

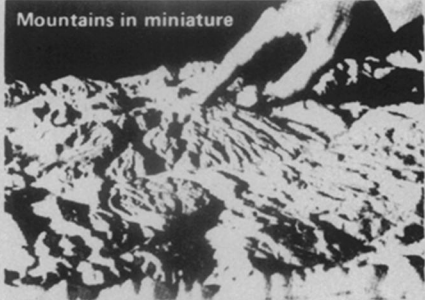
SCIENCE NEWS

MAY 24, 1980
VOL. 117, NO. 21



The Dawn of Science

Mountains in miniature



RAISED RELIEF MAPS

SHOW A LOT MORE... of the terrain of the eastern/western regions of the U. S. Mainland and Hawaii.

See the Adirondacks, Appalachians, Rockies, Sierras and other great outdoor areas in 3-D. Printed in 6 colors, these 22"x33" maps each represent approximately 70x110 miles and provide accurate visual information about:

Wooded areas — Mountains, hills and valleys — Streams, lakes and reservoirs — Elevation contours — Political boundaries — Urban areas and roads — Landmarks.

Reference for: Fishing — hunting — skiing — camping — backpacking — flying.

Send coupon for free index map/order form.

HUBBARD P. O. Box 104
Northbrook, IL 60062

Please send FREE descriptive information.

Name _____

Address _____

City _____ State _____ Zip _____

(Dealer inquiries invited)

SN

Circle No. 121 on Reader Service Card

bring outer space into your home or office
color **SPACE** photos



EARTH RISE

3'x2' FULL COLOR NASA SPACE PHOTOS

NASA's Most Beautiful Scenes from Space now available as large, titled, Full-Color Prints. Bring your home and office into the space age with these striking "windows on space." Available unframed, or quality framed with color coordinated mat, silver chrome frame, and non-glare glass. Order Yours Today!

FREE CATALOG FULL-COLOR

FRAMED \$79.95

UNFRAMED \$19.95 each

plus \$6.00 postage plus \$3.05 postage

Woodstock Products P. O. Box 4087, Dept. SN
Beverly Hills, CA 90213

Yes, rush me the _____ NASA prints I've checked below, **SATISFACTION GUARANTEED.**

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

FULL COLOR PRINT	FRAMED	UNFRAMED
• "FULL EARTH"	<input type="checkbox"/> \$79.95 (3'x2')	<input type="checkbox"/> \$19.95 (34"x22")
• "EARTH RISE"	<input type="checkbox"/> 79.95 (3'x2')	<input type="checkbox"/> 19.95 (34"x22")
• "MARTIAN SUNSET"	<input type="checkbox"/> 79.95 (3'x2')	<input type="checkbox"/> 19.95 (34"x22")
• "FULL JUPITER"	<input type="checkbox"/> 79.95 (3'x2')	<input type="checkbox"/> 19.95 (34"x22")

PLUS POSTAGE \$6.00 \$3.05

PAYMENT ENCLOSED \$ _____ (plus postage) Calif. residents add 6% Sales Tax

VISA MC No. _____ Expires _____

OR CALL 1-800-824-7888, Op. # 462
TOLL FREE in Calif. 1-800-852-7777, Op. # 462

WOODSTOCK PRODUCTS P. O. Box 4087, Dept. SN
Beverly Hills, CA 90213

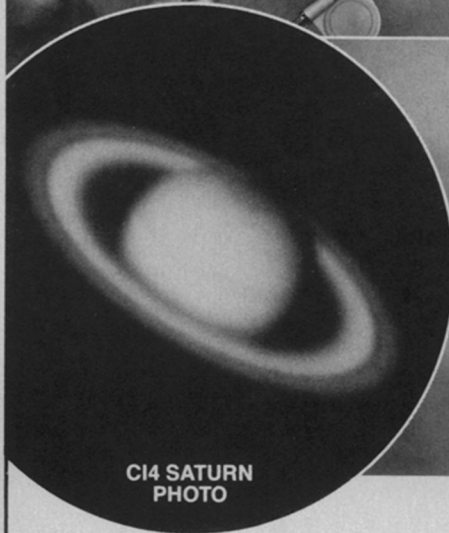
Circle No. 122 on Reader Service Card

Celestron®

C90 TELEPHOTO



C90 PHOTO OF TIGER AT 30 FEET



C14 SATURN PHOTO



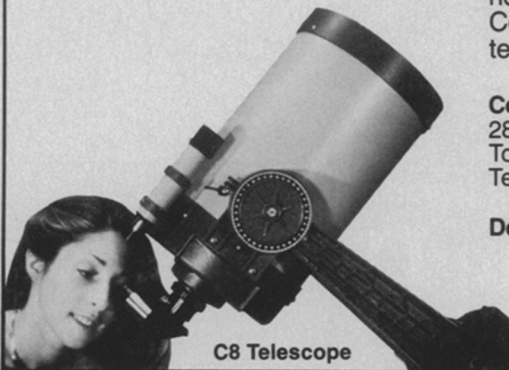
C90 TELESCOPE

For the photographer, astronomer, naturalist, educator, or casual observer—Celestron has established a new standard in superb telescopes and telephoto lenses at affordable prices (from \$245). All feature large observatory type mirror/lens optics folded into a compact, lightweight, portable telescope or telephoto lens. Close-up detail borders on the fabulous from celestial subjects light years away, to ships, planes, flowers, wildlife or people. Here is truly an instrument that allows you to view or photograph the world around you.

