

15¢

\$5.50 A YEAR

December 9, 1961

VOL. 80, NO. 24 PAGES 377-392

SCIENCE NEWS LETTER

®

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Photometric Tunnel

See page 390

A SCIENCE SERVICE PUBLICATION

GET READY FOR THE SPACE and SCIENCE ERA! SEE SATELLITES, MOON ROCKETS

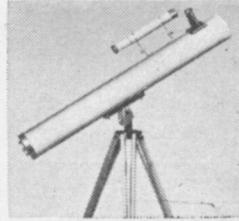


AMAZING SCIENCE BUYS

for FUN, STUDY or PROFIT



See the Stars, Moon, Planets Close Up!
3" Astronomical Reflecting Telescope
 (Famous Mt. Palomar Type)
60 to 180 Power



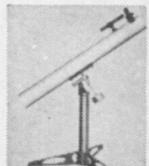
An Unusual BUY!

Assembled—Ready to use! You'll see the Rings of Saturn, the fascinating planet Mars, huge craters on the Moon, Star Clusters, Moons of Jupiter in detail. Galaxies' Equatorial mount with lock on both axes.

Aluminized and over-coated 3" diameter high-speed f/10 mirror. Telescope comes equipped with a 60X eyepiece and a mounted Barlow Lens, giving you 60 to 180 power. An Optical Finder Telescope, always so essential, is also included. Sturdy, hardwood, portable tripod. FREE with Scope: Valuable **STAR CHART** plus 272 page "**HANDBOOK OF THE HEAVENS**" plus "**HOW TO USE YOUR TELESCOPE**" BOOK.
 Stock No. 85,050-Q...\$29.95 Postpaid
 Send Check or M.O.—Satisfaction Guaranteed!

4 1/4" ASTRONOMICAL TELESCOPE!
 UP TO 255 POWER

New Vibration-Free Metal Pedestal Mount



With this scope you can see everything described above, but with greater power. Also, it will split closer double stars. Mirror has twice the light-gathering power. Rack-and-pinion focusing, real equatorial mounting—only one motion needed to follow the stars! Aluminum tube. 6-power finder telescope. 2 standard-size eyepieces and mounted Barlow lens give you powers of 45x, 90x, 135x, 180x and 255x. Low-cost accessory eyepiece available for higher powers. FREE with Scope: Valuable **STAR CHART** plus 272-page "**HANDBOOK OF THE HEAVENS**," plus the book "**HOW TO USE YOUR TELESCOPE**." Shipping wt. 25 lbs.
 Stock #85,105-Q...\$79.50 f.o.b. Barrington, N. J. Same telescope as described above but equipped with Electric Clock Drive.
 Stock #85,107-Q...\$109.00 f.o.b. Barrington, N. J.

SCIENCE TREASURE CHESTS

For Boys—Girls—Adults!



Science Treasure Chest—Extra-powerful magnets, polarizing filters, compass, one-way-mirror film, prism, diffraction grating, and lots of other items for hundreds of thrilling experiments, plus a Ten-Lens Kit for making telescopes, microscopes, etc. Full instructions included.

Stock No. 70,342-Q...\$5.00 Postpaid
 Science Treasure Chest DeLuxe—Everything in Chest above plus exciting additional items for more advanced experiments including crystal-growing kit, electric motor, molecular models set, first-surface mirrors, and lots more.
 Stock No. 70,343-Q...\$10.00 Postpaid



NEW! STATIC ELECTRICITY GENERATOR
 Sturdy, Improved Model

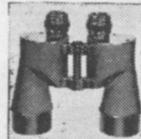
See a thrilling spark display as you set off a miniature bolt of lightning. Absolutely safe and harmless. Sturdily made—stands 14" high. Turn the handle and two 9" plastic discs rotate in opposite directions. Metal collector brushes pick up the static electricity, store it in the Leyden jar type condenser until discharged by the jumping spark. Countless tricks and experiments. 24 page instruction booklet included.

