is common in aftermarket gear in the same price range—and it is built into just about every home cassette deck sold today. Though Dolby-B is adequate for store-bought prerecorded tapes, the C-type circuitry gives home recordists a sonic edge—especially when taping digital compact discs.

The lack of Dolby-C illustrates a key point about factory sound systems: You don't get to choose the features you want, the way you could from among the wide assortment of aftermarket gear. Furthermore, our experience with the Pontiac's noise problem and the Continental's door speaker indicates that during the break-in period, you ought to check out the sound system as carefully as any other function of the automobile.

In our final analysis, based on sound quality and operating convenience alone, the Ford/JBL system gives the best value of the three. This praise is given grudgingly, since you can't buy it in a Taurus, T-Bird, Aerostar van or Escort. Though available in several GM cars, the equally impressive Delco-Bose is much higher priced.

Our dark-horse candidate is the Chrysler/Infinity system, soon to be an option in more cars. With a little more power (to prevent distortion at high volume) and a tape-search function, it could surpass its competitors. Just keep in mind that the three systems represent Detroit's initial attempts to overcome the problems of music reproduction in a car. These first efforts merit praise and augur improvements that should eliminate our criticisms over time.

# Capture your own street legal **BIG BEAR**



## Enter the **\$50,000 BIG BEAR SWEEPSTAKES!**

Win a street legal Big Bear, just like those monster trucks you've seen on TV! The Big Bear is a custom 1986 Nissan high-lift 4x4 pickup truck on monster wheels with A/C, AM/FM stereo, and deluxe cab. Worth over \$20,000 if you could buy it off the lot, the Big Bear is the **grand prize** in our super Big Bear Sweepstakes with prizes valued at over \$50,000!

No purchase is necessary... just pick up an entry form at your local hobby store or send us the completed coupon at right, and we'll send you an entry form with all the rules and details about the Big Bear Sweepstakes. If you **purchase a Big Bear model by phone or by coupon before January 29, 1988, we'll automatically enter you in the sweepstakes.**

Prize winners will choose from wooden ship models, car kits and collectibles, radio control kits, airplanes, tools for modelers, and much, much more because prizes are gift certificates you can use for **any item Model Expo sells!** Prizes may be redeemed at cooperating hobby stores or directly from Model Expo.

### 25 First Prizes

\$300 Gift Certificate

### 100 Third Prizes

\$75 Gift Certificate

### 50 Second Prizes

\$150 Gift Certificate

### 750 Fourth Prizes

\$10 Gift Certificate

**Remember! Entry forms are available only  
by mail or from your local hobby dealer!**

**Big Bear** is just one of Model Expo's RC champions! For a full color catalog packed with fast-action RC cars and boats, send \$1.00 with your coupon.



**model expo, inc.** 23 Just Road, Fairfield, NJ 07007

**VISIT OUR STORES**

New Jersey  
25 Just Road  
Fairfield 07007

California  
2758 W. Sepulveda Blvd.  
Torrance 90505

Illinois  
344 Ridge Road  
Wilmette 60091

## Build your own **BIG BEAR!**

Two-foot drops are nothing to this monster model... you can plow through mud, charge over breathtaking inclines, and pound obstacles underfoot as you take on the exciting world of off-road RC racing! This 1/12 scale RC model from Tokyo Marui has a pneumo-hydraulic system on a 12" steel base to guarantee traction at action speeds of 15 mph or more. Powered by a Mauch "Black" RS-480 engine and 7-gear differential, Big Bear muscles through the terrain on heavy-duty rear spring suspension and independent front springs. A steel coil spring front bumper handles all those unavoidable collisions.

Yes, the Big Bear model is a tough customer, but it's easy to build in about eight hours with the super clear instructions with exploded diagrams. A \$99.95 value, you can bring home the Big Bear for only **\$69.98**

Save over \$50.00 on our Sweepstakes Intro Special! It includes the Big Bear Kit plus everything you need to get rolling: 2-channel radio control unit, rechargeable NiCad battery pack, and universal quick charger for NiCAD batteries. The complete Sweepstakes Intro Package is a \$169.99 value... now only **\$118.88**

Use the coupon below to order your Big Bear Kit and accessory package, or call anytime from the US and Canada, toll free:

**1-800-228-5588**

(Orders only are processed at this number)



**Model Expo, Inc., 23 Just Road, Fairfield, NJ 07007 Dept. PM-57**

I can't wait to get rolling! Please send me the following items:

- Big Bear Kit only (#M159RC4) \$69.88 ea.  Full-Color Catalog, \$1.00 ea.  
 Sweepstakes Intro Special (Big Bear Kit PLUS radio, battery pack, and charger)  Free Sweepstakes Entry Form  
(#M444) \$118.88 ea.  only

Please add \$7.50 shipping and handling. NJ, CA, and IL residents must add appropriate sales tax.

- Enclosed is my check or money order for \$ \_\_\_\_\_  
 Charge my credit card:  Mastercard  Visa  American Express

Account No. \_\_\_\_\_ Exp. Date \_\_\_\_\_

Signature \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

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

No purchase necessary to enter sweepstakes. Void where prohibited. Sweepstakes ends January 29, 1988. Requests for sweepstakes entry forms must be received by December 15, 1987.

If not completely satisfied, return your purchase in its original condition within 30 days for a full refund.



## Geodesic Home Kits.

### Beautiful, Efficient, Affordable.

Monterey Domes sells home kits for less than many new home down payments. Completely affordable...remarkably beautiful...our homes are designed for a lifetime of savings.

The most energy efficient homes on earth...up to 50% more than everyday homes. In addition, construction costs are dramatically using our patented building system...our 1813 sq. ft. house package is just \$15,660!

Discover Monterey Domes living with our 100 page Color Catalog and Plans Book. ORDER TODAY for just \$7.00. Unconditionally Guaranteed or your Money Back!

- Please rush my 100 page copy of Monterey Domes Catalog and Plans Book. Enclosed is \$7.00.
- Also please send me the Monterey Dome Basic Dome Assembly Manual for an additional \$5.00.
- Order by Credit Card. Call 800-634-2255 (In Calif. 800-847-4663)

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City/State/Zip \_\_\_\_\_

Send to: MONTEREY DOMES  
Dept. AQ-3  
1760 Chicago Ave.  
Riverside, Calif. 92517



- 2 Screwwell Handles &  
One Concrete Screw-Vibe® \$375
- 2 Stubby Handles &  
One Concrete Screw-Vibe® \$330

**NOBENDO TOOL CO.**

P.O. Box 789 • Citrus Heights, CA 95611  
BROCHURE AVAIL. (916) 969-1933

## INSTANT COLOR

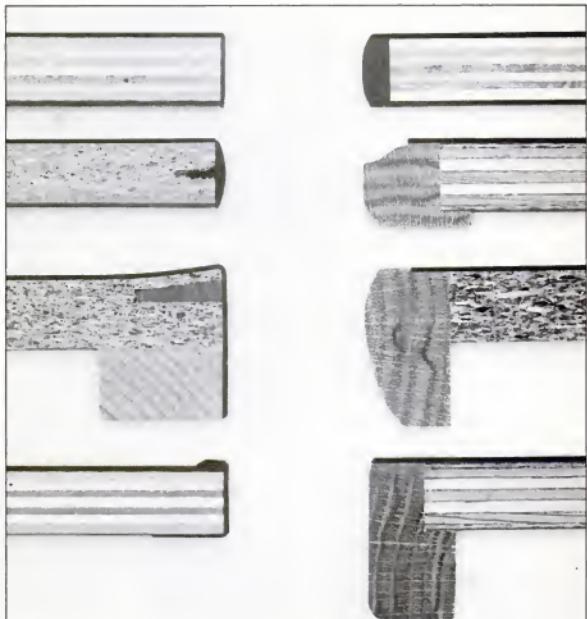
(Continued from page 100)

edge. Sand the laminate's face with 80-grit sandpaper to promote good adhesion to the edge band. Next, apply a contrasting color edge band and top-surface laminate. Then, rout the edge with a 45° chamfering bit to expose the pin-stripe accent. Note that colorless contact cement, made specifically for solid-color laminates, should be used

## LAMINATE SOURCE LIST

- Formica, 155 Route 46 West, Wayne, NJ 07470
- Laminate Council of America\*, Box 725, Mahwah, NJ 07430
- Micarta Division, Westinghouse Electric, Hampton, SC 29924
- Nevamar, 8339 Telegraph Rd., Odenton, MD 21113
- Pionite/DuraBeauty, Sterling Engineered Products, 1715 Indian Wood Circle, Maumee, OH 43537
- Wilsonart, 600 General Bruce Dr., Temple, TX 76501

\*An association that represents several laminate manufacturers.



Various edge treatments (left): plastic laminate; plastic T-molding; wood wedge for a drip-free edge; snap-on metal molding. Wood edges (right): round edge with flush laminate; routed ogee lip; clamshell with laminate set back; wood rail with flush laminate.



Here's an easy way to get the wood edge flush with the laminate. Place the laminate upside-down and plane the wood flush.



Try this setup to cut matched laminate edges for a perfect butt joint. Guide router, fitted with a straight bit, along a straightedge.



Here are two attractive, easy-to-make edges: pin-stripe (top) of solid-color laminates, and chamfered hardwood edge.



Cutaway view reveals their construction. After applying the laminates, cut chamfer with router fitted with a 45° chamfering bit.



Upper piece is covered with standard laminate; bottom piece features solid-color laminate. Note the absence of dark edge lines.

for invisible glue joints. Easy-to-install plastic T-molding snaps into a  $\frac{1}{16}$ -in.-wide kerf cut in the core's edge. T-molding is sold in hardware stores and through mail-order hardware firms. One such firm is the Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374.

## 1/2 Million Bics Sold Daily



Not affiliated with Bic Corp

### NEW! Bic Lighter Vending Machines!

Let America's 50,000,000 smokers line your pockets with money.

**GROUND FLOOR OPPORTUNITY**  
to be the first in your area to own  
and operate a vending route.  
Placed next to all cigarette machines.

#### PART OR FULL TIME

- ★ ALL CASH BUSINESS
- ★ NO SELLING
- ★ NO EXPERIENCE NECESSARY
- ★ INVESTMENT SECURED BY EQUIPMENT
- ★ NATIONAL ADVERTISING
- ★ FINANCING AVAILABLE O.A.C.

#### LIMITED WORLDWIDE DISTRIBUTORSHIPS

Call 24 hours for free brochure

**1-800-722-4773**

In California call (714) 894-1889

Vendgood Manufacturing Corp., Dept. PM5  
5011 Argosy, #5 • Huntington Beach, CA 92649



Send for the free Log Home Lovers Design Booklet or order our new color Plan Book of 100 beautiful models, \$6.95 (\$8.95 first class mail). MasterCard or Visa accepted.

Call toll free 1-800-558-5812  
In Wisconsin 1-800-242-1021



Dept. PRM-57 P.O. Box 707, Elkhart Lake, WI 53020

### CABLE T.V. CONVERTERS

WHY PAY A HIGH MONTHLY FEE? All Jerryold, Oak, Hamlin, Zenith, Scientific Atlanta, Magnavox and all specialized cable equipment available for shipment with 24 hours. For fast service MC/VISA or C.O.D. telephone orders accepted (312) 658-5320 60 Day Warranty (Quantity Discounts) 9 A.M. to 6 P.M. Monday through Friday Central Time. Stamp Envelope (60¢ postage) for FREE Catalog.

Midwest Electronics Inc.  
5143 W. Diversey • Chicago, IL 60639  
No Illinois Orders Accepted

\*\*\*\*\* PRESENTING \*\*\*\*\*  
**CABLE TV EQUIPMENT**  
\*\*\*\*\* STARRING \*\*\*\*\*  
**JERROLD, HAMLIN, OAK**  
AND OTHER FAMOUS MANUFACTURERS

• FINESI WARRANTY PROGRAM AVAILABLE  
• LOWEST RETAIL/WHOLESALE PRICES IN U.S.  
• ORDERS SHIPPED FROM CHICAGO WITHIN 24 HOURS  
FOR FREE CATALOG ONLY 1-800-345-8927  
FOR ALL INFORMATION 1-818-716-5914

**PACIFIC CABLE CO., INC.**  
7325 RESEDA BLVD. DEPT. 1700  
RESEDA, CA 91335

**VISA**

BUY ONE AND WE'LL MAKE YOU AN EXCLUSIVE DEALER\*

**max** 6 wheel drive **ATV**

Amphibious  
2 and 4  
passenger  
models



\*if the territory suits us.

Call Toll-Free **1-800-255-2511**

NY and Alaska 716-855-2226 Collect

Canada Toll-Free 1-800-338-0012

Recreatives Industries, Inc.

60 Depot Street, Buffalo, NY 14206

# Bad News For Escort

**Dear Customer,**

From Drew Kaplan

Escort has ignored DAK's second, one-on-one Maxon versus Escort radar challenge. And frankly, I'm fighting mad. I suppose they have a right to ignore me. But after referring to my challenge as only an "advertising gambit" and calling Maxon's radar detector an off-shore, primitive, and bottom-end unit, I'd think they'd be glad to wipe us out in a head to head duel to the death. But, I'm really mad for two other reasons and I think that you may be as fascinated by them as I am.

**Mad Reason 1.** Road and Track Magazine held an independent general radar detector test in their September '86 issue.

As far as I can see, Maxon beat Passport in Uninterrupted Alert, and Passport beat Maxon in Initial alert. Now to be fair, neither of us seem to have beaten the other by even 2 seconds at 55 miles per hour. So, we didn't win or lose by much.

And, Maxon's \$99<sup>99</sup> detector was tested against the \$295 Passport, not the \$245 Escort we challenged. What's interesting is that Road and Track had nice things to say about Passport and even about Escort, which wasn't even included in the tests any more.

Now, if you've been following DAK's challenge, you know we've only been challenging Escort. If you've read Road and Track's tests, you'll be amazed when you read Boardroom Reports, which I've reprinted for you to the right. What's really interesting is that it's the exact same person in both publications.

Actually, Maxon did extremely well. Road and Track only used 'over hill' and 'around curve' tests because on straightaways the differences weren't worth describing. (Imagine that!)

It's just as I've said in my challenge. I don't think there's much difference between Maxon's and Cincinnati's Radar detectors when it comes to sensing radar.

## THE CHALLENGE GROWS

In view of the opinions stated in the article in Boardroom Reports about the \$245 Escort, DAK hereby adds the \$295 Passport to our challenge.

**Mad Reason 2.** Did you ever hear about the cure for dandruff that was developed in the middle-ages? It was the guillotine. And frankly, I think you should be aware of Cincinnati Micro-

wave's advertising cure for the Rashid VRSS Collision Avoidance System.

The Rashid VRSS system, as described in Popular Science magazine, January 1986, sends out a radar signal on the K band ahead of your car. The good part is that it can help you avoid running into things higher than your front bumper. The bad news is that since it operates on K band, it sets off radar detectors.

Well, hats off to Cincinnati Microwave. I've tested the Passport against the Rashid unit and, as usual, they have done a splendid job. While every other detector I tested, including Maxon's, was driven crazy, theirs didn't utter a peep.

But then, my Maxon hasn't uttered any peeps lately either and let me tell you why. I was on my way to the Far East to visit Maxon, so I asked Tom, a manager at DAK, to purchase and test the Rashid. Well, did I ever hear from him. First the unit cost \$558 plus about \$100 to install. Then buying it and finding someone to install it took almost a month.

But the real reason he was unhappy was that the recommended method of installation involved cutting a 6½" hole in the front grill of his neat new car.

Well, much to my wife's chagrin, it's now installed in her station wagon.

After installation, it has to be set by an installer. He drives between 15 and 30 miles per hour toward a solid object. When the installer thinks he's reached a safe stopping distance, he adjusts the warning alarms to sound. Then in the future, when a similar distance is reached, lights will flash and an alarm will sound.

Of course, if you accelerate too quickly into a lane behind another car the same alarms can go off.

And, I haven't figured out what to do if

there's a dog in the road, dirt on the radar sensor, or how to compensate for the different stopping distances encountered on dry, wet, icy or snowy roads.

## MOST IMPORTANT PART

Speaking of advertising gambits, in virtually every magazine I pick up, I've been seeing Cincinnati's Bad News for Radar Detector ads spelling out the obsolescence of all other detectors.

If it's such an important feature that distinguishes them from us, there had better be some of these devices on the road, or Cincinnati Microwave's credibility may just be on the road as well.

I will add \$10,000 to my Escort/Passport challenge if Cincinnati Microwave can prove that there are even 1000 Rashid units on the road anywhere in the U.S. Oh heck, I'll add \$5000 if they can even find 500. (And, look at this.)

**NOTE:** There are several other potential collision avoidance systems on the drawing boards and each may have a DIFFERENT FINGERPRINT.

So, if you're a current Escort or Passport owner, I suggest that you find out how many Rashid units there are and what Cincinnati Microwave will do about the 'other' units before you pay \$\$\$ to have your current detector upgraded.

Besides, with over 3,000,000 square miles in the U.S., even 1,000 units would work out to less than one unit for every 3,000 square miles.

If a major car company successfully sells a collision avoidance system, then Maxon will be ready. But, the car companies currently can't even get consumers to pay \$200 for air bags. So, you decide, is it significant, or an advertising gambit?

Below is the NEW version of the challenge. Escort, a reply please!

## A \$20,000 Challenge To Escort

*Let's cut through the Radar Detector Glut. We challenge Escort & Passport to a one on one Distance and Falsing 'duel to the death' on the highway of their choice. If they win, the \$20,000 check pictured below is theirs.*

By Drew Kaplan

We've put up our \$20,000. We challenge Escort to take on Maxon's new Dual Superheterodyne RD-1 \$99<sup>99</sup> radar detector on the road of their choice in a one on one conflict.

Even Escort says that everyone compares themselves to Escort, and they're right. They were the first in 1978 to use superheterodyne circuits and they've got a virtual stranglehold on the magazine test reports.

But, the real question today is: 1) How many feet of sensing difference, if any, is there between this top of the line Maxon Detector and Escort's or Passport's? And 2) Which unit is more accurate at interpreting real radar versus false signals?

So Escort, you pick the road (continental U.S. please). You pick the equipment to create the false signals. (Don't forget our \$10,000 Rashid challenge). And finally, you pick the radar gun.

Maxon and DAK will come to your . . . Next Page Please



...Challenge Continued  
highway with engineers and equipment  
to verify the results.

And oh yes, we'll have the \$20,000  
check (pictured) to hand over if you beat  
us by more than 10 feet in either X or K  
band detection with the Escort, or by 2  
seconds at 55mph with the Passport.

#### BOB SAYS MAXON IS BETTER

Here's how it started. Maxon is a mam-  
moth electronics prime manufacturer.  
They actually make all types of sophis-  
ticated electronic products for some of  
the biggest U.S. Electronics Companies.  
(No, they don't make Escort's).

Bob Thetford, the president of Maxon  
Systems Inc., and a friend of mine, was  
explaining their new RD-1 anti-falsing  
Dual Superheterodyne Radar detector to  
me. I said "You know Bob, I think  
Escort really has the market locked up."  
He said, "Our new design can beat theirs".

So, since I've never been one to be in  
second place, I said, "Would you bet  
\$20,000 that you can beat Escort?" And,  
as they say, the rest is history.

By the way, Bob is about 6'9" tall, so if  
we can't beat Escort, we can sure scare  
the you know what out of them. But, Bob  
and his engineers are deadly serious  
about this 'duel'. And you can bet that  
our \$20,000 is serious.

We ask only the following. 1) The public  
be invited to watch. 2) Maxon's Engineers  
as well as Escort's check the radar  
gun and monitor the test and the results.

3) The same car be used in both tests.  
4) We'd like an answer from Escort no  
later than July 31, 1987 and 60 days  
notice of the time and place of the con-  
flict. 5) If Escort can prove that there are  
1,000, or even 500 Rashid units in opera-  
tion, we will present them with the ap-  
propriate \$10,000 or \$5,000 check at  
the beginning of the conflict. And, 6)  
We'd like them to come with a \$20,000  
check made out to DAK if we win.

#### HOW'S THIS FOR FAIR

Cincinnati Microwave will be deemed  
the winner and given the check if either

Escort beats Maxon by 10 feet in both  
uninterrupted and initial alerts, OR if  
Passport beats Maxon by 2 seconds at  
55mph in both uninterrupted and initial  
alerts. So, DAK wins only if we beat both  
Escort and Passport.

A tie will exist only if both the \$295  
Passport and \$245 Escort fail to beat  
Maxon's \$990 Dual Superheterodyne  
RD-1 Radar Detector.

#### SO, WHAT'S

#### DUAL SUPERHETERODYNE?

Ok, so far we've set up the conflict.  
Now let me tell you about the new dual  
superheterodyne technology that lets  
Maxon leap ahead of the pack.

It's a technology that tests each sus-  
pected radar signal 4 separate times  
before it notifies you, and yet it explodes  
into action in just 1/4 of one second.

Just imagine the sophistication of a  
device that can test a signal 4 times in  
less than 1/4 of one second. Maxon's  
technology is mind boggling.

But, using it isn't. This long range de-  
tector has all the bells and whistles. It  
has separate audible sounds for X and K  
radar signals because you've only got  
about 1/3 the time to react with K band.

There's a 10 step LED Bar Graph Meter  
to accurately show the radar signal's  
strength. And, you won't have to look at  
a needle in a meter. You can see the Bar  
Graph Meter with your peripheral vision  
and keep your eyes on the road and put  
your foot on the brake.



So, just turn on the Power/Volume  
knob, clip it to your visor or put it on your  
dash. Then plug in its cigarette lighter  
cord and you're protected.

**Radar detectors**

Today's best radar detectors aren't  
much bigger than a deck of cards. They weigh less than eight  
ounces, and cost less than \$200. Yet to beat them, you need a  
unit about the size of a briefcase.

DAK's RD-1 Radar Detector is  
different from other radar detectors in  
that it uses a dual superheterodyne system.  
This allows for greater resolution and  
more precise detection of radar signals.  
The RD-1 also features a unique  
feature called 'anti-falsing', which reduces  
false alarms and improves overall performance.

John Sommers, Road & Risk magazine:

"I'm not sure if the DAK is the best radar detector on the market, but it is certainly one of the best. I would recommend it to anyone who needs a reliable radar detector."

And you'll have a very high level of  
protection. Maxon's Dual Conversion  
Scanning Superheterodyne circuitry  
combined with its ridge guide wideband  
horn internal antenna, really ferrets out  
radar signals.

By the way, Escort, we'll be happy to  
have our test around a bend in the road  
or over a hill. Maxon's detector really  
picks up 'ambush type' radar signals.

And the key word is 'radar', not trash  
signals. The 4 test check system that  
operates in 1/4 second gives you ex-  
tremely high protection from signals from  
other detectors, intrusion systems and  
garage door openers.

So, when the lights and X or K band  
sounds explode into action, take care,  
there's very likely police radar nearby.  
You'll have full volume control, and a  
City/Highway button reduces the less  
important X band reception in the city.

Maxon's long range detector comes

complete with a visor clip, hook

and loop dash board mounting, and the power

cigarette adaptor.

It's much smaller than Escort at just  
3 1/2" Wide, 4 3/4" deep and 1 1/2" high. But,  
it is larger than Passport. It's backed by  
Maxon's standard limited warranty.

Note from Drew: 1) Use of radar de-  
tectors is illegal in some states.

2) Speeding is dangerous. Use this  
detector to help keep you safe when you  
forget, not to get away with speeding.



#### CHECK OUT RADAR YOURSELF RISK FREE

Put this detector on your visor. When it  
sounds, look around for the police.  
There's a good chance you'll be saving  
money in fines and higher insurance  
rates. And, if you slow down, you may  
even save lives.

If you aren't 100% satisfied, simply  
return it in its original box within 30 days  
for a courteous refund.

To get your Maxon, Dual Superhetero-  
dyne, Anti-Falsing Radar Detector risk  
free with your credit card, call toll free or  
send your check for just \$990 (\$4 P&H).  
Order No. 4407. CA res add tax.

**Special Note:** Now  
that we're challenging  
Passport, we've added  
an optional suction cup  
windshield mount and  
extra coiled power cord.  
(Sorry we can't afford to  
throw them in for free.)  
They're just \$5.00 (\$1 P&H) Or. No. 4800.

OK Escort, it's up to you. We've got  
\$20,000 that says you can't beat Maxon  
on the road. Your answer, please?

Escort and Passport are registered trademarks of Cincinnati Microwave.  
Rashid VRSS and Rashid Radar Safety Brake are registered trademarks  
of Vehicle Radar Safety Systems, Inc.

**DAK INDUSTRIES INC.**  
Call Toll Free For Credit Card Orders Only  
24 Hours A Day 7 Days A Week  
PM54 1-800-325-0200

For Toll Free Information, Call 8AM-5PM Monday-Friday PST

Technical Information... 1-800-272-3200

Any Other Inquiries... 1-800-423-2866

8200 Rammet Ave., Canoga Park, CA 91304

## DOUBLE DECKER

(Continued from page 96)

frame. Measure up from that line  $8\frac{3}{4}$  in. and cut a 2-in.-deep notch between both marks. This notch will accommodate both the landing frame and the decking. From the upper end of this notch, measure  $3\frac{1}{2}$  in. up and mark the post for cutoff. Remove the posts, cut them to length, and then cut the railing notches in the top as shown in the drawing. Keep in mind that the short inside posts that butt against the landing and deck are notched differently. The lower ends are notched on two adjoining faces to form the shoulders that rest on the decking.

Next, cut the posts for the railings to length, then notch both ends and chamfer the bottoms as indicated. Doubled 4x4 posts are required at the angled

corners of the lower deck. Build these as shown in photos 19 and 20. All the posts receive a 2x4 horizontal support to stiffen the top railing board and to conform to the plane of the balusters. Space the posts about 5 ft. apart or as required to suit your deck dimensions. They attach with lag screws.

After the posts have been installed, set 2x4s in the notches, on edge, and nail them in place. Then cut the 2x4 top rails and nail them into the supports and posts. Cut the balusters to length from 2x2 stock and chamfer the bottom ends. Space the balusters about  $4\frac{1}{2}$  in. apart, or less, if required by local building codes. It is advisable to prebore nail pilot holes to prevent splitting.

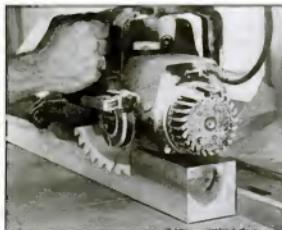
### Stairs

Dimension the stairs as indicated in the drawing. Then cut the inside stringers

to shape and nail them to the outside stringers. Join both assemblies to the top riser. Temporarily clamp this assembly to the landing so it rests on concrete piers at the bottom. Adjust the stringers until they are square to the landing then attach to the landing with carriage bolts. Cut and fit the treads, then nail them onto stringers.

The posts for the stair railing must be notched at top and bottom. To determine the angle, hold a 4x4 against the outside stringer and plumb it with a spirit level. Trace a line against the edge.

Conceal the open spaces below the decks with pressure-treated lattice panels attached to the posts with nails. When all construction is complete, sand over any sharp edges. Let the deck air dry for three to six months, then stain normally. **FM**



**16** All railing posts are notched before attaching to deck. To do this, first make crosscut using a circular or radial-arm saw.



**17** Complete notches in posts by ripping to the crosscut kerf using a circular or table saw. Finish the cut with a handsaw.



**18** Hold notched post in place and plumb with level. Then bore pilot holes for lag-screws. Install lags and tighten securely.



**19** To form angled corner posts, rip 4 x 4 stock to  $22\frac{1}{2}^{\circ}$  on band saw. Circular saw will work if cut is made from both sides.



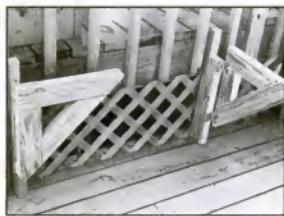
**20** Join both sides of angled post together with  $3\frac{1}{2}$ -in. No. 12 fl. screws. Bore pilot holes, countersink and plug screwheads.



**21** Cut bench support parts to size, then cut all required half-lap joints. Join with plastic resin glue and galvanized nails.



**22** Nail 2 x 4 cleats to upper deck beam and lower deck floor boards. Cut stair stringers to shape and nail into cleats.



**23** Cut parts for support braces on folding table to size and join with half-lap joints and hinges. Attach supports to deck framing.



**24** Nail boards for tabletop to end cleats. Then attach wedge-shaped stop blocks with galvanized T-hinges to bottom of table.

AS SEEN ON TV

MicroTech's Flea Collar is a  
veterinarian-tested, effective way  
to control fleas on your dog or cat  
without using poisonous sprays  
or chemical collars.



Ideal for Cats



# Fleas Gone or Your Money Back!

MicroTech® 2 Flea Collar is a smaller, more powerful version of the original flea collar that has solved the flea problems of more than 400,000 pets. Try one FREE for 30 days.

Biting fleas can make life miserable for pets and pet owners. Chemical flea collars, poisonous sprays and shampoos often seem to have little effect and can be irritating to pets and owners alike. The MicroTech Flea Collar eliminates fleas from your dog or cat safely — and keeps them free of endless scratching caused by this common insect scourge.

## Patented Circuitry

At the heart of this new breakthrough are specially engineered electronics called Pulsed, Modulated Burst Circuit - PMBC™ for short. It's so unique, it's patented. High frequency compressional waves, above human and pet hearing range, attack the sensory system of fleas. The pests are driven from your cat or dog and will not return while you continue to use MicroTech.

## Veterinarian Tested and Safe

In hundreds of tests, including evaluations by veterinarians, MicroTech repelled fleas and ticks from both dogs and cats, short-haired and long. Results were frequently dramatic and consistent. Even heavy infestations showed significant improvement when MicroTech was used.

## From a Veterinarian Report on MicroTech

"MicroTech has demonstrated its effectiveness in significantly reducing, or totally eliminating fleas from pets."

R.P.K., DVM

MicroTech is safe. In over one year of testing, no adverse reactions were reported; and, because MicroTech is electronic, it won't aggravate allergies or poison owners, children or pets who are sensitive to chemical sprays and shampoos. MicroTech is the first effective non-chemical treatment for fleas and ticks.

No matter where you live in the U.S., put MicroTech 2 to work on your pet. Residents in southern states will find MicroTech welcome relief from fleas and ticks that are present almost year round. If you live in the suburbs and rural areas with their greater insect population, you and your pet will welcome the ecologically safe repelling power of MicroTech.

## The Best Part May Be the Price

The very first hand-built MicroTech units were very expensive. But, like calculators, VCR's and other electronic equipment, the cost of production has dropped. Now, safe flea and tick control is within reach of everyone. MicroTech 2 is just \$49.95 (plus

## What Satisfied Users Say:

"We tell everyone we can about your product — our vet was impressed too! It's so nice not to have fleas in the house since our cat doesn't bring them in!"

— A.W., Pt. Arthur, TX

"We now have two contented beagles, each with one of your collars. The flea and tick problem at our house is nonexistent."

— G.R., Key West, FL

"Last year our beloved Irish Setter, Kerry was so flea prone, even with all the veterinary help offered allergy pills, etc., she had to wear a huge Elizabethan collar around the clock to keep her from ripping out her fur. The flea situation with Kerry was hopeless. NO MORE — she is never without her collar, and not a trace of fleas...Thanks from Kerry, and from us."

— P.B., Knoxville, TN

No Chemicals  
No Poisons  
No Sprays

\$3.50 shipping & handling). It comes complete with a durable, adjustable nylon collar, and long-life Duracell lithium batteries & a 1-year limited warranty. (Battery life is approx. 6-8 months, running 24 hrs. a day.)

Try One For 30 Days  
At No Risk

Put a MicroTech 2 on your pet for 30 days. If you are not satisfied with the reduction in fleas, return it for a full refund. You're protected by the manufacturer's strong one-year limited warranty as well as our 30-day money back guarantee.

**TO ORDER:** Send your check or money order for \$49.95 (plus \$3.50 shipping and handling) to Vanguard at our address below. Credit card holders can speed delivery by using our toll free Orderline. Specify dog or cat model.

**CALL TOLL FREE  
1-800-634-5463**

In Iowa 1-800-542-7981

Mon.-Fri., 8 am - 9 pm Eastern Time  
Win the endless war against fleas and ticks without poisonous chemicals. Order a MicroTech today and try it for a full month at no obligation.

**VANGUARD  
MAIL ORDER**

Dept. BB  
2800 Hoover Rd./Stevens Point, WI 54481

©1987 Vanguard Mail Order

# Be Your Own Boss and Make \$18.00 to \$30.00 AN HOUR!

**Find out how by...  
...sending now for your Free Lifetime Security Fact Kit!**



Your FREE Lifetime Security Fact Kit tells you how to make \$18.00 to \$30.00 an hour in your own Foley-Belsaw Full-Service Saw and Tool Sharpening Business. Your FREE Fact Kit explains how you can:

- be your own BOSS!
- work full time or part time, right at home.
- do work you enjoy and take pride in.
- operate a CASH business where 90¢ of every dollar you take in is clear cash profit.

And it is so easy to learn. Foley-Belsaw gives you all the facts and instructions. No previous experience or special training necessary. All you need is the desire and ambition to be your own boss. Foley-Belsaw tells you everything you need to know to be successful.

There's plenty of business where you live to keep you busy. It doesn't matter whether you live in a big city, small town or a small farm community.

## Earn While You Learn

You'll quickly be able to develop the skills necessary to earn a steady income. You'll be able to sharpen all types of saws, garden and shop tools for home, farm and industry.

Profits from your Foley-Belsaw Full-Service Sharpening Business can provide...

- ... CASH for future security or supplemental income
- ... CASH for travel, vaca-

tions, fishing trips  
... CASH for the things you've always wanted!

And you'll be able to set your own hours and not have to worry about layoffs and strikes. There are no franchise fees. Best of all—age or physical condition is no barrier—any age person can succeed.

You can be like Steve Taylor of Brookville, Ohio, who told us:

*"...the first year I grossed \$21,000.00."*

Or James B. Jones, of Albuquerque, NM who reported:

*"This past summer my sales and service amounted to almost \$6,000.00 a month."*

But you've got to get the FACTS before you can get started. So WRITE NOW for your FREE Lifetime Security Fact Kit. It's yours to keep with NO OBLIGATION.

<b>FOLEY BELSAW</b>		
The Foley-Belsaw Co. 20467 Field Bldg. Kansas City, MO 64111		
<b>FREE Lifetime Security FACT KIT</b>		
FOLEY-BELSAW CO. 20467 FIELD BLDG. KANSAS CITY, MO 64111		
<input type="checkbox"/> YES, I want to know more! Please rush my FREE Lifetime Security Fact Kit. No obligation and no salesman will call.		
Name _____		
Address _____		
City _____	State _____	Zip _____
( Area Code ) Phone _____		

# Popular Mechanics

**Plans, Plans, Plans!**



1987 Catalog  
of Plans

Only \$1.50

From a tool box to a hovercraft, an icebox cabinet to a storage barn, our catalog has plans for you. Pick from workshop items, models, furniture, outdoor sheds and toys. You can also select books on auto repair, boating, even the military. Choose a video from This Old House and more, too.