Free 4-page brochure or send \$2.00 for 32-page full color catalog on how to select and use a Celestron telescope or telephoto.

Celestron International
2835 Columbia St., Box 3578-12
Torrance, Calif. 90503, U.S.A.
Telephone: (213) 328-9560

Dealer Inquiries invited.



C8 Telescope

Take your choice of these modern money- and

<p>THE MASTER IC COOKBOOK "Use-it-now" info on every IC family and function—CMOS and TTL 4000- and 7400-series digital ICs, exotic CMOS, and linear ICs! For the 7400-series digital ICs, there are logic diagrams, power dissipation, propagation delay time (or maximum clock frequency for flip-flops, counters, and registers), and truth tables. For the 4000-series, you get all this <i>plus</i> the important CMOS specs: quiescent current, capability for driving TTL loads, and supply-voltage range. For linear ICs, here's <i>total</i> coverage of such essentials as pinouts, schematics, specs, block diagrams, descriptions, a list of features, etc. Also included are circuits you can build using linear ICs. 476 pps., 707 illus. Hardbound. Only \$15.95</p> <p>To order, circle "A" on Reader Service Card</p>	<p>PRACTICAL KNOTS & ROPEWORK If you've ever had a need for <i>any</i> kind of a knot, for <i>any</i> practical purpose whatsoever, you're more than likely to find how to do it in this new book by master craftsman Percy Blandford. Using hundreds of clear and informative illustrations, Blandford shows you how to make decorative ropework and netmaking knots. And, since most ropes are now made of synthetic materials, he shows you how to make knots using <i>both</i> natural fiber <i>and</i> synthetic ropes. Blandford concentrates on detail, giving you all the hands-on help you need on preparing the end of a rope, braiding, splicing, and on the tools needed for ropemaking. 406 pps., 305 illus. Hardbound. Only \$14.95</p> <p>To order, circle "G" on Reader Service Card</p>	<p>THE ILLUSTRATED DICTIONARY OF ELECTRONICS 868 pages of complete and modern definitions for well over 24,000 electronics/computer terms. You'll find literally any and every electronics term clearly defined, in the most modern language, according to the most accepted current usage. Containing a full range of entries/definitions for every phase of the electronics industry, it will keep you abreast of all the developments in each. The illustrations in themselves make this book unusual. . . 472 of them, each one making its point forcefully and clearly, and insuring that this new volume is the <i>total</i> source of information on electronic terms. Wiring diagrams, drawings of various devices and components, charts of pulses and sine waves. 868 pps., 472 illus. Hardbound. Only \$19.95</p> <p>To order, circle "M" on Reader Service Card</p>	<p>BUILD-IT BOOK OF SOLAR HEATING PROJECTS A "hands-on" guide to planning, designing, building, and installing a solar heating system. You'll learn how to brush up your metalworking skills, especially in terms of fabricating collector frames and absorber plates, how to join metals, by either soldering or mechanical fastening, how to properly glaze the collector, how to select cover materials, to cut glass, construct insulating glass units, where to buy aluminum, copper, glass, glazing material, fasteners, insulation, paint, and heat-transfer fluids. Covers the thermosiphon hot water heater, the pumped system circulating potable water, the closed-loop heat exchanger system, and the solar room heater supplements. 196 pps., 111 illus. Hardbound. Only \$9.95</p> <p>To order, circle "S" on Reader Service Card</p>
<p>TROUBLESHOOTING MICROPROCESSORS AND DIGITAL LOGIC A complete guide to modern microprocessor/microcomputer troubleshooting and servicing. How to understand and troubleshoot digital/logic and microprocessor circuits, how to dig into their operating systems, and how to locate and repair problems. You'll learn about binary codes, system interfacing, input/output devices, flowcharts, using oscilloscopes, logic probes, etc., when troubleshooting, testing, and repairing TTL logic gates, clock pulses, random-access memories, CPU's, VCR's, videodisc players, complete minicomputer systems, TV games, TV tuners, all kinds of digital circuits—and even microprocessors themselves! 308 pps., 229 illus. Hardbound. Only \$12.95</p> <p>To order, circle "B" on Reader Service Card</p>	<p>PLUMBING WITH PLASTIC Today, plastic is THE way to go when it comes to plumbing, and this HUGE working guide shows you how to install a full-house system in a new home, add on to an existing metallic or plastic system, or put in an auxiliary system for any purpose. You'll learn all about the various water supply sources available to you, along with the cold water, hot water, drain-waste-vent, waste disposal and various auxiliary system . . . plus how to allow for expansion, run plastic tubing, work with insertion, threaded, compression, no-hub, and gasketed fittings, correct mistakes, make fixture connections, hang and mount pipe and tubing, measure and cut lengths of pipe, etc. 406 pps., 269 illus. Hardbound. Only \$15.95</p> <p>To order, circle "H" on Reader Service Card</p>	<p>ELECTRONIC MUSIC SYNTHESIZERS How to build—or buy and use—your own modern electronic music synthesizer—all the info to choose, play, adapt, or even build a synthesizer. Part I covers buying; you'll see exactly what synthesizers are, and how they work in practice and in theory. Such musical workhorses as the Moog (Minimoog and Polymoog), ARP 2600, Odyssey, PAIA, Oberheim, RMI and EML Synkye synthesizers—plus various accessories. Once you've learned what makes a synthesizer work and how to produce all kinds of music and sound effects, Horn includes a section on how to build your own—keyboards, an op amp organ, the digital Poly-Syngan, oscillators, drones, filters, tunable noise stage. 168 pps., 127 illus. Hardbound. Only \$9.95</p> <p>To order, circle "N" on Reader Service Card</p>	<p>HOW TO DESIGN & BUILD YOUR OWN CUSTOM TV GAMES The COMPLETE book—a GIANT 546-page volume—on designing, building, programming, and modifying all kinds of TV games! It's a thorough course in game circuitry, with detailed how-to-build-it instructions and complete game schematics. You begin by building the simple Sourcebox unit, which stands between the game circuits and the antenna terminals of your TV set, and it generates all the sync and blanking signals that synchronize both the TV raster and the game operations. Proven circuits for those who want to begin with a ready-made design—Missile Attack, Dogfight, Ambush, Torpedo Attack, Tag, Pinball, Golf, etc. 546 pps., 244 illus. Hardbound. Only \$14.95</p> <p>To order, circle "T" on Reader Service Card</p>
