SCIENCE

1 November 1963

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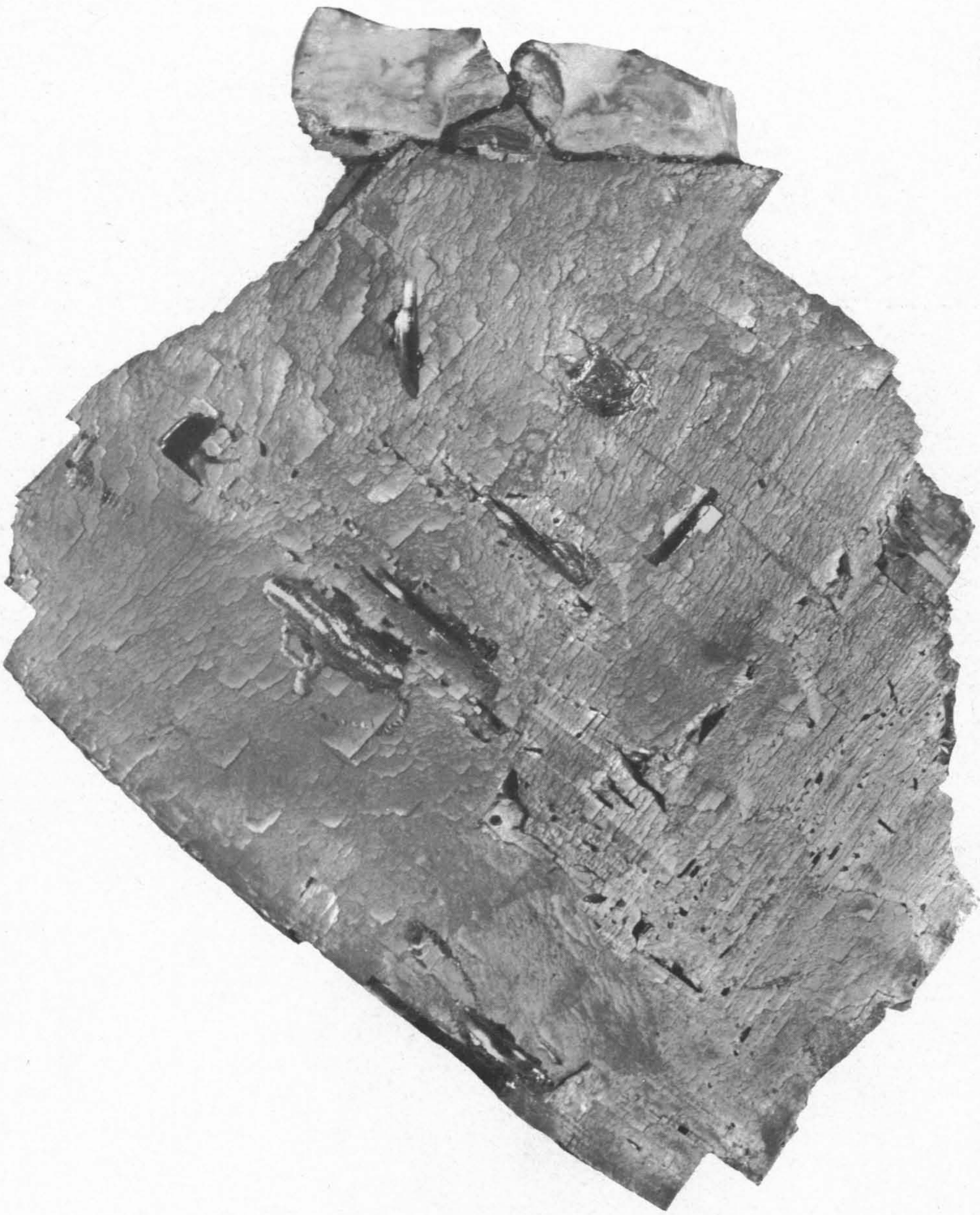