Send for your catalog today and see what you can build.

**TO ORDER** Send your name and address with check or money order to: Popular Mechanics, Box 1014, Radio City Station, New York, NY 10101.

Popular Mechanics is a publication of Hearst Magazines, a Division of the Hearst Corporation. ©1986 The Hearst Corporation. All rights reserved.

## A Career Start in 21st Century Electronics



Since 1905, National Technical Schools has helped over 300,000 people just like you learn at their own pace and build successful careers. Enter the boom in electronics through home study courses in Microcomputer Technology & Servicing, TV & Radio Servicing, Video Technology, Industrial Controls (Microprocessing), Robotics or Basic Electronics. Call 1-800-B-BETTER or write us today for complete details: NTS, Dept. PM-409, 456 West M.L. King Jr. Blvd., Los Angeles CA 90037.

FREE NTS Catalog

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Zip \_\_\_\_\_ Phone \_\_\_\_\_  
Area of interest \_\_\_\_\_  
Accredited by National Home Study Council

**NH** Northern  
Hydraulics  
INC.

Sale ends May 31, 1987.  
Order 24 hours, 7 Days a Week

# SPRING CLEAN-UP SALE!

See how you save now--up to..

**20-50%** off list  
price

on these name-brand products..and many more!

## FOLDING UTILITY TRAILER



OVER  
1000 LBS.  
CAPACITY!

\$184.95

## 29 Piece High Speed Drill



High speed twist drill bits  $\frac{1}{8}$ " to  $\frac{1}{2}$ " by 64ths.  
Rugged steel index for on-the-job convenience. \$65 list.

#150291.....3 lbs. ....\$17.95

## Swing-Away Swivel Jack



Pull pin swivel release and lock. 750  
lb. capacity. 23" lft. Attaches in  
minutes with common hand tools.

#12734.....16 lbs. ....\$36.95

## GAS ENGINES



5 HP Horizontal shaft.....\$132.95

8 HP Horizontal shaft.....\$187.95

10 HP Horiz./Cast iron sleeve.....\$227.95

3/4 HP Vertical shaft.....\$99.95

We carry a complete line of horizontal and vertical shaft  
gas engines ranging from 3 to 23 HP! Tecumseh, Briggs  
& Stratton, Wisconsin Robin and Kohler Combos.

## 8400 GPH 2"Water Pump



Chemical and abrasion resistant seals, comes with  
universal mounting base for permanent installation.

Ideal for clear water, chemical fertilizers, herbicide  
transfer, etc. Uses 2" suction, pumps 8,400 GPH with  
a 28 foot lift. 3 HP Briggs 4-cycle engine. \$329.95 list.

#10996.....37 lbs. ....\$175.95

## 1000 Lb.



## Hand Winch

#1294.....6 lbs. ....

We carry a huge line of electric winches too!

\$14.95

## Karcher® Pressure Washer

110 volt pressure washer delivers 670 psi of water  
pressure. Includes lance, spray gun, lance holder,  
1.8 hp elec. motor, delivers 2.2 gal. of water/min. You  
get wash brush, trigger gun with 33" of hose, spray  
wand & adj. nozzle. Mounting bracket & 1 liter of  
biodegradable cleaning compound. List: \$499.95  
Item #157161.....33 lbs. ....\$309.95



## Multi-Purpose Seat

Rugged vinyl-covered "Cool Seat" has air holes for  
comfort. Molded steel frame. Dimensions: 18" wide x  
14" deep (B) x 6" high (C). Ideal for farm,  
garden and industrial equipment. Bolt pattern:  
8 1/4" wide x 3" deep.

Item #..... ....8 lbs. ....\$19.50



## 105 Amp Oxy Mig Welder

Perfect for light to medium welding projects. Welds  
steel, aluminum and stainless steel. 120 volt AC, 60 Hz,  
single phase output 30 amps, max. 105. 60% duty  
cycle at 33 amps. List for \$499.00

Item #15535.....42 lbs. ....\$239.00



## UTILITY TRAILER KIT

OVER 1000 Lb.  
Capacity!



Road ready kit complete with fenders, approved lighting, wiring and connector, 480x8 demountable wheels, coupler assembly with safety chain, and slipper springs. 4'x4" bed size, overall 81 1/2" long x 46" wide. Sh. wt. 125 lbs.

#12542.....WILL SHIP UPS FOR \$30 PRE-PAID .....\$136.95

**Motorcycle Rails,** Make your trailer into a motorcycle trailer with this simple to mount motorcycle rail. Fits trailer above #12542. ....27 lbs. ....\$26.95

**Boat Trailer Adaptor Kit,** Boat trailer adaptor fits our #12542 trailer above and turns it into a boat trailer. Great for aluminum boats! ....44 lbs. ....\$47.50

**actronic inc**  
New manufacture program

## 4000 Watt & 5000 Watt Generators from



## Agtronic®

4000 Watt Recoil start, 8 Hp. Ship weight  
108 lbs. List: \$1009.....\$379.00

4000 Watt Electric & recoil start, 8 Hp.  
Ship wt. 113 lbs. List: \$1143.....\$459.95

5000 Watt Recoil start, 11 Hp. Ship  
weight 140 lbs. List \$1174.....\$599.95

5000 Watt Electric & recoil start, 11 Hp.  
Ship wt. 146 lbs. List: \$1299.....\$699.00

## TRAILER PARTS

**Hub & Spindle Set,** 2000 lb. capacity. 4" bolt circle,  
2 hub, 2 spindles, 2 dust caps, tapered bearings,  
lug bolts and cotter pins. ....\$38.45

**High Speed Trailer Wheels & Tires (4 & 5 Hole)**

480x8.....\$18.95

570x8.....\$32.95

LARGER SIZES AVAILABLE & IN STOCK

**Trailer Springs:** 1/4" wide wire center of 25 1/2".

Item # Capacity Springs Leafs Sale

1250 1000 lbs 2 2 \$22.00/pr

1251 2000 lbs 2 3 \$24.00/pr

1252 3000 lbs 2 3 \$27.00/pr

**Single Spring Shock Set,** #1255.....\$10.00/pr

Many other trailer parts in our large catalog!

## FREE CATALOG!

YES! I want to start saving BIG on all my needs for tools,  
parts and equipment. Send my FREE 124 page catalog today to:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_

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

MAIL  
REQUEST  
TO



Northern Hydraulics, Inc.  
Dept. #67435, P.O. Box 1499  
Burnsville, Minnesota 55337-0499

**NH** Northern  
Hydraulics  
INC. Dept. # 67435

Call TOLL-FREE, 24 Hours, 7 Days a Week!  
1-800-533-5545

(In Minnesota call 1-612-894-8310)

Shipping & handling charges are not included in prices.

FREE

FREE

"Easy  
to  
Use!"

# WATER WELLS FOR EVERYONE!

Since  
1952

You can drill water wells for less than \$1 per foot with our easy-to-use drills.

5 low-price models for home, farm, and commercial use.

Check one or both boxes for information and mail today!

Homeowner Model    Commercial Model

VIDEOTAPES  
AVAILABLE

Call or Write  
for FREE Brochures



Anderson Road  
Opelika, Alabama 36802

CALL TOLL FREE  
**1-800-821-7700**  
(Ask for Operator 5217)

Print Name

Address

City/State/Zip

Commercial  
Model

- NEW ENGINE - 18 hp Twin Cylinder
- NEW POWER - 4500 lbs. Max. Pull
- NEW LOADER - Lifts 570 lbs. to 7% ft.
- NEW BACKHOE - Digs & Loads to 8 ft.

Catalog - showing Magnatrac's construction & uses - \$1.00

Plans - for building a Magnatrac from local materials ... \$7.00

SEND TO STRUCK-KIT Dept: PM-57  
Cedarburg, Wisconsin 53012

## A SINGER'S DREAM!



### REMOTES VOCALS FROM RECORDS!

Now you can sing with the world's best bands! The Thompson Vocal Eliminator can remove most or virtually all of a lead vocal from a standard stereo record and leave the background!

Write or call for a free brochure and demo record.

**LT Sound**, Dept. P.M., P.O. Box 338,  
Stone Mountain, GA 30086 (404) 493-1258

## The alternative to waiting around for your septic system to back up



Your septic system is going to back up, right? Well you don't have to helplessly wait for it to happen. Simply flush RID-X down your toilet every month.

RID-X adds billions of safe bacteria to help keep septic systems running trouble-free. Lab tests have proven that 1 lb. of RID-X liquefies 25 lbs of solid waste in hours. That's better than the leading liquid septic system additive, or yeast, which contains no bacteria.

RID-X is safe for plumbing. It contains no harsh or caustic chemicals and won't harm pipes or your septic system.

RID-X is available where household products are sold.

# RID-X

THE SAFE WAY TO A WORRY-FREE SEPTIC SYSTEM.  
RID-X is a product of the G-CON Company, Inc.  
225 Summit Avenue, Montvale, New Jersey 07645

**FREE!** The Makers of RID-X will send you this informative booklet, which can help you avoid septic system failure. Send a card to RID-X, Dept. MBB  
225 Summit Ave.  
Montvale, N.J. 07645



## MEN PAST 40

Troubled With Getting Up Nights  
Pain In Back, Hips, Legs  
Nervousness, Tiredness

If you are disturbed by these symptoms, your trouble may be caused by chronic inflammation of your prostate. Methods that merely give temporary relief for this condition cannot be expected to remove the cause of your trouble.

The Excelsior Institute Clinic, devoted to the **NON-SURGICAL** treatment of diseases peculiar to older men, has a new **FREE BOOK** that tells how these troubles may be corrected. The **NON-SURGICAL** treatments described in this book require no hospitalization or long periods of convalescence. Treatments take but a short time and the cost is reasonable.

Write today. This book may prove of utmost importance to you. No obligation.

**Excelsior Institute Clinic**, Dept. 128B  
110 E. Broadway, Excelsior Springs, Mo. 64024

## AMAZING SCIENTIFIC AND ELECTRONIC DEVICES

LASERS, FLASHERS for show, war, weapons, burning, cutting, holography, sound control, motion picture application, PLASMA TORNADO, FORCE FIELD, ION WIND, ION MOTORS, LIGHTNING GENERATION, TELSA COILS, ANTI-GRAVITY, MAGNETIC IMPULSE GUNS, ULTRA-SONIC, ULTRA-VIOLET, LASERS, SHOCK AND STUN GUN PROJECTORS (for personal protection SEE IN TOTAL DARKNESS, LONG RANGE VOICE TRANSMITTERS, DIRECTIONAL MICROPHONES, INTRUSION DETECTORS, security systems, SATURN IT-1, ENERGY and INSIDE RODENT KILLERS, REPAIR KITS for the home. SEND \$1.00 FOR CATALOG OF PLANS, KITS AND COMPETED ITEMS TO

**INFORMATION UNLIMITED**  
BOX 716, DEPT. MB  
AMHERST, NH 03031



**DURASEAL** - The ultimate protective seal. Don't Let the Weather ruin your car's finish. Scientific break-through has combined silicones and resins to form a permanent seal. The first time to form a "PRO-WAS Paint Protection," better than any polish available. Durasel protects your car or boat against the elements for at least 4 years. We guarantee it! Price \$19.95. Send \$1.00 for postage & handling. Order regardless of which wax or polish you use. Order Today! \$19.95 + \$2.00 P&H Club or MO Allow 4 weeks) Durasel 162 Mt. Tom Rd. P.O. Box 106031.

### At Last a New Amazingly Simple GAS TURBINE JET ENGINE

Build from plans to flying plane.

Length 25", Dis. 8½", Wt. 19 lbs.

Fuel Gasoline! Develops 20 H.P. Ideal project for serious-minded hobbyists. Complete metal cutting lathe with milling attachment. For use on small racing planes, model cars, etc. Detailed instructions, parts list, drawings, and bits of material and photos. Price \$18.95. No. C.O.D. SAVOY SCIENTIFIC SANTA MONICA, CALIF. 90406



### Portable Steam Cleaner

Steam in 60 seconds

CLEAN Engines, Air Filters, Lawn Mowers,

3-year guarantee on fire box, coils. Uses liquid soap, propane fired. Wt. 120 lbs. Auxil. pump required on 100 psi steam pressure!

WILCOX CO. INC., Dept. M-18  
P.O. Box D, 940 West Broadway,  
Jackson, Wyoming 83001

### BUN-SHIELD-VISION

Plastic, durable see-thru vinyl. Static-Cling film. Easy to apply in cars, RV's. Reduces glare for sensitive eyes.

4" x 54" \$6.99 + \$1.50 ship  
6" x 54" \$8.99 + \$1.50 ship  
12" x 54" \$16.99 + \$1.50 ship

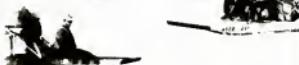
HAW SHIELDS, INC.  
TRAVEL 'N SHADE 4229 1st NW, Dept. PM7/Sacramento WA 95107

### Hydro-Rat AIRBOAT Plans

1 or 2 man Inexpensive and Easy to build Fun to operate

Shallow water hunting & fishing

Info brochure \$1.00 refundable on purchase of \$10.00 plans



SATISFACTION GUARANTEED  
Rocky Mountain Airboats Inc. P.O. Box 119 Morgan, UT 84020

### MUSCLES

HOW TO BUILD A MORE POWERFUL BODY!

FREE BOOKLET

New Muscle Jumping Methods gives you strong shoulders + Hammer arms + Gain

+ Powerful chest + Bigger arms + Gain

UNIVERSAL BODYBUILDING

Dept. 44 BOX 5654, DETROIT, MI 48240



### GASOLINE ENGINES

Generators, Troy-Built  
Tillers, and more  
**FREE CATALOG DISCOUNT PRICES**

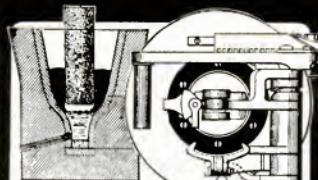
EXAMPLES  
5HP Briggs Horizontal.....\$143.95  
8HP Techumseh Horizontal.....\$159.95  
3.75HP Tecumseh Vertical.....\$199.95  
10HP Tecumseh Vertical Elec.....\$239.95  
500 Watt Toro Generator.....\$229.95

2 to 18 HP Engines, 500 to 5000 watt  
Generators, all at Discount Prices

### SMALL ENGINE CITY

2612 Lymond Ave., Suite PMS  
Minneapolis, MN 55408, 612/872-4288  
1-800-645-4468

# TECHNICAL BOOKS!

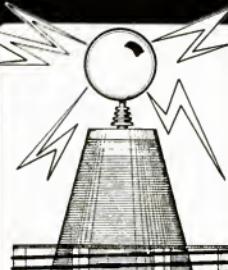


### CURIOS MECHANICAL MOVEMENTS

Explains 1927 designs for over 1000 different mechanisms. Everything from unusual engines and acoustic telephones to mining devices and perpetual motion machines. Dynamite illustrations! Fascinating! Don't pass this up! 412 page paperback

Order no. 4406

\$14.95



### TESLA COILS

TESLA COIL SECRETS  
Page through these massive notebooks of a buried treasure! Lightning bolt generators! Incredible diagrams and secrets! Rare info! paperback  
Order no. 4317

\$6.95



### Alternator SECRETS

Get thousands of watts from common auto alternators! Run tools, lights, AC DC appliances, charge batteries, do lighting, heating and more! Get 60 cycle AC from common induction motor. No rewinding! Jam-packed booklet! Secrets!

Order no. 80

\$3.00

### ALTERNATOR SECRETS

Get thousands of watts from common auto alternators! Run tools, lights, AC DC appliances, charge batteries, do lighting, heating and more! Get 60 cycle AC from common induction motor. No rewinding! Jam-packed booklet! Secrets!

Order no. 80

\$3.00

RUN THREE PHASE MOTORS ON SINGLE PHASE POWER!

Learn three proven methods in use since the turn-of-the-century! No motor rewinding! Easily done. Jam-packed booklet!

Order no. 81

\$3.00

### Giant How-to Catalog!

Discover rare, top-rate paperbacks, text books, industrial references on all types of unusual how-to: foundry, machine shop skills, engine repair, electronics, alternate energy, homesteading, survival skills, much more! Send \$1.00 for catalog and a 13.00 foreign airmail for your copy of our giant catalog filled with some great books then we can fit in this ad! Or request free catalog with any book ordered from us!

### HOW TO ORDER

Send your name, address, the total book cost, plus 75¢ for their first book and 25¢ for each additional to cover postage and handling. We accept cash and money orders. Or send VISA or MASTERCARD numbers with signature. Illinois residents add 6% sales tax. All books are guaranteed. You may return any book within 7 days for refund. Your satisfaction is guaranteed! Order today!

# Lindsay Publications, Inc. Write Today!

PO Box 12-DG, Bradley IL 60915-0012

- Send a catalog I've enclosed \$1.00 (\$3.00 foreign airmail).
- Send the books I've listed and a free catalog. I've enclosed 75¢ shipping for the first book and 25¢ for each additional.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

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

### ban the flush!



**Envirolet.**

The Ecological Toilet System

- NO WATER
- NO CHEMICALS
- NO SEPTIC TANK

Sancor Industries Ltd.

140 - 30 Milner Ave., Scarborough, Ont. M1S 3R3  
(CDA 416-299-6666)  
in U.S.A. TOLL FREE 1-800-387-5126

### The Homebuilt JET HELICOPTER

LOW-COST DESIGN - SIMPLIFIED ASSEMBLY

a liter low-cost fuel + No license needed

• Fully illustrated — Only \$149.95

• Helicopter Experimenters' Handbook

• over 100 photos & design blueprints

• Fully illustrated — Only \$10.95

\*BOTH ABOVE BOOKS: ONLY \$18.00

PMK/100-449-84  
U.S. Zone 100

N.E.W.: An exciting Kit Helicopter!

Details sent with book orders.

Postage/Handling Info: \$3.00 U.S. Zone 100  
with \$18.00 order. Add 10% for foreign orders.

MAILED/PAID  
P.O. Box 50  
Ridderwood, MD 21139



# HYUNDAI EXCEL

More than a million owner-driven miles bring lots of smiles.  
The price of this Korean car makes buyers happy, too.

BY MICHAEL LAMM, Contributing Editor

**W**hat sells Hyundais here is partly price, but that's not the whole story. The Excel's initial \$4995 base sticker brought floods of customers into Hyundai showrooms. Yet, it took more than price to convince people to buy.

"I was originally attracted by the price," confessed a Texas aircraft sheetmetal mechanic, "but when I

looked at the Excel I was pleasantly surprised by the car's quality of construction, its attractiveness, standard equipment, roominess and economy. I think it's a good value for the money."

Value, then—perceived or real—holds the key to Hyundai's phenomenal U.S. and Canadian successes. Word of mouth and good advertising helped, too. Early Excel ads told American

televiewers they could now afford two cars for the price of one. Judging from unsolicited remarks at the bottom of questionnaires we sent out, quite a few respondents took the TV hint literally. Several households now drive two and even three Excels.

Despite its recent arrival in North America, Hyundai already stands out  
*(Please turn to page 188)*

Seats on low-line care were judged comfortable, but owners of high-line GLS models often found seats rocked on their mounts.



The 68-hp, 1.5 liter Mitsubishi Four came in for a lot of criticism as having inadequate power for the weight of the Hyundai.

NEW  
PATENT PEND.

## AIR COMPRESSOR CONVERSION KIT **VOLKS-** **AIR**

KIT CONVERTS YOUR TYPICAL VW ENGINE INTO A HIGH OUTPUT AIR COMPRESSOR!

Twin cylinder kit for sandblasting, commercial and industrial use (50 CFM piston disp.) only \$399.00. Single kit for medium duty use (25 CFM piston disp.) \$279. 15 PSI capability. Write: Dunn Right Inc., Dept. PMVA, R.R. Box 184A, Anderson, S.C. 29624 Or phone 803-296-9316

FEATURED IN MAR. 87 HOT VWs MAGAZINE

Full Size  
Plan  
No. 400  
\$10.00

Build this  
Rocking Horse

35" x 58"



(516)

462-6228

ARMOR PRODUCTS Catalog \$1.00  
Box 445-C, E. Northport, NY 11731

**BUILD YOUR OWN  
ROCKET MOTORS!**

- \* 40 POUNDS THRUST!
- \* FIFTY CENTS EACH!
- \* BUILD A DOZEN IN AN EVENING!

Write for our catalog, and we'll send you a  
WORKING SAMPLE of one of our motors. YOU CAN  
MAKE YOURSELF from materials you'll find around the house.

Send \$2.00 to:  
Dept. PMS  
THE TELEFLITE CORPORATION,  
11620 Kitching St., Sunnyvale, Calif. 92388

**GO KARTS, MINICARS, MINIMOBILES, ATVs**

ENGINES-KITS-PARTS  
72 PAGE CATALOG  
\$3.00 REFUNDABLE  
Largest Selection.  
(216) 357-5569  
KART WORLD Dept. M  
1488 Mentor Ave., Painesville, Ohio 44077

### Pay For Your Hobby!

With White's NEW  
Series 3 Metal Detectors



Sensitive detectors locate the  
rare and valuable for fun and  
profit. \$99.95 & up!

Call Toll Free:  
1-800-547-6971

WHITE'S ELECTRONICS  
Dept. PA-6 Sweet Home, OR 97380

### Radio Shack Tandy

Our 10th year of DISCOUNTS  
COMPUTERS & CELLULAR PHONES  
Fpt. Prepaid. Save Tax-Free! Free 800-231-3680

**MARYMAC INDUSTRIES INC.**  
22511 Katy Fwy., Katy (Houston) TX 77450  
1-713-392-0747 Telex: 774132

### TELEPHONE LISTENING DEVICE

Record telephone conversations in your office or home. Operates on any standard telephone line. Record and your telephone line starts automatically when phone is answered. Records up to 10 hours. Listen back to recorded messages when phone is hung up.

**\$19.95 EACH** Pp. & Ins.

#### Super Powerful FM TRANSMITTER

Many times more powerful than other transmitters. Transmits up to 10 miles. FM radio - Easy to use. 100% solid state. 100% guaranteed. For Catalog of Transmitters, Voice Scanners and other specialty items, enclose \$2.00 to USI Corp.



## THERE IS MONEY TO BE MADE SELLING **KNAPP SHOES**



Start earning extra cash instantly... plus receive a 30% discount on a pair of cushion comfort Knapp shoes for yourself from the largest direct selling shoe company in the entire country. Over 20,000 stores people like yourself are running successful businesses. You can start making less than ever 250 attractive styles men's and women's including dress, casual, work, safety, and outdoor styles. Knapp will send you a complete FREE SELLING KIT, including everything you need to get started earning extra money immediately. There is no risk when you sell Knapp shoes. We support our sales people with free training and back our shoes with an unconditional money back guarantee. No cost! No obligation! Send coupon today!

Thomas McCaffrey, KNAPP SHOES One Knapp Centre  
Dept. 5890 Broomall, PA 19008

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
Tel No.: \_\_\_\_\_

**KNAPP** America works in Knapp shoes

### A \$75.00 BLOWER for only \$18.50???

**Sure - We want 1000 new customers to have our big catalog (free w/ order). This terrific blower puts out 400 cubic ft. to cool, heat, or heat. Has a built-in fan to blow air hot or cool with fresh air. Turbine wheel is 5 1/2" x 3 1/2" driven by 115V capacitor motor which runs at 1750 RPM. Has 1/2" diameter pipe, 1/2" diameter pipe, 1/2" outlet (4-1/2"). Mounts easily to pull or push air. Thoroughly pretested and gear for 1 yr. Reg. price is 75.00 - shaved to 18.50 for this sale. Call toll free 1-800-451-8899**

**Item A1129 - \$18.50 ... 2 for \$35.00  
ALLEN MACHINE CO. P.O. Box 98  
SARASOTA, FL. 33578  
Cr. Card Orders - 800-451-8899  
HOTLINE - 813 - 955-1414**

## BASEMENT TOILET FLUSHES UP To Sewer or Septic Tank No Digging Up Floors Install It Yourself - Anywhere Write McPherson, Inc., Dept. 16 Box 15133 Tampa, Florida 33684

## VARI-PRO ELECTRONIC VARIABLE AC MOTOR SPEED CONTROLLERS



Get the right speed for all your electric power tools, appliances, fans, lamps, grinders, lawn mowers, hand tools, etc. Adjust dim lights, etc. from 10% to 100%. VARI-PRO is a solid state unit that converts 120 VAC social controls into 120 VAC social controls. Any shaded pole, capacitor start motor can be controlled up to 15 amperes 1500 watts. 210° Serves energy 1 to 100% of rated power. 100% of rated torque up to 20 amperes 240 VAC. 29.95 + \$2.00 shipping and handling. Order from VARI-PRO or M.O. to: Progressive Control Systems, Inc., Box 59, Dept. VARI-PRO, 300 W. Main Street, Elkhart, Indiana 46514



**REPLICA MODELS**  
HISTORIC  
REPRODUCTION MODEL GUNS . . .  
Safe! Full size. Zinc alloy. Realistic.  
Over 30 parts. Cannot chamber or fire real ammunition. Safe for children. 100% safe.  
COLLECTOR'S ARMOURY  
800 Slaters Lane  
Box 59, Dept. VARI-PRO  
(800) 436-2000  
Elkhart, Indiana 46514

**U.S. M1911 45 AUTO  
\$79.95  
P.D.P.  
Length: 37" -  
Barrel: 5" -  
Overall: 41" -**

**HEART ATTACK**  
FREE REPORT. I survived heart attack. Out doctors. Used 90+ day painless technique. Cancelled surgery—Tossed out pills—Ends discomfort. Feel & look younger. Regained health. Laugh at doctors & pills. I am a new man. Helping others. Free report—SEND NO MONEY—only name and address! Survival-15, Box 3256, Austin, Texas 78764.

## INTRODUCING

The 1987 **Rascal**



Medicare Approved

## OUR HIGHEST QUALITY AFFORDABLE ELECTRIC 3-WHEELER

Take this compact, portable 3-wheeler anywhere. Easy One-Hand Operation. Built-In Battery Charger. Rear Suspension System. MEDICARE and private insurance reimbursable. 30 DAY FREE trial. Call or send coupon below for a FREE 20 page color catalog.

**1-800-662-4548**

**Electric Mobility Corp., Dept. 1203**

#1 Mobility Plaza, Sewell, NJ 08080

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zip \_\_\_\_\_  
Phone (\_\_\_\_\_) \_\_\_\_\_

## BE A LOCKSMITH

You'll enjoy your work as a Locksmith because it is more fascinating than a hobby—and highly paid besides! You'll go on enjoying the fascinating working year after year, in good times or bad, because you'll be the man in demand in an evergrowing field offering big pay and opportunities for your own boss. What more could you ask? Send for Free Booklet.

**TRAIN AT HOME—  
EARN EXTRA \$\$\$ RIGHT AWAY!**

### LOCKSMITHING INSTITUTE

Div. Commercial Technical Institute  
1500 Cardinal Drive, Dept. 10-057  
Little Falls, NJ 07442

Name \_\_\_\_\_ (Please Print)  
Address \_\_\_\_\_  
City, State, Zip \_\_\_\_\_

## Magnifying Reading Glasses



Send for your FREE Catalog today. Our 16-page catalog features 40 styles of magnifiers priced from \$9.98, plus many other helpful vision aids and useful products, such as our new magnified sunglasses and fisherman glasses.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

PRECISION OPTICAL Dept. 132-J, Rochelle, IL 61068

## HYUNDAI EXCEL

(Continued from page 186)

as a textbook success story, straight from the pages of *In Search Of Excellence*. It's the story of a totally unknown, unproven Korean automaker that arrives in Canada in 1984. Two years later, by sidestepping Canada's Japanese quota restrictions and on the

strength of a \$4300 car called the Pony, Hyundai becomes Canada's No. 1 best-selling import.

It now appears that Hyundai might repeat that performance here in the United States. By December 1986, the Korean automaker had sold 160,000 Excels to eager U.S. buyers. That number set a sales record that no freshman Japanese or German importer ever

came close to before. The figure also forced Hyundai to raise its first-year U.S. sales projection by 50 percent. In 1987, the company is aiming at 250,000 sales.

And now we find that the great majority of owners are more than happy with their cars. For example, a South Carolina receptionist wrote, "I'm averaging 38 mpg, and the fuel saving

### SUMMARY OF 1986 HYUNDAI EXCEL OWNERS REPORTS\*

Total miles driven	1,064,212	Specific likes:	Comfort opinion, front seats:	Average	10.2
Average mpg		Economics	Excellent	55.5%	6.1
4-speed manual transaxle		Price	Good	38.9	
In town	30.4	Styling	Average	4.2	
On the highway	34.8	Comfort	Poor	1.4	
5-speed manual transaxle		Handling			
In town	30.8	Specific dislikes:	Comfort	42.1%	
On the highway	36.4	Not enough power	Excellent		
3-speed automatic transaxle		No complaints	Good	46.4	
In town	26.6	Hard to shift gears	Average	10.7	
On the highway	31.2	Quality of materials	Poor	0.7	
Transmission					
Series choices:		Had any mechanical trouble?	No	64.3%	
Hyundai Excel (standard)	29.1%		Yes	35.7	
Excel GL	31.9	What changes would you like?	No		
Excel GLS	39.0	More horsepower	34.1%		
Major accessories and options:		No changes	Electrical	16.2%	
AM/FM stereo cassette	87.6%	Easier shifting	Shifter/transmission	14.1	
Air conditioning	59.1	More optional equipment	Carburetor	14.1	
Alloy wheels	38.6	Average	Clutch	10.1	
Why did you choose the Hyundai?		Range	Air conditioner	9.1	
Price	85.2%	\$4995-\$10,493			
Styling	25.6	Dealer repairs satisfactory?	No	28.4%	
Economy	18.1		Yes	71.6	
Hearsay	12.2	Workmanship opinion:	No		
Construction quality	9.3	Excellence	49.3%		
		Good	48.6		
		Average	1.8		
		Poor	0.4		
		Dealer service opinion:	Excellent	38.3%	
			Good	45.4	

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

## \$1000 A Month With Just A Hack Saw!

© by Philip E. Brancato Sr. 1986

### What Do I Do?

I make beautiful indoor/outdoor P.V.C. pipe furniture. Such as chairs, lounges, tables, swings, and all kinds of baby furniture out of P.V.C. pipe; and have been for 10 years. P.V.C. pipe furniture is the hottest selling furniture on the market today, because it is unique and beautiful and will not rot or rust and it will virtually last a life time.

### Profit Unbelievable!

The fantastic part of this business is the profit.



Just go look at some of this furniture in the stores and see some of the unbelievable prices it is selling for.

A chaise lounge that costs \$62.25 in material and three

hours of work is selling for over \$200 in the stores. I can sell my chaise lounge for anything I think my labor is worth. For once, the big manufacturing companies cannot compete with me or you on prices. You will find you will have more orders than you want!

### Where can you buy the P.V.C. Pipe?

You can buy the P.V.C. pipe from any local hardware store to start. Plus I will supply you with the name and address of one of the largest manufacturers of pipe, fitting, cushions, and table tops who will sell to you at wholesale prices and you do not have to buy a minimum amount, plus I will supply you with my shop manual and sixteen detailed shop drawings with pictures and measurements of sixteen different designs.

### Do you need my shop drawings?

No, you don't need my shop drawings unless you want to save hundreds of hours of trial and error work and thousands of dollars that I had to spend be-

fore I finally found the right design and measurements and tricks to the manufacturing of P.V.C. pipe furniture. I only wish that when I started, I could have bought these shop drawings and I would have gladly paid \$100 for just one of them.

### I will pay you!

Yes, I will pay you \$25 for any unique design shop drawing that I can use in my collection and workshop manual.

### How do you start?

1) Decide if you like to work with your hands to create things and want to make money.

2) Can you afford \$12.00 for my shop manual and sixteen drawings.

3) Send me your name and address along with your check for \$12.00 to:

Philip E. Brancato Sr.  
P.O. Box 237P15  
Riverview, Florida 33569  
(813) 677-6948

Please allow about two weeks for delivery.

I tried all those "Get Rich" gimmicks that are advertised, that never tell you anything until you've sent them your \$25, and then you find out their gimmicks were not for you. Well, I've tried them all and I'm still not rich.

All I ever wanted was something I could do in my spare time with my hands, make a little money and enjoy myself and not have to buy \$3000 worth of tools or merchandise to do it.

### Believe It Or Not

I found the most enjoyable and profitable business working with my hands and the only tools I use are a hack saw and measuring tape. The really nice thing about it is any man, woman or ten-year-old can do it.

plus the low initial price practically pay for the car." A Missouri technician said, "This car drives like a luxury vehicle. My mom has a Cadillac, and the Excel rides just as smoothly."

A Rhode Island computer manager said, "Workmanship is superior to American cars and as good as Japanese. Dollar for dollar, my Excel has to be the best automobile sold in America. Not since Henry Ford introduced his Model T has a car been so underpriced."

"Comfortable ride, easy to handle, and stops great even on wet roads," said a Tennessee lab technician.

A Massachusetts retailer wrote, "In my opinion, Hyundai has the same workmanship and quality as cars costing three times as much."

Nearly half of our respondents gave workmanship an excellent rating, and another 48.6 percent marked it good. A California police dispatcher observed, "Haven't been able to find anything wrong with this car, even after looking intentionally for a defect."

And so on and so forth. We could run quotes for pages and pages.

### Cost versus price tag

About a third of our respondents bought the standard \$4995 Excel, but not many paid that amount. Even subtracting freight, tax, license and so on, a mere 7.4 percent drove home for \$4995. A Florida hotel manager told us he'd been charged \$800 for rustproofing, "and I didn't have any choice in the matter." A New York systems technician grumbled, "You don't barter with the dealer. He knows if you don't buy this car, he's got others waiting."

Because dealers so often refuse to dicker on price and unashamedly "pack" their cars for extra profit, the importer has adopted a followup program to soften any hard feelings. "Hyundai Motor America immediately got in touch with me," wrote a Massachusetts aerospace specialist, "to be sure I was satisfied with the car. They left me with the impression that I, the customer, am very important to them."

Not to take away from overall owner satisfaction, the Excel does seem to have one big flaw and a lot of little ones, all of which Hyundai can easily correct.

The biggest gripe had to do with horsepower: not enough of it. The 68-hp, 1.5-liter Four—a carbon copy of the engine used in the 1995-pound Mitsubishi Colt/Mirage—struggles to make the 10 percent heavier Excel keep up with traffic. "Very poor on hills," noted a New Hampshire nurse. "On long grades, speed drops to 40 to 45 mph." A California bookkeeper: "You can really feel the air-conditioner compressor kick in—the engine lugs way down."

Among lesser complaints, we consist.

(Please turn to page 192)



## This VET Did It—and YOU Can Do It Too!

"War injuries left me badly handicapped, but now I'm a master locksmith, thanks to your training. Besides, the work is fascinating. If I can do it anybody can!"  
Glen Johnson, Larned, Kan.

Make Up to \$26.00 an Hour—even while learning!

Train  
FAST!  
at Home!