<p>HOW TO BUILD YOUR OWN UNDERGROUND HOME & HOW TO BUILD ADOBE HOUSES . . . etc. A HUGE 2-in-1 512-page "build-your-own-home" manual that shows you how to build sturdy, long-lasting, low-cost, energy-saving, maintenance-free houses. First, there's a complete guide to planning, building, and living comfortably in a totally unique geothermic house, which carefully takes you through all the stages of planning and building an underground home. You'll learn how to design and build adobe houses, patios, fireplaces, barbecues, hobby rooms, workshops, garages, guest houses, vacation homes, studios—using <i>modern</i> adobe construction methods! 512 pps., 1332 illus. Hardbound. List \$24.90. Special Sale Price Only \$19.95</p> <p>To order, circle "C" on Reader Service Card</p>	<p>HOW TO BUILD YOUR OWN SELF-PROGRAMMING ROBOT Complete over-the-shoulder instructions on how to use the 8085 microprocessor to build Rodney Robot, a robot capable of thinking and learning. It's a how-to introduction to the sophisticated subject of robotics and machine intelligence. You get directions to complete every portion of the project: robot mainframe, auxiliary power supply, front panel, CPU board, and tells you how to test the circuitry, install the motor control, wire the I/O board, add a main memory, put in sensing devices like eyes, ears, and a self-feeder, install a "beep-beep" voice, etc. . . . plus completely program your own Rodney. 239 pps., 103 illus. Hardbound. Only \$12.95</p> <p>To order, circle "I" on Reader Service Card</p>	<p>THE BUILD-IT BOOK OF CABINETS & BUILT-INS A GIANT 448-page guide that shows you step by step how to build fine cabinets, built-ins, and storage units for every room in your house—built-in cabinets and cases, book walls, base cabinets, window seats, sofas, windowboxes and planters, divider wall storage units, lighted built-in display cabinets, shelving, inglenooks and fireplace seating, base cabinets, sewing and laundry centers, beds, bunks, built-in gun racks, shadow boxes, and lots more. Practical projects, all of them. You get thorough instructions, drawings and photos, plus <i>complete</i> materials lists . . . It's clear enough for the beginner, detailed enough to intrigue even the most experienced woodcrafters. 448 pps., 297 illus. Hardbound. Only \$12.95</p> <p>To order, circle "O" on Reader Service Card</p>	<p>HOW TO READ ELECTRONIC CIRCUIT DIAGRAMS With this modern guidebook, anyone can quickly learn how to find his way around circuit diagrams. Beginning with basic components, each type is fully described (with schematic and pictorial illustrations), making it easy to identify them in schematic diagram form. Typical schematic diagrams are included, along with "guided tours" through AM receivers, audio amplifiers, AM-FM tuners, television sets (B&W and color), PA and sound systems, communications equipment, test instruments, etc. You'll learn how to trace signals from start to finish—component to component and stage-by-stage . . . A valuable reference source on electronic circuit symbols and terminology. 252 pps., 149 illus. Hardbound. Only \$9.95</p> <p>To order, circle "U" on Reader Service Card</p>
<p>21 CUSTOM SPEAKER ENCLOSURE PROJECTS YOU CAN BUILD A step-by-step guide to innovative, efficient audio speakers, with complete design and construction details! From simple closed-box systems to complex omnidirectional speakers, including cube, column, thinline, triangular, pentagonal, hexagonal, and rectangular truncated pyramid designs . . . for home or car, stereo or quad, even for a van or RV! For each project you get complete descriptions, full design and construction details, wiring facts, diagrams, info on phasing and impedance, tips on parallel vs series crossover networks, data on special circuits, a list of materials, and a description of sound characteristics, etc. 240 pps., 177 illus. Hardbound. Only \$12.95</p> <p>To order, circle "D" on Reader Service Card</p>	<p>HOW TO REPAIR CLOCKS A complete guide to repairing and overhauling ANY clock—mechanical, electric or electronic—antique or modern . . . even large pendulum-operated ones and cuckoo clocks. You'll learn how clocks are designed and work—pendulums, balance wheels, escapements, striking, chiming and alarm systems, cases, dials, hands, gearwheels and gear trains, weights, mainsprings and clickwork, star wheel stopworks, regulating pendulum suspensions, lever and cylinder escapements, ting-tang mechanisms, indexes, regulators, chains and lines, ratio wheels, pinwheels, and scapewheels. You'll see how to clean, repair, adjust, renovate and dismantle, and put them back together. 182 pps., 90 illus. Hardbound. Only \$9.95</p> <p>To order, circle "J" on Reader Service Card</p>	<p>LOW-HORSEPOWER FUN AIRCRAFT YOU CAN BUILD A complete, well-illustrated guide to recreational flying and some of the low and ultra-low horsepower homebuilt designs, including power hang gliders. In this book are the readily available low-cost, homebuilt aircraft that give hours of flying pleasure, what it's like to fly them and how to get started building and flying them. Also included are specifications lists and performance figures for all the aircraft included, plus where to get plans and kits. There is also detailed treatment of the engines most often used. There are a wide variety of designs to choose from! You can build monoplanes, biplanes, amphibious, seaplanes, antiques, gyrocopters, and even the very latest ultralights. 176 pps., 86 illus. Hardbound. Only \$9.95</p> <p>To order, circle "P" on Reader Service Card</p>	<p>COMPLETE LIBRARY OF LOG CONSTRUCTION & TIMBER FRAMING Here are 2 complete books in one—a GIANT 384-page course in learning the time-proven techniques and methods used by master carpenters and country builders to design and construct sturdy, long-lasting houses and structures. The illustrations are about the best we've ever seen in a how-to book. The authors show you how to custom-design your own house, use carpenters tools, get the materials you'll need (without shelling out your life's savings), lay a solid foundation, erect a house frame, put in a floor, build weathertight walls, cut every log, lay every board, and slap on every shingle. 208 pps., 388 illus. Hardbound. Only \$27.90. Special Sale Price of \$22.95</p> <p>To order, circle "V" on Reader Service Card</p>
