

computed some journeys you can make that way in the 1970's.

Take Neptune. A direct flight with today's launchers might require more than 30 years. But in 1978 planets will be arranged so that you can swing through the trees from earth to Jupiter to Saturn to Uranus and finally to Neptune—all in less than 9 years. Other similar flights are possible. You can swing off Jupiter to the sun in 2.6 years if you launch in April 1973, leave earth in October 1978 and go by way of Jupiter either to Saturn in 2.8 years or to Uranus in 5.9 years, or use Jupiter as your suspension point and reach Neptune in 8.1 years after a November 1979 start.

Solar-panel-powered ion engines would be aboard the vehicle to permit redirecting the flight at each planetary encounter. It appears that fly-by missions with such a system could use launchers no bigger than the Atlas Centaur.

Transuranium Facility at HVEC to Have Two Tandems

High Voltage Engineering Corp. is making plans for an installation that will study heavier-than-uranium elements. As indicated in the drawing, it would use two tandem Van de Graaff accelerators in series to accelerate heavy ions (up to multiply charged uranium) and hurl them at heavy target nuclei to create atoms heavier than those of the 104 elements observed so far. Particular goals would be atoms

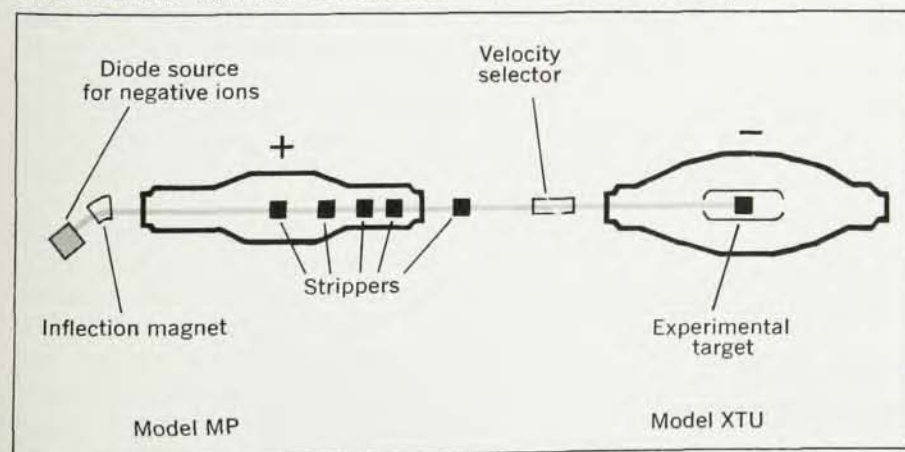
$^{114}\text{X}^{298}$ and $^{126}\text{X}^{310}$, one of which might be doubly magic and have an unusually long half-life, perhaps as long as 10 years. Intentions are to put the facility into operation at Burlington, Mass., by 1 Jan. 1970. Until other transuranium accelerators are available, HVEC would operate the facility for a group of agency-supported scientists. Thus it would become, for a limited time, a kind of privately operated "national lab."

Funds for the project would come partly from HVEC (\$4.2 million for construction) and partly from "a funding agency" (\$1 million for construction, \$0.8 million for operation).

Accelerated ions would start out from a newly designed diode source negatively charged, pass through a model MP tandem with several strippers and get their final acceleration as positive ions in a new tandem, a model XTU. Experiments would occur in the high-voltage terminal at the center of the XTU.

The diode source can inject ion currents ranging from $5\mu\text{A}$ of uranium to $500\mu\text{A}$ of hydrogen. The MP accelerator would have a 16-MV terminal potential and five solid gas strippers so that uranium ions emerging from it would have a 450-MeV kinetic energy and a most probable positive charge of 50. From the spectrum a cross-field analyzer would select ions, and then they would be accelerated to the terminal of the XTU, first of a new generation of tandem accelerators with its terminal at 20 MV. Thus uranium ions at the XTU terminal would have 1450-MeV energy and

TWO TANDEM VAN DE GRAAFFS in series will accelerate heavy ions.



Expanded versatility in reversible counters



Now two new options for the Hewlett-Packard 5280A Reversible Counter add to its measurement capabilities:

1. An internal time base permits precise setting of gating period in discrete increments as small as 1 msec, with front-panel setting. This means that besides straight totalizing, you can now measure frequency or normalize your readings.

2. A special "Readout on the Fly" feature allows you to record measurements at any instant without interrupting the count. This is achieved by transferring your count to an internal storage register. Time between recording commands can be as short as 1 msec, making the 5280A useful in information or control system work without retarding system speed.