# Be a LOCKSMITH!

If you enjoy fixing things, you're a "natural" to make hundreds of EXTRA DOLLARS a year in the fascinating business of Locksmithing. Rising crime has increased demand for service a thousandfold. Yet there's only one Locksmith for every 17,000 people!

### COLLECT CASH PROFITS ALMOST AT ONCE!

You're "in business" ready to make \$10 to \$26.00 an hour a few days after you begin Foley-Belsaw's shortcut training. Easy illustrated lessons complete with ALL practice equipment PLUS

- ALL TOOLS YOURS TO KEEP
- KEY MACHINE YOURS TO KEEP
- EXPERT PERSONAL ASSISTANCE
- BUSINESS-BUILDING HELP

**THIS DO-ALL PRO  
KEY MACHINE YOURS  
TO KEEP!**

Can add \$50 to \$100 a week to your income... and doesn't cost you a penny extra!

**FREE**

enable you to get your share of this always-profitable business. Hundreds we've trained are doing it. So can YOU.

MAIL COUPON to discover how Locksmithing can keep extra money coming in during spare time or in your own full-time business. Ideal for retirement—good jobs, too.

FOLEY-BELSAW INSTITUTE, 11165 Field Blvd.

Kansas City, Mo. 64111

H. Hunt, Wilmington, Del.—"I make \$50 a week extra."  
R. Davis, St. Louis, Mo.—"I cleared \$110 last Saturday."  
Ed Boyle, Pittsburgh, Pa.—"My business going at top speed. I'm moving to bigger quarters."

MAIL THIS COUPON + NO SALESMAN WILL CALL

FOLEY-BELSAW INSTITUTE, 11165 Field Blvd.  
Kansas City, Mo. 64111

Rush FREE book, "Keys to your Future."

Name \_\_\_\_\_

Address \_\_\_\_\_

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



**Y**es, this gutsy little machine speeds you from fat to flat! Gut Buster is specifically designed to firm and flatten the stomach as nothing else can. Get back that flat stomach you had when you ate right.

This extraordinary exerciser turns ordinary sit-ups into tummy tightening power stretches. Guts, Gut Buster is so tough on tummies you quickly get in perfect shape for snug jeans, knits and swim suits. Guys can trade those bulging bellies for sexy, sensuous muscle—fast!

Durable, no-nonsense construction makes Gut Buster the only stomach exerciser you'll ever need. Pop it in your suitcase for travel when you travel. Use it while you watch TV, in the office—anywhere—anytime you have a few minutes to spare!

Forget about gizmos, expensive rowing machines and exercises you don't need. If your stomach is the problem, Gut Buster is your answer!

### NO RISK GUARANTEE

Don't settle for anything but the original Gut Buster. You risk nothing when you order. You must see a flat-as-a-pencil stomach or return it within 30 days for a full refund of your money.

Go ahead Gut Busters, order today to get your stomach flat and keep it like that!

### OB. CHARGE FREE

Credit card customers don't wait any longer to get a flat stomach. Call toll free today: 1-800-255-4321. Ask for operator 1669.

©1987 Fitness Quest, Inc.

**AS  
SEEN  
ON  
TV**

# Gut Buster™

**Flatten your stomach  
in just minutes a day!**

### MAIL NO RISK COUPON TODAY

YES, I want to flatten my stomach in just minutes a day! Please send me information on Gut Busters ordering now. I understand I may be delighted to receive a catalog, plus a refundable shipping & handling charge of \$3.00.

**EXTRA RUSH SERVICE:** I'm in a hurry! I'm enclosing an extra \$1 for special handling and printing the word "RUSH" on the front of my envelope.

**CHECK OFFER BELOW:**

1 Gut Buster.....\$19.95 + \$2.00 postage

YOU SAVE \$5.00 WHEN YOU ORDER TWO

2 Gut Busters.....\$34.90 + \$4.00 postage

(Ohio residents add 6% sales tax.) — An order outside Continental U.S. sends \$6 shipping & handling per item and adds \$8 to \$10 to shipping & handling. (Canadian Residents: Please add \$3.00 plus \$3 shipping & handling to 56 Bramblewood Rd., Unit 8, Brampton, Ontario L6W 3N4)

**YOU MAY PAY IN ONE OF TWO WAYS:**

Cash Check or Money Order (Make checks payable to Gut Buster)

Charge my:  MasterCard  Visa Exp Date \_\_\_\_\_

Account No. \_\_\_\_\_

**OB. CHARGE IT!** By Toll Free Phone:  
1-800-255-4321 Ask for operator 1669

Name \_\_\_\_\_ (please print clearly)

Address \_\_\_\_\_

City \_\_\_\_\_

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

Gut Buster • Dept. H-1669

2000 National Blvd., Canton, Ohio 44750

# THE HEARST CENTENNIAL.

# 100 YEARS OF MAKING COMMUNICATIONS HISTORY.

This year The Hearst Corporation is celebrating its 100th anniversary in American journalism.

As a salute to the many thousands of employees who helped us reach this milestone, we have gathered together just a few from the past and the present who, in some special way, represent the achievements of all their co-workers over the past century. Reporters, columnists, editors, publishers, writers, broadcasters and business executives: they have made Hearst one of the largest and, we think, one of the best communications companies in the world.

And to our readers, our viewers, our listeners and our advertising clients for their support over the years...thank you!

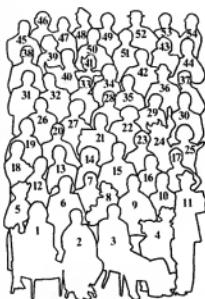


## *The Hearst Corporation*

1887    100 Years of Making Communications History    1987

1. Helen Gurley Brown, editor, *Cosmopolitan* 2. John Mack Carter, editor-in-chief, *Good Housekeeping* 3. Frank A. Bernack, Jr., president & ceo, The Hearst Corporation 4. Dagwood & Blondie, King Features cartoon couple 5. Louella Parsons, Hollywood gossip columnist 6. Gilbert C. Morley, executive vice president, The Hearst Corporation 7. J. L. Gmelin, cartoonist, *King Features* 8. Hearst Newspapers 8. Popeye, King Features sailor 9. W.R. Hearst, Jr., editor-in-chief, Hearst Newspapers 10. Randolph A. Hearst, chairman of the board, The Hearst Corporation 11. Walter Winchell, Broadway columnist 12. Arthur Brisbane, newspaper editor, columnist 13. Charles R. Lederer, former president & ceo, The Hearst Corporation 14. Nellie Jacobson, news anchor 15. V.E. Berlitz, Mass. 15. William Randolph Hearst, founder 16. Richard E. Berlitz, former president & ceo, The Hearst Corporation 17. Herbert R. Mayes, former editor, *Good Housekeeping* 18. Stephen Crane, novelist, *New York Journal* reporter 19. Frank Massi, former president & ceo, The Hearst Corporation 20. Richard E. Deems, former president, Hearst Magazines 21. Louis H. Wiley, *Good Housekeeping* Bureau, author 1904 *Pure Food & Drug Act* 22. Myron Cope, radio personality, WTAE-AM, Pittsburgh, PA 23. Mark Twain, special columnist, *San Francisco Examiner* 24. Hagar the Horrible, King Features Viking 25. Dr. Joyce Brothers, King Features columnist 26. Harry M. Rosenfeld, editor, Albany (NY) *Times Union*, *Knickerbocker News* 27. Dorothy Wallen, voice of Broadway columnist 28. Thomas Justin White, former general

manager, the Hearst organization 29. Harvey L. Lipton, vice president, general counsel, The Hearst Corporation 30. Thomas Hoving, editor-in-chief, *Connoisseur* 31. Frank Zachary, editor-in-chief, *Town & Country* 32. Bob Considine, Hearst newspaper editor 33. Frederick Remington, painter and illustrator 34. Elizabeth Gordan, food editor, *House Beautiful* 35. Anthony T. Mazzola, editor-in-chief, *Harper's Bazaar* 36. Bill Stern, sports narrator, Hearst Metrotone News 37. Jack London, novelist, *San Francisco Examiner* reporter 38. James Clavell, Morrow novelist, author of *Whirlwind* 39. Adela Rogers St. John, Hearst reporter, feminist 40. Jim Bishop, poet, reporter 41. Betty Bailey, King Features 42. Ambrose Bierce, short story writer, *San Francisco Examiner* columnist 43. Carmel Snow, former editor, *Harper's Bazaar* 44. Joseph Kingsbury-Smith, Hearst Newspapers national editor 45. Franklin C. Snyder, former general manager, Hearst Broadcasting 46. Annie Laurie, newspaper columnist, first "soob sister" 47. Raymond P. Petersen, executive producer, Hearst Magazine's former publication, *Good Housekeeping* 48. C.W. Chapman, former editor, *Motor Boating & Sailing* author, *Pikings* 49. Dorothy Dix, newspaper columnist 50. Marcus Morris, former managing director, Hearst's National Magazine Co., London 51. Sidney Sheldon, Morrow novelist, author, *If Tomorrow Comes* 52. Richard Harding Davis, New York author 53. Lawrence Hughes, president, Hearst Trade Books 54. Elinore Leonard, Arbor House novelist, author of *Bands*.





# BEST PRICES

## GENERATORS

### ELECTRIC POWER

Where and when you need it!

• 8 HP Briggs.

• 4200 Watts

• 120/240 Volts.

• Starts 1/2 HP Motor.

3000 Watt

JUST \$359

Inland Harbors Inc.  
Direct Suppliers of  
Boating+Outdoor+DIY  
Recreational Products

4200 WATTS ONLY \$385



6000 Watt  
JUST \$599

## Fulton

Swivel Swing-Away Jack,

23° tilt. Bolt-on wheel. Now \$34.95



Sale Price

Hand Winches 1,000 lbs. .... \$13.95

Trailer Light Kit ... \$17.95

2,000 lbs. Heavy computerized 4 or 5 bolt pair ... 23.95

480 x 8 Wheel & Tire, 4 or 5 hole ... 19.95

480 x 12 Wheel & Tire, 4 or 5 hole ... 32.95

Screw Jack with Wheel, 650 lbs. ... 31.95

## FREE CATALOG

Subscription

Inland Harbors Inc.

P.O. Box 35068

Dept. S120

Mpls, MN 55435

Name \_\_\_\_\_

Address \_\_\_\_\_

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

Zip \_\_\_\_\_ Dept. S12Q

Order Toll Free

800-544-2525

in MN

612-941-8280

Clip or call for best price.

# BEST BUY!

## EASY-TO-ASSEMBLE-KITS

In Stock for Immed. Shipping or Pick-up.

ONLY \$425 F.O.B. Broomall, PA  
for 3'6" diam.

(fits 8' 1/2" to 8' 1/2")

Comparable savings on diams. from 4' to 7'.

Kits available to fit any floor-to-floor hits.



Now!  
Showroom &  
Warehouse  
locations in:

Pomona, CA

(714) 598-5766

Sarasota, FL

(813) 923-1479

Houston, TX

(713) 789-0648

Chicago, IL

(312) 952-9010

© The Iron Shop 1977, 32

People who've looked everywhere tell us there isn't another spiral stair around that touches our combination of price and quality of materials and workmanship. We believe it! CALL OR WRITE FOR FREE BROCHURE.

To: The Iron Shop, Dept. PMST, Box 120, 400 Reed Road, Broomall, Pa 19008

Name \_\_\_\_\_

Street \_\_\_\_\_

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

We accept MasterCard, VISA and AMEX.

**THE IRON SHOP**  
MANUFACTURERS

## THIS NEW HOSE CLAMP PAYS YOU

\$61  
AN HOUR



GROUND FLOOR OPPORTUNITY  
TO START YOUR OWN  
MONEY MAKING BUSINESS

Over 32 Million old style metal clamps  
(worth over \$20 million) used require-  
ing starting NOW!

**SPEEDY CLAMP®**

Men, Women ... Now you can show this  
brand new high-profit product to local garages,  
auto/hardware stores, mechanics, boaties,  
hobbyists, plumbers, etc. Operate from home.  
Make your own hours, full or spare time. NO  
CAPITAL OR EXPERIENCE REQUIRED! Patented  
SPEEDY CLAMP™ made of AL-LI-Alloy, is  
very strong, corrosion, cut, corrosion & finger safe.  
metal clamps. Installs/removes 5 times faster  
too! No special tools. Less expensive than most  
metal clamps. Thousands of applications.  
COMPLETELY REUSABLE. LIFETIME GUARANTEE.

MultiNational Marketing Associates

P.O. Box 3160, Dept. PM 3

Reston, Virginia 22090-1160

NO OBLIGATION - NO SALESMAN WILL CALL

YES, I'm Interested! Send \$9.95 for confidential Business Plan and  
test assessment of 22 SPEEDY CLAMPS® worth \$10.50. Get started  
immediately. ACT NOW! (Nothing extra for postage and handling).

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY/STATE/ZIP \_\_\_\_\_

FREE PROFIT PLAN



Tells you all you need  
to know. Helps you  
get started quickly in  
this exciting business opportunity.

BEFORE YOU BUY COPY

THE  
30 DAY NO  
RISK TRIAL

Just \$9.95 brings  
you the test assess-  
ment plus the busi-  
ness plan and Big 22-piece

SPEEDY CLAMP™

kit. You get \$10.50  
which gets you  
started. FAST!

RUSH CUPON  
TODAY

## FACTORY DIRECT GRANDFATHER CLOCKS

### Do-It-Yourself Case Kits

Prices Starting At **\$159.50**

(movement and dial extra)

OR  
Completely Assembled  
and Finished

- Solid 3/4" hardwoods: black walnut, cherry, oak
- Heirloom quality
- Solid brass West German chiming movements and dial
- Easy to assemble kits or completely assembled and finished
- Money back guarantee

SEND \$1 FOR  
32-PAGE FULL  
COLOR CATALOG

**EMPEROR®**  
CLOCK COMPANY

WORLD'S LARGEST MANUFACTURER  
OF GRANDFATHER CLOCKS

P.O. Box 3600 • 1000 E. Main Street • Park  
Fairphone, Alabama 36060 • Phone: 1-205-928-2316

I am interested in  Do-It-Yourself Kits  
 Finished Clocks

Name \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_

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

(please print)

## HYUNDAI EXCEL

(Continued from page 189)

tently heard the following: "Difficult to shift, especially into REVERSE," said a Texas homemaker. In all, 14.1 percent of our respondents reported taking their cars back to the dealer to try to correct balky and imprecise shifting.

"The plastic window cranks break off in your hand," snapped a California naval ensign, "and the dipstick is hard to get at." He wasn't alone, either.

A number of people had trouble stuffing fuel in their Excels. A California estimator noted that: "The tank used to be hard to fill because the neck was so small." The dealer put in a bigger neck, and now it works fine."

There were those, too, who pointed out that the deck lid wouldn't stay open. "It's dangerous," wrote a Massachusetts special assistant, "because you hit your head leaning forward while the trunk lid's slowly coming down."

"Driver's seat rocks on its floor attachments," complained a California X-ray technician, "and the dealer has yet to fix it." This was a problem only for owners of the Excel GLS, because that top-of-the-line series comes standard with a 6-way adjustable driver's seat. Seats in the lesser GL and conventional Excel were judged comfortable and solidly planted.

Despite all the standard equipment that graces even the base Excel, a few items weren't offered at all on any series: power steering, tilt column and cruise control, to name the primary three. A number of buyers missed not being able to buy these options.

## Give it time

No big deals, any of these gripes. Give Hyundai a year or so and it'll likely fix everything at the factory level. Meanwhile, rumor has it that within two years the company will offer either a turbocharger or a bigger engine.

And finally, there's this from a Massachusetts civil engineer who'd been assigned to work in Korea. "My experience includes thousands of miles in the Hyundai Pony and Pony 2 wagon. These vehicles were in a car pool accessed by many different drivers and subject to Korea's harsh road conditions. The Hyundais performed well mechanically and maintained their tightness even though driven 'round the clock. My work took me on several visits to the Hyundai Heavy Industries shipyard, a few kilometers from the auto factory. My experiences with the workers led me to an overall faith in the reliability and the export quality of their products. I intend to purchase the Hyundai Stellar when it becomes available in the U.S." And so, undoubtedly, will a lot of other Americans.

# THE BETTER HOME



## How To Repair A **PORCH**

**B**ecause the porch is generally not built as an integral part of the main house, repairing or replacing it is well within the realm of the competent home craftsman. The porch we rebuilt was set into the corner of the building. Other types include those that are open at both ends, and those supported by the building on three sides.

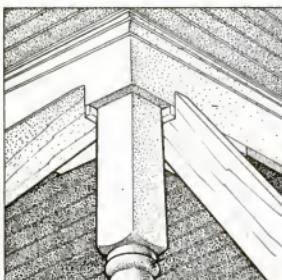
Before you begin work, make a preliminary inspection to determine the

BY PAUL BARRETT  
Illustrations by George Retseck

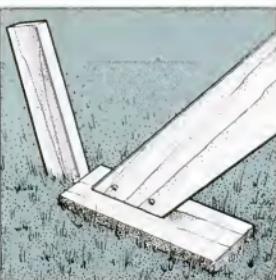
scope of the project. Inspect the deck, railings, posts and related woodwork for deterioration. To check for decay, probe the wood with an awl or screwdriver in several places. Bad flooring may be all that needs to be repaired, but this often suggests more serious problems underneath.

Frequently, newel posts (the posts that terminate the railing at steps and do not connect to the roof) are poorly secured to the porch floor. These should be replaced or refitted for safety. Also check the condition of the roof support columns which are prone to deterioration at their bases.

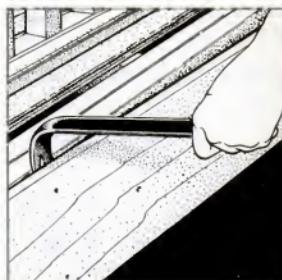
Next, inspect the porch for sags that may indicate frame deterioration. Hold a level against the roof support beam. If it's not level, determine whether the



**1** Place notched 2x6's up against the roof beam to support the roof temporarily. Secure them near each porch column.



**2** Toenail the base of the 2x6 supports to a short slab, and take up the roof load by driving tapered stakes into the ground.



**3** Pry away the molding and fascia around the deck framework and inspect the rim joists for signs of deterioration.

foundation piers or framework are at fault. If the piers are plumb and sound, they may simply need repointing. If not, you'll have to replace them. Be sure to dig below the frost line and position them plumb. They can be built with concrete block or brick, and mortar. Poured concrete can also be used. Construct square forms or buy tubes specially made for this purpose. If you can, crawl under the porch to inspect the structure. Problems in the framework indicate that a more complete rebuild is necessary.

The steps that lead up to the porch are a common source of trouble. On our job, the steps were fairly new and were manufactured as a separate unit, so removing them was simple. For older steps, you must remove the nails holding the stringers to the frame. If they need to be rebuilt, save a stringer to use as a pattern.

If the railings are in good condition you may be able to leave them in place and work around them. Otherwise, remove them by driving the nails that fasten them to the posts through with a drift punch. If you're not going to reuse them, it's simplest to saw through the rails near the posts or walls and pry away the remaining pieces.

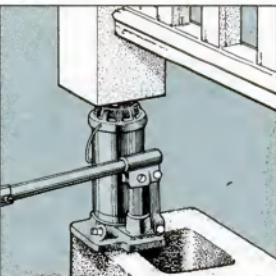
If you're going to replace the entire framework, make construction notes before you start. Record the distance of the outside rim joist from the building and note the direction of the interior joists.

If you've decided to replace the flooring or are going for a complete rebuild, you'll first need to support the roof so it no longer rests on the floor structure. For our corner porch, we installed two temporary support posts, 90° to each other, at the porch corner. On porches

with two open ends, it's usually only necessary to support the roof on the long front face. Place a support wherever there's a foundation pier.

Each support should be made from a length of 2x6 about 3-ft. longer than the height of the roof beam above the ground. The upper end of each temporary support must have a notch cut out so it will fit against the beam, and the bottom end must be cut off parallel with

and then place the platform underneath the bottom of the support on the ground. Toenail the support to the platform. Then drive the tapered stake into the ground behind the platform until the support takes the roof load off the porch columns. When all the temporary supports are in place and you're sure they're carrying the load, you can begin to remove the flooring and disassemble the frame.



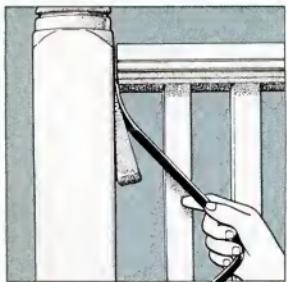
**7** Place a hydraulic jack between a foundation pier and porch post to adjust the roof to its correct height.



**8** Lag bolt a joist to the house, allowing for a space between it and the siding equal to the deck thickness plus  $\frac{1}{8}$  in.

the ground line. Gauge this trimming angle by leaning a piece of the support stock against the roof beam on edge. Hold a level against the face and mark the angle. Transfer the angle to the bottom end and trim to the line. At the top end, mark a square notch about 3x3 in. at the same angle and cut away the waste. Then cut two 24-in. tapered stakes from a scrap 2x4 and two pieces of 2x6 about 15 in. long for platforms. Place the notched end of the support against the bottom of the roof beam,

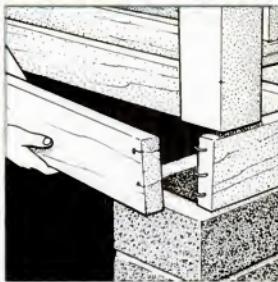
Next, remove the deck framework molding and fascia. Carefully cut the caulk line between the siding and the deck with a sharp knife. Remove the decking with a prybar and examine the joists for decay. If there are signs of rot, sometimes you can reinforce the existing joists by simply nailing new ones into the sides of the old ones. Often though, it's more practical to replace them. To do this, remove the nails that fasten the joists to the rim joists at both ends. Cut new joints to the same size



**4 Remove the rails with a prybar and wedge. If you plan to reuse them, drive the nails through with a drift punch.**



**5 Remove the old flooring to completely expose the underlying structure. Inspect the framework for structural soundness.**



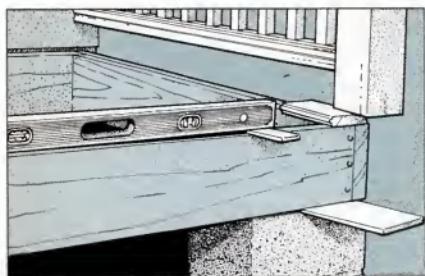
**6 With the roof temporarily supported, disassemble the framework. Begin by removing the end rim joists.**

and nail them in place. Be sure to keep the top of the new joists flush with the top of the rim joists. If the whole deck framework is rotted, remove all the joists and start from scratch.

With the old framework out of the way, and the roof temporarily supported by the 2x6s, you can remove any porch columns that may need to be replaced. Columns that are left should be connected temporarily to the roof

roof beam so it doesn't slip.

The first step in rebuilding your porch is to construct the outside of the framework, or box. Begin by selecting a piece of joist stock to install on the building. It's rare to find perfectly straight framing lumber. Most boards have a crown which must be marked before you use it for framing. Sight down the length on one edge and mark the edge of the board that has the convex crown. The joist should be installed "crown up" so that the weight of the floor will tend to straighten the board over time. If the joist is severely crowned —more than  $\frac{1}{2}$  in.—strike a chalkline along its length and saw or plane to this line.



**7 For good drainage, slope the deck away from the house about  $\frac{1}{4}$  in. over 4 ft. Use a 4-ft. level with a  $\frac{1}{4}$ -in. shim under one end. Adjust the frame until the bubble centers.**

Next, determine the height of the joist that's fastened to the house. Measure the thickness of the new flooring, and add  $\frac{1}{8}$  in. for clearance. Then mark the house wall at this point and strike a reference chalkline. Cut the joist to length, taking into account the thickness of the joists that will meet at corners.

Use 16d galvanized nails followed by  $\frac{3}{8}$ -in.-dia. x  $3\frac{1}{4}$ -in. lagbolts to fasten the first rim joist to the building. Next, attach the perpendicular rim joists and the remaining outer rim joist. Double those rim joists that carry the internal joists, span long distances or support posts that hold up the roof. On our job,

though the porch was a small one, we doubled the rim joists around the perimeter. Liberally nail these doublers with 16d nails.

The porch should be pitched away from the building about  $\frac{1}{4}$  in. over 4 ft. to allow for water runoff. Set this slope before the internal joists are placed. Place a 4-ft. level on one of the rim joists that extend out from the building. Insert a  $\frac{1}{4}$ -in. shim between the outer end of the level and the joist and raise or lower the box until the bubble centers. Install cedar shims under the frame to fix this height, or notch the joists if the frame is too high. Make this check on each side of the porch.

Next lay out the positions of the interior joists. Minimum spacing for the floor joists should be 16 in. on center for good structural support. If your porch is small you can divide up the length into equal spaces that come as close to 16 in. as possible. Mark the joist positions with a square line down the inside faces of the rim joists that they hang on. Place an "X" to indicate which side of the line the joists are hung.

Mark the crown on the lumber to be used for the joists and check that they're all the same width. Occasionally, sizes will vary slightly and this should be taken into consideration when positioning the joist hangers so the tops of all the joists will be flush. Set the joist hangers at the proper height and nail them in place using the special nails provided.

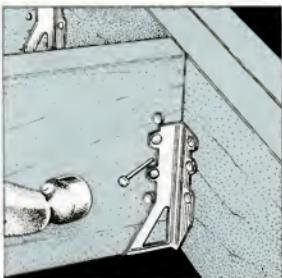
Measure the joist length across the box at both ends and cut the joists to fit. Slip them in place and nail through the hanger holes using the joist hanger nails. Then toenail the interior joists to the rim joists using 16d nails. Two nails per end are adequate.

beam with lengths of scrap wood. These posts were never intended to hang from the roof and, depending on how they're fastened, are liable to simply fall off.

Place a hydraulic jack between a foundation pier and porch post and slowly lift the roof. Raise the roof to its correct height plus about  $\frac{1}{4}$  in. for clearance. Adjust the temporary supports as you go. If the porch posts have been removed, you can nail two 2x4s together for a jack post. Be sure it's plumb and toenail the top end to the



**10** Using a framing square, lay out and nail interior joist positions on rim joists. Nail the joist hangers to correct height.



**11** Cut the joists to length and nail in place with joist hanger nails. Complete the nailing with 16d toenails, two per end.



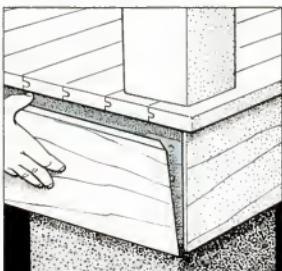
**12** We spliced an extension on the old newel post to fasten it to the frame. Box in around the post for flooring support.

Next, prepare the framing to accept the newel post. On this job, we found that the post was not fastened directly to the frame, but was held in place with angle brackets screwed to the floor. Since the post was basically sound and architecturally attractive, we decided to use it as part of the new structure. To attach it properly, we notched the end to receive a poplar splice that would extend below the floor and attach to the frame. We cut out the inside piece of the doubled rim joist so that the poplar extension fit snugly and lagbolted the post to the frame. Then we fit 2x4 blocking across the joint. This blocking supports the floorboards around the post. If you're replacing your post with a new one, extend it into the framework and box it in.

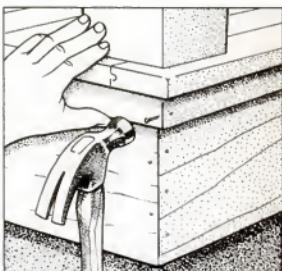
Porch posts, both the ones that support the roof and the newel posts, can be made if necessary. Design details of these posts give character to the house and attention should be paid to building posts that are in keeping with the house design. Round posts are made on a lathe. If the post is longer than the capacity of your lathe, you can make it in sections. Turn a tenon in the end of each section that will fit a corresponding hole bored in the adjacent piece. Assemble the sections with waterproof glue. Square posts can be solid or hollow. Hollow ones allow you to create a wider post without the unnecessary weight of solid wood. They are built up with boards butt-joined at the corners, and can be made in sections with sides that are parallel or tapered. Square posts are ornamented with base and crown moldings in keeping with the style of the house. Both solid and built-up square newel posts should have a cap, usually with bevelled edges, to

protect the end grain of a solid post, or to close off the open end of a hollow post.

To deck over our porch, we used tongue-and-groove clear fir, which is standard for porch floors. Face-nail the



**16** Fascia boards are installed over the rim joists. Miter the corners and fasten with 8d galvanized finish nails.

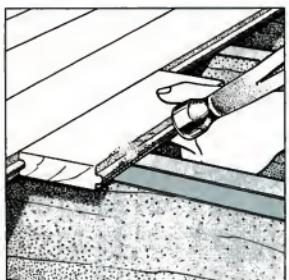


**17** Install the decorative molding under the flooring overhang. Leave a  $\frac{1}{2}$ -in. to 1-in. deck overhang beyond the molding.

first piece in place using 8d galvanized finish nails, tongue edge out. If the groove edge of the first piece is exposed, rip or plane this edge to remove the groove. Nail the succeeding pieces by driving the nails diagonally through the tongues. Use a nailset to finish driving the nails and avoid marring the wood. If you have trouble fitting the boards, avoid hitting them in place with your hammer. Instead, cut a scrap of flooring to use as a tapping block. For badly bowed boards, face-nail and toenail a portion of the board that you can get to fit, and use a pry bar to pull the rest of the piece in place. Let the ends run wild, to be trimmed when the floor is completed.



**20** Attach the completed baluster assembly to the top and bottom rails by nailing through strips with 6d galvanized nails.



**13** Use a tapping block to tighten up the joints in the flooring. This saves marring the tongue-and-groove boards.

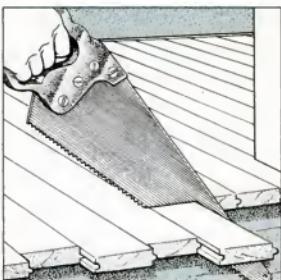
the uncut floorboards to the desired deck overhang and cut to the line. When figuring the overhang, be sure to take into account the fascia and molding that will be applied and add an additional  $\frac{1}{2}$  in. to 1 in. to the overhang for a



**14** Drive 8d galvanized finish nails diagonally through the tongue. Finish driving the nails with a nailset.

reveal. If you're reusing the old railing, toenail it back in place with 8d finish nails. You can also purchase ready-made railing and baluster parts at some lumberyards, or make your own.

To make the railings, select weather-



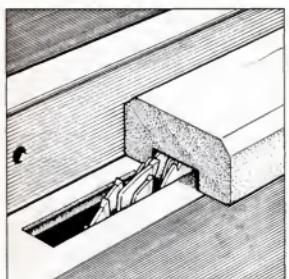
**15** It's quicker to trim the flooring after it's all installed. Strike a chalkline, taking into account necessary overhang.

you need for a run of railing. Divide the total rail length by the number of balusters desired plus 1 to get the approximate baluster spacing. Then multiply the number of balusters by their width ( $\frac{1}{2}$  in.) and subtract this from the total rail length. Divide this amount by the number of balusters plus 1 to get the exact spacing between each baluster.

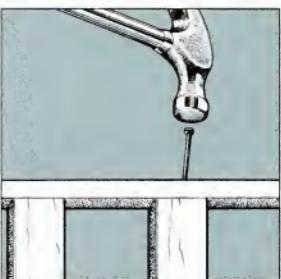
Mark off the strips with the correct spacing. Nail the  $\frac{1}{2}$ -in. strip to the ends of the balusters at the marks and keep the edges flush. Repeat this on the other ends of the balusters. Place the assembly in the groove of the bottom rail and nail through the strip. Then turn over the unit and repeat the procedure with the top rail. Place the assembled railing in position and toenail it to the posts with 8d galvanized finish nails. Use a nailset to finish driving the nails.

The frame is then covered with 1-in. fascia boards of the same width as the joist stock and mitered at the corners. Apply this fascia to the box with 8d galvanized finish nails. Because the porch is sloped, the line for the miter cut on the end fascia boards will not be precisely square to the edge of the board. Mark the appropriate cutting line by holding the uncut fascia in place and tracing the frame corner on it. Follow this line when cutting the  $45^\circ$  miter. Don't forget that it represents the inside line of the miter. After applying the fascia, install the molding with 4d galvanized nails.

Finally, caulk around the edge of the deck where it meets the siding to seal the corner and protect the house and porch framework from moisture. Reattach the steps using 16d nails. Then prime your porch and paint it with a good quality oil-based enamel.



**16** Use a dado blade in the table saw to plough the  $1\frac{1}{2}$ -in. x  $\frac{1}{2}$ -in. groove in the rails for the baluster assembly.



**17** Mark the  $1\frac{1}{2}$ -in. x  $\frac{1}{2}$ -in. strips with the baluster spacing and nail to the baluster ends. Keep the edges flush.



**18** Install the railing by toenailing it to the posts with galvanized nails. Finish driving the nails with a nailset.

resistant 2x4 stock such as cedar, redwood or pressure-treated lumber. Use a router or table saw to shape the top of the rail to the desired profile. We used a table saw to cut a simple  $45^\circ$  bevel along the top edges of the top and bottom rail. Then set up the table saw with a dado blade and cut a  $1\frac{1}{2}$ -in.-wide x  $\frac{1}{2}$ -in.-deep groove in the bottom of the top rail, and the top of the bottom rail. Rip two strips to fit flush inside these grooves the full length of the rail. Cut the balusters  $1\frac{1}{2}$  in. square and to finished length. Measure the distance between the posts and cut the rails and strips to exact length.

To figure the baluster spacing, first estimate how many balusters you think

# Homeowners' Clinic

BY NORMAN BECKER, P.E.

## A shrinking problem

I just moved into a house that's 1 year old. There are open joints between some of the walls and floors which, I assume, are caused by shrinkage of the wood framing. What is the effect of the moisture content of wood on shrinkage and decay? Is the shrinkage of wood proportional to the change in its moisture content?

PAUL KLIENKOPF  
RIVERVALLE, NJ

*There is a direct relationship between the moisture content of wood and shrinkage. However, this only exists when the moisture content is below the fiber saturation point, which for most species of wood is about 30 percent.*

Moisture content (MC) is expressed as a percentage that defines the weight of moisture-bearing wood relative to the same piece when oven dry. Moisture exists in freshly cut (green) wood in two forms: as free water contained within the cell cavities, and as absorbed water contained within the cell fibers. The moisture content of green wood can be as high as 200 percent. Initially, as the wood dries, only the free water is given up.

The moisture content at which all the free water has been lost and all the absorbed water remains is called the fiber saturation point. Even though the moisture content has been reduced from 200 percent to 30 percent, no shrinkage occurs.

Shrinkage primarily occurs across the grain and begins when the cell fibers give up the absorbed water. The total shrinkage that can occur takes place between fiber saturation point (about 30 percent MC) and a theoretical moisture content of 0 percent. For every 1-percent moisture loss below fiber saturation, there will be a  $\frac{3}{5}$ -percent shrinkage or  $\frac{1}{30}$  of the total shrinkage.

Depending on the temperature and humidity of the surrounding air,

wood will give up or take on moisture until its moisture content is in equilibrium with the moisture in the air. Normally wood never reaches a moisture content of 0 percent.