<p>COUNTRY COMFORTS—THE NEW HOMESTEADER'S HANDBOOK Shows you how to build fireplaces, construct water systems, make forges, put up stone masonry walls, build stone saunas, fabricate animal shelters, put up fences, construct greenhouses, make your own tools, and many other home crafts . . . and how to work with materials as diverse as soil, glass, wood, concrete, stone, metal, rubber, canvas and logs; how to make tools of wood and metal, fabricate your own concrete reinforcing cable, how to insulate with natural materials from the homestead itself, how to construct outbuildings, root cellars, shingles, doors, windows, pipe, rafters, flashing, etc. 240 pps., 8½" x 11" 545 illus. Long-life leatherette. Only \$14.95</p> <p>To order, circle "E" on Reader Service Card</p>	<p>THE MASTER HANDBOOK OF BOAT AND MARINE REPAIR Here's everything you must know to keep your wood, metal or fiberglass cruiser or sailboat, hull, engine, electrical system and marine electronics equipment ship-shape. From basic hull maintenance to the operation/maintenance of complex electronic systems. Here are <i>all</i> the maintenance tips—all the straight facts on paints, varnishes, sealers, fiberglass, replacing steam-bent ribs, preventing galvanic corrosion, how to braze and weld, how to repair sails, how to handle everything connected with the electrical system, including how to completely rewire your boat, how to keep your marine electronics gear in top shape. 400 pps., 298 illus. Hardbound. Only \$14.95</p> <p>To order, circle "K" on Reader Service Card</p>	<p>BUILD-IT BOOK OF OPTOELECTRONIC PROJECTS A 48-project learn-by-building guide to the super-practical world of optoelectronics . . . with thoroughly readable instructions on how to create everything from an LED circuit monitor to an electronic stopwatch to an ultrasophisticated pulse stretcher, from a digital tachometer to a two-level logic probe to a garage nightlight. You'll build state-of-the-art optoelectronic packages . . . like LEDs, LCDs, displays, photo-detectors, optoisolators, and photodiodes. Every project is original and comes with complete parts lists, detailed circuit descriptions, circuit options, and loads of schematics. Most of the circuit components are standard—and can be used in project after project. 238 pps., 175 illus. Hardbound. Only \$8.95</p> <p>To order, circle "Q" on Reader Service Card</p>	<p>MASTER HANDBOOK OF 1001 PRACTICAL ELECTRONIC CIRCUITS The ideal schematic sourcebook of IC and transistor circuits for practically anything and everything—with ALL the data needed to put them to work . . . each circuit diagram has every component carefully labeled, and every schematic is accompanied by all the info you need to construct the circuit for use in your own individual application. The circuits included are completely up-to-date, and have been designed, built, tested, reworked as necessary, and perfected. You'll find any circuit you're ever likely to need in the pages of this rich volume. Includes an ultra-complete 22-page Index, plus an Appendix of IC substitutions. 602 pps., over 1250 illus. Hardbound. Only \$15.95</p> <p>To order, circle "W" on Reader Service Card</p>
<p>HOW TO MAKE HOME ELECTRICITY FROM WIND, WATER AND SUNSHINE A complete guide to using nature's forces to homebrew your own electricity. It's all practical, use-it-now info—plus all the data you need on solar cells, electric motors, generators and alternators (including armature reaction, magnetization, rectifiers, etc.), storage batteries, inverters, DC to AC conversions, generation of 115 volt, speed controls and sensing, 60 Hz electricity etc. You'll find out how to put up a windmill, install a water wheel, build and install a solar heat engine, set up a hydroelectric powerplant, construct solar cells and collectors . . . and even hook up a microprocessor chip to protect your appliance motors! 252 pps., 151 illus. Hardbound. Only \$9.95</p> <p>To order, circle "F" on Reader Service Card</p>	<p>HOW TO DESIGN, BUILD & PROGRAM YOUR OWN WORKING COMPUTER SYSTEM Here's THE complete computer build-it book, including design, construction, programming, testing and debugging! This 2-in-1 volume combines both hardware and software so you can homebrew your own <i>customized</i> computer system completely from power supply to terminals. You'll find all the info you need to choose a central processor chip, incorporate the hardware and peripherals you need, and test each component as you build. You get large, carefully developed PC board construction photos, accurate parts location diagrams, wire-wrap construction data and complete system testing data. 308 pps., 138 illus. Hardbound. Only \$14.95</p> <p>To order, circle "L" on Reader Service Card</p>	<p>THE COMPLETE HANDBOOK OF LOCKS AND LOCKSMITHING Here's a thorough step-by-step course in ALL the techniques and skills of the locksmith's craft . . . that shows you how to service ANY lock, how to cut ANY key! It's written for beginners, and it teaches you all the skilled, practical know-how of the professional locksmith. It covers the whole field of locksmithing, from the simplest to the most sophisticated high-security protection devices. You learn how to cut keys, decode lock codes, extract broken keys, change lock combinations, repair lock mechanisms, convert everyday locks to more protective ones, and how to open locks. Even how to start your own locksmithing business. 392 pps., 200 illus. Hardbound. Only \$10.95</p> <p>To order, circle "R" on Reader Service Card</p>	<p>ARTIFICIAL INTELLIGENCE An exciting, thought provoking guide to the sophisticated techniques used to make machines "think." It carefully defines artificial intelligence, explains the theory behind advanced computer programming and shows you how to program your computer to assume the rudiments of humanlike intelligence. You can rig your computer to play chess, to recognize visual patterns, for robotics, to translate languages, to learn by experience, to solve problems in logic, to retrieve information, to handle tough problem-solving situations. Covers state-graph searches, subproblems, hierarchical plans, procedural nets, tree searches, heuristics, computational logic and more. 252 pps., 118 illus. Hardbound. Only \$12.95</p> <p>To order, circle "X" on Reader Service Card</p>