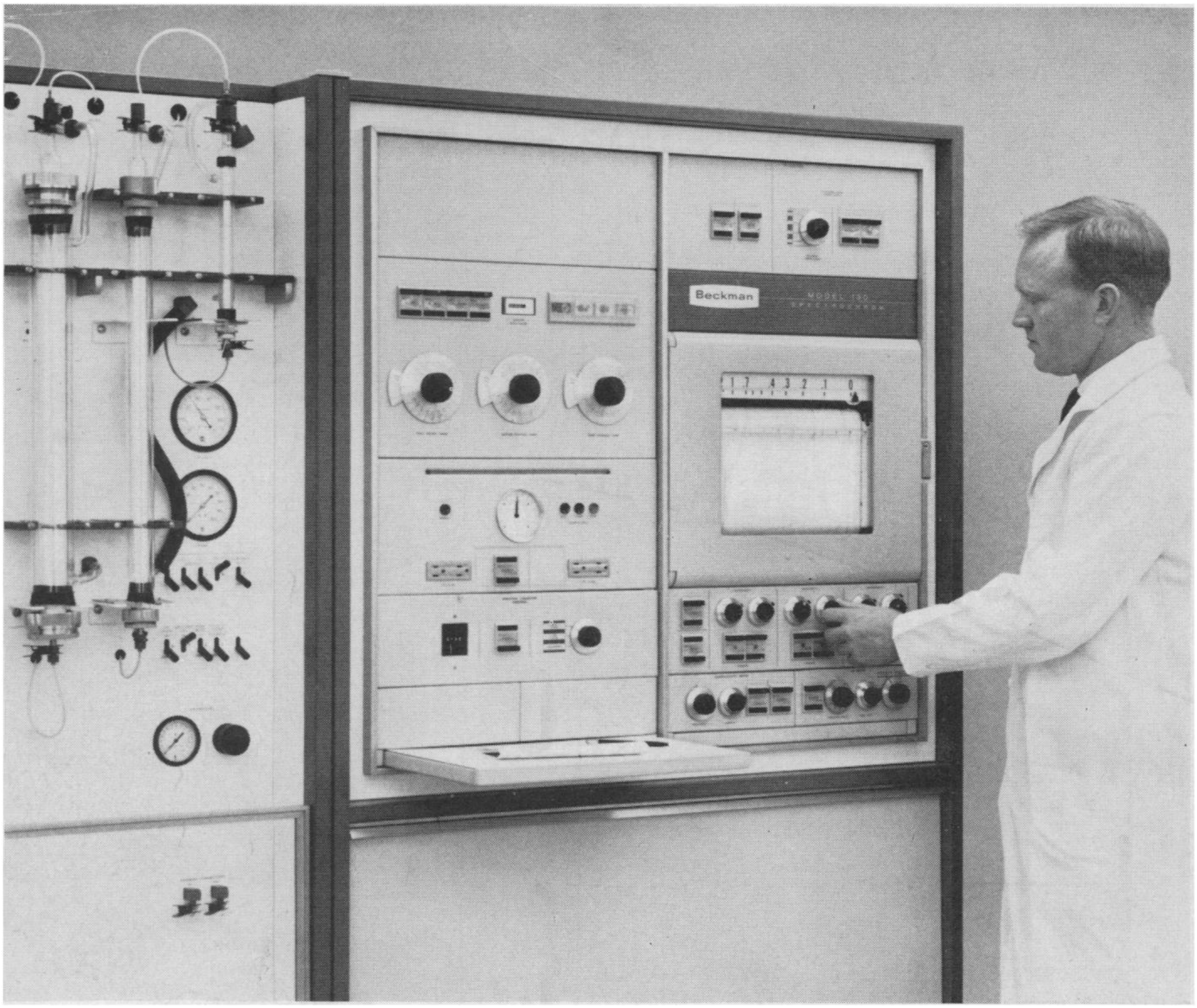
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