If wood is kept constantly in 70° air with a 60-percent relative humidity, its moisture content will eventually reach about 11 percent. As far as decay is concerned, the decay fungi (rot) will only grow in wood when the moisture content is above 20 percent. Moisture levels below this will not support decay and the wood could last for hundreds of years.

## Bugged

Our problem is box elder bugs. Our house is light green with shaker shingle siding. We plan on repainting and would like to keep the color light. Can you tell me if there is an additive for paint that will keep the bugs away? It seems the color is attracting them by the thousands. At night they crawl under the shingles, only to come out the next day. Can you help?

THOMAS BURTON  
DYER, IN

Box elder bugs feed on the seeds of the female box elder tree and their presence indicates that there must be one nearby. In the fall the bugs seek protected dry places for winter shelter.

I consulted entomologists at Cornell University and the Cooperative Extension at the University of Wisconsin about the effect of color on the box elder bug. Both indicated they were unaware of any preference to light or

dark colors. At present there are no insecticides that you can add to paint that will eliminate your problem. Phil Pelletier, the extension entomologist at the University of Wisconsin, suggests spraying the bugs in the early fall with a solution of Tide laundry detergent and water. Although this will not eliminate the problem, they have found it an effective control. The best long-term solution is to remove the nearby female box elder trees.

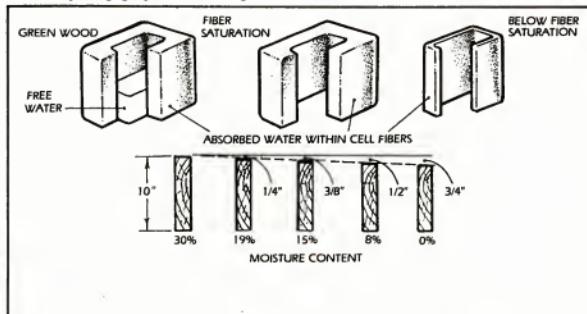
## Creosote problem

When I was installing a wood stove in my fireplace, I discovered that the smoke chamber above the damper was covered with creosote. The damper opening is too small to reach up into this space from below. A chimney cleaning brush pushed down from above will not reach the area. Do you have any suggestions?

ROBERT J. WHITTIER  
DUXBURY, MA

If you can't remove the damper plate (almost all damper plates can be removed or pushed aside once the handle is removed), then do the job with a "pull-cord chimney brush," which has a cord attached at its top and bottom. One person stands on the roof and, while holding one end of the cord, drops the brush down to a person by the fireplace hearth.

Make sure to drop enough cord down so the brush is positioned in the smoke chamber. Then, alternately pull from the top and bottom to brush away the creosote.



*Do you have a home-maintenance or repair problem? Send it to Homeowners' Clinic, Popular Mechanics, 224 West 57th St., New York, NY 10019. Letters cannot be answered individually, but problems of wide interest will be discussed in the column. For more home-repair and maintenance help, get PM's Home Care Guide, \$2.45 postpaid. Send your order(s) to Popular Mechanics, Box 1014, Radio City Station, New York, NY 10101.*

# How To Replace A Lockset

**W**orn-out locksets can be a major aggravation. They're not hard to replace, though, using common household tools.

To remove the inside handle, first examine the sleeve for either a small opening or a clip that protrudes through a slot. If the sleeve on your lockset shows a protruding clip, press it with a screwdriver and pull off the handle. If there's a small hole, you should push an awl or nail through it to depress the clip.

The cover plate or rose usually snaps off by means of a slotted clip, or by turning it past a number of grooves in the rose flange. If your lockset has a slotted clip, depress it and pry the rose

free. If the rose is the grooved-flange type, look for an opening and use your screwdriver to pry off the rose.

If you don't find a screwdriver slot, use adjustable pliers to turn the rose until the grooves line up with the gaps in the mounting plate, and then you can remove the rose.

Next, separate the lock halves by removing the two long screws that hold them together, and remove the lock from the door. Then you should take out the bolt by removing the two small wood screws that fasten the bolt plate on the edge of the door.

To install your new lockset, first install the new bolt. If you're lucky, the new bolt plate will be the same size as

the old one. If it's larger, extend the recess in the door with a chisel. If the recess is too big, install the bolt and fill the excess with wood filler to be finished later. Then slide the lock cylinder through the door from the outside. Make sure that the bolt catches in the slot of the lock. Assemble the lock halves with the two long screws.

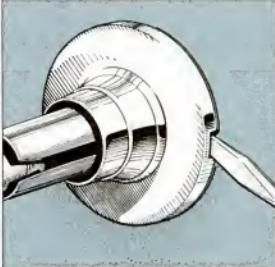
To install the rose and handle, simply snap them over the clips. If your rose needs to be twisted on, press it firmly against the door and turn it until the grooves in the flange catch on the mounting plate.

Now, check to see if the old strike plate works with the new lock. If so, and the finish is an appropriate match, the job is done.

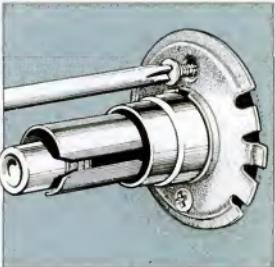
Otherwise, you should remove the old strike plate and install the new one. To measure the exact location, close the door and mark the correct bolt position. Align the new plate and adjust the recess as necessary as with the bolt plate.—Merle Henkenius



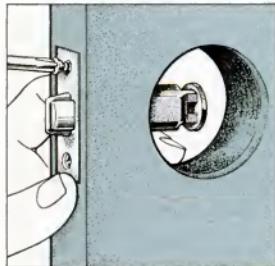
1 To remove the handle, find the clip on the sleeve and press. Use an awl if the clip is reached through a small hole.



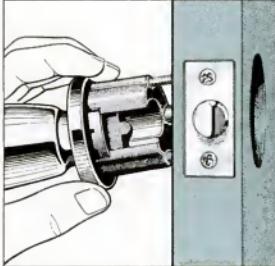
2 After the handle is removed, pry off the rose with a screwdriver to gain access to the main lock screws underneath.



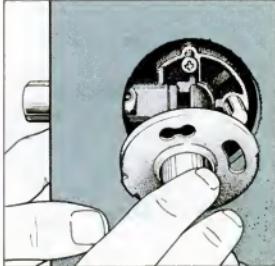
3 Two long screws extend through the door and hold lock halves together. Remove these and lock will come apart.



4 Take out the bolt by removing the two small screws that attach the plate to the door edge. Pry out the bolt if it's stuck.



5 After installing the new bolt, slide the lock cylinder in place and check that it engages properly with the bolt.



6 Reassemble the lock with the two long screws. Snap the new rose and handle in place and then install the strike plate.

# Appliance Clinic

BY STEVE TOTH

## Washer eats clothes

I have a General Electric automatic washer, model No. 1WA50BMA, serial No. LC124876. The machine has a very annoying habit of allowing small articles of clothing to escape the inner tub and get in the outer tub and pump. How can I fix this?

JIM J. MCCAIN  
SALEM, OREGON

*Check to be sure the clothes retainer ring is mounted properly and secured to the basket. Next, check the plastic cover shield and its attachment to the top of the machine.*

*If these parts are in place and in good shape, then you'll probably need to narrow the gap between the cover shield and the tub. Purchase an emergency brake cable shortener, available at auto parts supply stores, and install it on the vertical suspension cable at the rear right corner of the machine. By shortening this cable, the tub will lift and narrow the gap between the cover shield and clothes retainer ring, lessening the opportunity for clothes to go over the side.*

To install the cable shortener, first unplug the machine and remove the back cover. You'll see a cable that goes from the suspension up to the top rear corner on the left side. Install the shortener on this cable and adjust it

*until you get a distance of  $\frac{1}{4}$  to  $\frac{1}{2}$  in. between the cover shield and the clothes retainer ring. Be sure the cable shortener doesn't vibrate against the shell of the machine.*

*A nonmechanical solution, if the gap is not too great, is to place all small items, like handkerchiefs and socks, together in a mesh washing bag.*

## Leaves a gap

I have a Whirlpool refrigerator and recently installed a new door gasket. I followed all the instructions, but now find a space at the bottom corner of the door on the handle side. What's the cure?

CATHY HUGENBERG  
COVINGTON, KY

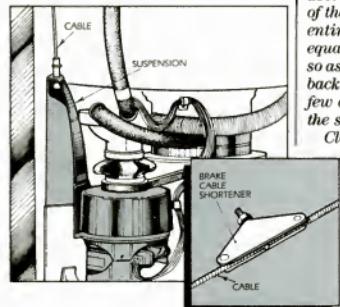
*First, make sure the refrigerator is level and on a solid floor. Also check the inner plastic door panel to be sure it's not cracked or bowed. If it is, replace the panel. Next, unplug the refrigerator, and remove everything from the inner door panel and shelves.*

*Roll the gasket back to expose the screws and retainer, which hold the inner door panel and gasket to the outer door panel. Loosen these screws  $\frac{1}{2}$  to  $\frac{3}{4}$  of a turn on the top, bottom and handle side of the door. You'll notice that the door is now somewhat flexible. Close the door and adjust the outer door panel so the top and bottom edge of the gasket comes in contact with the entire front of the refrigerator cabinet equally. Then carefully open the door so as not to bend or twist the panel. Roll back the gasket again and tighten a few of the screws on the top, and then the side.*

*Close the door and test the gasket for complete contact. If the seal is good, tighten a few more screws and test again. Finally, tighten the remaining screws and recheck for proper contact.*

## Out of balance

My Kenmore 700 automatic washer, model No. 1106914712, serial No. C-40318701, works fine until it goes off balance and the machine stops. A buzzer sounds and the washer won't start in any of the cycles.



Install a brake cable shortener on the suspension cable to narrow the space between the cover shield and tub.

The repairman started it by shaking the agitator. Can you tell me what's wrong?

VINCENT BELLETTO JR.  
RICHWOOD, WV

*Your machine is equipped with an off-balance switch that's activated by the motion of the base plate. Then a holding solenoid is energized, which breaks the electrical circuit to the timer and motor and causes the buzzing noise. By moving the agitator, you also move the base plate and in turn move the trip lever on the off-balance switch, enabling the machine to start.*

*First, check the snubber pad. Unplug the machine and raise the top by inserting a putty knife between the top and cabinet front about  $2\frac{1}{2}$  in. from each corner. Push in on the two top locks while lifting the top. At the right rear corner, you'll see the snubber pad and spring. Lift the spring and remove the pad. Check the underside of the pad to see that the surface is not glazed or worn down and make sure the spring is not broken or slack. If either of these parts need replacing, order a snubber pad and spring, Sears part No. 350902, for about \$4.*

*Next, remove the rear access panel and check the off-balance switch. On the left side, at about the same height as the base plate, you'll see the switch and trip lever mounted to the cabinet. Gently move the trip lever back and forth to be sure it moves freely. If it binds or there's any corrosion, replace the unit. Use Sears part No. 350780, which costs about \$12. While you're in this area, check that all the gear case braces are fastened securely.*

*Finally, check to make sure the machine is level. To do this, plug in the machine, open the lid and start a cycle. Allow the water to rise to the bottom row of holes in the basket, and then shut off the water by pulling out the control knob. Adjust the two front leveling legs until the water is level in the tub. Load the machine with clothes and test-run through a cycle.*

*If you have a problem with any appliance, send your question, along with the model and serial numbers, to Appliance Clinic, Popular Mechanics, 224 West 57th St., New York, NY 10019. Sorry, but letters cannot be answered individually. Problems of wide interest will be discussed in this column.*

# COMING NEXT MONTH



## Fencing With A Flair

- Build our arched gate
- 3-fence mix 'n' match
- Install posts and rails
- Finish with lattice



## Convertible Cavalcade

Get set for summer with our giant ragtop test of the new, popular-priced import and domestic models.

## Detroit Sneak Preview

See photos and advance info on the '88 cars, plus the scoop on the '89 T-Bird and '90 GM Minivan.

## Hi-Fi On The Highway

Tune into state-of-the-art car sound systems in our Special Section. New hardware is described plus tips on upgrading your current system.

## Performing Party Boats

Come along for the fun as we wring out the powerful new deck boats for rivers and lakes.



Overseas

# TAX-FREE SALARIES

POSITIONS NOW AVAILABLE IN:

- ★ N. AFRICA ★
- ★ EUROPE ★ ASIA ★
- ★ MID-EAST ★
- ★ S. PACIFIC ★
- ★ W. GERMANY ★
- ★ S. AMERICA ★ UK ★
- ★ CARIBBEAN ★

**FIRST \$70,000 EARNED IS TAX FREE**

FREE TRAVEL • FREE FOOD  
FREE HOUSING • FREE MEDICAL

World's Oldest and Largest  
LICENSED AND BONDED  
Overseas Employment Agency.

**15,000+ OPENINGS  
AVAILABLE IMMEDIATELY**  
GENERAL, PETRO CHEMICAL  
ENGINEERS, ELECTRICAL  
CONSTRUCTION, EX-MILITARY  
ACCOUNTING, FINANCE  
MD's, DDS, RN's, EDP  
NEEDED URGENTLY

All Positions offer: 1-2 year contracts, free housing, free food, transportation, R & R, medical, dental, etc.

\$450 Advance Fee  
**100% REFUND IF YOU ARE NOT MATCHED WITH AT LEAST 3 COMPANIES**

Call NOW, or send resume to:

**O**verseas  
Unlimited  
Agency, Inc.

CALL NOW (213) 739-8080  
3460 Wilshire Blvd., Suite 908A, Los Angeles, CA 90010

OR CONTACT (208) 344-0442  
290 Bowline Ct., Suite 240A, Boise, ID 83706

For the following states only: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, Washington D.C., West Virginia.

OR CONTACT (813) 985-7300  
402 1/2 56th St., Suite 800A, Tampa, FL 33607

For the following states only: Connecticut, Delaware, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont.

Employment Not Guaranteed



**WOODWORKERS' MART**

\* Tool box plans—sturdy, durable, built of solid cherry or walnut. Looks like old-style tool boxes displayed at antique shows. \$4.95

\* Roll-top desk plans—a handsome piece with classic tambour top and plenty of drawers. Made from cherry. \$5.95

Send check or money order to Popular Mechanics, Box 1014 Radio City Station, New York, NY 10019

## Build this Utility Shed, from Popular Mechanics.

Create a big 12' x 16' shed, with storage loft, built-in workbench, bay window and room for garden equipment. Plans complete with materials list, blueprints and 8-page instruction booklet.



To order, send \$17.50 to Popular Mechanics, Dept. MART, P.O. Box 1014, Radio City Station, New York, NY 10101.

Popular Mechanics is a publication of Hearst Magazines, a division of The Hearst Corporation. © 1987 The Hearst Corporation.

## VENTURA... New Eye Protection Goggle Has What You Want!

Ideal for shop, yard, or wherever eye protection is needed.

**Comfort:** Light frame, soft wide nosebridge seals to facial contours with sleek, adjustable headband.

**Protection:** Fog-free injection-molded lens exceeds government impact protection standards.

**Design:** Frame space between eye and lens permits wearing prescription glasses.

**View:** Optically correct lens provides a very wide field of clear 140° panoramic vision.

**Price:** These goggles can be yours for only \$5.95 plus a pair plus \$1.00 shipping and handling.

**Guarantee:** If for any reason you are not happy with these Protector Safety goggles, return them within 30 days for a full refund.

**Order:** Send \$6.95 per goggle (includes shipping fee); to: Protector Safety, Dept. VSG, P.O. Box 5127, Charlotte, NC 28225



NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_  
STATE \_\_\_\_\_ ZIP \_\_\_\_\_

OR CALL TOLL FREE 800-343-4359 VISA & MASTERCARD, CHECK OR MONEY ORDER ACCEPTED ALLOW 3 WEEKS FOR DELIVERY

## SHELVES — NEW — for SASH WINDOWS

DAYLIGHT FOR YOUR INDOOR PLANTS! SHELF SPACE FOR ANYTHING!

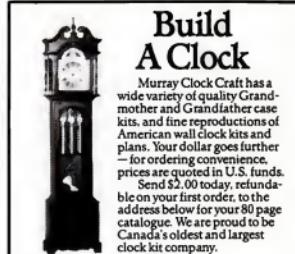
INSTALLS AND REMOVES WITHIN SECONDS INSTANTLY! NO HOLES TO DRILL! TOP SASH OPENS & CLOSES WITH SHELF IN PLACE.

- \* Strong Anodized Aluminum Hangers
- \* Do-It-Yourself Assembly
- \* Uses Window Width Boards (1 x 6, 1 x 8 or 1 x 10)
- \* Unavailable Anywhere Else
- \* UNIBUS - EXCLUSIVE - US-MADE

For Info. Send \$2.00 (Credit to Order) and self addressed envelope. Please specify upper or lower (old) shell.

HANGER KIT #10000  
KIT-\$13.95 each \$6.25 (No PMR on two or more KITS)  
30-day money-back guarantee. You must be satisfied

ACT CO., Dept. PM75 13921 ESWORTHY ROAD  
GERMANTOWN, MD. 20874



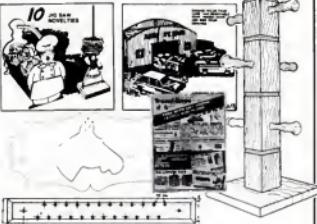
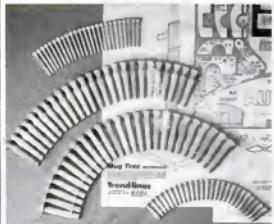
## Build A Clock

Murray Clock Craft has a wide variety of quality Grandmother and Grandfather case kits, and fine reproductions of American wall clock kits and plans. Your dollar goes further — for ordering convenience, prices are quoted in U.S. funds.

Send \$2.00 today, refundable on first order, to the address below for your 80 page catalogue. We are proud to be Canada's oldest and largest clock kit company.

Murray Clock Craft Ltd., 510 McNicoll Ave.  
Dept. OA, Willowdale, Ont., Canada M2H 2E1 416-499-4531

## \$28.00 Woodworker's Package For Only \$9.95!



As an introductory promotion, a leading mail order company is offering \$28.00 of their most popular woodworking items at an amazing price of \$9.95. The complete package includes 25 full size shaker pegs, 25 mini-shaker pegs, 25 mug rack pegs, and 25 tie rack pegs—plus a detailed full size unique horse design shaker peg plan, a full size plan for a beautiful tie rack, and a full size plan for a useful mug rack.

This alone would be a tremendous value. But you'll also receive full size patterns for 10 great items—a hanger for pot holders, note pad holder, napkin holder, muffin server, doughnut holder, pretzel holder, cleanser holder, knife rack, towel bar, and spice shelf. Plus: full size plans for four nifty cars with their own garage. You'll also receive a woodworking catalog loaded with page after page of discount power tools, hand tools, wood parts, wood fasteners, sanding supplies, wood finishes and much, much more. You may order up to four of these \$28.00 woodworker's packages for \$9.95 each. Include only \$2.95 shipping and handling regardless of how many you order.

**\$28.00 worth of  
woodworking items  
for only \$9.95!**

Name \_\_\_\_\_

Address \_\_\_\_\_

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

Quantity Price Ea. TOTAL

--	--	--

TOTAL: Add \$2.95

Shipping/Handling

(MA residents add .50 each order  
for sales tax)

DETROIT CASH DISC  
CHECK OR MONEY ORDER

Mall to:  
Trend-Lines, Inc.  
375 Beacham St.,  
Box 6447M  
Chelsea, MA  
02150

PM57

**SALE**  
*Makita*  
Power Tools



1-800-247-7178

10" MITER SAW MODEL LS1000 ..... \$219.00

8 1/4" TABLE SAW W/CARBIDE TIPPED BLADE MODEL 2708W ..... \$219.00

CORDLESS DRIVER-DRILL KIT MODEL 6012HDW ..... \$96.00

FINISHING SANDER MODEL B04510 ..... \$48.00

7 1/4" CIRCULAR SAW MODEL 5007NB ..... \$97.00

Model 1900BW 3 1/4" Planer ..... \$99.00

Model 6070DW 3 1/4" Cordless Drill Variable Speed, Reversible ..... \$58.00

Model DP3720 3 1/4" Drill, Variable Speed, Reversible ..... \$48.00

CALL TOLL FREE  
1-800-247-7178  
IN WISCONSIN  
608-244-4777

5% SALES TAX FOR WI. RESIDENTS  
HOURS 8:00-4:30 M-F

VISA • MasterCard • Money Order • Check

FREE FREIGHT  
On All Tools

IN CONTINENTAL U.S.A.  
PRICES SUBJECT TO  
CHANGE WITHOUT NOTICE

P.O. BOX 7658  
1801 EAST WASHINGTON AVE.  
MADISON, WI 53707

1984  
MARLING  
L.I. MFG. COMPANY

# WORTH WRITING FOR

## 311 MICKEY'S BOATS

Cobia is the official boat of Walt Disney World. Catalog illustrates models, including the Sun-Skiff 177 outboard with casting platform and tackle box. Free

## 312 THE WINNER'S EDGE

Four Winns has been manufacturing fiberglass power-boats for nearly a quarter of a century. Now it would like you to know about its "Winner's Edge Owner Protection Plan" and how it gives owners an additional two years of coverage at no extra cost. Free

## 313 BAY CRUISERS

For 1987, Bayliner offers an exciting lineup of America's favorite pleasure boats, 14-15 feet. They're all top quality, loaded with standard features, at prices starting under \$5,000. Free

## 314 OVERBOARD ON OUTBOARDS

Mariner's 1987 full line of 2 to 220 hp outboards includes the first electronic fuel injected outboard. Also new for '87 are 3 cylinder 75 hp and 90 hp loopcharged outboards and 9.9 hp outboard. Fully illustrated, 4-color catalog. Free

## 315 REVIEWED YOUR INSURANCE NEEDS LATELY?

Growing family? New home? Recently retired? Chances are you'll find it's time to update your insurance protection. Union Fidelity Insurance shows you how to meet your changing needs. Free

## 316 GASKET MAKING AND SEALING

Loctite has developed a comprehensive guide to gasketing applications for domestic and foreign cars and light trucks. Offers a checklist of gasket installation tips and the proper use of silicone gaskets. Free

## 317 IT'S THE BUILDERS CHOICE™

Colorful 12-page brochure from Stanley Door Systems features their very best in Insulated Steel Entry Door Systems. Includes both patio and entry door systems that the homeowner can be proud of. 25¢

## 318 HI-TECH INSULATING GLASS

PPG's 8-page, 4-color brochure illustrates the new intelligent window and explains how it can retain heat in winter, reflect solar energy in summer for year-round energy conservation. Free

## 319 RAIN, RAIN GO AWAY

With an average yearly rainfall of 35 inches, a home downspout discharges some 13,000 gallons of rainwater. Learn how RAINGO™ gutter & downspout systems clean and collect rainwater. From Genova. Free

## 320 MASTER KEYS TO CAR CARE

38 areas of car care are detailed in 13 handy folders. Step-by-step instructions with clear illustrations and diagrams. Conveniently fits in your glove compartment. From POPULAR MECHANICS. \$5.95

## 321 MACHINES FOR WOODWORKING

Learn how the Unimex Interchangeable Concept has advanced technology for stationary woodworking machines. Informative catalog from Elecktra Beckum USA. \$1.00

## 322 THE DOME - EFFICIENCY CAN BE BEAUTIFUL

GEODESIC DOMES, INC. is offering a beautiful brochure that provides detailed information on building and finishing energy-efficient geodesic domes. Includes color pictures and 80 popular home plans ranging from 910 sq. ft. to 5750 sq. ft. Price list included. \$8.00

## 323 LIGHT UP YOUR LIFE

WORLD CLASS. 45 years of marketing experience makes VELUX a world leader in roof windows and skylights. 28-page brochure, "Complete Guide to Roof Windows and Skylights," is invaluable because the more you know, the better you can compare. Free

## 324 WOODWORKER'S CATALOG

Woodcraft Supply Corporation's catalog of quality woodworking tools. Everything from bit braces to wood borers, from saws to sharpening stones offered. Every product sold satisfaction-guaranteed. Free

## 325 THE WELDER

New York Bronze would like to introduce you to a space age adhesive/sealant designed for all types of repairs—car hoses, attach molding, seal faucets and pipes, bonds concrete to concrete, repairs bath tiles and towel bars. Even mends shoes, rubber boots and has a thousand other uses. Free

## 326 PICKUP PROTECTION

Durakon's 4-page pamphlet shows dramatically how the Durakon® can protect your pickup truckbed from scratches, dents and damage and can increase its resale value. Free

## 327 HIFI - LOW PRICE

The latest Crutchfield catalog offers home and car stereo, video and telephone products. Loaded with informative articles and charts. Plus, savings on top quality brands. \$1.00

Popular Mechanics 5/87

Box 1718, Sandusky, Ohio 44870

Please see that I receive the items checked below

- |                              |                                  |                                     |                                     |                                     |                                     |
|------------------------------|----------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> 311 | <input type="checkbox"/> 316     | <input type="checkbox"/> 320 \$5.95 | <input type="checkbox"/> 324        | <input type="checkbox"/> 328 \$8.95 | <input type="checkbox"/> 332 \$4.95 |
| <input type="checkbox"/> 312 | <input type="checkbox"/> 317 25¢ | <input type="checkbox"/> 321 \$1.00 | <input type="checkbox"/> 325        | <input type="checkbox"/> 329        | <input type="checkbox"/> 333        |
| <input type="checkbox"/> 313 | <input type="checkbox"/> 318     | <input type="checkbox"/> 322 \$8.00 | <input type="checkbox"/> 326        | <input type="checkbox"/> 330        | <input type="checkbox"/> 334 \$1.00 |
| <input type="checkbox"/> 314 | <input type="checkbox"/> 319     | <input type="checkbox"/> 323        | <input type="checkbox"/> 327 \$1.00 | <input type="checkbox"/> 331 75¢    | <input type="checkbox"/> 335        |
| <b>□ 315</b>                 |                                  |                                     |                                     |                                     |                                     |

This Coupon Expires July 31, 1987

Total money for priced items \$ \_\_\_\_\_

Service Charge \$ \_\_\_\_\_ .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

Sophie Gronowicz, Classified Sales Manager Dorothy Nolan, Classified Service Manager  
Rate: \$7.00 per word payable in advance each insertion. Minimum insertion ten words.  
Bold face capitalized words—\$1.00 per word additional (First word set in Bold Face at no  
extra charge, Zip Code Free.) Centered Headlines in All Bold-Face Letters—\$45.00.

The next available issue to place an advertisement in America's No. 1 Classified Section is JULY. The closing is MAY 5th.  
Send remittance payable and order to Popular Mechanics, Classified Department, 224 West 57th Street, New York, New York 10019.

Please indicate Heading under which ad is to appear. As a consumer service and in cooperation with our mail-order advertisers  
who use post office box addresses for their convenience in handling your order, Popular Mechanics  
maintains a register of such mail-order advertisers containing their complete names and street addresses.

Advertisers using P.O. Box number must furnish complete name and street address for our records.  
To avoid delay in the publication of your ad, please send samples and descriptive materials with your request  
if your ad does not state clearly what is being offered.

**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

HOW TO start your own profitable business at home! Ten great books combined into one. Free Details. Turnbull Publishing, 3330 West 114th St., Chicago, Illinois 60655, Suite 101A.

HOW to lawn service \$2.25 Refundable. Morrison, Box 634, Cheney, Kansas 67025

PUBLISH Your Book! Join our successful authors. All subjects invited. Publicity, advertising, beautiful booklets. Send for fact-filled booklet and free manuscript report. Carlton Press, Dept. PM, 11 West 32 Street, New York 10001

NOW!! Four new books!!! Can Literally turn your life around!! Free brochure. BEE-GEE Industries, Box 13036, Wichita, KS 67213-0036

POSITIVE approaches: How to get a Raise or Promotion. \$2.00. Donohue, 1369 66th Street, Brooklyn, New York 11219.

PROTECT yourself from mail fraud. Guaranteed. Send \$6.00 to: Winn Publishing, 705 Harrison Drive, Richmond, CA 94806

WOMEN CALLING YOU!! Booklet explains how to get them to do all the work. \$4.95. Decor House, 1118 Oakway Court, Nashville, TN 37214

HOW TO - Lose weight, fly, computers, more! Catalog \$1 and SASE. Easyway, P.O. Box 42821, #604, Houston, TX 77242

QUINA BOARD And other scientific phenomena explained. Booklet \$4.95. Decor House, 1118 Oakway Court, Nashville, TN 37214

IRRESISTIBLE STRATEGY FOR MAKING \$500 TO \$5000 MONTHLY WRITING NEWSLETTERS. GAME PLAN ONLY \$6.95. TO: PUBLICIST, BOX 2005, WHEATRIDGE, COLORADO 80034-2005.

SAVEM! DON'T BUY Telephone Company repair service. Booklet spells telephone, wiring, repair, installation. Simple. Send \$3.00. Guaranteed. Zamec, P.O. Box 264, Medina, MD 20205.

CHANGE Bad Credit into Good Credit rating almost overnight. Enjoy life again! Free Report. Caldwell, 216 Harmon Hill, Hopkins, S.C. 29061

YOU CAN LEARN TO RELAX. Doctor's guide to reducing stress. \$4.00. Wilson World, 11172 Huron, Suite 21, Northglenn, CO 80234

HOW to succeed. \$8.00. Kerry Cline, Box 193, Baisden, WV 26508-0193.

HOME JOURNAL - record history, improvements, landscaping, ownership costs, taxes. Send \$8.95 to: Lenesbury Press, P.O. Box 310PM, Adams, MA 01220-0310.

DO IT yourself and self-help books! Auto Repair Manual \$12.95, Legal Manual \$14.95, Medical & Health Manual \$19.95. Fixing Old Houses For Profit \$8.95. Free Details! Watson Box 16, Richview, IL 62877

GOLD MINE in Classified Ads and Garage Sales! Tips to save you Hundreds of Dollars! Send \$3.00. Free Bonus. Wallace Enterprises, Box 1027, Londonderry, NH 03053.

LOTTERY PLAYERS!! Everything you need to play your state lottery and WIN! How, where and what to play. Easy to learn systems. Tips to increase your winnings and much more! For "The State Lottery Players' Guide To Winning," send \$12 to: Winning Enterprises, Box 5623, Hopkins, MN 55343.

INCREASE YOUR INCOME BY READING TRADE JOURNALS. Keep Up To Date on Latest Developments. And Get Information Not Available In The General Press. Send for Free Valuable Information. Smithfield, 25422 Trabuco Road #105-383B, El Toro, CA 92630

HOW To Start A Full Or Part Time Business in Dump Trucking. For ALL The Facts Send \$4.95 To: Hauling For A Profit, P.O. Box 1270, Pasadena, MD 21222

POPULAR MECHANICS "PLANS AND IDEAS" CATALOG #1700 — Hundreds of ideas workshop projects, plans and shop tools, storage houses, boats, furniture, toys — just about everything! Send \$1.50 to: POPULAR MECHANICS P.O. BOX 1014, RADIO CITY STA., NEW YORK, NY 10101

## MAGAZINES

WORLDWIDE ENGLISH MAGAZINES-NEWSPAPERS. Sampler: \$4.92. FREE Brochure. Multinewspapers, Box DEBS, Dana Point, California 92629.

ELECTRONICS/COMPUTER enthusiasts. Enjoy doing, learning, saving with monthly construction plans, how it works info. Subscribe today! \$17.97 yr., \$2 sample. Modern Electronics Magazine, Dept. M1, 76 N. Broadway, Hicksville, NY 11801.

FREE Magazines Guaranteed Results \$3.00. Dept. M, Wengco, 2601 West Wells, Milwaukee, Wis. 53233

## CATALOGS

FLAGS! FLAGS! FLAGS! American, State, Religious, Foreign. Home and business FLAGPOLES. FREE CATALOG! Write: LIBERTY FLAG, 424/PK East Main Street, Reedsburg, WI 58599 or Call 608-524-2834.

ELECTRONICS FOR SECURITY, COUNTERSURVEILLANCE AND PERSONAL PROTECTION. CATALOG \$1. HUNTEREX, BOX 12922, WINSTON-SALEM, NC 27117

HEATING, COOLING, EQUIPMENT, PARTS, CATALOG. All makes. \$3.50 Refundable. Plus thousands of items for industry, home. Source Distributors, P.O. Box 863, Arlington Heights, Ill. 60006

HARDWOOD SWINGS, HAMMOCKS, CHAIRS Catalog \$2.00. Arlene's, Box 7380, Puyallup, WA 98373

FREE literature personalized pin or adhesive name plates, any wording. Write: Dependable, 21 Kerinworth, Prospect Heights, Ill. 60070

LEATHERCRAFT Supplies, tools, kits. Catalog \$1.00 (Refundable). Crafter, Tombstone, TX 75489-0699.

PORTER'S FREE PHOTO/VIDEO/CATALOG BEST IN THE INDUSTRY

OVER 4,000 products - Brand names, many unique and unusual items, discount prices and Fast service. For your Free copy write: Porter's Camera Store, Inc., Box 628, Dept. PM, Cedar Falls, Iowa 50613 or phone 1-800-553-2001.

CLOCKMAKING supplies. Dremel Tools. Catalog \$1.00 (refundable). Craftstar, Tombstone, Tx. 75489-0699.

BUT KNIVES, CUTLERY ITEMS at Wholesale. Save up to 60%. Huge Selection, Satisfaction Guaranteed, Fast Service. Send for FREE Catalog. Smoky Mountain Knife Works, Box 714PM, Sevierville, TN 37862.

## AUTOMOBILES

OLD CAR FANS - subscribe to HEMMINGS MOTOR NEWS, world's largest old car marketplace. Hemmings has over 600 pages of ads each month, crammed with thousands of old cars & parts for sale. Only \$17.95 for 12 giant issues. Subscribe to the "bible" of old car collectors today. Send to: Hemmings Motor News, Dept. 7518, 100 Bennington, Vermont, 05201. Order Toll Free 1-800-228-2028 ext 137 within Nebraska dial 1-800-642-2300 Visa/MasterCard Only.

IS IT True You Can Buy Jeeps for \$44 through the U.S. government? Get the facts today! Call 1-312-742-1142 Ext. 7133.

'47-'72 Chevy/GMC Truck Owners, Color Catalog \$5.00; State Year of Truck. Golden State Pickup Parts, Box 119, Santa Barbara, CA 93102.

RADIATORS and heater cores. Wholesale prices. Radiator Express (605) 541-6220.