To order any of these books, circle the letter on the reader service card facing this page.

time-saving TAB volumes—on FREE 10-day Trial!

HOW TO BUILD YOUR OWN WORKING ROBOT PET

An incredible book that shows you how to construct your own robot and program it. Included is all the technical data you need on interfacing the body, building the power system, constructing circuits, putting together the mechanical and locomotion system, programming the brain, etc. Here are just some of the features you can build into your robot: a sonar distance measuring circuit (Soniscan), similar to the navigational methods used by dolphins, a self-charging system, a system (Excom), so the robot can hear you, an understandable language and grammar (Fredian) for communicating with the robot, a means of speech (Audigen) so the robot can "talk" with you, and much more. 238 pps., 96 illus. Hardbound. **Only \$10.95**

To order, circle "Y" on Reader Service Card

THE PRACTICAL HANDBOOK OF BLACKSMITHING & METALWORKING

A hands-on 448-page guide to the professional, time-honored techniques of blacksmithing and metalworking. You'll learn how to work with iron and steel, sheet alloys, zinc, brass, tin, bronze, lead, aluminum, copper, and precious metals, and how to form cast iron, wrought iron, and alloy steels, using smith's tools you can make yourself: hammers, tongs, forges, mandrels, swage blocks, etc. Blandford shows you how to cut, shape, form, bend, solder, braze, weld, rivet, harden, anneal, punch, draw, twist, split, loop, scroll, saw, shear, file, drill, hollowout, planish mold, and cast, metals of all types. 448 pps., 909 illus. Hardbound. **Only \$15.95**

To order, circle "EE" on Reader Service Card

MASTER HANDBOOK OF ELECTRONIC TABLES & FORMULAS—3rd Edition

This well-written, easy-to-understand problem-and-solution guide on electronics math and theory covers ALL the concepts used in electronics, communications, electricity, and related areas. It explains literally everything you need to know to conquer the intricacies of the mathematics and theory of electronics. You'll be able to perform all kinds of mathematical equations and get the results quickly and easily—the related electronic principles are fully explained and the governing math formulas are stated in the simplest possible way. You'll really understand both theory and practice when you're using this manual. 322 pps., 96 illus. Hardbound. **Only \$14.95**