GALENA CRYSTAL



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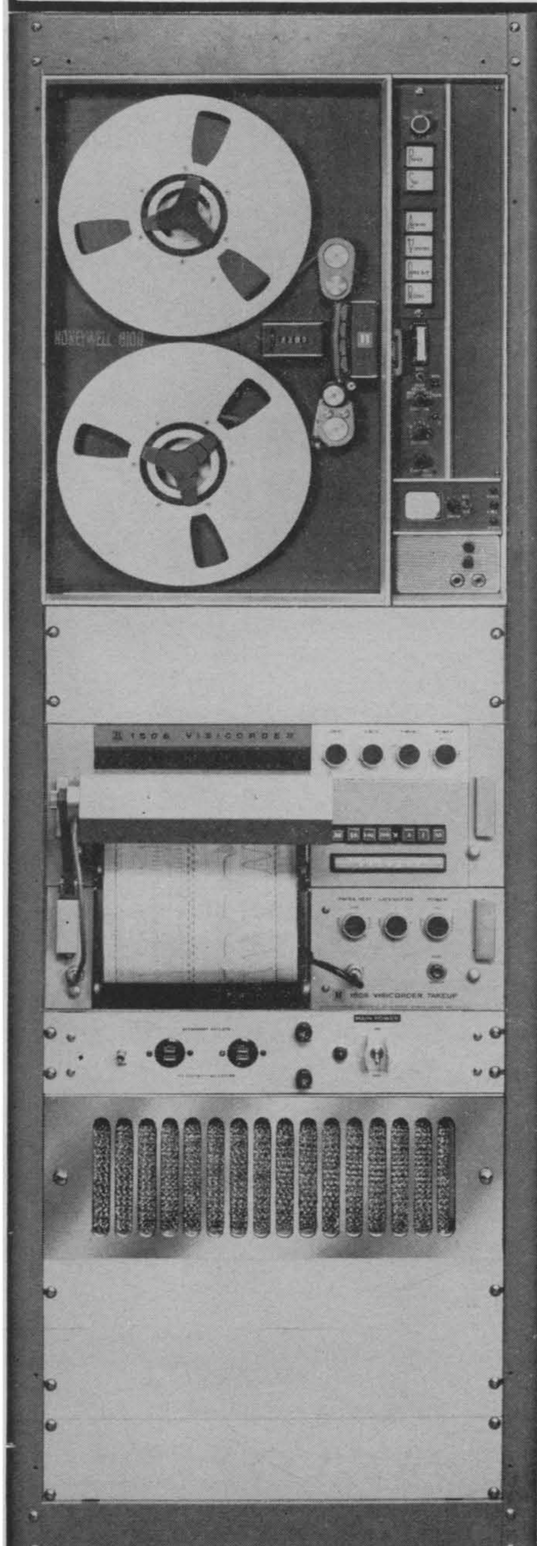

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Honeywell

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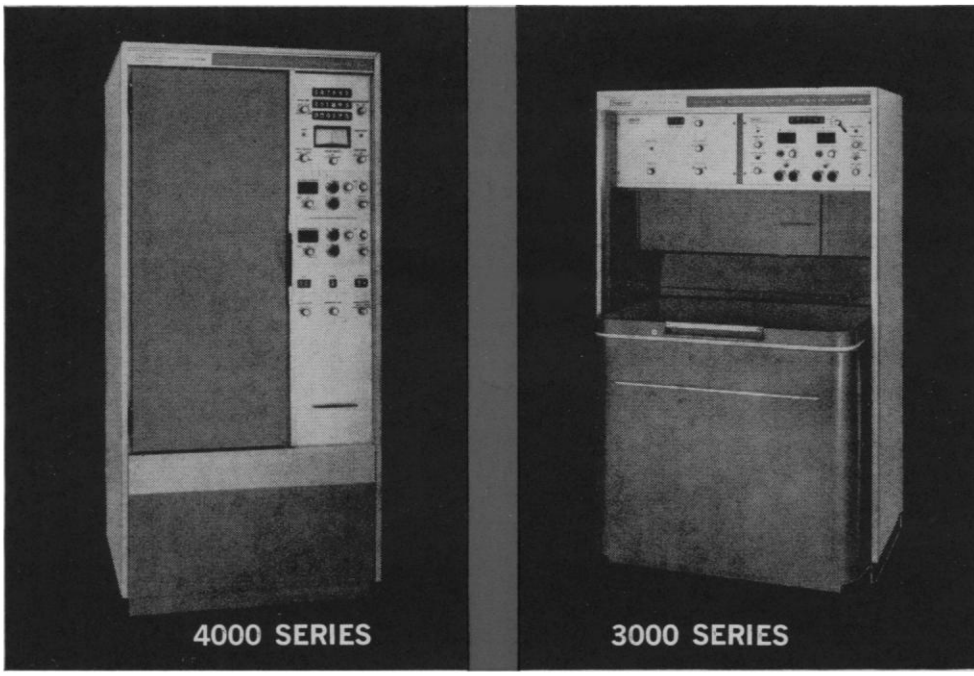
COVER