Order Stock No. 70,070-Q...\$12.95 Postpaid

LIFE SIZE VISIBLE HUMAN HEAD



Precise, Full Color, Take-apart Model. Study the most complex organ easily, inexpensively. Ideal for student, hobbyist, professional. You will be amazed at the detail. Molded from actual human skull. Eyes, ears, and teeth easily removed and disassembled for complete study. Entire brain, spinal cord and organs of mouth and throat presented in vivid detail. Amazingly low price—conforms to rigid laboratory standards. 16-page fully illustrated medical handbook included.
 Stock No. 70,447-Q...\$9.95 Postpaid



Here's a Terrific Buy!
WAR SURPLUS! American-Made!
7 x 50 BINOCULARS

Big savings! Brand new! Crystal clear viewing—7 power. Every optical element is coated. An excellent night glass—the size recommended for satellite viewing. Individual eye focus. Exit pupil 7 mm. Approx field at 1,000 yds. normally cost \$274.50. Our war surplus price saves you real money.

is 376 ft. Carrying case included. American 7 x 50's normally cost \$274.50. Our war surplus price saves you real money.
 Stock No. 1544-Q...only \$74.80 postpd. (tax incl.)
 9 x 30 Binoculars—look above and a terrific bargain—Stock No. 983-Q...\$33.00 postpd. (tax incl.)

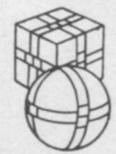


D-STIX CONSTRUCTION KITS
 Great Teaching Aid!

Newest, handiest visualizing and demonstration tool for teachers—elementary, high school or college. Colored wood sticks 1/8" thick and "easy-on" rubber joints approx. 3/16" diam. fit together quickly to form all kinds of simple or complex shapes, structures. Ideal for teaching mathematics, chemistry, physics, design, engineering, architecture, abstract art—or for developing children's interest in form and structure. Work out geometric figures, molecular structures, structural members, configurations and perspectives, models of many types. 3-dimensional visualization adds interest—speeds understanding. Used by professional planners, designers, architects. Money-back guarantee.

Stock No. 70,209-Q (220 pcs.)...\$3.00 Postpd.
 Stock No. 70,210-Q (370 pcs.)...\$5.00 Postpd.
 Stock No. 70,211-Q (452 pcs.)...\$7.00 Postpd.

WOODEN SOLID PUZZLES



12 Different puzzles that will stimulate your ability to think and reason. Here is a fascinating assortment of wood puzzles that will provide hours of pleasure. Twelve different puzzles, animals and geometric forms to take apart and reassemble, give a chance for all the family, young or old, to test skill, patience, and best of all to stimulate ability to think and reason while having lots of fun. Order yours now.

Stock No. 70,205-Q...\$3.00 Postpaid

NEW PORTABLE ELECTRONIC SPEAKER
 PROVIDES "VOICE POWER" FOR INSTITUTIONAL AND HOME USE



First low-priced power speaker to do a real job. Carries your voice 500 feet or more—loud and clear. Can be modulated for shorter distances. The "greatest" for speech making—indoors and out—for use in and around schools (especially cheer leaders and athletic directors, hospitals, churches, other institutions, in the home. Wonderful playing for youngsters. Case—impact-resistant plastic. Power—4 D cell flashlight batteries (not included). Size 8 1/2" x 5 1/2" x 2 1/2". Weight—2 1/2 lbs. Carrying strap. Up to 50 ft. extension cord may be added to mike.
 Stock No. 70,502-Q...\$12.95 Postpaid

MAKE YOUR OWN \$300 OVERHEAD PROJECTOR FOR LESS THAN \$50



New Edmund Overhead Projector Optics Kit plus locally purchased materials gives you a projector comparable to models selling for \$300 and up. Ideal for "in-school" and industrial instruction. A remarkably versatile teaching aid. Terrific for cartoon talks and lecture work. Operates in lighted room. Kit includes condenser lens, lamp, socket and easy-to-follow directions.
 S.N. 70,514-Q...\$15.00 Postpaid

MINIATURE WATER PUMP



Wonderful for experiments, miniature waterfalls, fountains, HO gage railroad backdrops, etc. Tiny (2 1/4" x 1 1/4") electric motor and pump ideal for hobbyists, labs, schools. Pumps continuous flow of water at rate of one pint per minute at a 12" head. With 2 D batteries in series will pump to 24" high. Runs 48 hours on battery. Works in either direction. Self priming.
 Stock No. 50,345-Q...\$2.25 postpaid

NEW TAPE RECORDER

At an Amazing \$29.95

American Made—For Business, School or Hobby



Latest type, super-sensitive transistors in place of expensive bulky tubes is secret of low price. Excellent tone and quality. Real handy item for teachers, students, engineers, salesmen, etc. Single foolproof control changes from rewind, off, play, record. All-transistor circuit, sensitive crystal microphone, built-in Alnico V dynamic speaker for clear, loud amplification. Compact, lightweight, 8 1/2" x 9 1/4" x 3 1/4". Operates on 2 size D and one 9 V transistor battery (not included). Two 3" reels and 150 ft. magnetic tape, plus instructions (included).
 Stock No. 70,480-Q...\$29.95 Postpaid