To order, circle "KK" on Reader Service Card

1001 THINGS TO DO WITH YOUR PERSONAL COMPUTER

Over 1,000 just-plain-fun applications—with actual programs, printouts, flowcharts, diagrams and illustrations to help you put these applications to work. Twelve Chapters contain programs for any use, and applications for everyone: business and financial, mathematical, technical and scientific educational, control and peripheral, hobbies and games, etc. . . . you'll be impressed with the wide range: a shorthand translator, weather forecasting, precise values for camera settings, animated films, model railroads, controlling household devices like wood stoves, Morse code, almost 100 games (including pool), etc. 336 pps., 100 illus. Hardbound. **Only \$12.95**

To order, circle "QQ" on Reader Service Card

BUILD YOUR OWN WORKING ROBOT

Complete instructions—plans, schematics, logic circuits, and wiring diagrams—for building Buster, the most unique pet in the world! Not for novices, Buster is a sophisticated experiment in cybernetics. You build him in 3 phases, and watch his personality develop as you add more advanced circuitry to his mainframe. The first-phase robot, Buster I, is "leashed," and dependent on his master for decision-making; Buster II has a basic brain, equipped with a wireless mike, he can enter a room and talk with the occupants. Buster III responds when called, and when "hungry" finds his charger, and plugs himself in. Watch his personality evolve as you build him from the ground up. 238 pps., 117 illus. Hardbound. **Only \$8.95**

To order, circle "Z" on Reader Service Card

THE BASIC COOKBOOK

A complete dictionary of all BASIC statements, commands, and functions—with programming examples and flowcharts—it thoroughly defines the BASIC vocabulary in alphabetical order, illustrates the definitions with sample programs, and further clarifies the programs with matching flowcharts . . . plus explaining BASIC system commands. ARRAY, COS, END, FOR-TO, GOSUB, INPUT, LIST, RANDOMIZE, REM, SCRATCH, SGN, SQRT, TAN—these are just some of the workhorse words of BASIC programming you'll be able to professionally manipulate. It also defines programming terms that apply to APL, ALGOL, COBOL, FORTRAN, RPG, PL1, and other computer languages. 140 pps., 49 illus. Hardbound. **Only \$7.95**

To order, circle "FF" on Reader Service Card

PRACTICAL ELECTRONICS MATH

A comprehensive problem-and-solution study guide and reference on electronics math and theory (with actual worked-out examples) that covers ALL the concepts used in electronics, communications, electricity, etc.! Each section deals with a different aspect of electronics, and all related principles are explained, and the governing formulas clearly stated, so they can be put to use immediately. The major subjects covered include Ohm's Law, inductance, capacitance, AC sine waves, alternating current circuits, resonance, coupled circuits, power supplies, vacuum tubes, plus AC machines, temperature coefficients of crystals, frequency tolerances, etc. 504 pps., 276 illus. Hardbound. **Only \$15.95**

To order, circle "LL" on Reader Service Card

THE METALCASTER'S BIBLE

A complete and practical do-it-yourself's guide to all kinds of metalcasting in the home shop: how to make molds and patterns, how to analyze scrap metal for purity, how to mix alloys and strengthen metals, how to determine and maintain the proper temperatures to melt various metals, how to extract molten metal from a furnace and how to pour it . . . you'll be able to cast almost anything out of any kind of metal: hollow balls, bushings, plumbing ware, bronze bells, hard-to-find parts, sculptures, plaques, etc. Plus, there's plenty of data included on making/repairing/maintaining crucibles, kilns, cupolas, burners, ladles, squeezer heads, dip-out furnaces, jigs, core ovens and foundry chills. 434 pps., 372 illus. Hardbound. **Only \$15.95**

To order, circle "RR" on Reader Service Card

MODERN DIESEL CARS

A fact-by-fact, car-by-car, advantage-by-advantage examination of today's diesel cars and those soon to come. It's the complete report on what's happening and what's in store—carefully scrutinizes every diesel car ever made—the Mercedes, the Volkswagen Rabbit, Peugeot, Citroen, Perkins, Opel, Oldsmobile, Austin Rover, Ford, Scout, Toyota's land cruisers, AMC's Jeep, Volvo's originals and others. Tells you how diesel engines work, gives complete design-analysis of 11 models, and includes step-by-step instructions on how to make fuel changes, insure fast startups, drive to conserve fuel, handle smoke exhaust problems, get maximum performance and much more. 272 pps., 200 illus. Hardbound. **Only \$9.95**

To order, circle "AA" on Reader Service Card

THE STEEL SQUARE

A comprehensive guide to using the world's most versatile construction tool—the steel square! The single most useful tool of the building trade. Siegele shows you how to use the steel square (and its cousins, the try square, protractor, bevel square, and the radial square) in hundreds of different ways—to calculate pitch cuts, work out rafter patterns, frame up hips and valleys, frame out irregular-pitch roofs, compute gable studs, lay out bay windows, figure board feet, calculate spacing for ladders, determine step sizes, build stairways, square up joists, cut newel posts, fashion balusters, construct circular stairs, build concrete steps, square up moldings, and much more. 192 pps., 498 illus. Hardbound. **Only \$8.95**

