How hostile is the moon?

One day man may learn to harness the resources of the moon in order to fashion a self-sustaining environment. But when he first journeys there, he will have to do so in a simulated earth environment. Air, food, water, temperature control—these and many other features of terrestrial life must be engineered into the mission. Problems such as this are part of Bellcomm's daily work for NASA. Highly qualified men can assist in planning and evaluating systems for this ambitious, far-reaching project. Fields of interest include computing and programming, physics, mathematics, engineering, flight mechanics, aerodynamics and aeronautical engineering in general. It is not easy work, but it is rewarding for men capable of doing it. If you believe you are such a man, your résumé would be welcomed by Mr. W. W. Braunwarth, Personnel Director, Bellcomm, Inc., Room 1115S, 1100 17th St., N. W., Washington 6, D. C. Bellcomm, newest company of the Bell System, is an equal opportunity employer.
State Sponsored Nuclear Research

State governments are rapidly expanding their financial sponsorship of nuclear research and training programs, thus moving into an area traditionally supported by federal or national agencies.

Modern experimental facilities create an atmosphere that attracts, and holds, the scientists and engineers needed to sustain academic excellence. Such technical leadership also provides a firm base for new industrial enterprise.

State of Kentucky Pledged $100,000 for Accelerator

At the University of Kentucky a Van de Graaff 5.5-million-volt Model CN particle accelerator was purchased after the Governor of Kentucky pledged $100,000 from his capital building fund and the Kentucky Research Foundation made $75,000 available. The balance of the expenditure came from other resources available to the university.

New 5.5-million-volt Model CN particle accelerator was purchased by the University of Kentucky with the help of state agencies.

Most Widely Used Accelerator Type

The 5.5-MeV Van de Graaff now is the university's and the state's largest and most powerful physics research tool. It can produce intense monoenergetic beams of both electrons and positive ions, as well as neutrons and x-rays in a continuous beam or in bursts as short as four nanoseconds.

At first, the accelerator will be used by the university to accelerate protons, deuterons, or Alpha particles. With pulsed beam, the physics department will carry out time-of-flight measurements and study neutron-induced reactions.

Facility Expected To Attract More Research Grants

While the Van de Graaff will be used mainly for investigation of nuclear structure physics, it will also be at the disposal of all the university's departments engaged in scientific studies under research grants or contracts from federal and industrial agencies. It will be operated by the faculty and graduate students on an estimated yearly budget of $150,000 when at full capacity.

New Product Line Available from ARCO

High Voltage Engineering's ARCO Division, Walnut Creek, Calif., has introduced a new line of products designed for use in the high vacuum, microwave, and particle accelerator industries.

The products, which are being offered as standard items, have been developed and tested by ARCO during the past ten years, and are a direct result of extensive effort associated with advanced high power accelerators. Included in this group are:

- 1½" all-metal straight-through or right-angle high vacuum valves
- An oil diffusion pump system for high vacuums rated at 40 liters/sec. The package includes a roughing pump, traps, valves, and electrical control. (Base vacuum rating 10⁻⁸ Torr.)
- X-ray and neutron producing tungsten and uranium-clad targets for use with 5-150 MeV high power electron beams
- Pulsed 200 kV electron guns
- 10-100 MeV electron beam analyzing and deflecting systems for use with high power accelerators

For further information, write Manager, Special Products, ARCO Division, High Voltage Engineering Corporation, Walnut Creek, Calif.
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often accompanied by the generation of particle streams that escape from the sun and produce terrestrial effects. The international coordination of all types of observation is crucial for obtaining a complete temporal picture of such a complex event, and it is the time relationships that often provide the key to understanding the mechanisms involved. Direct solar investigations are supplemented by countless varieties of terrestrial observations of ionospheric, cosmic-ray, auroral, and geomagnetic disturbances—observations that permit extrapolation backward in time to fill in details of the causative solar event, such as the total energy of the radiation and particle emissions and their spectral characteristics.