FREE AUTOMOBILE SECURITY CATALOG: Largest selection available. Do-It-Yourself. Pagers, alarms, hoodlocks, glass detectors. Allow 4 weeks. Immediate Delivery. Send \$1.00. Automotive Security Equipment, Dept. 2, P.O. Box 382, Plainview, New York 11803

VAPOR Carburetor Triples MPG. Free Information. H&A, R2 PV, Bowling Green, MO 63334

SUPER Mileage Carburetors! Do They Work? FREE DETAILS. TDC, Dept. 587A, 304 San Miguel, St. Charles, MO 63303

NEW: The Choffo Cleares Your Windshield with Hot Water. Free information. Roka, P.O. Box 293, Carlisle, PA 17013

SILIC 50% OFF "BIG" ADVERTISEMENT PRICES: \$38.95 POSTPAID!! Information Catalog, \$3.00 refundable. AUTO-CYCLE H.E.L.P.S., Box 517, Timnath, Colorado 80547

HOW To Deal With Your Auto Dealership's Service Department. This Fantastic Book Saves You Time, Money And Aggravation. \$3.95 Postpaid. Forum Publications, 4818 Delores, Union City, Calif. 94587

HOW TO MAKE MINOR AUTOBODY REPAIRS, Fix Scratches, Dents, Rustouts, etc. Step by fully illustrated book. Mail \$4.95. Autocraft Unlimited, P.O. Box 442, E. Grand Forks, MN 56721-0442

10,000 AUTO PARTS below wholesale, in stock for immediate shipment! FREE information. Consumer Discount, 10429 Lakeland, St. Louis, Missouri 63114. 314-427-0890

PICKUP TRUCK TAILGATE LOCKS: Protect your tailgate from theft, two stainless steel locks, with instructions. Send \$24.95. Tailgate Saver, 2310 Ferwood Ave., Dallas, Texas 75216

WORLD'S FINEST FRICTION REDUCING TREATMENT DOUBLES MILEAGE POTENTIAL. FREE PROOF. ALMQVIST, GT51, MILFORD, PENNSYLVANIA 18337. DEALERS WANTED.

STAINLESS Steel MUFFLERS, Pipes, Clamps, Exhaust Systems. BORLA INDUSTRIES, 2639 Saddle Ave., Oxnard, CA 93066.

(Continued on next page)

## AUTOMOBILES

(Continued from preceding page)

**VIDEO: ENGINE REBUILDING** Small block Chevrolet disassembly and complete reassembly. Video 100 minutes of step-by-step instructions and procedures. Call free 1-800-346-4336. \$39.00. Videosmith, Box 19156, Cheyenne, WY 82003

**AUTO APPRAISALS.** Current market evaluation. Include year, make, model, miles. \$9.95. Car Consultants, Box 8956, Fountain Valley, CA 92708.

**EARN THOUSANDS!** New Book *Talk Secrets of Auto Detailing, Learn Techniques and MONEYMAKING OPPORTUNITIES*. \$9.95 plus \$2.50 S/H. Creative Concepts, Inc., 3-3, 530 Stevens, Suite #04, Addison, IL 60101

**HOT SEATS.** Locked Doors, Lost Keys . . . ? No more! Unique new driving accessory catalog. FREE. MCI, Box 4800-C, Sparks, NV 89432-4800

**YOUR CAR WILL RUN ON AIR!** (With only a tiny amount of gas vapor around the spark plugs.) For plans send only \$20.00. Jet-Air,™ 3210 Ave. H., Lubbock, Tex. 79404

**AUTO Service.** Repair Record Book, \$3.00. G-A Enterprises, Box 596, Fort Hamilton Sta., Brooklyn, NY 11209

## AUTO SUPPLIES & EQUIPMENT

**ALTERNATOR** Generator Rebuilding Book. Price: Hechalum Engineering, Box 26224, Las Vegas, NV 89119

**PARTS:** Army, Jeep, and truck parts. Spare Parts & Equipment Co., P.O. Box 751, Lexington, Kentucky 40567-0751

**CORVAIR PARTS**-Giant 400 page catalog rushed \$4.00. Clark's CORVAIR Parts, Inc., R1 2, Shelburne, MA 01370. (413) 625-9776.

**AUTOMOTIVE** air conditioning parts discount prices: Catalog \$2.00. Auto Air Supply, 166 Placid Heights, Saginaw, Texas 78155.

**MOTALOY** ring valve job while driving. Guaranteed \$10.00, two \$18.00. Postpaid. Andris, Box 34081, San Francisco, CA 94134. Dapt A

**ENGINE OVERHAUL KITS:** WHOLESALE CATALOG \$2.00. ESG, Dept. PM, Box 13053, Lansing, MI 48901

**AUTO Book Center** Stocks 2000+ titles. Repair Owner's Manuals. All Makes 1920-86. \$4.45. 48Pm Applicator. Auburn, MA 01501. Ph. 617-332-3081 M/C Visa

**PARTS:** Jobbers, Engine Builders, Automatic Transmission Shops, Buy Rebuilding Kits Below Wholesale. For-eign and Domestic Catalogue \$3.00. Rebuilders Wholesale Warehouse, Box 125, Cliffside Park, NJ. N.J. 07010

**RUST SURGEON** Removes rusting spots, scratches on cars and other surfaces. FREE refil: \$5.00. Daniels Products, P.O. Box 53179 Trinity Lane, Waukesha, WI 53186

**PUMP MAN** a tool to make pumping gasoline easy. Send \$1.25. Pump Man, RD 1 Box 102-B, Bedford, Pennsylvania 15522

**"FLUID FINDERS"** - new peat & stick color coded labels attach to critical fluid check points under hood. 1 minute installation. \$1.00 for 3 sets for \$3.00: Fluid Finders, P.O. 26012, Minneapolis, Minn. 55426

**SYSTEM "4B-PLUS"** Adds years to engine life. Saves gas. Worthwhile investment, one-time engine treatment. \$14.50. Strategic Marketing, 14420 Troquois, Apple Valley, CA 92307.

**NEW Headlight-On Alarm;** Adds battery drain and expensive Towing! Order Now! \$11.95. Box 15464, Pensacola, Fla. 32514

**INDASH car video/sound system** with b&w TV. Electronic digital am/fm/mpx radio and auto reverse cassette player. DETAILS: Tech Electronics, Box 1580, Haleah, FL 33011

**MICRON Ring Valve Job** Guaranteed while Driving \$6.95. Two \$15.00 Postpaid. HARVCO, 1492 West Alameda Avenue, Denver, Colorado 80223

**MOTORCYCLES, MOTORSCOOTERS & SUPPLIES**

**MINI-BIKE Kit-\$49.00**, Go-Karts, 2, 3 And 4-Wheel ATVs', Engines, Wheels, Tires, Clutches and Accessories. 1987 40 Page Wholesale Catalog \$2.00. Go-Karts & Kits, P.O. Box 755, Toledo, OH 43624-0755.

**GO-KARTS** factory direct, from \$39.95 to \$239.95 complete ENGINE \$1.00. Schmidier, P.O. Box 142, Springfield, PA 18081

**GO-KARTS** MiniBikes, Atv's, Kits, Parts, Engines. Lowest Prices. Largest Selection. 800 page Catalog \$3.00. Refundable. Kart World, Dept. C, 1488 Mentor Ave., Peinasville, Ohio 44077

## AVIATION, HANG GLIDING

**PULSE JETS**, Pressure Jets, Rocket Engines, Turbines, Plans, Kits, Assembled. To 10,000 ft. Thrust. Catalog \$3.00. Metal Products, Box 1881M, Murfreesboro, TN 37133

**DESIGN-BUILD AIRPLANES, HANG GLIDERS.** Simplified publications brochure 25¢. McCoy Aircraft, Suite 243, Box J, Manhattan Beach, CA 90266

**"LESS EXPENSIVE FLYING FOR A RECREATIONAL PILOT"** Send for booklet. Fisher Aviation, R13 Box 552, Marthasville, MO 63357.

**747 PILOTS EYE VIEW VIDEO.** Takeoffs, landings, from 747 cockpit. 20 minutes. Classic music. VHS/BETA. \$24.95 to: Have Productions, 103-49 104 Street, Ozone Park, NY 11417

**HOME-BUILT EXCITEMENT.** Build "CHOPPY" hobby helicopter. Simplified construction - motorcycle engine. Plans: \$20. US\$ 24.95. Kit: \$3. POLYNYVA, Box 670M, St. Ram, Quebec, Canada J0L 2L0

**PILOTTED ULTRALIGHT BLIMPI** No license required. Guaranteed completed plans, only \$29.95. Thistedown Airships, 50 East Kelsey Ave., Salt Lake City, Utah 84111.

## NEW WAY TO FLY

**AMAZING 1750 ft flying machine** CLIMBS to 10,000 FEET. NO WINGS or Helicopter Blades. For \$25 to Fit in Trunk of Car. SAFEST, EASIEST, CHEAPEST Way to Fly. Come Be a Dealer (if open). For Complete information & FREE Demo flight signs \$35.95 to: Freedom Flyers, P.O. Box 135B, West-Pittston, PA 18643.

## PROPELLERS

**PROPELLERS** - for Hovercraft, Ultralights, Homebuilt, Wind Generators. Information \$1.00. Aerotec, R1, Box 1025, Quinlan, TX 75474. 214-447-2010

## SPACE & ASTRONAUTS

**NASA** amblams, toys, gifts, collectibles. Catalog \$1.25. Amblams, Collector Trends, Box 361, Dayton, Ohio 45409

**BOOMERANGS . . . HI-TECH RETURNERS!** Polycarbonate. Paxolin. Wood Constructed. World's Best! Collectible. 11th Annual Catalog. FREE! Boomerangman, 601-1 N. 3rd, Monroe, LA 71201-4222

## HOVERCRAFT

**HOVERCRAFT** Plans All Sizes Catalog \$1.00. Universal Hovercraft, Box 261, Cordova, Illinois 61242

**AERO-CAR** Amazing Hovercraft built easily with ordinary tools. Lawnmower angina power. Carrier one man plus. Hovers, flies forward, backward. Sideways over land/snow/water. Complete construction plans and brochure. \$10.95. Aero-Projects, Box 5118P, Clinton, New Jersey 08805

**HOVERCRAFT PLANS & PUBLICATIONS** Catalog \$1.00. Lansing Aero-Marine, P.O. Box 27655, Lansing, Michigan 48909

**VW HOVERCRAFT** Information \$10. Plans \$25. Neotaric, Box 2438, Melbourne, Australia, 3001

**BARTLETT** Flying Saucer Ultra-Light Hovercraft Featured in Documentary Film, "Force Beyond." Powered By Ordinary Lawn Mower Engine. Complete Plans \$10.00 Info-Pak \$1.00 Send To: Harb Bartlett, P.O. Box 156M, Silverdale, WA 98383

**SNOWMOBILE ENGINES** New Two Cylinder 386CC With Electric Starter, Carburetor, Manuals. Only \$250. Shipping \$20. Many Applications Hydrotach, Box 14444, Long Beach, Calif. 90803. 213-424-6094

**ADVANCED Ultralight ACU**, unique performer. Infopack \$8.00. Cert cheque Money order. ULM, Box 478, Carlton Place, Ontario, Canada, K7C 3PS

**PEGASUS**: Hover over fields, parking lots or any surface that's flat and hard in this floating machine. Build it yourself for about \$150 worth of plywood and paint and an old lawnmower engine. The Pegasus has a 7-ft. Die. and hover's 10' above the ground. A gallon of regular gas provides 3 hours of flying time. PC-1800 - \$95. Send Order To: Popular Mechanics, P.O. Box 1014, Radio City Station, New York, NY 10101

## CBS', RADIO & HAM EQUIPMENT

**POLICE Scanners**, Baartec, Regency, HPR, Box 19224, Denver, CO 80219

## electronics

**NIGHT VISION SCOPES.** Reconditioned Military units. Both Starlight (Passive) and Infrared (Active). Catalogs \$4.00. STANO Components, P.O. Box 6274, San Bernardino, CA 92412, (714) 883-7282

## EARNS \$30-540 PER HOUR!

WITH only a BASIC knowledge of electronics, YOU can start your own PROFITABLE full/part time MOBILE TV REPAIR BUSINESS. Write: Dowdell TV, P.O. Box 8057, Temple Hills, MD 20748

**BUGGED? WIREDAPPED?** Find out fast! Countermeasures equipment catalog \$1. Capri Electronics, Box 569P, Bellflower, CA 90212

**DESIGNS** for 30 HOT SELLING Electronic products \$5.00. P.O. Box 378, Bay Pines, FL 33504-0378

## COMPUTERS & SOFTWARE

**TI-99/4A Software** Hardware bargains. Hard to find items. Huge selection. Fast Service. Free Catalog. Dynamic, Box 690, Hicksville, NY 11801

**COMPUTER FACT BOOK** Learn about computers the Easy Way. For FREE Information Write: Computer & Arts, 5560 LaJolla Blvd., Suite 472-H, LaJolla, CA 92037

**SOFTWARE**, IBM Compatible. Less than \$4.00 Disc. SASE for Catalog. PSCo, Box 1057, Capitol, CA 95010

**COMPUTERS** are for everyone! Invest in used system with confidence—new booklet tells how. Guaranteed. Order now! \$4. STARR, Box 3401, Wenatchee, WA 98801

**PROGRAMMABLE CONTROLLERS**. Simplified explanation designed to help electricians understand, install and maintain microprocessor-based sequencers. \$3.60. WPD Publications, 169 Ridge Road, Utica, New York 13501

## STEREO, CASSETTE TAPES, ETC.

**THOUSANDS OF OLDIES!** Hard-to-find 45rpm hit records from the last 40 years including pop, country, rock and soul. Send \$2.00 for catalog to: American Pie, P.O. Box 66455, Dept. PM, Los Angeles, CA 90066

## TV & VIDEO EQUIPMENT

NOTICE: USE OF CERTAIN ITEMS IN THIS CLASSIFICATION REQUIRES STATION AUTHORIZATION.

**CABLE TV** Converters, quality merchandise, we ship C.O.D., low prices. Send \$2.00 for catalog. Cabltronics Unlimited, P.O. Box 266PM, S. Weymouth, MA 02190. (617) 843-5191

**VIDEO MOVIES** Giant catalog-directory \$5.00 (refundable). Towar, Dunkirk, MD 20754-0213

**CABLE-TV CONVERTERS**. Scientific Atlanta, Jerrold, Oak, Zenith, Hamlin. Many others. "New" VIDEO HOPPER "The Copy Killer" Visa, MIC & Amex Accepted. Toll Free 1-800-626-7623. BAB Inc., 10517 Upton Circle, Bloomington, MN 55431.

**CABLE-TV Converters**, Microwave Antennas. Large Selection. Free Catalog. TCE, Box 343, Brooklyn, NY 11230

**VIDEOS**, Ram-by-mail. Boating, Travel, Crafts, How-to, Sports, Business, Star Trek, much more. Catalog \$2.00 refundable. Armchair Video, Box 18K1350, Miami, FL 33116

**DONT** Get left behind in the Video craze. Technical information is available to help you better understand it. For listing send \$1.00 to: Ric's Photo, P.O. Box 4232, Vassal, CA 92728

**CABLE TV** converters and equipment. High quality. Low prices. One year warranty. Galaxy Enterprises, P.O. Box 6474, Great Falls, MT. 59406. Or call (406) 761-7191.

## CAMPERS & TRAILERS—KITS, PLANS

**BUILD YOUR OWN** - Travel Trailer - Fifth Wheeler - Motorhome - Camper - Pickup Cover - Plans - Patterns - Kits Catalog \$1 - Glen-L R.H.'s, 9152PM Rosecrans, Box 1804, Bellflower, CA 90706

## BOATS, OUTBOARDS, TRAILERS, & KITS

**BOAT KITS - PLANS - PATTERNS** - 250 Designs - 8'70' - Plywood - Fiberglass - Steel - POWERBOATS - Cruisers - Houseboats - Hydroplanes - Runabout - Outboards - Catamarans - Kayaks - Pontoon - Sailboat - Dinghy - Drifters - Trailers - Multihulls - SUPPLIES - Epoxies - Polyesters - Cloth - Foam - CATALOG \$3.00 (Airmail \$5.00)-Book Amateur Boatbuilding, \$6.00. CLARKCRAFT, 16-P Aqualane, Tonawanda, NY 14210

**EVINRUDES - NEW 1985 BARGAINS - TOP BRANDS** . . . all sizes . . . \$2.00 handling . . . Scott McCulloch parts . . . Electro Marine, 610 Merrick Road, Lynbrook, New York 11563

**BOAT** Plans - Patterns - Kits - Designs of 7'5"-75' - Sailboats - Powerboats - Boatliners - Spinnakers - Hullsboats - Rowboats - Kayaks - Dinghies - Hydroplanes - Runabout - Outboards - Outrigger - Boatbuilding Supplies - Catalog - Fiberglass - Fastenings - Glues - Books. Revolutionary "Poxymold/Poxysheld" manual \$2.00. Glen-L, 9152 Rosecrans, Box 1804MP, Bellflower, CA 90706

(Continued on next page)

**POPULAR MECHANICS** • MAY 1987 205

## BOATS, OUTBOARDS, TRAILERS, & KITS

(Continued from preceding page)

**BOAT KITS - SAIL** 16'-30'. FIBERGLASS. Save half. Anyone can assemble. FREE 40 page catalog. LUGER, Dept. BC-57, P.O. Box 1398, St. Joseph, MO 64502. 1-800-BOAT KIT in MO: (816) 233-5116.

**FIBERGLASS** Boat Building Materials Call or Write for FREE Catalog 1-900-237-9511 or Fl. residents 1-800-282-9498. Suncoast Fiberglass, 2680 Palm Beach Blvd., Fort Myers, FL 33901

**BEAUTIFUL BOATS YOU CAN BUILD FROM OUR 300 PROFESSIONAL DESIGNERS!** In Boatbuilder's International Directory, the established completely independent guide for plans, kits, materials, hardware, rigging, tools, etc. Dinghies to yachts, working. NEW 8th edition bigger & better, the ever only \$50 plus \$1.50 shipping. **BOATBUILDER'S DIRECTORY**, 1001 Bridgeway Dept. 621M, Sausalito, CA 94965.

**SECRETS** How To Save On Used Outboards. Free Information. Edwards, P.O. Box 1124P, York Harbor, ME 03911

**CYCLING-ON-WATER** For fitness fun or fishing, light & fast, with an efficient drive end big rudder tail, your bicycle and build from Dwg's & Data \$20.00 or Info Pack \$5.00. Jumbo's, P.O. Box 955, Willis, Tex. 77378.

## CAMPING EQUIPMENT & TENTS

**IS YOUR LIFE WORTH 3 BUCKS?** Our New Catalog Of Military, Outdoor & Survival Gear Is! Refund On Purchase. Ground Zero, P.O. Box 335H, Croton, OH 43013

## OUTDOOR EQUIPMENT

**PICNIC TABLE:** Stowaway Picnic Table is a clever one-piece design that folds like a scissor for convenient storage. Easy to build. (PC-1716-\$5.95). Send order to: Popular Mechanics, P.O. Box 1014, Radio City Station, New York, NY 10101

## ATHLETIC EQUIPMENT AND BODY BUILDING COURSES

**BIGGER** More Powerful Muscles - faster! Free Booklet! Universal, Box 6694A, Detroit, Michigan 48240

**KUNG FU** Free Lessons, Send \$10 for Postage. McLisa, Box 1755, Dept. PM87E, Honolulu, Hawaii 96805

**ATTENTION BODYBUILDERS** New natural bodybuilding product. IT WORKS LIKE STEROIDS WITHOUT SIDE EFFECTS. Send SASE plus \$1.00: FSE, P.O. Box 35634, Canton, OH 44735

## SPORTFISHING

**HUGE HAWAIIAN MARLIN!** Gentle seas, pristine islands, \$400/day. Free brochure! 1-800-356-5662. Charters-H, Box 3602, Kona, Hawaii 96745.

## FISHING, TACKLE, LURES

**FREE** Sinker Mold Catalog over 100 molds 25 shapes. Carmen's, Box 220PM, West Newton, MA 02059

**SUPER SHEARS-COMPACT 8 1/4"** FISHERMAN'S FRIEND. Cuts thin, tails, fishing leads, steel wire, sheet metal, leather, hardboard. Wide-gauge stainless steel with cushion grip for left and right hands. Includes leather scabbard, lanyard. \$12.95 plus \$3.60 shipping and handling. Shipped duty free from our U.S. warehouse. Satisfaction Guaranteed. Valley Trader, 2775 Modugno, Dept. 308, P.O. Box 5375, St. Leurent, Que. Canada H4L-4Z9

## GUNS, DECOYS, HUNTING

**BEEMAN HIGH POWER ADULT AIRGUNS**, Fine Firearms, Magnum Slingshot. Guaranteed best prices for the very finest. Unexcelled power yes, but more importantly: unequalled accuracy, trigger action, durability, ownership pride. \$1 Lifetime Repair Policy. Mention code PMC for FREE Airgun Catalog/Firearm information. Add \$1 for fast mail. Beeman, 3440-PMC Airway Dr., Santa Rosa, CA 95401-2040.

## BATTERY REBUILDING SCHOOL

**TECHNICAL** breakthrough in battery chargers-use 1/2 the electricity compared to old type. Technical breakthrough in carbon pile testers-no burnout! Moore Tool & Cover Company, 10415 US 98, Sebring, FL 33870. 813-655-1616

## ENGINES, MOTORS

**SMALL ENGINES** Galore! Free Discount Catalog. Engines, Box 166P, Ashland, MO 65010.

**GENERATOR KIT** 5 H.P.-2400 Watt, Assemble in minutes. Save hundreds. Send \$5.00 (refundable) to: Gen-Kit, PMB6702, P.O. Box 160, Rockford, MN 55373

**ENGINE**, Chevy 350-305, all new parts, 6 month warranty. \$695.00 shipped today. (216) 966-7900.

**NEW** Lightweight 6HP. Engines \$99.00. U.F.M. 922D Industrial, Lodi, Calif. 95240

**VIDEO BRIGGS & STRATTON ENGINES** Tuneup. 2 hours 3 H.P. Recoil Starters, Ignition, and much more. VHS/BETA. Send \$39.95 Check or M.O. To: Portable Services, P.O. Box 1082, La Salle, IL 61301.

## TOOLS FOR SALE

**BOLTS, SCREWS, TOOLS, WHOLESALE, DIRECT**. Guaranteed. Catalog \$1.00 (Refundable), Camelot, Dept. 44, Box 65, Bristol, Wisconsin 53104

**MIDGET RATCHET KITS** Made in U.S.A. Fully guaranteed. Designed to function in confined areas. Free Brochure. CHAPMAN MPG, CO., Dept. PMS P.O. Box 250, Durham, CT 06422. (203) 349-9228.

**DEL'S TOOLS** We Have The Tool To See You Time At The Price To See You Money. For Free Information Write: Del's Tools, 4146 51st Street #2, San Diego, CA 92105

**REPLACEMENT HARDWOOD TOOL HANDLES**. High quality, low cost! Send \$2.00 (refundable) now. Ozark Handle Catalog, Box 3900, Eureka Springs, AR 72632

**HARDWARE, SUPPLIES, TOOLS, AUTOMOTIVE** Discounted. Guarantee. Catalog \$1.00 Refundable. Action, Box 201PM, Neillsville, WI 54456

## UPHOLSTERY SEWING MACHINES

**UPHOLSTERY** Sewing Machines with Walking Feet. Complete to use only \$510.00. Thompson Model PW201-AVAILABLE FROM YOUR LOCAL DEALER, or order direct (Master Charge-Visa). Dattoh Mfg. Inc., P.O. Box 12110, Lubbock, Texas 79452-Phone: (806) 744-6774

## MACHINERY, TOOLS & SUPPLIES

**BANDSAW** mill 16hp. Build for \$1,000.00. Literature \$35. Pans \$25.00. Sado Constructors, 79 Forbes St., East Hartford, CT 06108

**4" METAL CUTTING LATHE** \$104.50. Taig, 15048 Proctor, Indiana, CA 91746

**BEST** Prices. Woodworkers Machinery Catalog. Free. McKilligan, PMS-67, Johnson City, N.Y. 13790

**SMALL FOUNDRY** Furnaces, Supplies. Free literature. Pyramid Products, 3736 South 7th Avenue, Phoenix, Arizona 85041

**"SHARPENERS REPORT"** Monthly Newsletter, Sharpening Guidebook, Angle Wall Chart, Free details, Skog Company, Dept. PMS, P.O. Box 22559, Minneapolis, MN 55422

**BANDSAW BLADES**, Any Size, Free literature. King Saw, 6541 Tidewater Drive, Norfolk, Virginia 23509

**LATHES, MILLS, TOOLS** New catalogs \$1.00. Blue Ridge, Box 536V, Hurricane, WV 25262. 304-562-3538.

**LATHE OWNERS** Low Cost Quick Change Tool Post. KRF, Box 785A, St. Joseph, MI 49085. 616-429-7050

**STEEL** Aluminum, Brass-Steel, Bar, Shop Supplies, Plans. Write: CEL, RR1, Box 163, Cemerion, IL 61423

**STAINLESS STEEL** Mix of  $\frac{3}{8}$ "- $\frac{1}{2}$ " Dia. 10-24" lengths 5.5"- \$5.00 + \$2.95 Shipping. RDS, Box 206, Webster, NY 14580

**LATHES - INDUSTRIAL-HOBBY** FROM \$295.00, METALS, SUPPLIES, LARGE CATALOG \$2.00. CAMPBELL TOOLS 32nd YEAR, 2100-D SELMA RD., SPRINGFIELD, OHIO 45055. 1-513-322-6562.

**FREE WOODWORKERS CATALOG**: Waverly Woodworks, Dept. 42, Route 5 Box 1204, Forest, Virginia 24551. (804) 525-7247

**SHARPENING SUPPLIES**. Finest quality supplies at lowest possible prices. Call Toll Free 1-800-553-2861. In MN call collect 612-866-6653. J-Tool Engineering, 6425 Cedar Ave., Minneapolis, MN 55423.

## ENERGY SAVING

**SERIOUS** About Cutting ELECTRIC BILLS By 50%? Free Information. AAA Services, Box 1260, El Dorado, AR 71730.

## SOLAR & ALTERNATE ENERGY

**"NEW TECHNOLOGY!"** Automatic Feathering Flat-blade Radial Windmill. Powerful, versatile design allows multiple uses. Build from local materials; tower not needed. Minimal welding and machining. Plans (vertical & horizontal) for private use only; patent pending #06/934,870. \$20. Custom Welding Mtg., 1293 NW Well, #1342, Bend, Oregon 97701.

**ECONOMICAL** solar collector. 140°F Air on 0°F day. Passive or active. Plans \$5. B&B Builders, ON735 Lea Drive, Belvoir, IL 60510

**CATALOG-SOLAR, HYDRO-ELECTRIC, WIND POWER** Equipment. Over 350 items. Send \$3.00 U.S. to: WESCO, Box 936, Redway, Alberta, T6H 0L0

**"ENERGY SYSTEMS"** of the 80's. Complete Sourcebook Featuring ARCO Solar Modules. \$50.00 P. Use M.C. Check. FREE INFO IPC-P.M., P.O. Box 649, N. San Juan, CA 95960. (916) 292-3754

**FREE HYDROGEN FUEL** and Oxygen Generator uses Water and Solar Cells. Plans and Kit \$12.00. Prairie Power, Box 6291, Edmonton, Alberta, T6H 0L0, Canada

**FREEI** Solar Energy Products catalog. Gil Electronics, Box 16287, Soquel, CA 95073

## HOME CRAFTSMAN

**SAWBUCK**-Fascinatingly new design lets you cut round timber or slabs quickly, using your chain saw. Plans \$2.00. Sawbuck, P.O. Box 731, Rutherford Hall, NC 27045

**MAKE YOUR OWN FAMILY HEIRLOOMS**. Detailed drawings, material lists for country quilt, stool, round top trunk. Brochure \$1.00. Refunded first order. Sugar Creek, Box 1566A, Sioux Falls, SD 57101

**3 MODEL-T** style toy autos from this set of full scale wood working patterns. A coupe, pickup and flat bed with stake sides, can be made from common materials. Send \$5.00 to: R-D Enterprises, Dept. T-PM-1, P.O. Box 1933, Mount Vernon, WA 98273

**WOODCRAFT PATTERNS**, Windmills, Wishing Wells, Bird Houses, Feeders, Flying Duck, Pheasant, Outdoor Planters, Catalog \$1.00. Crafters, 11840 US. 27 North, DeWitt, Michigan 48620

**FAVORITE WOOD TOYS**, Patterns, Parts, Wheels, Catalog \$1.00. Toys and Joys, Box 626M, Lyndon, Wash. 98264

**BATTERY CLOCK MOVEMENTS**. Below wholesale prices. Best Quality. Catalog \$1.00 (refundable). Yankee, Box 26, Thompson, Connecticut 06277

**CATALOG FULL-SIZE FURNITURE PLANS** - \$2.00. Refundable with first order. Traditional, Early American, over 180 Furniture Designs, 1827 Elmwood, Dept. CP-87, Glenview, Illinois 60023

**PVC PIPE FURNITURE** Plans, Kits And Supplies. Free Brochure, Casual, Box 208, Tewksbury, MA 01876

**PROFITABLE WOODEN "COUNTRY CRAFTS"**. Made \$2,000 one weekend. 100 full size patterns and details only \$6.00. Harville Woodcrafts-P57, 12355 Market, Harville, OH 44632

**BESTELLE \$5 FOR A COMFORTABLE BED?** IT'S True. Your own WATERBED from easy plans & pictures. Free information: Waterbeds, Dept. P. Box 338, Granby, MA 01033

**PROFIT & FUN** Birdhouses & Feeders - 5 Plans - includes Free marketing tips. \$7.95 - Alfred Otto Publishing Co., Box 69076SG, Houston, TX 77269

**FILE CABINET PLANS** 2 Drawers And 4 Drawer, Easy To Build, Both \$5.00. Thomas, Box 40285-A, Bellevue, WA 98004

**STOP TOILET SWEAT** (No Hot Water). Plans \$3.00. 340 Pine St., Centerville, MA 02632

**NEW MULTI-ACTION WHIRLIGIG**. Pattern \$2.00: Carter, 2063 Eaton Dr., Hendersonville, NC 28739.

## WOOD, WOODWORKING

**AMAZING PLANS** For 14 end 45 ft. Short Rubber Band GATLING GUNS. \$10.00. Boxes 1554, Colton, Calif. 92324

**UNIQUE WOODWORKING PLANS**, 5 Projects, \$10.00. Ernie Ledbetter, P.O. Box 60417, Las Vegas, NV 89160

**EZ BUILD** Kitchens with dialed cabinet \$39.90. Box 292421, Ft. Lauderdale 33329

## PLANS, BLUEPRINTS, PROJECTS

**GRAMP'S SPECIAL PLANS** for 3-10 year old pilots. Wood construction plans \$17.00. Information \$2.00. Gramp's Products, Box 389, Tyndall, S.D. 57076

**STRANGE STUFF**. Plans Kits Construct Satellite Dish \$69.00. Bugs, Adult Toys. Informational Photo Package \$3.00 Refundable. Dirijo Corporation, Box 212, Lowell, N.C. 28051

**DEPRAVED Technologies**, SPACE age gadgets. Catalog \$1.00 refundable. Box 11487, Chattanooga, Tennessee 37401

(Continued on next page)

## PLANS, BLUEPRINTS, PROJECTS

(Continued from preceding page)

77 BARNS, MINIBARNS, WORKSHOPS, GARAGES. Outstanding Catalog \$4. (REFUNDABLE). ASHLANDBARNS, 99050 Butlercreek, Ashland, OR 97520.

EASY Build Entertainment Center. \$10.00. Bentley, Box 80635, Rochester, NY 14606

LANDSLAVER PLANS. Fast proven design. Class five (six foot axle). Lightweight, caroppable. Easy to build. \$20. FAST FIVE, P.O. Box 5072, Hilton Head, South Carolina 29938.

3-D PHOTOGRAPHY-Inexpensive holography technique! No table, mirrors, lenses. Instructions \$9.95. Podrey's, Box 4653, Clearwater, Florida 33518-4653

STEELSS STAINLESS Steel BBQ Grill/Snorker LAST FOREVER Plans \$5.00. 5729 Ave P, Birmingham, AL, 35228

THICK galvanized steel arches. For underground living, bomb-shelters, bridges, storage. All sizes, easy set up. Steel Panel Buildings, Fremont Airport, Fremont, OH 43420.

EASY TO BUILD DOG HOUSES, 3 Sizes. Complete Plans \$5.00. Thomas, Box 40285-B, Bellevue, WA 98004

PLANS. Mystifying Illusions, Exotic Electronic Gadgets. Catalog \$1.00. D. Taylor, P.O. Box 1612, Destin, FL 32541

BUILD A Retail-Quality Walk-System With A Saw And Drill! \$5.00. Associates, Box 229215-P, Columbus, OH 43228

ANTIQUE Clothes Hamper. Great Home, School Project. Women Love. Excellent Seller. Plans \$3.00. Westways, Box 406, Worland, WY 82401.

PLANS FOR 200+ TOOLS, Catalog \$1.00 Refundable. Wood-Mat, 3314 Schoff, P.O. Box 1614, Elkhorn, NE 68001

WATER BALLOON CATAULPT, Range over 200'. Kit \$15.00 plans \$5.00. Burns, P.O. Box 1654, Collegiate, TN 37315

EASY TO BUILD 10 x 12 Barn. Free Details. Plans, Instructions, Material List, \$8.00. Plan Ahead, Box 852, Wilmington, OH 45177

172 TRAILER PLANS Motorcycle, Utility, Car, Construction - Strong, Streamlined, good looking, easily built. Catalog \$4.00 (Refundable). Tag-Along, Box 15107, Salem, OR 97309

COMPUTER DESK With HUTCH. Book and Disk Storage With Two Drawers and Room For Printer. Low Cost, Fast and Easy Construction. Plans \$5.00. Ryan Associates, P.O. Box 33942, Denver, CO 80233

## FOR THE HOME

ROACHES: Effective Methods To Exterminata. Guaranteed. \$2.00. Wengco, 2601 West Wells, Milwaukee, WI, 53233

SS\$ GUARANTEED SAVINGS, TIME AND MONEY Extend Life Of Ordinary Light Bulbs And Candelabras Up To 8 Years. FREE Literature. Marchel Enterprises, Box 60, Penrose, Colo. 81240

SEAL Concrete Cracks From Inside! Screwjet Sealacrack Booklet \$3.00. S.A.S.E. Box 86, Ramona, KS 67475.

## HOME BUILDING & REMODELING

BECOME your own General contractor. Step by step booklet shows how anyone can save almost 1/3 off the cost of a new home or remodeling project. Send \$7.95 to: REC, Inc., P.O. Box 4024, Glens Falls, N.Y. 12801 add \$1.00 shipping and handling.

## PLASTICS

CASTOLITE Liquid Resins and Molding Supplies to cast, embed, coat, fiberglass, repair and reproduce, in industry, laboratories, craft work. Catalog \$2.00. CASTOLITE, Dept. 87EPM, Box 381, Woodstock, IL 60098.