To order, circle "GG" on Reader Service Card

THE COMPLETE MICROCOMPUTER SYSTEMS HANDBOOK

A complete guide to microcomputers—how they operate, how to use them, how to program them, and how to troubleshoot and repair them . . . plus the very latest on modern applications and up-to-the minute info on all the latest state-of-the-art concepts like magnetic bubble memories, computers in networks, computer decision making, computer simulation and forecasting, teaching machines to learn, using computer technology to operate and control robots, speech synthesizers, digital (computer-created) music, mobile computers, etc. . . . you'll learn how to find and fix troubles in all these and many more. 322 pps., 125 illus. Hardbound. **Only \$15.95**

To order, circle "MM" on Reader Service Card

HOW TO DESIGN AND BUILD AUDIO AMPLIFIERS, including digital circuits—2nd Edition

Whether your need is for a preamp, an amplifier, a power amplifier, a mixer, a tone modification circuit, power supply, or a special accessory, you'll find all the necessary data to create practical, completely modern circuits. If you understand simple current flow, how to handle simple unit conversions, how basic discrete components work, and possess a knowledge of elementary algebra, you're all set. There's plenty of specialized information included, too—hybrid equivalent circuits, equivalent-T circuits, circuit characteristics of JFETs, equivalent noise generators, power amplifiers and power ratings, thermal circuits and limits. 350 pps., 249 illus. Hardbound. **Only \$15.95**

To order, circle "SS" on Reader Service Card

THE GIANT HANDBOOK OF COMPUTER PROJECTS

This MAMMOTH 504-page step-by-step guide to building modern computers and accessories—CPUs, memories, I/O hardware, etc.—is a HUGE collection of ready-to-use construction info designed for computerists who want the most flexibility. It's a builder's dream, with projects and complete schematics, parts lists, and step-by-step construction instructions. There's also a thorough discussion of microprocessors, with comparisons of several units, including the Kim-1, the Z-80, and the 8080, etc. . . . plus data on memory boards, RAM checkout, PROM programmers, memory chips, inexpensive input/output devices, paper tape systems, interfacing with clock chips, and more. 504 pps., 217 illus. Hardbound. **Only \$15.95**

To order, circle "BB" on Reader Service Card

AUTOMOTIVE AIR CONDITIONING HANDBOOK—Install., Maint. & Repair

A complete guide to installing, servicing, and understanding auto air conditioners . . . with troubleshooting charts, repair/installation instructions, complete schematics of the most popular units, and how-it-works explanations! Step-by-step instructions show you how to handle any system breakdown that comes along—busted hoses, overcharge, moisture contamination, low charge faulty components. Even if you've never handled an auto air conditioner before, this manual can show you how to service one: the troubleshooting charts are especially designed and logically programmed for sensible, efficient problem-solving. 280 pps., 149 illus. Hardbound. **Only \$9.95**

To order, circle "HH" on Reader Service Card

THE COMPLETE HANDBOOK OF SEWING MACHINE REPAIR

How to service, adjust, and repair ALL kinds of sewing machines! You'll learn how every type of sewing machine operates (both straight-stitch and zig-zag . . . both the old-timers and the most advanced automatics)—in nontechnical language. Then, step-by-step instructions show you how to check electrical components, adjust drive belt tension, regulate the machine for best performance, and properly set stitch and presser regulators. Literally any type of repair, will be a snap on any machine. Additional adjustments and repair tips help you solve specific problems in Brother, New Home, Pfaff and White machines. 308 pps., 238 illus. Hardbound. **Only \$14.95**

To order, circle "NN" on Reader Service Card

THE BICYCLE BUILDER'S BIBLE

How to modify, build, select, buy, use, repair, and recondition bicycles and pedal/operated vehicles . . . plus how to construct a pedal-driven electricity generator, winch, and Archimedes screw and pumps. You'll learn everything about bicycle repair from the simple advanced work like wheel lacing, overhauling, and converting (e.g. how to convert a standard bike into a folding one). Plus, how to build every kind of bike there is: double-decker bikes, a tandem, walking machine, a high-rise bicycle, pivot bike, an old front-wheel penny farthing, broncos, miniature bicycles, water pedal cycles, flying pedal cycles, unicycles, motocross bikes, exercise cycles converted from used bikes, etc. 368 pps., 280 illus. Hardbound. **Only \$14.95**

To order, circle "TT" on Reader Service Card

ILLUS. DICTIONARY OF BROADCAST-CATV-TELECOMMUNICATIONS

A GIANT, one-stop source of 9,000 definitions that explain ALL the terminology used in ALL fields of telecommunications! It's a complete word-by-word guide to the broad spectrum of telecommunications, and contains explanations of the terminology used in radio, TV, CATV, audio, advertising, magnetic recording, graphics, automation, music, journalism, broadcasting, statistics, writing, disc recording, film, makeup, news, acting, audience measurement, lighting, sound, programming, sales, video, etc. Designed for everyone who wants to understand the jargon of broadcasting/CATV/telecommunications. 420 pps., 106 illus. Hardbound. **Only \$14.95**