Natural cubic crystal of lead sulfide which has been sawed, etched, and sampled. Light and dark bands record stages in growth of crystal outward from wallrock. The slots are sites where samples were cut from individual growth zones for measurement of lead isotope variations (× 1.6). See page 574.

Higher E^2/B in New TRI-CARB® Spectrometers



The "figure of merit" used in quantitative evaluation of the counting performance of liquid scintillation spectrometers is the factor of efficiency squared divided by background (E^2/B). The instrument with the highest E^2/B can achieve a desired statistical accuracy in the shortest counting time, or it can collect data to the greatest accuracy in a given time.*

New Tri-Carb Spectrometers have an E^2/B approximately 100% greater for tritium and 50% greater for carbon-14 than older type liquid scintillation spectrometers. These high figures of merit have been accomplished by both:

(*a*) *Increasing efficiencies*
(*b*) *Reducing backgrounds*

INCREASED EFFICIENCIES

New 3000 and 4000 Series Tri-Carb Spectrometers provide significantly higher counting efficiencies for low energy isotopes through the use of improved optics and advanced electronics with Pulse Summation, an exclusive Packard development.

A specially designed optical chamber maximizes light collection by transmitting the greatest number of photons from the liquid scintillation sample to the photocathodes of a pair of carefully selected and matched photomultiplier tubes. The use of 13-dynode phototubes obviates the need for preamplifiers and permits the use of high speed electronic circuitry for Pulse Summation. This results in a twofold improvement in the signal-to-noise ratio. Result: higher efficiencies than ever before possible with this type of counting equipment.

LOWER BACKGROUNDS

Background is significantly reduced by the improved electronics and by superior shielding of the detector. Ultra-high-speed coincidence resolving time (30 nanoseconds) virtually eliminates background contribution from "accidentals", even when using more efficient photomultiplier tubes with inherently higher dark noise.

Great care is taken to select only radioactively clean material for the detector shield. A minimum of 2 inches of lead is provided in all directions, including the ends. "Graded shielding" of lead, cadmium and copper is especially effective in reducing background from environmental radiation.

By increasing efficiencies and reducing background, new Tri-Carb Spectrometers achieve the highest possible E^2/B. Thus, they permit the most accurate collection of data in a given counting time or, alternatively, the most rapid collection of data to a given accuracy, thereby effectively increasing actual counting capacity.

Higher E^2/B is just one of many significant new features available in Packard Tri-Carb Spectrometers. Ask your Packard Sales Engineer for complete details, or write for Bulletin.

***N.B.** Since there are substantial variations in standards (especially tritium) prepared in different laboratories, it is important to use the **same standard and blank** in comparing the performance of two instruments.

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1 November 1963, Volume 142, Number 3592 SCIENCE

Tightening Federal Budgets

Last month William Carey, executive assistant director of the Bureau of the Budget, warned the 17th National Conference on the Administration of Research that the rapidly increasing research and development budgets of the past two decades have brought us to a level at which "reaction is at last setting in. It is apparent in the scientific community. . . . It is apparent also in the Executive Branch of the Federal Government, where the budgetary pinch is becoming acute. And it is perhaps most spectacularly apparent in the Congress, where a mounting wail of frustration and uneasiness is being reflected in a rash of proposals to bring science and technology to heel."