PLASTICWORKING videos, manuals, plans, supplies \$1.00. refundable. Bewley Associates, Box 7290, Moore, OK 73163

## DO IT YOURSELF

DOG Grooming-\$5.00-Shaules, 1505 Old Herdin Rd., Billings, Mont. 59101

HOMEMADE COUNTRY WINE Muscadine, Watermelon, etc. 5 Delicious Recipes with Instructions. \$3.00: Walco, Drawer 129, Swartz, LA 71281

BELT BUCKLES for coins or stones, specialty buckles, jewelry mountings, cut stones, clock works. Wholesale catalog 25¢. Eloxite Corp., 806½ 10th Street, Wheatland, Wyoming 82201

INSTALL YOUR OWN IN GROUND SWIMMING POOL for as low as \$1,695.00. Cheswick Pools, Rt. #28, Cheswick, PA 15024. 412-274-6400

ELECTROPLATING. Complete Textbook. Electroplate Metallica/Nonmetals. \$11.95. Details Free. Tropix, Palm Bay, FL 32906-0095

BUY WHOLESALE! Parts for Lawn, Garden Equipment, Small Engines, Chainsaws, Minibikes, Karts. More. Includes repair manual, specialty tools. Send \$4.00 for 184 page catalog, Saw-On-Parts, P.O. Box 45231, Dept P., Somerville, MA 02145

COMPLETE In-ground swimming pool kits from \$1595.00. Free Brochures & Price Lists. Burnett, 341 Hillard Road, North Little Rock, Arkansas 72116

BUILD YOUR OWN 60' PROJECTION T.V. AND SAVE \$200. COMPONENT EXACTLY THE SAME USED BY MAJOR T.V. MANUFACTURER SEND \$2.00 CATALOG: JOHANNA'S GIFT, 7 WALDO ROAD, NORWICH, CT. 06360

HOMEOWNERS, Check and service your own A/C and Heating system. Complete instructions and illustrations. Save on service calls. \$5.00. T's A/C and Heat, P.O. Box 3049, Spring, TX 77383

KITCHEN REMODELING-EUROPEAN CABINETS Ready To Assemble/Install. SAVES HUNDREDS. Layout/Planning Kit \$5.00 (With Order). Construct-A-Kitchen, Dept. PM104, P.O. Box 540316, Miami, Florida 33164

LEARN UPHOLSTERING, Instructions also. Supplies Catalog. Jim Dandy Sales, Box 30377, Cincinnati, Ohio 45230

PVC PIPE FURNITURE Plans, Kits, Material. Free details. Mountain Leisure, Rt. 1, Box 3614-PM, Sautee, GA 30571

STOP Removing Ashes From Your Stove. Ashes burn without chemicals. Simplified instructions. \$2.00. Embers II, P.O. Box 1161, Rialto, HN, Cal. 92704-1161

GARAGE Sales Know-How! \$2.00. Rampick, 587PM, 554 S. Austin Ave., Chicago, IL 60638

STOP NEIGHBOR'S LOUD STEREO, FAST! Simple Plans, Instructions. Legal. \$7.00. BAILEY'S, 424M West Commonwealth, Fullerton, CA 92632

BACKYARD MECHANIC Quick, easy guide. \$2.95 plus Two First Class Stamps. Lemon Tree, Book Div-PM, Box 444, Thorndale, Texas 76577

LEARN POODLE GROOMING Free Information. Write: CJW, 109 Bingham, Newton, MS 39345

INSTALL Your Own Inground Pool \$10.00. P.O. Box 1181, Brentwood, TN 37027

LEARN HOW TO FIX YOUR IBM SELECTRIC TYPEWRITER. Over 50 quick and easy repairs. Save Hundreds of dollars. For instruction manual send \$12 to: Palaha Typewriter Service, 1750 Kalakaua Avenue, #3-226, Honolulu, Hawaii 96825

CORDLESS PHONE MONITOR. Simple Instructions to modify cheap AM radio to receive entire 1.7 MHz cordless phone band. No parts required, only a screwdriver. Also instructions how to monitor the new 46-49 MHz frequencies. Only \$.99 complete. ADVANTAGE INC., Box 1066, Edgewater, Fl. 33023

UNFINISHED Picture Frame Molding Mill Direct, Duraplu, R12C, Lake Arthur, LA 70549

YOU CAN SOLDIER LIKE AN EXPERT With New Process Easy, Inexpensive, \$6.95 Complete. Ronald Semega, 6796 Baresford, Parma Heights, OH 44130. Details Free.

4.221 Catalogs Listed. Sources for Anything! \$5.00. Directory, Box 924529, Atlanta, Georgia 30314

PROJECTION TV ... Convert your TV to project 7 Foot picture ... Results comparable to \$2,500 projectors... Total Cost less than \$300. PLANS & BENS \$21.95. Illustrated Information Free. Macromac-Bl, Washington Crossing, Pennsylvania 18977. Creditcard Orders 24HRS. (215) 736-9977.

## ARTS, CRAFTS, SUPPLIES

STAINED GLASS Supplies. Complete catalog \$2.00. Sunshine Glassworks, 3690 Harlem, Buffalo, NY 14215

CLOCK WORKS. Wood clock blanks, rockhound supplies, belt buckles, cut stones, etc. Wholesale catalog 25¢. Eloxite Corp., 806½ 10th Street, Wheatland, Wyoming 82201

STAINED GLASS SUPPLIES: EXCITING SUPER CATALOG-PGM \$3.00. CORAN-SHOLES INDUSTRIES, 509 E. SECOND, BOSTON, MA 02127.

QUARTZ CLOCK MOVEMENTS-digital \$1.50, epoxy resin \$16.00 gallon, foil prints 95¢, music movements \$1.40, complete clock \$6.50, components, parts—much more! 52pg, wholesale catalog \$3.00 (credited). Steebar, P.O. Box 463P, Andover, MA 01821-0463.

FREE Supply Catalog. Save 30-60%! Suncoast, 6234P-2AN, Saint Petersburg, Florida 33710

STAINED GLASS INLAYING. Easy, No Leadng. Illustrated Instructions \$5.00. M. Wood, 2470 Berryessa Rd., Suite HM519, San Jose, CA 95133

"GETTING Started in Stained Glass." \$1.00. Whittemore, Box 20657, Hanover, Mass. 02339

## CARTOONING, COMMERCIAL ARTS, SIGN PAINTING

CARTOON for Fun and Money!!! Free Booklet!!! Cartoons, Box 40614A, Detroit, Michigan 48240

LEARN Sign Painting, Pin Striping. Free Catalog. Kaufmann Company, Centertown, Missouri 65022

FACE PAINTING \$15-\$40 Hr. Possible. Manual \$7.75 Guaranteed. Information: Wisdom Publishing Co., 218 Clyde Ave., Syracuse, NY 13207

## MODELS, MODELS SUPPLIES

FIRING CANNON Model Plans CATALOG \$2.00. GREEN-PMS, Box 692, Shalimar, FL 32579-0692

RADIO CONTROL Airplanes, Boats, Helicopters, Supplies. Big Discount Catalog \$5.00 (Refundable). Modelers Supply, Box 3107, Eclectic, AL 36024

MECHANICAL FLYING BIRDS! THESE BIRDS FLY LIKE REAL BIRDS. INFO. \$1.00. BIRDS, P.O. BOX 1643, ELIZABETH CITY, NC 27903

MICRO - PRECISION TABLE SAW 4" x 6" table size 21<sup>1</sup>/<sub>2</sub> blade, .010-.057" thick 1<sup>1</sup>/<sub>2</sub> HP. Precac Tool Co., 512 Main Street, Westbury, NY 11590

"WORKING STEAM MODELS" I KITS or ASSEMBLED. New! Fire Engines, Locomotives, Limousine, Roadstar, Truck, Marine, Stationary Engines and Accessories. One of the largest stock in North America. Two Steam Books total 68 color pages \$5.95 (refundable) Colored Circular \$1.00 LARGE DISCOUNTS. DIAMOND ENTERPRISES, Dept PM, Box 537, Alexandria Bay, NY 13607. (313)-475-1771

## TOYS, GAMES, KITES, PUZZLES, NOVELTIES

CHALLENGE! Can You Solve The FIVE DOZEN Puzzle? Instructions To Make \$5 AIRMAILED. Moodie, Havnlik, Finstown, Orkney Islands, Scotland. KA17 2JX

## MAGIC TRICKS, JOKES, VENTRILLOQUISM

FREE! World's Leading Novelty Catalog. 1600 Jokes, Tricks, Science, Sports, Hobbies. Johnson-Smith, F-01, Bradenton, Fla. 34233-3796

LEARN VENTRILLOQUISM! Guaranteed Instruction, Supplies, DUMMIES. Information Free! Maher, Box 420-PM, Littleton, Colorado 80160.

FREE Pranks/Magic Catalog. Garner's, 1085 Fifth NE, Salem, Oregon 97301

FREE! Insider Magic Report. MAGICIANS INTELLIGENCE, 3380 Sheridan, Amherst, NY 14226

AMAZE your friends! Someone picks a card out of the deck, phones your confederate who immediately names the card. Details \$10.00. The Williams Co., P.O. Box 241, Vestal, NY, 13850.

FREE Professional Magic Catalog. Send \$1.00 To Cover Postage. Winkler's Warehouse Of Wonders, 245 Doyle Rd., Oakdale, NY 13637

## ALUMINUM CAN CRAFT

ALUMINUM CAN CRAFT Airplanes, Ships, Trains. Fun profitabile hobby. FREE info. Write: Debie Productions, P.O. Box 110273-D, Aurora, CO 80011

## HOBBIES & COLLECTIONS

NAZI & Historical Military Collectibles. FREE catalog. HMA, Box 18065P, Layayette, CA 94549

PAPER AIRPLANE BOOKLET 12 Original Planes. Send \$5 to: Richard Krebs, 11402 Cherryhill Rd., Bettswell, Md. 20705

AMERICAN MADE PROTOTYPE GAUGE ONE ELECTRIC TRAINS. 24 inches long. Nearly 8 lbs of beauty and power. Also available, LIVE! "STEAM POWERED TRAIN SETS"! New! 20 page colored catalog \$2.95 (refundable) Excellent discounts. DIAMOND ENTERPRISES, Dept. M, Box 537, Alexandria Bay, NY 13607. (313)-475-1771

## DECALS, EMBLEMS, PATCHES

CUSTOM EMBROIDERED EMBLEMS, PINs, DECALS. Free Catalog/Quotes. Rush Sketch. Steinl, 619 Jane, N.Y.C. 10014. (212) 925-2293

## ANTIQUES, RELICS, INDIAN GOODS & CURIOS

FREE List to Serious Collectors. 30,000 Indian Artifacts, Pots, Spears, Axes, Staffs, Beadwork. Caddo Trading, Box 669, Murfreesboro, AR 71958

(Continued on next page)

POPULAR MECHANICS • MAY 1987 207

## ANTIQUES, RELICS, INDIAN GOODS & CURIOS

(Continued from preceding page)

INDIAN Relics List 50¢. Identification Guide Book \$11.44. Arrowhead Samples \$20.00. Seer's, Deerfield, MD 64741  
"WARMAN'S ANTIQUES GUIDE" contains 50,000 prices. Only \$14.55, check or money order. Money back guaranteed! G.J. Meidler, North Sheridan, Box 40922, (PMS), Chicago, 60640

## STAMP COLLECTING

50 YEARS Old fifteen different United States, over fifty years old-25¢ with approvals. Jaxon, Box C11-P, New Rochelle, New York 10804

FREE 10 triangle stamps! Approvals. Gordon Devison, 307M, Contocook, NH 03229

TRY OUR personalized worldwide approvals. Hedges, Box 306, Hencok, MD 21750

FREE! Big Bargain Catalog - New Edition listing thousands of bargains including U.S. & B.N.A. stamp, packets, albums, accessories and supplies. Also line stamps from our approved service. Buy only what you like. Return balance promptly! Thank You. Jamestown Stamps Co., Dept. E57PM, Jamestown, NY 14701

FREE 25 World Wide Stamps Plus Free Catalogue With Over 2,000,000 Stamps. No Approvals. Jetters, 28311 Franklin, C334, Southfield, Michigan 48034.

50 DIFFERENT Old U.S. between 1861 and 1939 - \$1.00 Ed Roush, 423 Shepherd, Mansfield, Ohio 44907.

FREE Gift with First Purchase. U.S. Approvals And Want List Service. 20¢ for Handling. The Stamp Boutique, P.O. Box 456, Madison, NJ 07940

100 Different U.S. 25¢. Approvals. Bradley, Box 425P, Midlothian, VA 23113

FREE 50 Canadian stamps with approval request. Briner's, P.O. Box 5607, San Mateo, California 94402

OLD U.S. stamps on approval. Sherman, Box 15355E, Philadelphia, PA 19111

"INVERTED ERROR" + 100 Different United States, 50¢ with approvals. Lurey, P.O. Box 7068, Silver Spring, MD 20907

UNITED Nations 3 Complete Mint Sets 25¢. Approvals. Corrette, P.O.B. 1509-M, Lake Placid, Florida 33852

WORLD, 80 different, 20¢. Approvals. KSG, Box 651, Nelson, BC, Canada V1L 5R4

FREE!!! Beautiful Stamps, Gold, Silver, Other Approvals. Delor, 2117 Fleetwood, Herper Woods, MI 48225

COLLECTIBLES, Bird, Duck & Wildlife Stamps & Prints. Free Catalog. Dapot, Dept. PS, Sullivan, Ill 61951

CANADA, Commemorative starter packet, 10¢ Approvals. Harley Boardman, Little Valley, New York 14755

ISRAEL 15 Diferent 10¢ Approvals. Sam Chazen, Box 666, Delray Beach, Florida 33444

APPROVALS, General, Topics, 30 years Service Collectors. Ridout, #1009, Houston, ME 04730

200 DIFFERENT Canada \$1.00. Worldwide approvals. Quebechill, Box 68, St-Jérôme, Canada J7Z 5T7.

20 DIFFERENT 4¢ mint US \$1.00. Free Lists. No Approvals. Robert Wagner, Box 29246, Minneapolis, MN 55429

CANADA, 100 different 25¢ Approvals. Oroszky, Box 1-C, Sarnie, Ontario, Canada N7T-7H8.

FREE! 125 Different Foreign, \$10.00 Catalog Value. Approvals. Rick's, 520 South 23rd, Herrin, IL 62948.

BARGAIN 100 World-wide Stamps 25¢. Quality Approvals. R. Perker, Box 143, West Brookfield, MA 01585

WORLD Wide Stamps mounted in books on approval 2s and up. TRUST STAMP COMPANY, P.O. Box 100-P, Jamaica, N.Y. 11435

FREE Surprise Collection with approvals. Gould, Box 750128, Petaluma, CA 94975

FREE sample copy. Stamps the weekly magazine of Philately. 665 Canisio Street, Hornell, NY 14843

ONE TWO! Three Cent Stamp Approvals. Regardless Catalog. Kistar, 1645 52nd St., San Diego, CA 92105

AUSTRALIA 50 DIFFERENT BEAUTIFUL COMMEMORATIVES 10¢. Approvals. Pence, P.O. 3041, Winchester, Virginia 22601

100 Used American And British Commonwealth Commemoratives And Pictorials, \$1.00 With Quality Approvals. SSS, Box 208, Wales, WI 53183

ON APPROVAL Worldwide quality stamps. Reasonable prices. Isham McConnell, Box 47, Bedford, MA 01730

FREE British Commonwealth Pricelist. No Approvals. Rideau Stamps, P.O. Box 2626, Sidney, B.C., Canada V8L 4C1

50% OFF, Scot Catalogue Prices, On Most Approvals Write: BoJo Stamps, 4 Mayfair Cr., Kitchener, Ontario, Canada N2A-1M9

2,000,000 stamps 150 countries 2¢ each. Baider, Box 4149, Dearborn, 48126

LIQUIDATING Tremendous Old Accumulation. Bargain Lists Free. Alatala, Meynard, MA 01754

DISCOUNT packets - worldwide, British, U.S.A. - \$1.00 each. Redgrave, 2453 Keystone, Tarpon Springs, Florida 33589

300 WORLDWIDE 25¢ Approvals. J. Martin, Box 245, New York, NY 10023

40 EUROPE 25¢ Approvals. Birrell, 2304 Hancock #9E, Austin, Texas 78756

MAKE MONEY COLLECTING STAMPS. Guide shows how, where to buy and sell. \$3.00. Charles Gregory's, 2001 College Avenue, Anderson, SC 29621.

FREE A mint U.S. commemorative plateblock is yours tree with your approval request. Colonee, Box 12131, Albany, NY 12212

FREE. U.S. Mint pictorial set complete. Mint approvals included. Hildabrand, Box 4867, Santa Clara, California 95054

## PLAYS, SONGS, MANUSCRIPTS

POEMS, Songs Wanted. Free Recording/Publishing Broadway Music Productions, Box 7438PM, Sarasota, FL 34378

HIT SONG WRITER'S TIP SHEET, TWELVE TIPS \$1.50. Rondo Music, Box 6785-PM, San Mateo, CA 94403.

## MUSIC INSTRUCTIONS & INSTRUMENTS

VIOLIN PLANS: Two 24 x 36 Precision Drawings, \$10 ppd USA. Woodcraft Specialties, 48 N. 21st St., Battle Creek, MI 49015.

ACCORDIONS, NEW, USED, Electric, electronic, Cordovox, concertina, Button Boxes, Hohner. We Buy. Sell. Trade. Exchange. Repair. Tune. 50 Years Experience It Dealers Unavailable. Call or Write for Brochure. Mastercard And Visa Accepted. CASTIGLIONE ACCORDION, 1264 E 7 Mile, Detroit, MI 48205. 313-527-1591/600-325-1823

PIANOS, PLAYERS, PUMP ORGANS. Rebuild and repair. Catalog of "How-To" books. \$2.00 (refundable). Vestal Press, Vestal 11, New York 13850.

VIOLIN, GUITAR, etc., making materials, accessories, books. Catalog. \$1.00. International Luthiers Supply, Box 580397, Tulsa, OK 74158

INTERNATIONAL VIOLIN COMPANY, Catalog for instrument makers, repairers. Imported tonewood, tools, varnishes, parts, accessories, strings, cases. European instruments, bows. Assemble yourself violin and guitar kits. Catalog \$1.00 includes 10% discount certificate. Dept. HR, 4026 W. Belvidere Ave., Belmont, MD 21215.

INSTRUMENT Kits! Build Appalachian and hammered dulcimers, banjos, mandolins, even harps, harpsichords. Free Catalog. PM Hughes, 4419 West Collax, Denver, CO 80204

ACCORDION Top Brands. Cordova, Buy Direct. Tremendous Discounts. Trades accepted. Free brochure. PM, Accordion-O-Rama, 16, 19th Street, New York, NY 10011. Phone 212-675-9089.

## SELF IMPROVEMENT

SELF IMPROVEMENT Books, 400 to choose from. \$1.00 JoviC Enterprises, 805 W. 29th St., Lawrence, KS 66044

FREE! List of 400 unique self - improvement books. 22 categories, all subjects. Large SASE. The Revolving Door, 1266 Delmar Ave., West Chester, PA 19380. SEND TODAY.

CHARISMAS: How to Develop the Power to Attract and Influence People. Cassette tapes: US \$20.00. Charisma Book: US \$8.00. Free list of 300 Self Improvement Books. Order Today: B.C. ENTERPRISES, 215, 1011-17 Ave., SW, Calgary, Alberta, T2T 0A8 Canada

NEW METHOD. How to Stop Smoking. Send \$3.00. Box 6048, Clinton, Iowa 52732

## EDUCATION & INSTRUCTIONS

LOCKSMITHING. Free book. Locksmithing Institute, Dept. 310-057, Little Falls, NJ. 07024

HANDLE YOUR OWN LEGAL AFFAIRS. Be a Paralegal Accredited Attorney Instruction. Home Study. FREE CATALOG. Southern Career Institute, Dreher 57PM-2158, Boca Raton, FL 33427. (305) 368-2522

OBEY Jesus. Include Acts 2:21-47. Tracts For Printing \$1.00. 1127 N.E. Fifth St., Ocala, Fl. 32670

MONEY AVAILABLE FOR COLLEGE EDUCATION - All 50 states. RESULTS GUARANTEED! Call the MONEY WIZARD, toll-free 1-800-US-1221, EXT-6166, to order free valuable report.

EXTENSION And Post-Graduate Awards in Philosophy, Art, Science, Botany, Medicine, Homeopathy, Radionics, and others. 30 subjects Computer course (airmail \$1.00 refundable). Registrar, Sussex College of Technology, Highfield, Denenhill, Sussex, England RH17 7EX.

RADIESTHESIA. Radionics, Dowsing E.S.P. Courses and Equipment illustrated Catalog \$1.00 (refundable). Established 27 years. Dept. PM-R, Bruce Copen, Highfield, Denenhill, Sussex, England RH17 7EX.

HIGH SCHOOL DIPLOMA AT HOME. NO CLASSES. Low cost. Information Free. Call toll free 1-800-228-5600 or write: American School, Dept. #345, 850 E. 58th St., Chicago, IL 60637

PIANO TUNING PAYS - Piano tuning - Electronic organ servicing learned easily at home. Free booklet Niles Bryant School, P.O. Box 20153, Sacramento, CA 95820

L-EARN Clock Repair. Enjoyable, lucrative. Free Details. School of Clock Repair, 6313 ComeAbout Way, Rm. M, Awendaw, SC 29429

LEARN Sewing Machine repairing. A profitable Trade. Easy to learn. Free details. Sewing Center, 167 FR, Rochelle, GA 31079

BECOME an Electronic Or Video Technician in only 14 months. Financial Aid, Placement Assistance and an Associate's Degree. Call Now! (214) 263-2613 Dallas, (213) 595-1660 Long Beach, or (713) 956-0010 Houston. VTI

AUTOSUGGESTION. Sleep-learning Headquarters! Tapes, records, books. Gigantic catalog free. Research Association, Box 24PM, Olympia, Washington 98501.

UNIVERSITY DEGREES By Mail. Accredited Bachelors, Masters, PhD's. Free Facts. Revisited. Careers-PM5, Box 470886, Tulsa, OK 74147

LOCKS Smithing, Universal School of Master, Correspondence and Shop Training. Box 214852PM, Sacramento, CA 95821

LEARN Auctioneering - Free Catalog. Nashville Auction School, Box 2026, D-4, Columbia, Tennessee 38402-2026

EARN MORE IN 90 DAYS. Free 1987 catalogue describes 200 success proven correspondence Diploma courses. Grenon Institute, 263A Adelaide Street West, Toronto, Canada M5H 1Y3

UNIVERSITY DEGREES BY MAIL Bachelors, Masters, Doctorates... Legal, inexpensive, worldwide. Free revealing details: Counselor, Box 1082M, Kempton, Ontario, Canada K0G 1J0

UNIVERSITY DEGREES! Economical home study for Bachelor's, Master's, Doctorate. Prestigious faculty counseled for independent study and life experience credits. (5600 Students, 600 Faculty). Free Catalog. University of Creative Arts, (MC), Inc., President, California Pacific University, 1415 Third St., Dept. 2625, San Rafael, CA 94901. Toll Free: 800-227-0119. California: 800/552-5522; or 415/459-1850

LIFESAVING EMERGENCY CARE. Easy-to-use First Aid guidelines. Plastic chart. Magnetized pocket. Send \$10. 3 sets \$20. Guaranteed. D. Milan, 649 NE 7th Ave., #5P1, Boca Raton, Fl. 33431

DOCTORATES, MASTERS, BACHELORS... Without Attending Classes. Convenient, Inexpensive, Fully Accredited. Write: KENSAM, Box 1383, Rockaway, NY 11691

NUTRITIONISTS INSTITUTE Of America, home study program. Numerous subjects and life help yourself in a comprehensive educational correspondence school. Free booklet, call 1-(800)-821-5234. 812 Woodswether Road, Kansas City, MO 64105

SPANISH: Essential Travel Conversation: "Shopping, Customs, Transportation, Eating..." 15 years experience. Manual. Cassette, \$9.95. John Langner, 1415 Hilltop, Sweetwater, TX 77480

SUPER-INTELLIGENCE! Amazing results guaranteed! Info. EDEM, Box 1462, Glendale, CA 91170

(Continued on next page)

## EDUCATION & INSTRUCTIONS

(Continued from preceding page)

**PROFESSIONS, Medicine Others** Bachelors, Masters, Ph.D.'s. Unique Quick Methods, Homestudy, Enrich Consultants, 163 Jorletem Street, Suite 1105, Brooklyn, New York 11210

**DETECTIVE PROFESSIONAL** Easy Home Study. Free legal pin, certificate, future. Professional Investigator Training School, Dept. CP, P.O. Box 41256, Los Angeles, CA 90041

## SCHOOLS

**WORLD WIDE COLLEGE OF AUCTIONEERING, INC.** Since 1933. Term Soon. Free Catalog. COL. GORDON E. TAYLOR, Box 949, Dept. 19, Mason City, IA 50401. 515/423-5242.

## EMPLOYMENT INFORMATION

**JOBs, CRUISESHIPS, TUGS, SHIPS, RIVERBOATS, OIL-RIGS: Women-Men** Work month-Home month. USA + Overseas. Information \$3.00. Marine Employment, Box 207, Central, IN 47110

**OVERSEAS** Jobs \$20,000 to \$60,000. Free information. Doycorp, Box 697SZ, Pocatello, ID 83201

**TRUCK** Drivers Needed Immediately. No Experience? Companies Will Train You. Purchase Trucks With No Money Down. Write: Sutton, 104 Hampshire Dr., Somerset, NJ. 08873.

**OVERSEAS OIL INDUSTRY CONSTRUCTION JOBS**. High Paying, Valuable Employment Directory For Engineers, Trades & Laborers. Send \$5.00 To: GFS Research, P.O. Box 88, Pearl City, HI 96782

**BEGIN CAREER ON AMERICA'S WATERWAYS**: SASE for free information. Inland Maritime Services, P.O. Box 247, St. Amant, LA 70774

**SOPHISTICATED EXECUTIVE SALES** High Commission. Exclusive Territory Possible! Call Now (800)426-7768 in NY (212)477-5110.

## EMPLOYMENT WANTED

**ARE YOU LOOKING FOR EMPLOYMENT?** Try our Classified Section! It costs only \$5.70 per word. And, if you wish to run all or part of your ad in bold capital letters you can do so for as little as \$1.00 per word additional. Act now! Send your ad to: **POPULAR MECHANICS, CLASSIFIED DEPT., 224 WEST 57TH STREET, NEW YORK, NY 10019**

## HELP WANTED

**ALASKA SUMMER EMPLOYMENT**—fisheries. Earn \$6000-\$8000/cam. \$50.00/12-hour shift for two-month fishing vessel. Over 8,000 openings. No experience necessary. **MALE OR FEMALE**? For \$2+page employment booklet, send \$5.95 to: M&L Research, Box 84006P, Seattle, WA 98124.

**OVERSEAS** ... \$25,000 - \$75,000+. Free Report! Employment, Box 19760-A.R., Indianapolis, IN 46219.

**AUSTRALIA WANTS YOU!** Bag Pay! Transportation! Newest Employment Handbook—\$2.00. International, Box 19107-A.R., Washington, DC 20006.

**GOVERNMENT JOBS** \$10.64—\$59,230+. Now Hiring. Call 805-667-6000 Ext. R-20024 for current federal list.

**DO YOU NEED \$800?** No Job, No Hurry. No Credit, Call This Number: 24-HRS. (707)-475-0204.

## FOR INVENTORS

**INVENTORS**: Commercial success IS possible. But there are no free lunches. \$10.00 and self-addressed-stamped envelope required. Alvarado, Box 172, Freeland, MD 21053

**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 (516) 499-4343

**INVENTORS**: Learn how to submit your ideas to industry. Call free 1-800-528-6050. Canada 1-800-528-6060. X831.

**NONPROFIT** Foundation helping inventors over 11 years. Free recording forms. Free evaluation. Affiliated Inventors Foundation, 5015-B Iowa, Colorado Springs, CO 80909, or call 1-800-525-5865.

**INVENTORS**: Can you patent and profit from your idea? Call or write for your free information package. Over a decade of service. **AMERICAN INVENTORS CORPORATION**, 82 Broad Street, Dept. PM, Westfield, Massachusetts 01086. 1-800-333-5556. In Massachusetts or Canada call (413) 569-3753.

**PATENT IT ECONOMICALLY!** Free Details. Licensed since 1958. N. Ranier, 2008 Fendulic, Richmond, VA 23229

**INVENTIONS Wanted! PATENTVESTMENTS INTERNATIONAL**, 1050 Connecticut #300, Washington, DC 20036

**INVENTION** Drawings By Professional Patent Draftsmen. Draftsman, P.O. 72, Woodstock, Virginia 22664

**REGISTERED PATENT ATTORNEY** Reasonable rates. Edvin D. Schindler, 1523 East 1 Street, Brooklyn, NY 11230

**REGISTERED PATENT ATTORNEY** Washington, D.C. Suburb. Donald A. Kettlestrings, 414 Hungerford Drive, Rockville, Maryland 20850

**INVENTOR** WI Supply Information And Forms For Patents, Copyrights and Trademarks. "Do It Yourself." \$16.95. G. Trimble, Box 3082, Long Beach, CA 90803

**INVENTOR'S NOTEBOOK: PROTECT YOUR IDEAS** - Legal descriptions, claims, drawings, sketches, photographs and designs. Numbered pages and index, sketch space. Provides originality verification and protected disclosure. Recommended by Patent Office. \$29.50. Moneyback Guarantee. Order C. O. D. Visa/MasterCard Write: I.D.E.A. Suite 355, 6657 E. Indian River Road, Virginia Beach, VA 23464 / CALL: 800-843-8167, ext. 805, in VA 800-237-0112

**TEST MARKET** Your Invention At The 30th Annual Minnesota Inventors Congress, (nonprofit organization), June 12-14, 1987. Contact: MIC, P.O. Box 71C, Redwood Falls, MN 56263. 507-637-3344

**INVENTORS**: If you have an invention for sale or license, write for free booklet explaining how we can help. Kessler Sales Corp., C-5-F1, Fremont, Ohio 43420

## US PATENTS \$70+

DO IT yourself & save \$\$\$! Patent Attorney reveals inside secrets. All forms provided. \$5.00 for specifics. **TECHNICAL CO-OPERATIVE INT'L.**, 480 Lighthouse Avenue, Pacific Grove, CA 93950

**BOOK** Protection Ideas, Inventions, without Patent Details. Milestone, RIS 879sp, Twin Falls, Idaho 83301

## INVENTIONS WANTED

**INVENTION MARKETING, FREE INFORMATION, REPRESENTING MANUFACTURERS**, Patmar, 77 Fulton, 260, Financial District, New York, NY 10038

**INVENTORS**! Have an idea? Don't know what to do? Call AIM for free information kit. Toll Free 1-800-225-5800

**LEARN** how to offer your invention for sale or license. Free booklet outlines procedures, royalty rates, requirements. Kessler Sales Corporation, C-5-NW, Fremont, Ohio 43420

## REAL ESTATE & FARMS

**UNITED NATIONAL REAL ESTATE** ... New FREE Catalog! Top real estate values coast to coast. Full Color Premier Properties section. **UNITED** ... For every type of real estate! **UNITED NATIONAL REAL ESTATE**, 4700-PM Bellevue, Kansas City, MO 64112.

**CALIFORNIA**, Lots, Acreage. \$40 Down, \$40 Monthly. Box 35291, Los Angeles, 90003.

## YOUR OWN FISH AND HUNT LAND LOW AS \$39 ACRE \$50 DOWN

BEST areas for fish and game. Government report more fish and game per square mile. **TITLE GUARANTEE, BUY-BACK GUARANTEE**. Bought thru ESTATE LIQUIDATIONS across Canada. **EASY PAYMENTS**. Get your FREE catalog NOW! **CANADIAN ESTATE LAND**, Dept. PMS, 2411 Yonge Street, Suite 303, Toronto, Ontario M4P 2Z1. Phone any time 1-800-488-0444.

**SLASH MORTGAGE PAYMENTS-7 ways-Free** information. Barlow, Box 697, Blairsdon, CA. 96103.

**GOVERNMENT HOMES FROM \$1 (U REPAIR)**. DELINQUENT TAX PROPERTY. REPOSSESSIONS. CALL 805-687-6000 EXT. GH-20024 FOR CURRENT REPO LIST.

**EASY GUIDE** Applying For Mortgage Loans, \$4.00. P.O. Box 1500, Ellicott City, Maryland 21043.

**MONTANA LAND** 20 Acres (or more) starting at \$6950 with \$500 down. \$98.22/month. Near Beautiful Yellowstone Park and National Forests. In the heart of trophy elk, deer, moose, antelope and turkey hunting. Blue ribbon trout streams. Guaranteed Access. Insured Title And Warranty. Your Inspection Welcomed. Free Color Brochure. Video tape. **APPLY TODAY CALL TOLL FREE: 1-800-238-2626**. **YELLOWSTONE BASIN PROPERTIES**, 1119 N. 7th Ave. Dept. P.M. P.O. Box 3027, Bozeman, MT 59772-3027 (406) 587-5468

**FREE CATALOGS - FLORIDA, GEORGIA**. Homes, Land, Businesses. Please Specify State & Property Preferred. **COUNTRY NETWORK**, Box 368B, Gainesville, MO 65655-4632. (417) 679-4632

**NORTHERN IDAHO**. 5-10-20 ACRES. Trees, meadows, creeks, springs, clear air, wildlife. Northwest forest and lake country. Hundreds of choice parcels. Homesteads, miniranching, recreation, retirement. Easy terms. FREE brochure, maps, photos. **NATIONAL ASSOCIATED PROPERTIES**, Dept. ME, 1111 Sherman, Coeur d'Alene, Idaho 83814. (208)654-8161.

**LAND** available land for sale of all kinds in Minnesota and Wisconsin. Lakeshore, islands, river frontage, timber, retreats, cabins, for recreation, investment, retirement, hunting/fishing, or vacation. Send \$12.50 for a one year subscription. (Spring-Summer-Fall-Winter) 4 issues to: Land, P.O. Box 10750, Minneapolis, MN 55440. (612) 333-5412

**CANADIAN COUNTRY PROPERTIES**. Acres for recreation, development, farming, hunting, fishing, investment, minerals, etc. **OUR 72ND YEAR**. Terms available. Titles guaranteed. Catalog armailed \$1.00. **DIGNAM CORPORATION**, Suite 496, 85 Bloor Street East, Toronto, Canada M4W 1B5

## EXPORT-IMPORT

**IMPORT** Hong Kong, Taiwan, Worldwide. Dirt Cheap-Free Details. Gary Enterprises, 88-1 PMS Quigley Drive, Scottsville, NY, 14546

**IMPORT/EXPORT**. How to, and sources. Kitco, Drawer 6266P, Kansas City, Kansas 66106

## BUY IT WHOLESALE

**FREE** 16 page PRINTING PRICE LIST, 1 to 5 colors, sheets sheets to catalogs. Copen Press, 100 (PM) Berman St., Brooklyn, NY 11208

**BELTS**, Buckles, Key Tags, Hat Tac, Jewelry, More. Complete line fast sellers. Big Profits. Complete dealer set up. Color catalog \$1.00 (refundable). Anchor, Box 3956-PMM, North Providence, RI 02911

**CLOSEOUT** Jewelry \$5 dozen. (Catalog 25c). Roussells, 107-1631 Dow, Arlington, MA 02174

**WORLDWIDE BARGAINS** ... Imports - Dropship - Closeout - Surplus - Freebies. (Send Catalog). Marnees, Box 1717PM, Highland, Ind. 46322

**EARN MONEY** selling rings, jewelry, buckles, watches—buy direct, 130% below retail. Catalog \$1.00 (refundable). Anka-PM, 90 Greenwich Ave., Warwick, RI 02886

**400,000 BARGAINS Below Wholesale**: Many Free! Liquidations ... Closeouts... Job Lots ... Single Samples. Free Details. Bargainhunters Opportunities, Box 1409-A, Holland, Michigan 49424

**SINGAPORE, HONG KONG, TAIWAN DIRECTORIES**. Listing 11,000 suppliers, 20,000 products. Buy direct. Information \$1.00. Merrick Distributing, Box 274M, Merrick, NY 11566

**VACUUM CLEANERS** "Discount Prices" New Rainbow \$499.95, Kirby, Filter Queen, Panasonic, Royal, Oreck, Details: ABC Vacuum Warehouse, 6720 Burnet Rd.-Austin, TX 78757

**CLOSEOUTS** Discounts! Below Wholesale! Freebies! Information/stamp: DDN, Box 20152K, Ferndale, Michigan 48220

**REPLICA WATCHES** Free Brochure. 1-713-847-8881. Box 3027, Houston, TX 77273

**SAVE \$500 yearly!!!** Important details, 112 manufacturer addresses. Sunnyraiser Enterprises, Box 399, Sumas, Wash. 98295. Enclose \$2.00.