OFFSPRING OF SCIENCE... REALLY BEAUTIFUL CIRCULAR DIFFRACTION—RATING JEWELRY



Shimmering rainbows of gemlike color in jewelry of exquisite beauty: made with CIRCULAR DIFFRACTION—GRATING REPLICAS. Just as a prism breaks up light into its full range of individual colors, so does the diffraction grating. Promises to become a rage in current fashion. 1" diameter.
 Stock No. 30,349-Q Earrings...\$2.20 Postpaid
 Stock No. 30,350-Q Cuff Links...\$2.20 Postpaid
 Stock No. 30,372-Q Pendant...\$2.20 Postpaid
 Stock No. 30,390-Q Tie-clasp...\$1.65 Postpaid
 Stock No. 40,519-Q Bracelet (Six 3/4" Gratings)...\$7.70 Postpaid

EXCITING NEW LOW-COST MOON MODEL—AN OUTER-SPACE CONVERSATION PIECE



Exact replica in relief with 30,000 formations for study—peaks, craters, the 2-million-square-mile Ocean of Storms, etc. Formations scaled to size. Distances relationships lead to narrow margins—valuable teaching aid and outer-space display for museums and institutions. with "black light" spec-ing it shows Moon Phases, and with "black light" spec-tacular effects! Made of tough

washable plastic in three colors, can be marked without damage. Reverse side blank to provide room for present and future space data. Wonderful gift for amateur astronomers—space enthusiasts. Exciting "conversation piece" for living room or den. Diam. 12" Wt. 3/4 lbs. Priced remarkably low.
 Stock No. 70,515-Q...\$12.50 Postpaid

Terrific Buy! American Model OPAQUE PROJECTOR



Projects illustrations up to 3" x 3 1/2" and enlarges them. No film or negatives needed. Projects charts, diagrams, pictures, photos, lettering in full color or black-and-white. Operates on 115 volt, A.C. current, 6-ft. extension cord and plug included. Operates on 60 watt bulb, not included. Size 12" x 8" x 4 1/4" wide. Weight 1 lb., 2 oz. Plastic case with built-in handle.
 Stock No. 70,189-Q...\$7.95 Postpaid

ANALOG COMPUTER KIT



Ideal introduction to the increasingly important electronic computer field. For bright students, or anyone interested in this new science. Demonstrates basic analog computing principles—can be used for multiplication, division, powers, roots, log operations, trig problems, physics formulae, electricity and magnetism problems. Easily assembled with screwdriver and pliers. Operates on 2 flashlight batteries. Electric meter and 3 potentiometers are mounted on die-cut box. Answer is indicated on dial. Computer is 20" long, 9" wide, 2" deep.
 Stock No. 70,341-Q...\$14.95 Postpaid

FREE CATALOG-Q

160 Pages! Over 1000 Bargains!

America's No. 1 source of supply for science experiments, hobbyists. Complete line of Astronomical Telescope parts and assembled Telescopes. Also huge selection of lenses, prisms, war surplus optical instruments, parts and accessories. Telescopes, microscopes, satellite scopes, binoculars, infra-red sniper-scopes, items for making "Science Fair" projects, math learning and teaching aids.



Request Catalog-Q

ORDER BY STOCK NUMBER . . . SEND CHECK OR MONEY ORDER . . . SATISFACTION GUARANTEED!

EDMUND SCIENTIFIC CO. BARRINGTON, NEW JERSEY

Make over 200 Small
Computing and Reasoning
Machines with . . .

BRAINIAC®

ELECTRIC BRAIN CONSTRUCTION KIT

EQUALS THE ORIGINAL 1955 electric brain construction kit PLUS many improvements and additions: over 600 parts—including 116 improved patented wipers so that all switches work well. The BRAINIAC K18 Kit gives full specifications for 201 computing, reasoning, arithmetical, logical, puzzle-solving and game-playing machines . . . 155 BRAINIACS (1957-58-59), etc., 13 TYNIACS (1956), and 33 original GENIACS® (1955).