The IQSY Disciplines

Meteorology. The IQSY program places great emphasis on investigation of the atmosphere above pressures of 100 millibars (about 20 km)—that is, the region not accessible to most conventional meteorological techniques. With increased knowledge of this region, a three-dimensional picture of the

Fig. 2. The Alouette topside-sounding technique. Also illustrated, for comparison, are ground-based sounding (left) and rocket sounding (right) techniques. [Defence Radio Telecommunications Establishment, Canada]
PERKIN-ELMER GAS CHROMATOGRAPHS THE BROADEST SELECTION—WITH THE MOST ADVANCED FEATURES—OFFERED BY ANY MANUFACTURER
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This sophisticated gas chromatograph combines the most modern advances in instrument design and performance with utmost simplicity of operation. Whether you use it in the research laboratory for precise elution time measurements, or in the routine control laboratory for dozens of daily automatic analyses, its unmatched speed, resolution, reliability and precision open new areas of information on virtually any organic mixture amenable to gas chromatographic separation. It adds automatic reset and programming features to an unparalleled accuracy of temperature control, to provide—for the first time—dependable unattended operation.

### MODEL 800 SERIES

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**800 DIFFERENTIAL FLAME**. The basic instrument in this series features the Dynathermal oven design with fully proportional temperature control and Perkin-Elmer’s exclusive Differential Flame Ionization Detector. For dual or single column, packed or capillary operation, precise linear temperature programming, sample collection—the ultimate in versatility.

**800 DIFFERENTIAL FLAME/HOT WIRE**. The Hot Wire Detector in this combination is installed in a separate temperature-controlled oven, and may be used independently of, or in parallel with, the basic Differential Flame Ionization Detector.

**800 DIFFERENTIAL FLAME/ELECTRON CAPTURE**. In this version, both the basic Differential Flame Ionization Detector and the Electron Capture Detector—in its separate thermostatted oven—are mounted at the same time. Pulser power supply is optional.

**800 DIFFERENTIAL FLAME/MICRO CROSS-SECTION**. The newest Perkin-Elmer detector system, the Micro Cross-Section Detector, is mounted in a separate thermostatted oven, in addition to the Differential Flame Detector. It may be interchanged with either the Hot Wire or the Electron Capture Detector described above.

### MODEL 801 SERIES

**BASIC UNIT $3195**

**801 DIFFERENTIAL FLAME**. Designed to meet the needs of medical, biomedical and pesticide residue applications, this instrument retains all the control advantages of the Model 800, but features an all-glass system, including “on column” injection in either of the dual columns. A major breakthrough is the new all-glass removable injection block, which permits the analysis of “dirty” samples, i.e., anaesthesia gases in blood, pesticide residue extracts.

**801 DIFFERENTIAL FLAME/HOT WIRE**. As with the standard Model 800, the Model 801 can be equipped with an accessory Hot Wire Detector installed in a separate temperature-controlled oven, to permit dual-column thermal conductivity operation.

**801 DIFFERENTIAL FLAME/ELECTRON CAPTURE**. Particularly useful for pesticide residue analysis and silyl ether derivatives of steroids. The Electron Capture Detector can be installed at the same time as the dual Flame Ionization Detector. Again, pulser power supply is optional.

**801 DIFFERENTIAL FLAME/MICRO CROSS-SECTION**. Also available with this version is our newest detector system, the Micro Cross-Section Detector, mounted in a separate thermostatted oven.

### MODEL 810 SERIES

**BASIC UNIT $1695**

**810 DIFFERENTIAL FLAME**. This new series, of modular design, offers—for the first time—dual column operation, with the high-sensitivity Differential Flame Ionization Detector, at an extremely low price. Included in the basic instrument, in addition to the Flame Detector, are the “ballistic” temperature programmer, and separate temperature control for the dual injection blocks, with the proven Dynathermal oven concept.

**810 DIFFERENTIAL FLAME/HOT WIRE**. The Hot Wire Detector in this combination is installed in a separate temperature-controlled oven, and may be used independently of, or in parallel with, the Differential Flame Ionization Detector.

**810 DIFFERENTIAL FLAME/ELECTRON CAPTURE**. In this version, both the additional Electron Capture Detector—in its separate thermostatted oven—and the Differential Flame Detector of the basic instrument are mounted at the same time. A pulser power supply is optional.

**810 DIFFERENTIAL FLAME/MICRO CROSS-SECTION**. The Micro Cross-Section Detector is mounted in a separate modular thermostatted oven, and is installed at the same time as the Differential Flame Ionization Detector which is basic to the instrument. It may be readily interchanged with the Electron Capture and Hot Wire Detectors described above.
811 DIFFERENTIAL FLAME. The low-cost way to achieve outstanding performance in medical, biomedical and pesticide residue studies where glass columns are specified. As in the Model 801, this unit features an all-glass injection and column system, coupled with modular design and Differential Flame Ionization Detector in the basic instrument.