**2000 QUALITY IMPORTS**: Wholsale Catalog \$3.00 (Refundable). A.S. POB 20622PM, Dallas, Texas 75282

## ADVERTISING AGENCIES, ADV. SER. MAILING LISTS

**NEW NAMES MONTHLY** MIXED STATES AVAILABLE! **IMMEDIATE SHIPMENT** Adhesive Labels; Computerized - Guaranteed Opportunity Seekers 200\$15-500\$25; 1000-\$40. Others. ADVON, Drawer B2, Shelley, ID 83274. Visa/MC/AmEx 1-800-992-8866.

**FREE** Mailing List Consultation. Details. GOC-39P, Box 1107, Stuart, FL 33494. (305) 334-5205. 1-800-554-5478

**OPPORTUNITY SEEKERS** MLM NAMES, FREE SAMPLE. Venture-LP, Box 336, Riviera, AZ 85442

**HOT list** - many categories. Credit card orders 1-800-843-0751-515-232-6789. List, Box 1033, Ames, IA 50010

**MAILORDER BUYERS LISTS** ALL CATEGORIES DISCOUNTED COMPUTERIZED IN ZIP CODE ORDER. NO CHARGE for Peel and Stick Labels. GUARANTEED DELIVERABLE. For Complete Details RUSH SASE to: MML, 508 Echo Hill Ct., Ballwin, MO 63021

(Continued on next page)

**POPULAR MECHANICS** • MAY 1987 209

## ADVERTISING AGENCIES, ADV. SER. MAILING LISTS

(Continued from preceding page)

NAMES! FRESH, HOTLINE, DELIVERABLE! LABELS!  
GUARANTEED! QUALITY PRICES! 1-(800)-992-9405.

FRESH, RESPONSIVE NAME LISTS OF ACTUAL mailorder BUYERS. Most Categories. Computerized in ZIP CODE ORDER. GUARANTEED! DELIVERABLE! For Brochure RUSH SAME TO: INDOSAT CONTINENTAL, P.O. Box 273, Urbana, IL 61801-0273.

FRESH HOT NAMES! OPPORTUNITY SEEKERS. Peel/Stick Labels. Zip Coded. GUARANTEED! DELIVERABLE! 500/520; 1000/\$35. 2000/\$60. JR Enterprises, 809 Briarwood PM5, Victoria, Texas 77904

OPPORTUNITY SEEKERS 500/\$25 MLM/\$35 Peel/Stick GUARANTEED. Multi-Source, Box 556M, Moorestown, NJ. 08057

MAILORDER BUYERS ALL CATEGORIES. Computerized in ZIP CODE ORDER. These people will respond to MAILORDER OFFERS. GUARANTEED! DELIVERABLE! For full details RUSH SAME TO: SUCCESS CONNECTIONS CO., 6 SE 10th Dept. E-01, Pendleton, Oregon 97801.

MAILORDER Buyers Thousands of mailorder Buyers lists are now available for immediate use! Computerized on Peel end Stick labels in zip code order. Guaranteed Deliverable! For complete details Rush to: Lencolit N. Evans, 17A & Peterson Ave., I.M.C. PM, Philadelphia, PA 19145

FREE sample of mailing lists that get results! McCenn, 32 Main, Carteret, NJ 07008

## BUSINESS SERVICES

MORTGAGES AND TRUST DEEDS PURCHASED. Top prices paid. For immediate quote on current rates, send a Self-Addressed, Stamped Envelope plus Day-Time Phone Number to: Hudson, Dept. AC701, Box 421, Canal Street Station, New York, NY. 10013.

INCORPORATE without legal fees! Free booklet tells how, includes forms. Call Harvard Business Services, now 800-345-CORP.

## PRINTING PRESSES, RUBBER STAMP OUTFITS

BARCO Type Founders. Type and Rubber Stamps catalog. Mail \$2.00 refundable on first order. Acme, Bensonville 60106

TYPE Fonts, Hand Printing Presses, Hot Stampers, Supplies. 120 Pages. \$2.00 Deductible first order. Acme Type, 1720 N. Marshall, Chicago, 60622

MAKE rubber stamps—big profits. Complete supply and equipment catalog with instructions. \$1 deductible with order. Star Stamp Supply, 1720 N. Marshall, Chicago 60622

TYPE for printing. Catalog \$1.00/deductible! 1st order. Quaker City Type, R.D. 3, Box 134, Honeycutt, PA 19344

PRINTING Presses, new and used supplies. List 50¢. Turnbaugh Printers Supply, Mechanicsburg, Penna. 17055

## PRINTING SUPPLIES

PERSONALIZED Shipping Labels. Deep Discount! FREE DETAILS! Labels, Box 90C, Tamarkan, MN 55787.

QUICK Copy Printing. Low Prices. Write: Nationwide, 614 North Main, Bloomington, Illinois 61701

1,000 Thermographed Business Cards \$13.50. Vista, Box 81, Miami, Florida 33138

## GIFT SHOPPING

GIFTS for all occasions. Free catalog. Melinda's Gifts, 3237 Schuler Drive, Bossier City, LA 71112

AN EXCLUSIVE COLOR CATALOGUE OF COOPENHAGEN, SKOAL, SKOAL BANDITS AND SKOAL LONG CUT assortments, hats, shirts, jackets, license plates, fender covers, cuspidors etc. etc. Available only from SMOKELESS TRADERS, P.O. BOX 729, SPARTA, NC 28675

PERSONALIZED BRASS TAGS. Business cases, golf, pet, luggage end knives. Other giftware. Free catalog. J. Sturt Gifffware, 6 Division Ave., Blueprint, NY 11175

## 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

TAKE NO CHANCES. Deal with oldest, most reliable firm in old gold business. Established in 1934. We buy Gold, Silver, Platinum, Diamonds, Highest Cash. Free Information: Rose Industries, 29-A East Madison, Chicago 60602

CLOCKWORKS, wood clock blanks, rockhound supplies, belt buckles, cut stones, etc. Wholesale catalog 25c. Eloxite Corp., 806½ 10th Street, Wheatland, Wyoming 82201

CLOCKS, MOVEMENTS, ACCESSORIES (German). Free catalog. 1-800-558-2574. Instruments Services, Dept. PM, 433 So. Arch, Jenkintown, PA 19046

SWISS WATCH REPLICA. 100% Details! Satisfaction! #1 Swiss!

LOWEST PRICES paid by you for first quality diamond jewelry. Guaranteed. FREE color catalog. Diamond Limited, Box 66, Dept. 12, Granger, IN 46530. (219) 277-9336.

## TREASURE FINDERS

TREASURE—Locate quarter mile away with ultra sensitive locator—brochure free. Research Products, Box 270270-AMC, Tampa, Florida 33688

TREASURE Locators Ancient and Electronics. Most Complete Line. Free Catalog DETECTORES, P.O. Box 17129, Dallas, TX 75217.

SAVE up to 40% on metal detectors. All major brands including White's and Garrett. FREE discount catalog. Northwoods General Store, Dept. DPMS, 1325 Greenway Cross, Madision, WI 53713, (608) 274-4680.

GOLD BUG. New metal detector for gold nuggets. Free catalog. Fisher, Dept. POP, 1005 I Street, Los Banos, CA 93633

## PROFITABLE OCCUPATIONS

FREE Information Starter & Alternator Rebuilding, Box 422, Seymour, TN 37865

PLASTERCAST ... Profitable Home Business 3000 Models Available. Details. Lynette, 6251C Montpark, Mentor, Ohio 44060

FREE Brochures. Repair air conditioning, Refrigeration, Tools, Supplies, full instructions. Dooloo, Inc., 11252 Goodnight, Dallas, TX 75229

REPAIR lawnmowers thousands of parts and tools wholesale list 50¢. Ellwanger's, PM, P.O. Box V, Port Jervis, NY 12771

MAKE \$1000 WEEKLY DETAILED AUTOMOBILES! Le-guaranteed—saturation guaranteed. Info: Gropubco, Box 61291, Oklahoma City, OK 73146

STEADY INCOME Servicing cutlery. Simple business-low investment. Ed Liebling, 6305 Westward #109, Houston, TX 77081

MAKE MONEY IN SPARE TIME. Earn Generous commissions as e subscription sales representative for leading magazines. For full details and instructions, send this ed with your name and address to: POPULAR MECHANICS, Dept. AB-M, 250 W. 55th St., New York, NY 10019

## SALESMAN-DIST.

MAKE EXTRA MONEY DURING YOUR SPARE TIME! Earn weekly commissions by advertising the use of Celentino's popular Advertising Birth Photo professional services from AA-1 firm. Our 70th year. No experience necessary. No investment or collections. Set your own hours. Full Time Potential! Write to Kevin Peas, NEWTON MANUFACTURING COMPANY, Dept. EP/MC5, Newton, Iowa 50208

PINS, charms, tie-tacks, key-chains made-to-order. 3-weeks delivery by airmail. Daisy-PB, Box 6-65, Taipei, Taiwan, R.O.C.

## AGENTS WANTED

YOUR OWN OFFICE SUPPLY CATALOG Write: Bemis, Box 51586, Knoxville, TN 37950-1586

## 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. Mellingen, Dept. A2706, Woodland Hills, California 91367

ARAB BUSINESSMEN have money to buy & invest. Top feeders fees paid. IMEA, 187PM, Box 3574, Newark Beach, NJ 07105

\$200 Profit Daily With Your Own Professional Housecleaning Service. No Investment. Details. Westfield, Box 83P, Middleton, Wisconsin 53562

ELIMINATE DEBTS Free Details. TJ Enterprises, 2275 Rem Rd., Dept. 357, Miles, Michigan 49190

EASY BUSINESS! Earn \$1,000's Weekly. Free Details! Write or send stamped addressed envelope. Toddco, Dept. PM, 4219 West Olive Ave., Burbank, CA 91505.

INCREASE Your Income! Arrange loans, leases, other financial services through nationwide lender network. Prestigious money business, full/part-time. Top Commissions, complete training, continuous support. Free details by electronic mail! PFA, Box 697-P, Dene Point, CA 92629, (714) 240-0405 100pm

EARN WHILE YOU LEARN. Repair Hydraulic Jacks. Free Details. Hydraulic Jack Inc., Dept. PMC2, P.O. Box 18, Accord, NY 12404

RICHES & FULFILLMENT for you with millionaire's secrets! Free brochure. S.L. Distributors, Rt. 1, Box 341, Ozark, AL 36360

OWN YOUR OWN BUSINESS Become Financially Independent! FREE Details. Wright, C. Enterprises, 73 Lydgate, Dept. D, Memphis, Tenn. 38109

HOME BUSINESS OPPORTUNITIES Guaranteed way to start your own profitable business at home. Proven programs. Free details. Midwest Communication, P.O. Box 5139, Morton, IL 61550

START MONEYMAKING WOODCRAFT BUSINESS making "Easy - Quick" toys, gifts, novelties. Free details. WILLIAMS, 3600L, San Sebastian, Tucson, AZ 85715

ATTENTION: Would you pay \$5 for a tire that sells for \$55? Free details. SASE. Mulvihill & Associates, 372 So. Jasmine, Denver, CO 80224

\$15,000 MONTHLY Income! Easy Moneymaking Plan. No Investment! McDowell #M-5, 3650 Wilshire, Los Angeles, CA 90010.

GUARANTEED! \$1,000 Pound from "Junked" tires! (Stamp appreciated). LeValley, Fountain, FL 32438

CLIP newspaper items—\$2 - \$25 EACH FREE Report Clippings/B, Box 6109, Pompano, FL 33063

10 CREATIVE business opportunities. Extraordinary profit potential. \$20 Creative Resume, 3507 Fay St., Huntsville, AL 35810

GET RICH using OTHER PEOPLE'S MONEY!! Unique - amazing business!! DETAILS FREE!! Finance/B, Box 4605, Margate, FL 33063

GET RICH!! Secret law smashes debts—brings Cash. Credit! FREE report!! Wealthkit/B, Box 4036, Pompano, FL 33063

\$100,000 OPPORTUNITY That Most People Miss. Russell's, 308 McDonald, Baton Rouge, LA 70808.

\$25,000 LOANS INTEREST FREE! Secret Federal law WIPE OUT DEBTS! Details FREE!! Moneywise/B, Box 63667, Margate, FL 33063

VINYLS! Where the money is! Professional repair, refinishing, recolor furniture, car tops. Quick, easy. Two small \$20 jobs a day earn you \$1,000 a month. Homes, cars, offices, restaurants, unlimited customers. Start earning after a few days practice. Details free. VIP, 2007 Monroe, Chicago, 60618.

\$40,000 ON 'LA ACREL' New Hydroponics - inexpensive, pleasant, practical! Free information. Robin's Box 1214, Franklin, TN 37065-1214

RECYCLE METALS. NO, NOT BEER CANS! Easy \$48 weekly! Free information. Recycler, Box 1214, Franklin, TN 37065-1214

TAKE Catalog Orders. We dropship 2955 best selling specialty products. Lowest wholesale prices. Immediate delivery. Spectacular home business opportunity. Free Book. SMC, 9401 De Soto Avenue, Dept. 20-77, Chatsworth, CA 91311-4991.

MAILORDER Books. 1,000% Profit Report. Selective, Box 1140, Clearwater, FL 33517

MAKE BIG MONEY REPAIRING WINDSHIELDS & Plate Glass! Up to \$60,000 yearly! Call TOLL-FREE for Valuable FREE report. 1-800-321-2597. Glas-Weld Systems, Box 575SDS, Bend, OR 97707.

\$1,000 weekly mailorder. Immediate opportunity. No obligation. Enterprise, 210 Welch-PM, Ames, IA 50501

CONCRETE Block Machines: Catalog \$1.00. Route One, Box 3740, Rapid City, South Dakota 57702-3740

REPAIR HYDRAULIC JACKS—DETAILS FREE. WRITE: HYDRAULIC PARTS SUPPLY, BOX 4157, BROWNSVILLE, TEXAS 78520.

VENDING MACHINES. No selling. Routes earn amazing profits. "Big Catalogue FREE." Parkway Corporation, 1930 PMB Greenspring Drive, Timonium, Maryland 21093

LEARN Sewing Machine Repairing. Men, Women. Lucrative Profits. Gresslin Correspondence School, Box 5104, Spencer, Iowa 51301.

MAKE MILLIONS MANUFACTURING BATTERIES!! Supplies available. Everlast, Box 365, Bogota, NJ 07603.

(Continued on next page)

## BUSINESS OPPORTUNITIES

(Continued from preceding page)

**HUGE PROFITS!** Reconditioning used car batteries. Secrets others don't tell. Tell please. Battery Outlet, Box 3300, Hickory, NC. 28603

**PREPARE Tax Returns.** Earn high fees, dignified work. Train at home. Accredited Program. National Tax Training School, Monsey, NY. 10592

**EARNINGS UNLIMITED!** Mail our burglar alarm advertisements from home! RBM Merchandising, Box 59314, Chicago, IL. 60659

**\$1,000 Weekly.** Home Business Directory, Box 2019-PM, New York, New York 10163.

**FANTASTIC EARNINGS!!** Selling Books. National Marketing, 5A Elaine, Spring Valley, NY. 10977

**\$192.00 From Square Foot Plywood.** (Huge Demand) Revealing Profit 50¢. (Refundable). Woodwin, Bridgewater, Mass. 02324

**MAKE HOMEMADE BOOKLETS.** I've earned \$187,000 with mine. Free information. Falcon, P.O. Box 1039, Gatlinburg, TN 37738

**NEW discovery in battery reconditioning.** Eighteen months guarantee means "Big Profits Fast!" Elecrite, 7415 Gable Dr., Little Rock, AR 72205

**ASSEMBLE** wooden novelties at home. We pay \$232.88 weekly. No experience. SASE. Walpine, Box 650M, Pinellas Park, FL. 34290-0660

**ALUMINUM SCRAP — Recycle Yourself — MAKE \$25.00/POUND!** Free Information: Industrial-PM75, Box 127, Alexandria Bay, New York 13607

**EXTRA INCOME.** Assemble products at home. No experience. Details: 1-813-545-8421, Ext. 698.

**MULTI-LEVEL Mailorder.** Two Opportunities. O'Neill-M, 10 Oak Lane, Suisun, CA 94585

**LEARN MIRROR RESILVERING** free information. Silvercraft, Box 127, Lansdowne, PA 19050.

**BATHTUB REGLAZING,** product sales, service and training. Call Unique Coatings Corp. (313) 538-8600.

**BUMPERSTICKER PRINTER.** Cheap, Simple, Portable. Free Details. Bumper, POB 22791 (GC), Tampa, FL 33622.

**MAKE Rubber Stamps.** Highly Profitable. Free Details. STAMPER, P.O. Box 22809 (GC), Tampa, FL 33622

**PROFITABLE GOLD FOIL PRINTER.** Personalize business cards, pencils, matches. Free details. Gold, P.O. Box 24986 (GC), Tampa, FL 33623

**SCREEN PRINT T-SHIRTS.** Inexpensive kits. Free Details. T-Printer, P.O. Box 23991 (GC), Tampa, FL 33623

**'SELL INFORMATION BY MAIL', ENJOY SUCCESS, WEALTH, INDEPENDENCE.** Write: Fairfield Publications, 10-A Woodcrest Avenue, Trumbull, CT 06611

**\$1,000 WEEKLY Possible** Banana Baby Shoes **FREE BROCHURE SHOWS HOW.** NBPM, 398 Airport, Sebring, FL 33870

**MAKE BALLOON ANIMALS.** \$400 Weekends! **FREE SAMPLES/INSTRUCTIONS:** Funnymen's - PM75, Box 250, Alexandria Bay, New York 13607

**ASSEMBLE PRODUCTS AT HOME.** Many opportunities paying High Weekly Profits presently available without investment. Write: Businesses, 928 Brighton 11th, Brooklyn, New York 11235

**I MADE \$40,000 Year by Mailorder!** Help others make money! Details 25c: Torrey, Box 318YV, Ypsilanti, Michigan 48197.

**\$40 + \$100/HOUR.** Amazing breakthrough process restores Burned/Damaged Countertops. **WITHOUT RE-PLACEMENT,** 2 hours/day earn \$30,000/year. Millions of apartments, homes pay profit immediately! Free information. RENEW, Box 19636-PC, Portland, Oregon 97219.

**NEED QUICK MONEY?** End worry. Easy Spare time. Free details. CPOA, Box 1011, Wilcox, Arizona 85644

**\$25,000 IN YOUR BACKYARD.** Spatiest-growing profitable specialty plants. Easy-start with \$50. Free information. HOMESTEAD, Box 988PM, Friday Harbor, WA 98250

**\$10,000 MONTHLY** Taking Photographs at Home! Call recorded message: (603) 874-8155

**ASSEMBLE** Electronic parts. We supply components and instructions. No experience, no selling, guaranteed payment. Write: SouthTech Electronics, Box 28217K, Kenneth City, FL 33709

**"MORTGAGE Brokerage."** Lucrative! (Particulars \$2,000). Sources-P6, Box 291332, Davie, FL. 33329

**MAKE MONEY AT HOME,** free information or several lucrative home businesses. Write: Java, Dept. 112PM, Box 1564, Bellaire, TX 77401

**EARN \$1,000/SI** Home Mailing Program. Century, Box 2659PM, Danbury, CT 06813

**RAW GOLD NUGGETS** This is a golden opportunity **CURRENT LISTINGS WITH SAMPLE \$6.00.** DAWSON GOLD EXCHANGE, 3224 Lee St., Anchorage, Alaska 99501

**MAKE Computer Clones** in 1/2 hour. \$850 weekly spare-time! "Scrivedrive Easy." Experience unnecessary. Write: CompBuild, 771PM, Battle Ground, Washington 98604

**UNLIMITED INCOME GUARANTEED** Seven Most Profitable Home Businesses! Easy To Start. Low Investment! Free Information: Pollard Enterprises, 2581-PM2 Country Wood, Greenville, MS 38701.

**AMAZING FORTUNE** hidden in "junked" batteries. Take it for pennies! 17 years. Success secrets yours now. Write: OwenCo, 771PM, Battle Ground, Washington 98604

**NEW OPPORTUNITY!** Learn Telephone Service And Repair At Home. **AVERAGE \$35.00/HOUR.** Free Brochure. Setcom, 2196-L Collins Blvd., Gulfport, MS 39057

**\$1000'S WEEKLY** Mailing. Stamped Envelope. CENTER, Box 931747, Los Angeles, CA 90093

**FREE... TREASURE OF HOME BUSINESS OPPORTUNITIES**... MAILCO, Box 34370, BARTLETT, TENNESSEE 38134-0370

**MAKE PVC FURNITURE.** Turn your spare hours into \$31,200/year! Easy home assembly business. Write: PVC, 771PM, Battle Ground, Washington 98604

**PIANO Tuning** Learned quickly at home. Free information. Empire School, Box 1014PM, Jupiter, FL 33468

**MAKE YOUR DREAM COME TRUE.** EARN \$60,000 YEARLY REPAIRING SMALL CRACKS IN WINDSHIELDS NOT REPLACING THEM. CALL TOLL FREE 1-800-825-8523 OR WRITE: **THE GLASS MECHANIX INC., BOX 17693, PLANTATION, FLA 33318**

**HONG KONG, TAIWAN** Products Cheap. Free Details. Write: Delta Publications, Box 230, Indianapolis, Indiana, Miss. 36751

**FREE Information!** Financial Independence Without Leaving Home! No Experience Required. Ground Floor Opportunity, Met Today! R.C.L., 11915-B North Gray, Carmel, IN 46032

**LEARN the Seven Most Profitable Home Based Businesses.** Send for Free Information. Thomas Publishing, Dept. 67, P.O. Box 766, Manassas, Virginia 22111

**HUGE PROFITS - Making Planters-Growing Herbs.** Write: Planters, P.O. Box M421, Brush Prairie, WA 86066

**REFRIGERATION REPAIR,** good earnings from your home, part or full time. Free brochure. CTS, P.O. Box 1729, Milwaukee, Wisconsin 53201.

**NEW! How to Turn Your Sparetime Into Big \$\$\$\$. '99 Home Business Opportunities'.** More Information - \$1.00. (Refundable). Anderson, Dept. A, Box 5600, Don Mills, Ontario, Canada M3C 2T9.

**FIRST USA OFFER** \$10 wood into \$480 quickly, easily. **VERY LARGE MARKET - can be DONE IN THE HOME!** Details \$3. G. Gazley, Box 206, Belleville, Ontario, Canada K5B-5A2.

**MAILORDER OPPORTUNITY:** Start profitable home business without experience or capital. Write for free book, plus details. Mail Order Associates, Inc., Dept. 755, Montvale, NJ 07645.

**HOW To Operate Home Businesses \$20.00 Import-Export \$8.00 World Gifts, 3708 Lillooet Street, Vancouver, B.C., Canada V5M 3PS**

**RAGS TO ROLLS:** Incredibly simple method took welfare-level teacher to Washington Post interview and cash-purchase of Rolls Royce. Have helped thousands. I'll help you. FREE heavily documented proof. Simplex, Box 1281, Dept. M, Sandy, Utah 84091

**START A SUPER PROFITABLE BUSINESS** from scratch. Free Subscription to Opportunity Magazine tells how. Write Opportunity, Dept. J53, 6 N. Michigan, Chicago, IL 60602.

**HOME MLM**-Mailorder Business. Start without capital. Free tape. Dickinson-PM587, 313 Uncas, Milwaukee, Wisconsin 53207

**EARN MONEY REGRouting BATHROOMS.** Earn \$30 to \$50 per hour. Write for "How To Make Money Regrouting Bathrooms" booklet. BENISSA SALES, INC. 114 East 32 St., New York, NY 10016

**POWER, MONEY, RESPECT** Start Your Own Business At Home. Let the Post Office Work For You. Send \$1.50 P.H. Dept. PM-A, P.O. Box 9249-2401, San Jose, Calif. 95157

**999 SUCCESSFUL LITTLE KNOWN BUSINESSES.** Free details. D. Dickey, 323 South Franklin Building, Suite D-223, Chicago, Illinois 60606

**SEIZED IN GOVERNMENT NARCOTICS RAID!** Automobiles... Vans... Boats... Furniture... Thousands other items. But Dirt Cheap--Resell for Big Profits! Free information: Marcel, Box 7557-M, Monroe, LA 71211

**\$5,000.00 FREE of Interest Grants, not loans!** Everyone eligible! Business financing without collateral, co-signers, credit. Guaranteed Application information. Send \$1.00 (refundable) . American, 4011-PM57 Valleyview, Crystal Lake, Illinois 60014

**\$1800+ WEEKLY,** Start "YOUR OWN" Profitable Business At Home. **FREE DETAILS:** Radco Publishing Co., P.O. Box 40783, Redford, MI 48240

**MAKE-SELL ACRYLIC KEYTAGS** with colorful designs. Professional. Highly profitable business. Free brochure. Peacock Design®, Inc., 3766 W. Devon, PM587, Lincolnwood, IL 60645

**\$10,000 MONTHLY** working 2 hours per day at Home! National-PB, Box 504, North East, MD 21901

**START** Investment Company with \$10,000. Details \$4.00. Kornack, 235-W Courtline, Hatboro, Penna. 19040

**BIG income as independent sales representative.** United Association Manufacturers' Representatives, Drawer 6266P, Kansas City, KS 66106

**FABULOUS HOME BUSINESSES**-Pick from several-Free bonuses. Free details. Wayne Publishing, Rm 133 Fairway Rd., Morehead City, NC. 28557

**\$200 from gallon of \$8 paint.** Easy, overlooked moneymaker. Details free. Peintman, Box 22623, Dallas, TX 75222

**GET RICH DOING YOUR FAVORITE THING.** Instructions. S.I. Guaranteed. FREE shopper's pocket calculator with order. SNP, Suite 18-270, Department PM5, 12416 North 28th Drive, Phoenix, Arizona 85029

**INDEPENDENCE! WEALTH!** Proven Home Businesses, Free Details. MacKinlay Publishing, Dept. PM5, 219 N. Orange St., La Habra, CA 90631

**MAILORDER!** Smart opportunity for profitable home business. No experience necessary, small investment. Free details: Sale Publishing, Box 1557, Denver, CO 80215

**GET RICH AT HOME:** Brand-new with exhaustively documented proof! Weber, PM4, P.O. Box 93, Eureka Springs, AR 72632

**\$35,724 + yearly - GUARANTEED!** Buying gold, silver platinum scrap. It's everywhere! Free report!! PG&G-1, Cascade, CO 80809-0774

**TRAIL Subscription** Absolutely free. Send name, address, zip to: Spare Time Money Making Opportunities magazine, Dept. C-17, 5610 W. Oklahoma Ave., Milwaukee, WI 53219

**RETRIE** early—I did at 45. Learn safe, easy, profitable investment methods that work. \$4.00. Retire Early, Box 447, Cedar Knolls, NJ 07007

**AMAZING OFFER HOW-TO Books** (Proven) Most Profitable Home Businesses Today. Guaranteed. Free-Details Now. Cathys D1PM, 556 Eastmor Drive, Grand Junction, CO 81504

**INCORNE DISCOVERY!** Famous Ph.D. scientist reveals HIGH-INCOME discoveries anyone can use to achieve wealth. Free facts: Achievement-B57, Box 23624, Milwaukee, WI 53223

**EXCITING** New program. Work three years and retire. RWD, 7333 Grand, Indianapolis, IN 46250

**START your own profitable business at home.** Write for FREE details. Robert Mark, 416 Roosevelt Road, Box 362, Bemidji, MN 56601

**UNLIMITED CASH!** Sell Get Rich Books by Mail! Delta, 30 E. Mitchell 98, Phoenix, AZ 85012

**WHAT** really sells in the mail order magazines? Special report. Only \$2.00. Write: J.L.C. Future Publications, Inc., 105 Fifth Street, Scotia, NY, 13202

**\$180 per Roll Guerrilla Taking Photographs.** Experience Unnecessary 35MM Camera and Film Supplied Free. 1-416-482-2109 x70 Days/Evenings/Weekends.

**OPERATE** your own mail order business at home! BEGINNERS ARE EARNING \$1000.00'S MONTHLY USING THE METHODS OF THIS BEST-SELLING BOOK. Send \$4.00 to: Cergill Publications, 600 N. Oakland Ave. Box 1A, Pasadena, CA 91101

**INCREDIBLY EASY INCOME.** Free information. Multi Services PM, 1731 Howe #236, Sacramento, CA 95825

**PUBLISH, PROMOTE & PROFIT** with your own Best-Selling Book! Free details. Premium, Box 1621-A5, Spring, Texas 77383

**EARN \$50,000 this year** unlimited long distance \$120.00 month. Multilevel marketing, high quality product sells. White: Lawrie Enterprises, 943 S. New St., West Chester, PA 19382. Include Phone Number.

(Continued on next page)

**POPULAR MECHANICS • MAY 1987** 211

## BUSINESS OPPORTUNITIES

(Continued from preceding page)

**VENDORS NEEDED!** No experience or investment required. Begin immediately! Paid monthly. Write: Caligan, 3368 Governor, Suite F, San Diego, CA 92122.

**TURNS \$4 into \$39.95 (Woodworking).** Free Brochure! Pineshop, 897-3 Mammoth, Manchester, NH 03104.

**HELP** deciding which money making opportunity for you. Reveals All. Free details. Insight-A, Box 60117, Tucson, AZ. 85751.

**105 easy homework moneymaking ideas.** Booklet \$2.00. Sunshine Sales, Box 511-B, Byron, IL 61010.

**TIRED** of moneymaking Ideas That Don't Work? This One Does! Free Information Reveals All. Brant Consulting, Box 8027, Williamsport, PA 17701.

**NEVI FAST,** Profitable Home Income Opportunities! Revealed! FREE! Send Sample. ALCO, B769(PMS), Socorro, NM. 87001.

**EARN \$400 TO \$1000 PER WEEK, INITIAL INVESTMENT \$100.** YOU CAN LETTER TRUCKS & VANS WITH COMPUTERIZED CUSTOM VINYL LETTERS, SHIPPED TO YOU PRE-SPACED, EASILY APPLIED, PERMANENT, USED WORLD-WIDE, BETTER THAN PAINT. MANY STYLES, MANY COLORS. OUR PROGRAM INSTRUCTS YOU COMPLETELY. 40 YEARS EXPERIENCE AIDS YOU WITH FLEETS, DEALERS, COMP., & SMALL BUSINESS. INFO: 35 TO: AMERICAN VINYL GRAPHICS, 703 JERICHO TPK., STE. JAMES, NEW YORK 11760.

**OPPORTUNITY SEEKERS LIST \$1.00 . . .** List, 364 Indiana Street, Webash, Indiana 46952.

**AMAZING MAILORDER BREAKTHROUGH!!** 1500% Profit!! Every Home Prospect!! Investment? Almost Nil! Free Samples - Details - Rush 2 Stamps. Geeren's, Box 982, Zanesville, Ohio 43701.

**MAKE A FORTUNE** In Your Driveway! NEW Released Manual!! "Buy and Sell Used Cars For Profit and More." GOLDMine Opportunity. EXCITING Details. Automaney, 1298 Somerton, Cleveland, OH 44124.

**RECYCLE PLATINUM** Full or part-time moneymaker. Send \$2 for background report. AA Perkins, Box 65688, Seattle, WA 98145-1688.

**MAILORDER.** Be your own boss. Start profitable home business. 9 days, part time, without experience or capital. We dropship to your customers. Free info: RERS, Dept. 34, P.O. Box 400609, Houston, TX 77056.

**FREE DEALERSHIP - SELL MAILING LISTS!** Grab your share of the Big Profits in this Multi-Million dollar industry! Complete program free! PCW, Box 1302MP, Valley Stream, NY 11582.

**CALL Now!** MLM Hotline 24 Hours/Day Recording. (313) 274-9067.

**RUB-R-SLATE,** Homite, Insulrock, Bestaco, Bays Laboratory, 2066-2075 Drive, Cedaredge, Colorado 81413-9628.

**MAKE \$1000 WEEKLY** in mailorder. \$2 brings complete instructions. Horizons, Box 1043, Escanaba, MI 49829.

**MAKE \$50/Hr** assembling computer clones. Experience unnecessary. SASE: PCIFIE, 14102 Woodlawn, Austin, TX 78250.

**NEW PRODUCTS-Dealerships-Franchises-Free Details-** Devert, P.O. Box 103, Ashland, KY 41105.

**MANUFACTURE CYPRESS CLOCKS** And Tables! Start your own business. No experience or investment required or part-time. We give manufacturing instructions, free advertising for mail orders, the opportunity of supplying sales crews, student employment. For color brochure write: I.C.M., Box 156, Intercession City, FL 33849.

**UNIQUE COMPUTER GIFTS.** Profitable. Free Details. Passer A. Sonia, 2458 Lomita #126, Lomita, CA 90717.

**SELL BOOKS BY MAIL.** Profitable Advanced Method. Free Details. Woodland-M, Box 124, Moorhead, MN 56560.

**NEW IMPORTS NEWSLETTER.** Foreign manufacturers seeking American distributors/representatives. Free information. International, Box 636PM, Newark, NJ 07101.

**UP TO \$15,000 MONTHLY** possible! Details. FREE! Bonfile, 671-FPMC Ninth, NY 10036.

**MAKE \$240 Daily** with Free tires/2 hours. 12 Years Success Secrets now yours! Details: TireCo, 771PM, Battle Ground, Washington 98604.

**OUT OF WORK? NEED MONEY?** \$100 booklet shows you how to start your own business through classified advertising. Popular Mechanics, Dept. KC, 224 W. 57th St., New York, NY 10019.