To order, circle "CC" on Reader Service Card

THE A TO Z BOOK OF COMPUTER GAMES

Here are 26 exciting and instructive game programs—all tested and ready to run, and designed to illustrate the fine points of computer programming! Each of these sophisticated programs includes full documentation on how the game works, what the program contains, how to alter or modify the existing program, how it relates to other programs, plus valuable programming gems. Games include poker, blackjack, roulette, battleship, O-Tell-O, golf, dice, slot machines, etc. This book is not just a random collection of fun games—it's a carefully thought out sourcebook of fun and exploration, learning, reasoning and logic, experimentation, and actual programming practice. 308 pps., 73 illus. Hardbound. **Only \$12.95**

To order, circle "II" on Reader Service Card

THE COMPLETE BOOK OF OUTDOOR MASONRY

A truly complete do-it-yourself's bible on building with concrete, mortar, bricks, stone, concrete blocks and slabs, clay and ceramic tile, stucco, and adobe. A remarkably clear, complete, compellingly interesting, worthwhile course in all the tools, the terminology, and the techniques of the art of masonry—written especially for do-it-yourselfers. It emphasizes time-tested, simplified masonry methods—know-how that shows you how to work with virtually every masonry material, how to construct a wide variety of projects like hand-some mortar-laid stone walls, long-life flagstone terraces, useful mortared brick barbecues, beautifully paved walks, and driveways. 416 pps., 269 illus. Hardbound. **Only \$11.95**

To order, circle "OO" on Reader Service Card

THE MASTER GUIDE TO ELECTRONIC CIRCUITS

616 pages of working models of circuit actions in diagram form, plus a look inside components, let you track electron currents and see what's actually happening inside electronic circuits! It's 5-complete-books-in-1, and is sure to have the answers to any questions you could have about electronic circuits and components and how they work. Uses a dynamic, nonmathematical approach to explaining electronic circuit action, one that actually takes you "on a ride" through scores of different circuits, and that shows you how to positively identify and track every electron current flowing in a circuit, and to fully describe the current's movements at any given moment. 616 pps., 302 illus. Hardbound. **Only \$19.95**

To order, circle "UU" on Reader Service Card

PROGRAMS IN BASIC FOR ELECTRONIC ENGINEERS, TECHNICIANS, & EXPERIMENTERS

35 ready-to-use workhorse programs designed to help you solve hundreds of everyday problems! Electronic design programs, math programs, statistical programs, mechanics programs—all the programs you need to rig your computer to tackle those time-consuming jobs. Need a program to help you bias Class A transistor amplifiers? Or design op-amp networks? Make antenna calculations? All these programs and more are presented in a foolproof format—each is accompanied by a brief explanation of capabilities, a set of pertinent formulas or illustrations, a sample program run, and a detailed flowchart. 140 pps., 49 illus. Hardbound. **Only \$8.95**

To order, circle "DD" on Reader Service Card

HOW TO TROUBLESHOOT & REPAIR AMATEUR RADIO EQUIPMENT

A complete guide to finding and fixing troubles in all types of ham gear, from power supply to antenna. It's a truly all-inclusive manual that fully explains what makes ham equipment work, and how to troubleshoot and repair it, plus improve its performance, and it contains the most modern, up-to-date info on everything from ammeters to voltmeters, from the simplest troubleshooting job to complete rehabilitation of old equipment, from tube-type transmitters to solid-state FM transceivers, from scanners to SSB, from CW to A-M equipment! This book will show you exactly how to get the bugs out with a minimum of time, trouble and money. 448 pps., 361 illus. Hardbound. **Only \$14.95**

To order, circle "JJ" on Reader Service Card

ALL ABOUT SWIMMING POOLS

A complete homeowner's guide to planning, servicing, maintaining, and repairing in-ground and above-ground swimming pools. Lets you enjoy your pool to the utmost, because it shows you how to understand and cope with swimming pool problems without frustration or excessive cost. There's nothing about pools that isn't covered. Invaluable info on water treatment, pool painting, and major repair will take the guesswork and risk out of doing it yourself. You'll find instructions on winterizing and summerizing your pool, and will learn all about pumps and motors, piping, filter maintenance, recommended pump-starting procedures, and filter troubleshooting (there's a complete chart included). 182 pps., 65 illus. Hardbound. **Only \$6.95**

To order, circle "PP" on Reader Service Card

ALL ABOUT TELEPHONES

An eye-opening guide to expanding the capabilities of any telephone . . . with everything about telephones, including accessories, FCC regulations, mobile systems, and computer linkups. You'll learn exactly how each part of the telephone system works, the differences between digital and analog transmissions, how to hook up your own phone, install your own telephone accessory equipment and interconnect devices, debug a phone, scramble voice transmissions, install a car phone, etc. Also covers highly sophisticated equipment like cordless phones, mobile phones, Skyphones (used in airplanes), voice stress analyzers, facsimile communications, electronic mail systems, etc. 192 pps., 140 illus. Hardbound. **Only \$8.95**

To order, circle "VV" on Reader Service Card

For prepaid orders take 5% disc. on 2 books and 10% disc. on 3 or more books.