811 DIFFERENTIAL FLAME/HOT WIRE. Like the Model 810, the Model 811 permits the attachment of a modular, accessory Hot Wire Detector, complete in its own separate temperature-controlled oven, permitting dual-column thermal conductivity operation.

811 DIFFERENTIAL FLAME/ELECTRON CAPTURE. In critical pesticide residue analyses, as well as bio-medical determinations of the silyl ether derivatives of steroids, the Model 811 provides low-cost proficiency. The Electron Capture Detector can be installed at the same time as the basic Differential Flame Ionization Detector.

811 DIFFERENTIAL FLAME/MICRO CROSS-SECTION. Also available with this version is our newest detector system, the Micro Cross-Section Detector, mounted in a separate thermostatted oven. It is interchangeable with the Hot Wire and Electron Capture Detectors described in the two paragraphs above.

820 HOT WIRE. This instrument has the same features as the Model 810. The principal difference is that the Model 820 is equipped with the Dual Hot Wire Detector and control unit. Separate temperature control for dual injection block, columns and detector.

820 ELECTRON CAPTURE. The Electron Capture Detector module is interchanged with the basic Hot Wire Detector module. The addition of the Ionization Detector Electrometer Amplifier module completes this unit.

820 MICRO CROSS-SECTION. The Micro Cross-Section Detector is interchanged with the Hot Wire Detector module.

154D THERMISTOR. Here is the world standard for gas chromatography. The reliability of this model has been proved by the thousands of instruments installed and operating in the field today. The Model 154D features a precisely-thermostatted, circulating air bath oven, and thermistor thermal conductivity detector.

154D THERMISTOR/FLAME. With the thermistor detector and the flame ionization detector usable independently, in series, or in parallel.

154D THERMISTOR/COLUMN SWITCHING. Three columns may be installed in the instrument and used independently or in series. Columns may be switched in and out while operating, and all columns may be backflushed.

154L THERMISTOR. The lowest-cost precision-engineered gas chromatograph on the market today. Of the same oven design as the Model 154D and with the same thermistor detector, the Model 154L is ideal for routine analysis.

154L THERMISTOR/COLUMN SWITCHING. Ideal for Natural Gas Analysis where columns must be switched during analysis and heavy ends backflushed.

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ACCESSORIES

1 **D2 Integrator.** An all-electronic integrator which combines high speed with automatic operation; 7-digit readout of area with 3-digit readout of both time of beginning of the peak and time of peak maximum.

2 **194B Printing Integrator.** While low in cost, this integrator performs functions otherwise obtainable only in very high-priced instruments; that is, a printed digital readout at rates up to 6,000 counts per minute, no pen excursions to count or interpolate.

3 **Pyrolysis Accessory.** Features include capability for handling samples in both solid and liquid states, accurate measurement of the sample and its residue, instantaneous heating of sample to desired temperatures and wide operating temperature range (150–1000°C).

4 **Micro-Reactor Accessory.** This is essentially a micro-pilot plant with heated reaction chamber and direct introduction into the gas chromatograph. Particularly useful for surveying activities of catalysts as reflected in the composition of reaction products.

5 **Column Switching and Sampling Valves.** Gas sampling and liquid sampling valves, switching and reverse flow valves, all made of Teflon and stainless steel to prevent sample contamination.

6 **Recorders.** Perkin-Elmer's selection includes ten models, all leading makes; also, the correct chart paper for each chromatogram.

SPECIAL SYSTEMS AND FACILITIES

**Column Facility.** In addition to furnishing standard chromatography columns and related supplies, the Column Facility of Perkin-Elmer can design and build columns and also furnish liquid phases, support materials, adsorbents and special coatings for your specific requirements.

**Computer Data Handling System.** New Computer Data Handling System, licensed from Shell Development Company, ties gas chromatographic output to your computer. Saves time and money, and improves accuracy by eliminating all need for manual computations.

**Gas Chromatograph-Mass Spectrometer Hookup.** We would be happy to discuss your particular problems in mating your gas chromatographic effluent with the inlet of your mass spectrometer even when using small-diameter capillary columns.