WITH OUR BRAINIAC KIT K18, you can build over 200 small electric brain machines and toys which "think," compute, reason and display intelligent behavior. Each one works on a single flashlight battery . . . is FUN to make, FUN to use and play with, and TEACHES you something new about electrical computing and reasoning circuits. All connections with nuts and bolts—no soldering required. The Brainiac K18 kit is the result of 12 years' design and development work with miniature mechanical brains including: the original 1955 kit, Tyniacs (1956), Relay Moe (automatic relay machine playing tit-tat-toe—pictured in Life Magazine, March 19, 1956), Simon (miniature automatic digital computer with 129 relays—see "Simple Simon" by E. C. Berkeley in Scientific American November 1, 1950), Squee (electronic robot squirrel—see "Light Sensitive Electronic Beast" by E. C. Berkeley in Radio Electronics, December 1951), etc.

PROGRAMMING YOUR OWN PROBLEMS FOR THE BRAINIAC

The Brainiac is the smallest and lowest-cost semi-automatic, general-purpose digital computer existing. Many problems in ALL fields of knowledge and business can be programmed for the Brainiac—to the extent that a number of versatile multiple switches can express the problem. We shall be glad to program YOUR OWN problems. Write us—no charge for simple problems, modest charge for complicated ones.



WHAT CAN YOU MAKE WITH BRAINIAC KIT K18? Over 200 machines including—LOGIC MACHINES: Syllogism Prover, Intelligence Test, Boolean Algebra Circuits, Douglas MacDonald's Will Analyzer, A Simple Kalin-Burkhart Logical Truth Calculator, Diagnosing Motor Car Trouble, etc. GAME-PLAYING MACHINES: Tit-Tat-Toe, Nim, Wheeled

Bandit, Black Match, Sundorra 21, etc. COMPUTERS: To add, subtract, multiply or divide using decimal or binary numbers, Forty-Year Calendar, Prime Number Indicator, Money-Changing Machine, etc. CRYPTOGRAPHIC MACHINES: Coders, Decoders, Lock with 15,000,000 Combinations, etc.

PUZZLE-SOLVING MACHINES: The Missionaries and the Cannibals, Age-Guessing Machine, Submarine Rescue Chamber, Daisy Petal Machine, Fox-Hen-Corn & Hired Man, Uranium Space Ship and the Space Pirates, The Three Monkeys Who Spurned Evil, General Alarm at the Fortress of Dreadeerie, etc. QUIZ MACHINE: How to Tell an Aardvark from an Armadillo, The Waxing and the Waning Moon, Polar Air Routes, history, geography, trigonometry, grammar, statistics, calculus, etc.

WHO IS EDMUND C. BERKELEY? Author of *Giant Brains or Machines That Think*, Wiley 1949, 270 pp. (15,000 copies sold); Author of *Computers: Their Operation and Applications*, Reinhold, 1956, 366 pp.; Author of *Symbolic Logic and Intelligent Machines*, Reinhold, 1959, 203 pp.; Editor & Publisher of the magazine, *Computers and Automation*; maker and developer of small robots; Fellow of the Society of Actuaries; Secretary (1947-53) of the Association for Computing Machinery; Designer of all the Tyniacs and Brainiacs.

BRAINIAC KIT K18 . . . the kit with limitless possibilities—backed by an organization of 12 years standing in the computer field—\$18.95. (For shipment west of Mississippi, add 80¢; outside U.S., add \$1.80.)

WHAT COMES WITH YOUR BRAINIAC K18 KIT—

Complete Plans, Instructions, Explanations & Hardware:

- Every part needed to build Brainiacs, Tyniacs—over 600 pieces including control panel, multiple switch discs, jumpers, improved wipers (Pat. No. 2,848,568), bulbs, sockets, washers, wire, battery and special tools.
- Complete descriptions of 201 experiments and machines in book of 256 pp.
- Over 170 circuit diagrams including 13 exact wiring templates.
- Manual "Brainiacs—Small Electric Brain Machines—Introduction and Explanation" by Edmund C. Berkeley.
- "Introduction to Boolean Algebra for Circuits and Switching" by Edmund C. Berkeley.
- "How to Go from Brainiacs to Automatic Computers" by Edmund C. Berkeley.
- List of references to computer literature including "Minds and Machines" by W. Sluckin, published by Penguin Books (Baltimore), 1954, 233 pages, and other references.

only **\$18.95** . . . MORE VALUE • MORE FEATURES

7-Day Full Refund Guarantee If Not Satisfactory

MAIL THIS COUPON OR A COPY OF IT

BERKELEY ENTERPRISES, Inc.

815 Washington St., R243, Newtonville 60, Mass.

Please send me Brainiac Kit K18. (Returnable in 7 days for full refund if not satisfactory—if in good condition.) I enclose \$_____ in full payment.

My name and address are attached