These new options PLUS:

- six operating modes, including modes for interferometer fringe counting;
- 2 MHz counting rate, up or down;
- reversal in $0.25\mu\text{sec}$;
- adds or subtracts (1 MHz rate for each channel);
- stable, wide-range trigger input level controls.

The standard 5280A with the 5285A Universal Plug-in costs \$1900. Options are extra.

A 40-page Application Note (AN #85) is now available without charge—"Using A Reversible Counter." Call your local HP field engineer or write Hewlett-Packard, Palo Alto, Calif. 94304. Europe: 54 Route des Acacias, Geneva.

HEWLETT  PACKARD

take a
good
look...

at Farrand Grating
MONOCHROMATORS

- Efficient
- Compact
- Precise
- Rugged
- Versatile
- Inexpensive

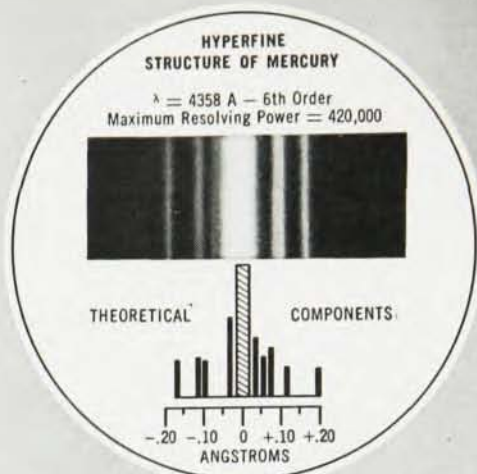


Write for descriptive literature

Farrand OPTICAL CO., INC.

535-PT So. 5th Avenue
Mount Vernon, New York 10550
914-668-9393 / Cable Address: FOCUS NY

The Pioneers in Fluorometry



Theoretical resolving power of a Farrand Master Diffraction Grating reflecting the efficiency of Farrand Replicas.

Farrand Grating Monochromators utilize the famous Farrand grating replicas and associated precision optical components... resulting in unusually high efficiency, excellent spectral purity and extremely low scatter. A number of models are available to cover various spectral ranges from 200 mμ to 3000 mμ. These Monochromators are ideally suited for a wide range of uses including such applications as microscope illumination, monochromatic projection and spectral measurements.

Research Scientists Optical Processing

Bendix Research Laboratories have excellent career opportunities in an expanding research group for scientists with an advanced degree in either Physics, EE, or Optics. Work will be in the areas of:

- HOLOGRAMMETRY
- SPATIAL OPTICAL FILTERING
- LASER OPTICS RESEARCH

Experience in laser technology is highly desirable. Please send resume to:

Personnel Director
Research Laboratories
The Bendix Corporation
Southfield, Michigan 48076

Bendix Research Laboratories

AN EQUAL OPPORTUNITY EMPLOYER

SEARCH AND DISCOVERY

an estimated beam intensity of 3×10^{11} ions/sec.

Experiments at the high-voltage terminal would be difficult, but the problem would be solved by telemetry, a rabbit system, a rotating wheel or photographic plates.

LASL Builds the World's Smallest Nuclear Reactor

You can now build a critical mass with 242 grams of U^{235} if you do it right. Carroll B. Mills and George A. Jarvis of Los Alamos Scientific Laboratory have done it right. By interleaving 0.003-cm-thick foils of U^{235} with 0.316-cm-thick polyethylene foils, they achieved criticality with a rectangular solid 15.4 cm square by 12 cm high. Each face of the core was covered with a layer of U^{235} foil, and the entire core was surrounded with a cubical beryllium reflector 30.4 cm thick.

This minimum critical mass of 242 g beats the old record set by L. P. D. King and R. E. Schreiber in 1943. They measured a minimum critical mass of 565.5 g for U^{235} in an aqueous solution of uranyl nitrate with a thick beryllium reflector.

Criticality can be obtained without any moderation or reflection using a sphere of 47 kg of pure U^{235} . With a little effort you can become the only kid on your block.

Tesla Laboratory Becomes Historic Site—Officially

The Brookhaven, N. Y., Town Historic Trust has taken one of the town's laboratories under its wing and designated it an "historic site." Not the laboratory that has made the town world famous, but that of Nicola Tesla, the electrical pioneer who rivaled Thomas A. Edison and whose induction motor won preference for ac power over dc. The building, which is on the north shore of Long Island, was designed by the famous architect Stanford White in 1902 and occupied by the Croatian-born inventor who came to the United States by way of Graz and Prague. It belongs now to Peerless Photo Products. □