**PROJECTION TV** ... Make \$\$\$'s assembling projectors ... Easy ... Results comparable to \$250 projectors ... Total Cost Less Than \$30.00 ... PLANS, B' LENS & Dealers information \$20.50 ... Illustrated information FREE ... Macromedia-BIX, Washington Crossing, Pennsylvania 18977, Creditcard order 24HRS. (215) 736-2860.

## MONEymaking OPPORTUNITIES

**WEALTHY BUSINESSES!** LEARN NEW moneymaking ideas, opportunities, concepts. FREE DETAILS. Westfalls, P.O. Box 346 Dept. PM-57, Elizabethtown, PA 17022.

**\$15,000 MONTHLY** income! Easy Moneymaking Plan. No investment! McDowell #MQ-5, 3660 Wilshire, Los Angeles, CA 90010.

**HUGE PROFITS GUARANTEED** Home businesses that work! FREE information. Profits Unlimited, 525 West Ave. C, Dept. 5B, Killean, TX 76541.

**HUGE PROFITS** From Orient Products. Free details. Meadors, 1285 Salem, Redford, MI 48239.

**NO SELLING! EXCEPTIONAL INCOME.** Dignified Opportunity. Grenier, Box 3291, Huntington Beach, CA 92647.

**LEARN** Easy Wealth Producing Secrets. Free Information Cleek Book Company, P.O. Box 979, Duluth, Ga. 30136.

**BUMPERSTICKER PRINTER.** Cheap, Simple, Portable. Free Details. Bumper, POB 22791 (GG), Tampa, FL 33622.

**GET RICHIEST** Zero Investment, No Borrowing. Free Details! Money, 6520 Selma, #32P57, Los Angeles, CA 90028.

**AMAZING! MAKE \$1000.00 PROFIT SELL 70 MONEY MAKING REPORTS. FREE INFORMATION. BOX 1867.** HIALEAH, FLA 33011.

**GET RICHIEST** Secret law smashes debts-brings Cash! Credit! FREE report! WealthKt/B, Box 4036, Pompano, FL 33061.

**FANTASTIC** earnings mailing from home! Offer: Rush Stamped Addressed Envelope. Imperial, P-8 X17410, Fort Lauderdale, FL 33318.

**MAKE Rubber Stamps Highly Profitable.** Free Details. STAMPER, P.O. Box 22809 (GG), Tampa, FL 33622.

**ENJOY** Reading And Making Money! No Investment. No Hassle. Write: DEW, 1612 Layton, Clovis, NM 88101.

**MONEY** From discarded tires! Details. Brownie, Box 53, Fishers, Indiana 46038.

**EARN \$5,000 ANY WEEKEND!** Amazing new system makes it easy. No money down, Stealproof! FREE PROOF. Write: Crossroads, Box 5097-C9, Babylon, NY 11707.

**EVALUATE "Moneymaking" Opportunities!** Avoid Scams. Ripoffs And Losers! Complete Report \$9.95 Details. Free! Seabert Associates, 1205-A Prospect Dr., Stratford, CT 06497.

**HIGH PROFITS With Custom T-Shirts And Caps.** Transfer machines, supplies. Press, P.O. Box 22809(GG), Temple, FL 33623.

**EXCEPTIONAL** Opportunity. Earn Thousands. Plus savings on present & future Mortgage costs. Details: First Fidelity Mortgage, Box 9185-SP, N. Charleston, SC 29410.

**GOLD Mine in garage sales!** For booklet send \$2.00 to: Golden Const., P.O. Box 1462, Summerville, SC 29484-1462.

**BIG BONUSES!** Ideal opportunity! Free Details. Albright, Box 295, Pike, NY 14130.

**LOTTERIES!** Systems increasing luck dramatically! \$19.95 money order: Richard Heiters, Box 220, Dorion, Quebec J7V 7J5.

**STUDENTS, Retirees, Part-Time!** Begin Own Profitable Business Get Instructions Now! \$19.95. Brown Enterprises, 3963 Lugo Avenue, Lynwood, California 90262.

**START A SUPER PROFITABLE BUSINESS** from scratch. Free Subscription to Opportunity tells how. Write Opportunity, Dept. J, 58, N. Michigan, Chicago, IL 60602.

**BANK SAVINGS ACCOUNT** pays over 50% interest per year. Small or large amounts. Details, \$5. Avon Ventures, 815-A Brazos St. Suite 305, Austin, Texas 78701-2502.

**FREE BOOKLET** MAKE BIG BUCKS IN BUSINESS. \$1.00 POSTAGE-HANDLING. 1248 ROSEWOOD, DEERFIELD, IL 60015.

**CAR - VAN OWNERS** - Extra Money Made Easy. Details \$3.00 - RPM, Box 159PM, Wyckoff, NJ. 07461.

**FREE** details-New wealth! Sweep Parking Lots: Scarborough, 212 So. Chestnut, Copan, Okla. 74022.

**VALUES!** Unique opportunities revealed. Free information. Hare, 424 Pine Island Road, Suite-5P, Ft. Myers, Fla. 33900.

**HOW TO MAKE UP TO \$750.00 NEXT WEEKEND.** Booklet \$4.00 Larkins Ltd., Foster Drive RR3 Box 1762, Bennington, Vermont 05201.

**MAKE THOUSANDS AT CASINOS, EASY SYSTEM** send \$12.00 to: TD & Associates, 6114 LaSalle Ave. Suite 317, Oakland, Ca. 94611.

**MAKE MONEY FIXING OLD HOUSES . . .** Details. INNOVATION, Box 810PM, Mango, Florida 34262.

**EASY SECOND INCOME, EARNINGS UNLIMITED** Free Details. Zaff Publications, 50 Cedar Lane, East Patchogue, New York 11772.

**MAKE MONEY.** Wealthbuilding plans, shrewd investing secrets. Free details. Nordic, Box 130M, New York, NY 10101.

**EARN** Big Money Send \$34.98 to: Ed Proctor, Box 9600, Selkirk Man., Canada R1A 2B5

**AMBITION?** Production, marketing? Unusual - free information: Anderson, Box 848, Levittown, N.Y. 11756.

**MAKE MONEY** at home write short articles. Secret lies in knowing what to write and where to sell. Booklet tells how. Send \$3.00 plus \$1.00 psh to: Creative Gifts, 7410 N. 53 Ave., Minneapolis, MN 55428.

**NEW 21 WAYS** for quick and easy profits. Details: Pierce, Box 1730, Lewisville, TX 75067.

**\$1,000'S Working Home** Rush Stamped Envelope: Allstate, Box 691809, Los Angeles, CA 90069.

**PICK PROFITABLE** home business you prefer. Dozens described. Free report. Success-M, Box 622, Midway City, CA 92655.

**SECRETS** of mailorder. Millionaire expert reveals techniques for success. Proven methods. Financial freedom. Free info. HPC, 4540 South Brentwood, Dept. PMS, Independence, MO 64055.

**DIAMONDS:** Fiawless, 3 Carats \$250. Resell For \$1000's. Gemtrade, Box 383, Grebov 7160, South Africa.

**EARN EXTRA MONEY** in spare time. Hundreds of people have found it profitable to serve as independent part-time representatives taking subscription orders for America's favorite magazine. No previous experience is required. Receive ongoing training with need-to-know earning generous commissions. Write now, while you have it in mind. You'll be glad you did. Budget Reading Service, Dept. P57, One North Superior Street, Seneca, Ohio 44870.

**ADVERTISE** Free in 507 Magazines. \$5.00 Directory, Box 11N, Atlanta, Georgia 30301.

**65 EXCITING HOT Money-Making Reports \$5.** Free gift with orders. Satisfaction guaranteed. RAJ, 1146 Cherokee, Lehigh, Fla. 33936.

## MAILORDER OPPORTUNITIES

**MillIONAIRE Mailorder** Expert Reveals Money-Making Secrets. Free, Exciting, Hour Cassette: Mel Powers, No. Hollywood, California 91109.

**BUILD** financial freedom through Mail Order; I'll show you how - Free Details! Robert Rendell, Box 698, Hixson, TN 37343.

**FREE Details How To Start And Operate Your Own Profitable Business At Home** ACT Marketing, 5915 Fairway Dr., Hope Mills, NC 28348.

## RABBITS-CHINCHILLAS-FUR BEARING ANIMALS

**GUARANTEED INCOME.** Raise Chinchillas. Send \$10.00 (refundable) to: Chinchillas, Dept. B, P.O. Box 7463, Mesa, Arizona 85206.

## POULTRY & GAME BIRDS

**SWANS, PEACOCKS, "EVERYTHING--You Name It!"** Chicks, Hatching Eggs, Incubators, Cages, Equipment. 56 page color catalog \$1.00. STROMBERG'S, Pine River 59, Minnesota 56474.

## OF INTEREST TO ALL

**DENIED CREDIT?** Hounded by Bill Collectors, Excessive Credit Payments, Judgment, Etc.? Restore, Repair, Establish Credit Or Reduce Your Debt Totally Without Bankruptcy. Send SASAE, Sunshine Credit Care, Box 1363, Natchitoches, LA 71457.

**HORSES** pitchers information and game related catalog. Send stamped self-addressed envelope. National Horse Pitchers Association, Dept. P, Box 298, Wilkinsville, MA 01590.

**FREE PRIVACY CATALOG.** Cash income opportunities. Hiding assets. Secret loans. New identity. Elen, Box 8410-PC, Fountain Valley, CA 92728.

**FREE** Promotional Albums, Concert Tickets, Stereos, etc. information: Barry Publications, 477 82nd Street, Brooklyn, NY 11209.

**NEED CREDIT CARDS? BAD CREDIT HISTORY?** Seven steps that will help your credit rating! \$1.00. The Idea Co., Box 2978, Gallup, NM 87301.

## OF INTEREST TO ALL

(Continued from preceding page)

**RV/CAMPER** owners, fisherman-Amazing Slipnot™, many uses, for example, Bright Ideas Unlimited, P.O. Box 18709, Irvine, CA 92713

**EYE** Protection Information \$1.00 Master Eyewear Information, Box 52, Clinton, Maryland 20735

**THE KENTUCKY DERBY PRESENT AND PAST YEARS WINNER CIRCLE PRESENTATIONS, FREE INFORMATION, WINNER CIRCLE PRODUCTS, 1341 FRANCES DRIVE, NEW ALBANY, IN 47150**

**TRAVEL** Anywhere in the World for FREE! Information \$3.00. Hussey, 100 Western D5, Kalamazoo, MI 49008

**EARN HIGH INCOME** - 12 easy and proven investments. For complete details send \$3 to: Mutual Research, Box 150, Wilmington, Ohio 45177

**MULTIPLY MANUFACTURERS' REBATES!** \$Hundreds extra yearly. Complete details \$4.00. Marketech, Box 794, Brookfield, WI 53008

**GUARANTEED RETIREMENT MONEY!** Proven method, no risk. Guaranteed to work for everyone. 100's of 1000's possible. Complete program, send \$5.00 to: Retirement Enterprises, Box 152, Skul Valley, Arizona 86338

## GOVERNMENT SURPLUS

**NARCOTICS RAID SEIZURES** ... Autos... Vans... Boats... Airplanes... Millions Surplus Bargains... many 1% original cost! "Worldwide Sales Directory"-\$3.00. Disposal, Box 19107-AR, Washington, DC 20036.

**ARMY SUPPLIES** New and Used Best Prices. \$2.00 Catalog Refunded First Order. Wyoming Mining Supplies, 102 2nd Street, Gillette, Wyoming 82716

**GET IT ALL:** Narcotic Raids... Military Surplus... \$1.00 Homes... \$59.230.00 Jobs... Oil Lottery... \$3.00 Refundable: R.E.S.E.L., Box 1491, Daytona Beach, FL 32015.

**MAGNESIUM SUPPLY** FIRE-STARTER - used by Armed Forces - Lights at 450°F. Uses any Ktles. \$6.00. Fire-Starter, 5618 Jefferson, New Orleans, Louisiana 70123

## LOANS BY MAIL

**ASSISTANCE WITH BUSINESS LOANS** Contact BEVSCO, P.O. Box 2265-A, Norcross, GA 30091

**PERSONAL AND BUSINESS Loans Available** Write: NRCPA, 2014 N. Saginaw, #110, Midland, MI 48640.

**LOANS by mail!** Instant reply! Rush stamped addressed envelope: Merigold, Box 200, Richardson, TX 75080.

**BORROW \$500-\$40,000 "Overnight"** On signature. Keep indefinitely! Action #R-5, 3660 Wilshire, Los Angeles, CA 90010.

**VISA®# MasterCard®** Simple Effective Guaranteed Program. 1-800-626-6902 (California) 1-800-843-4046.

**FREE MONEY!** \$300,000.000 Giveaway. Grants. Never repay. Details \$1.00. Jaka, Box 3066-PM57, Saminole, FL 33542

**BORROW \$40,000 "overnight."** Any purpose. Keep indefinitely! Free Report! Success Research, Box 19739-AR, Indianapolis, IN 46219.

**BORROW \$100,000. OVERNIGHT** Action Guaranteed. Rush 22c Stamp: Financing, Box 1015, Carlisle, PA 17013-6015

**VISA/MASTERCARD!** Quick Personal/Business Loans. Refused elsewhere? Write National Finance, Box 35726FN, Richmond, VA 23235.

**MONEY PROBLEMS?** Free Book describes Loans, Cash, Government Grants, Other benefits, available to individuals. Write: Associates, Box 98-AX, Brooklyn, New York 11235

**BORROW \$500 - \$40,000 on Signature!** 97% Eligible! Any Purpose! Free Application: United, Box 3789M, Downey, CA 90242.

**NEED MONEY?** Cash, Loans, Government Grants, 99% eligible/no investigation. KPA, Box 373PNM, Woodmere, New York 11598

**BORROW \$60,000 "Overnight."** Any Purpose! Keep indefinitely! Free details. Write: Martin, Box 45-M, Old Westbury, NY 11568

**MONEY PROBLEMS?** Guaranteed results! Instant reply. Details \$1.00. C & J Marketing, Dept. P, 432 Washington Street, Weymouth, MA 02188. 617-337-4425.

**BORROW \$500 - \$100,000 99% eligible.** Free application. National, Box 63PM, Mouth of Wilson, VA 24363

**CASH** loans Arranged! Signature only! Send SASE to: BJ, Box 2158PMB, Gibsonton, Florida 33534

**LOANS ON YOUR SIGNATURE ONLY!** Fast approval! To \$25,000. No Collateral. Send for free applications! NACC-PM5, Box 5399, Torrance, CA 90503

**INSTANT CREDIT!** VCR's, TV's, and more. Sullen, Box 3058, Rochester, NY 14614

## DIVORCE

**WINNING** Information \$2.00 **MEN'S RIGHTS ASSOCIATION**, 17854 (Lyons), Forest Lake, MN 55025

## PERSONAL

**BORROW \$5,000.** No Credit Or Employment Needed. 24 Hrs. Call (702) 788-9299.

## REMAILING SERVICE

**TRUSTWORTHY** Forwarding, Stamped Remails \$1.00. Diamond-H, Box 129A, Caddo, Texas 76029.

**FREE Remailing List.** Agents Needed. PS, Box 29856, San Antonio, Texas 78229

**UNLISTED ADDRESS** Discreet and confidential. Remail \$1.00 Single Mail Forwarding Service, 8050 S. Main, Houston, Texas 77025

**CONFIDENTIAL** Mail Receiving/Forwarding. Mail Drop, Box 608039PM, Orlando, FL 32860

**CONFIDENTIAL**, Unlisted Forwarding Address. Remails \$1.00, MS, Box 31511, Phoenix, AZ 85046

**YOUR PERSONAL OVERSEAS ADDRESS**, Manhattan, Suite 602, 36 Soi Langsuan, Bangkok 10500 Thailand

**PROMPT** Forwarding, Stamped Remails. \$1. Box 4055, Wilmington, Delaware 19807

**FREE INFORMATION!** Remailing/Forwarding-Mail Store, Box 2523, Santa Barbara, California 93120

**SECURITY, Confidentiality, Details:** Consumer Warehouse, 6333 Pacific #508, Stockton, CA 95207

## POSTAL AUCTIONS

**POSTAL AUCTIONS** are selling thousands of items of unclaimed merchandise from 39,270 post offices. Complete facts, information, tips, locations. \$15.00. Nationwide Research, P.O. Box 7307, Houston, TX 77248-7307. Allow 4-6 weeks for delivery.

## WANTED MISCELLANEOUS

**BUYING TUNGSTEN CARBIDE, TUNGSTEN, MOLYBDENUM, SILVER SOLDER, SILVER CONTACTS, GOLD, PLATINUM**, 800-321-6914 Ohio 216-531-8333 collect.

**GOLD, SILVER, PLATINUM, MERCURY, TANTALUM, SAMPLES EVALUATED FREE**. Orr Assaying Service. Call Wholesale Terminal Toll Free: 1-800-932-1010.

**SCRAP SILVER CONTACTS, FORKLIFT CONTACTS, SILVER SOLDER, STERLING, GOLD PLATED, ROBERT LESZCZAK, 652 MYRTLE ST., ELIZABETH, NJ 07202**

**AUTOMOBILE LITERATURE WANTED:** 1900-1970. I buy automobile sales brochures, manuals. Miller, 6710 Syracuse, New York 13211

## PERFECT KNOWLEDGE

**SURVIVE** under Universal Law into Millennium as Godstated by CREATOR'S original MEASURES, embracing TOTAL knowledge for unlimited free ENERGY; monadic gravity, friction-free, work/travel VEHICLES; instant MANNA. Do not write. Must prove yourself. ATA Base, 1500 North Texas, Weslaco, Texas 78596

## HEARING AIDS

**HUGE SAVINGS** Eliminate Dealer Markups. Free Trial. Batteries Wholesale. Terms Arranged. Call Toll Free 1-800-323-1212. Or Write: Lloyds-PMC, Rockford, IL 61110

**FREE HEARING AID CATALOG**. Save ½ by mail! Write: "MoneySavers", 9530PM-5 Langdon, Sepulveda, California 91343.

## SCIENCE & CHEMISTRY

**FREE, SCIENTIFIC CATALOG**. RJM Laboratories Inc. Presents its Latest Catalog Containing Scientific Laboratory Equipment And Supplies, Including A Complete Line of Specialty Laboratory Glassware. Write Today For Your FREE Catalog. RJM Laboratories Inc., P.O. Box 899, Seneca, CA 92071

**ANATOMICAL CHARTS, MODELS, SKELETONS,** \$1.00 Catalog. CHARTS, 7124 North Clark, Chicago, IL 60626

**LABORATORY CHEMICALS, GLASSWARE - APPARATUS.** Established 1953 - Catalog \$1.00. HAGENOW LABORATORIES, 1302 Washington, MAINTOWOC, WISCONSIN 54220

**COPPERPLATING.** Simple formula will plate steel. Send \$1.00 and stamp envelope: 540 Dussel, Meumee, OH 43357

## FORMULAS, PLANS, ETC.

**ANY FORMULA** \$10.00. Catalog \$3.00. J. Bellfort, Box 568, Chicago, 60690

**MONEymaking** 21 Simple Formulas \$2.00. Research, Box 291332P, Devie, FL 33329

**MONEymaking** CHEMICAL PRODUCT FORMULAS! CATALOG LISTING THOUSANDS ONLY \$5.00 (REFUNDABLE): GWA3, Box 193, Brookfield, WI 53006-0193

**125 MoneyMaking** formulas, Reports, Everything \$5.00. Phillips Enterprise, Box 482, East Bernstadt, KY 40729

**PERFECTUAL** Electric Car Plans for Scale Model Available, Send \$5.00 to: Nil, 2011 16th Street #210, San Francisco, CA 94103

## TRAVEL AND RESORTS

**MAKE YOUR VACATION TAX DEDUCTABLE!** 10 ways. Sample issue \$7. Taxletter, 424 West Commonwealth, Fullerton, CA 92632

## SPECIAL SERVICES

**INFORMATION** On anything. Ferguson Research Specialists, 60-15 Woodside, Woodside, New York 11377.

## HERBS

**GIANT HERB Catalog** - Free Samples! Send \$1. (Refundable). Penn Herb, 605P North Second, Philadelphia, 19123

## HEALTH, VITAMINS

**PSORIASIS** Sufferers: Discouraged? Write for Free Information! That is helping thousands. Pixacol, P.O. Box 28117PM, Dallas, TX 75228

**UNIQUE** artwork for the fitness enthusiast. Send for free information. DS Expressions, P.O. Box 4026, Neenah, WI 54956-0402

**HANGOVERS:** Home Remedies \$2.00 SASE. Islander's Enterprises, 8 Sta. Rosa Box 917, Cetano, P.R. 00632

**PRO-80** Major Nutritional Breakthrough Of The 80'S. Helps Overcome STRESS, FATIGUE: HYPOGLYCEMIA: PM'S SYNDROME: HEADACHES: DEPRESSION. Bottle Of 60, Month Supply, \$14.50. Check Or Money Order. Jimmy Carter, 11101 Centennial, Austin, Texas 78726

## WORK CLOTHING

**OKB** B/Goth work clothes (Railroadmen) Free Catalog, Dept. PC, Sullivan, Illinois 61951

**UTILITY APRON-16 oz.** cotton denim-2 large pockets in front-durable tie strings-made to same specifications as purchased by U.P.S. \$4.95 each plus \$1.00 P&H. No C.O.D. Connor Plus, P.O. Box 787 - Hancock Station, Los Angeles, California 90044

## WEARING APPAREL

**GENUINE** handmade snake hide belts, men's \$17.99, ladies \$10.99. Send remittance with waist size, limit 40" to: George Klusassen, 640 E. 236 St. Apt. 4B, Bronx, NY 10466. Need Distributors.

## REPAIRS & SERVICES

**WATER Treatment and Equipment Maintenance Manual.** \$7.50 & \$2.00 Postage. Magnum Publication, 13 Pondfield Rd., New Fairfield, CT 06812

## GARDENING & LAWN CARE

**SOL TESTING SERVICE** 12 tests plus recommendations. FREE prepaid meter. FSL, Dept. B, Box 1144, Freedom, CA 95019-1144

## RECIPES, COOKING, ETC.

**ECONOMY**-casseroles, pan dishes, vegetables, more. SASE, \$4.50. Envelope, 2520 Columbia Pike (Rear), Suite 340, Arlington, VA 22204

(Continued on next page)

**POPULAR MECHANICS** • MAY 1987 213

# Popular Mechanics

224 West 57th Street, New York, N.Y. 10019  
Classified Advertising Dept. (212) 262-4825

Order  
Form  
M87

**DEADLINE FOR ADS:** Copy and Payment must be in by the 5th day of the 2nd preceding month for the issue in which the ad is to appear. See Head of Classified Section.

**HOW TO COUNT WORDS:** Name and address must be included in counting the number of Words in your ad. Each initial or number used counts as 1 word: J.J. Smith, 224 West 57th Street, New York, New York 10019: 9 Words. Zip codes are not counted. Phone #: 2 Words. Symbols used as keys are charged for: City or State count as 1 word each: New Brunswick, New Jersey: 2 words. Abbreviations such as C.O.D., F.O.B., R.P.M., U.S.A., P.O., 5x7, 16mm are counted as 1 word. (P.O. Box 392 counted as 3 words) Webster's International Unabridged Dictionary will be used as our authority for spelling, compound words, hyphenations, abbreviations, etc. Please make checks payable to POPULAR MECHANICS.

Only \$70.00 for 10 word minimum

\$7.00 each additional word

**BOLD FACE CAPS add  
\$1 per word**

(First Word: No Charge For Bold Face)

Remittance of \$ \_\_\_\_\_ is enclosed to cover \_\_\_\_\_ insertion(s) in the \_\_\_\_\_ issue(s). \_\_\_\_\_ Classification

No Charge for CAPS	2	3	4	5	6	7
8	9	10-\$70.00	11-\$77.00	12-\$84.00	13-\$91.00	14-\$98.00
15-\$105.00	16-\$112.00	17-\$119.00	18-\$126.00	19-\$133.00	20-\$140.00	21-\$147.00
22-\$154.00	23-\$161.00	24-\$168.00	25-\$175.00	26-\$182.00	27-\$189.00	28-\$196.00
29-\$203.00	30-\$210.00	31-\$217.00	32-\$224.00	33-\$231.00	34-\$238.00	35-\$245.00
36-\$252.00	37-\$259.00	38-\$266.00	39-\$273.00	40-\$280.00	41-\$287.00	42-\$294.00
43-\$301.00	44-\$308.00	45-\$315.00	46-\$322.00	47-\$329.00	48-\$336.00	49-\$343.00
50-\$350.00	51-\$357.00	52-\$364.00	53-\$371.00	54-\$378.00	55-\$385.00	56-\$392.00

YOUR NAME \_\_\_\_\_ (PLEASE PRINT) PHONE: \_\_\_\_\_  
 FIRM (NAME IN AD) \_\_\_\_\_  
 YOUR ADDRESS \_\_\_\_\_  
 CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_  
 DATE: \_\_\_\_\_ YOUR SIGNATURE \_\_\_\_\_  
 (PLEASE PRINT OR TYPE COPY • FOR ADDITIONAL WORDS ATTACH SEPARATE SHEET)

## RECIPES, COOKING, ETC.

(Continued from preceding page)

SUPERI Lasagne, Manicotti, Recipes-\$3.00. P.O. Box 2138, Ferme, B.C., Can. V0B 1M0

10 FLAMBÉ FLAMED RECIPES. Exotic \$5.00 WisCo, P.O. Box 13264, Akron, Ohio 44313

FREE CHALLENGER Color Photo! With Tropical Key Lime Pie Recipe \$1.00, Universal Enterprises, Box 296, Edgewater, Florida 32023

GRANDMA'S FAVORITE DESSERTS. SASE \$2.00. Choice Treasures, P.O. Box 27, Stormville, NY 12562

ELEGANT old-world pastry recipes \$2.00. Respond now - Special bonus. Rock Liq., 25 B'way, Haverstraw, N.Y. 10521

FUDGE Cake Recipe. Like Grandma use to make! \$2.00 SASE. McCracken House, P.O. Box 107, Paoli, IN 47454

DESSERTS 8 Delicious recipes \$3.00. NEVERFAIL, Box 73, North Edgecomb, Maine 04556

JUST FOR TWO, 20 recipes created for one or two people. Send \$3.00 to: Michael Bush, 4790 Irvine Blvd. Suite 105-214, Irvine, Calif. 92714

EXOTIC CURRIED CHICKEN DISH. Send \$2.00 and receive our spice mixture and recipe. Khan, 1900 Mt. Zion Dr., Golden, CO 80401.

ITALIAN Recipes 25 Best of Ma and Grandma. Secrets Revealed! \$4.95 to: Gibson, Box 74, Buffalo, NY 14221.

TRADITIONAL Maine Lobster Clam Bake. Detailed Recipe \$4.00. P.O. Box 1124P5, York Harbor, ME 03911

SPECIAL COLLECTION on quality bordered paper - great gift ideas - \$4.50 set delivered - FazioCorp Inc., P.O. Box 2059, Dorval, Que. Canada H9S 3K7

CHOCOLATE LOVERS BEWARE! Scrumptious recipes to satisfy any Chocoholics craving. \$3. SASE Chocoholics, P.O. Box 6940, Colorado Springs, Colorado 80934.

ABALONE DIVERS! 5 favorite recipes \$3.00. M. Jorgensen, P.O. Box 497, Redwood Estates, Ca. 95044

HOME BARTENDER'S GUIDE! Favorite Drink Recipes And Preparation Techniques! Send \$7.95 To Burton Publishing, Box 1606, Indianapolis, IN 46206

TOMATO DUMPLINGS. \$2.00. Jimco Associates, 160 East Central, LaFollette, Tenn. 37766

JERKY Recipe, use BEEF, DEER, ELK \$3.00 JLC. Box 633, Marshalltown, Iowa 50158

SECRETS for successful soups, plus ten recipes \$3. Lawrence Clarke, Box 570A, East Aurora, NY. 14052

10 DELICIOUS Desert Recipes \$2.00 and stamped envelope. Randy Clark, P.O. Box 66, Spring Church, PA 15686.

CAJUN recipes de terrebonne. \$2. to: 1159 Bayouside, Houma, LA 70363.

101 POPCORN IDEAS. Exciting new recipes. \$3.50. Karstyn McCoy, P.O. Box 770, Dept. 10771, Burlingame, CA 94011

## WINEMAKING, BEERMAKING, ETC.

WINEMAKING—BEERMAKING—GASOHOL. Free Supply Catalog. Yeast Equipment. Continental, Box 188PM. Casselberry, FL 32707

WINEMAKERS—BEERMAKERS: FREE ILLUSTRATED CATALOG OF SUPPLIES. SEMPLEX, BOX 11476R, MINNEAPOLIS, MINNESOTA 55411

WINEMAKERS—BEERMAKERS • Free Catalog - Fast Service - Large Selection: Kraus, Box 7850-L, Independence, Missouri 64053

BEERMAKERS ONLY! FREE Catalog Newsletter. William's, Box 2195-M, San Leandro, CA 94577

WINEMAKERS BEERMAKERS SODAMAKERS Free Catalog. Joe and Sons, P.O. Box 11276, Cincinnati, Ohio 45211

BEERMAKERS—Free Recipes, Catalog. Guaranteed Lowest Prices. Brewmaster, Box 321, Marion, IA 52302

WINEMAKERS—Brewmakers Free Catalog. Low Prices. Free Recipes. Cellar-M, Box 33525, Seattle, WA 98133

BEERMAKING - WINEMAKING Catalog. Lowest Prices. BEERGEAR, Box 25093N, Lansing, Michigan 48909.

WINE BEER MAKING Catalog: B&J Enterprises, 1845 South 19th, Springfield, Illinois 62703

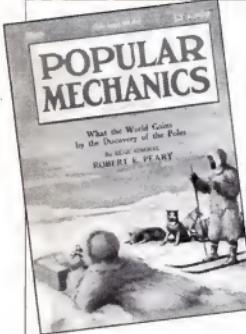
## BURGLAR ALARMS & HOME PROTECTION

DO IT yourself car alarm! Free details! Watson, Box 16, Richview, IL 62877

ALARM Decals, Pkg. \$2.00. Mitchell's Signs, Box 146, Rustburg, Virginia 24568

# TIME MACHINE

75 YEARS AGO: May 1912



Peary describes the poles.

## Dominion poles

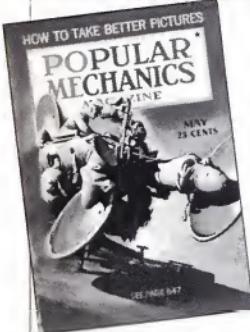
Writing for PM in 1912, explorer Robert Peary noted: "In the first chapter of Genesis, we read that on the sixth day the Creator . . . created man, and said: 'Let them have dominion over the whole Earth.' It is only now, with the attainment of both uttermost points of the Earth, the North and South Poles, that the scriptural permission and command has been effective." Peary said conquests of the poles would open new shipping lanes and create new avenues of exploration.



## Put us to sleep

Insomnia was almost impossible to cure in 1912. But a London inventor created a machine to put insomnia to sleep. The patient would lie down on a bench with his head facing the ceiling over a bucket. A pumping mechanism would drip "medicated fluid" across the patient's forehead at a graduated speed and a fixed quantity. The flow would lull the patient to sleep in a kind of mechanical hypnosis. Based upon an African nursing custom, it didn't work well on Western adults.

50 YEARS AGO: May 1937



Infrared plane detectors.

## Ears for war

It looked like a circus clown's tricycle gone haywire. It was an Austrian aircraft detector, a rigging that had hydraulic legs and three huge dish "antenna" ears. These used a combination of radio waves and infrared light to spot approaching planes. The radio waves worked well at the horizon level. The infrared rays were able to detect approaching aircraft above the cloud cover. The American military was using it at the start of World War II before radar was perfected.



## Airline or bomber flies

America was not yet at war with Germany, so we treated as good news the announcement that the German Postal Service had successfully tested a 30-passenger, single-wing, 4-engine plane that could fly across the Atlantic nonstop at speeds of up to 186 mph.

The German aircraft carried pontoons for emergency landings only. It could hop from Germany to the English Channel Islands across the Atlantic to Newfoundland in less than nine hours. Once the war began, however, the technology loomed as a constant threat.

25 YEARS AGO: May 1962

## Indy in a rut

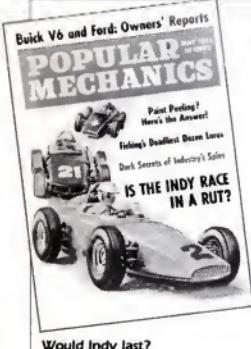
We wondered if the Indianapolis 500 hadn't become "a beer festival" without much interest for racing fans. The basic race had become a formula: "Take a group of carbon-copy, Meyer-Drake-engined cars, stuff them with fearless, well-coordinated boys, and let them go round in a circle until something goes wrong . . . the crowd loves blood." Despite our reservations, we reported on breakthrough developments in the engineering of the auto body and other systems for the race.

## Abu's are forever

A panel of experts selected fishing lures they felt were so good the lures would last forever. The Abu reflex spinner topped the list with more than 70 varieties. The Bass-Oreno came with a floating-diving wiggler and was especially good for Bass and Northern Pike. The Bomber was called "the hottest thing in deep fishing anywhere." In all, the panel selected 12 all-time greats including: Dardevle; Flatfish; Hawaiian Wiggler; Jitterbug; Ike; Mirrolure; Pike Minnow; and River Runt.

## Industrial spies

Industrial espionage was coming into its own as former FBI and CIA agents began opening private agencies dedicated to peeking through your competitor's keyhole. One spy, Ulmton Cumming of New York City, declared that he was "the top industrial spy in the country." Ingenuity was the main tool of the industrial spy, but some new technologies were emerging to help him, such as microphones so sensitive they could pick up sound a quarter mile away, and rapid-sequence cameras. **PM**





**WHEN IT COMES TO  
OUR WARRANTY,  
THE COMPETITION'S  
BEHIND US 100%.**



## DODGE RAM PICKUP.

When it comes to our competition's warranties, there's no competition at all. With our new 7/70 Protection Plan, we're still the very best in the business. Seven years or 70,000 miles.\* Now when it comes to power plants, we've got V-8s and Sixes. When it comes to payloads, we've got everything from 1,420 up to 6,415 pounds! And when it comes to warranties, we've got it all. Just buy or lease a Ram Tough Dodge.†† And go with the best.

\*"Best Built" based on survey of owner problems with '86 light trucks designed & built in No. America and sold Oct.-Nov. '85 (5 mos. avg. usage).

See 7/70 powertrain & 7/100 outer body rust-through limited warranty at dealer. Excludes imports. Restrictions apply. †Includes Chassis/Cab models.

†Shown with dealer installed options.

BUCKLE UP FOR SAFETY.



**7/70**

DIVISION OF CHRYSLER MOTORS

**THE BEST BUILT, BEST BACKED AMERICAN TRUCKS  
ARE RAM TOUGH™**



# Real Challenge

Real people  
want real taste.  
**Winston**

SURGEON GENERAL'S WARNING: Smoking By Pregnant Women May Result in Fetal Injury, Premature Birth, And Low Birth Weight.

16 mg. "tar", 1.2 mg. nicotine av. per cigarette by FTC method.