We have not reached a ceiling; most of the scientific and technical agencies will have more money for 1964 than they had for 1963. But Carey's warning must be taken seriously nevertheless. The House of Representatives recently supplied jolting evidence by cutting the 1964 budget of the National Science Foundation by a whopping 45 percent and by forbidding that agency to start any new programs. The Senate is now considering the NSF budget and, as it has in some other years, may vote a larger appropriation that will require a compromise between House and Senate levels. The Senate may do this, but so far it has had little encouragement to go above the House level; congressional files of telegrams and correspondence contain little evidence that scientists are objecting to the reduction in the NSF budget or to the restrictions on NSF operations.

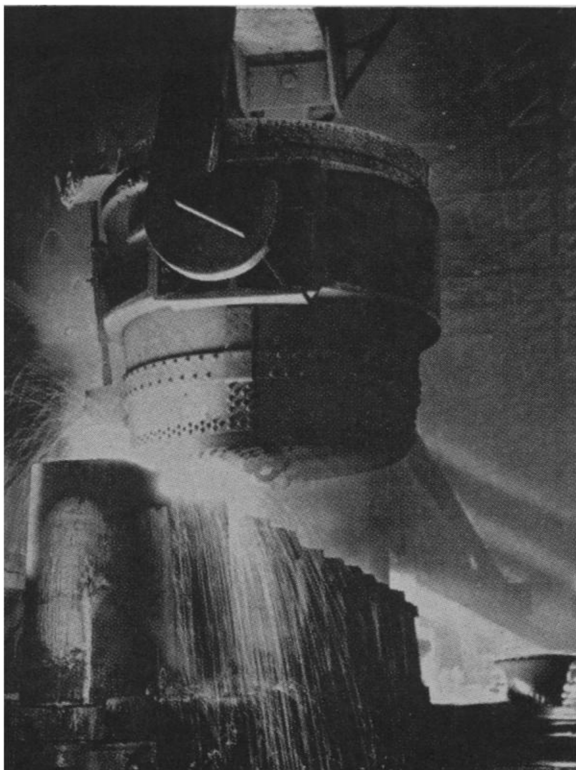
The House action constitutes an immediate test of how scientists will react to a sudden cessation of the growth trends of past years. But Carey's paper, which was presented before the House acted, went beyond specific budgets to deal with a problem that results from a slowing down of the rate of growth: the necessity of developing rational means of assigning priorities. Someone will have to adjudicate the competing claims of Big Science and little science; apportion funds among fields; weigh the relative merits of spending for research, for facilities, and for the improvement of teaching; and decide how much is justified for high-energy physics, for oceanography, for radio astronomy, and for other fields in which the costs for basic facilities are high. Some fur may fly before the decisions are reached, but in the process issues will be illuminated more clearly than they have been in the past. This will be good, but the decisions will still be painful.

In all of this there are two clear warnings. One is that unless the university and research scientists, the cognizant agencies (NIH, NSF, and others), and the President's scientific and budgetary aides learn to collaborate effectively in making the necessary decisions on priority, Congress will make those decisions. The other is that the spokesmen for science are going to have to do their homework more thoroughly. We have grown lazy during the period of rapidly increasing appropriations. From now on it will be foolish to approach Congress with anything other than a strong and soundly documented case.—D.W.

The column separates and the disc comes out

ANNOUNCEMENT:

Packard has developed a method of producing CLEAN STEEL



PACKARD **CLEAN STEEL** is produced in modern facilities under carefully controlled conditions.

CLEAN STEEL . . . steel which contains negligible radioactivity has been the object of long and determined search to provide suitable shielding material for large, low-level counting facilities. Battleship plate (and other old scrap) has been available in limited supply and generally in odd sizes and shapes. Frequently it can be obtained only in curved or tapered plates, and construction with such material (particularly armor plate) is difficult and expensive.

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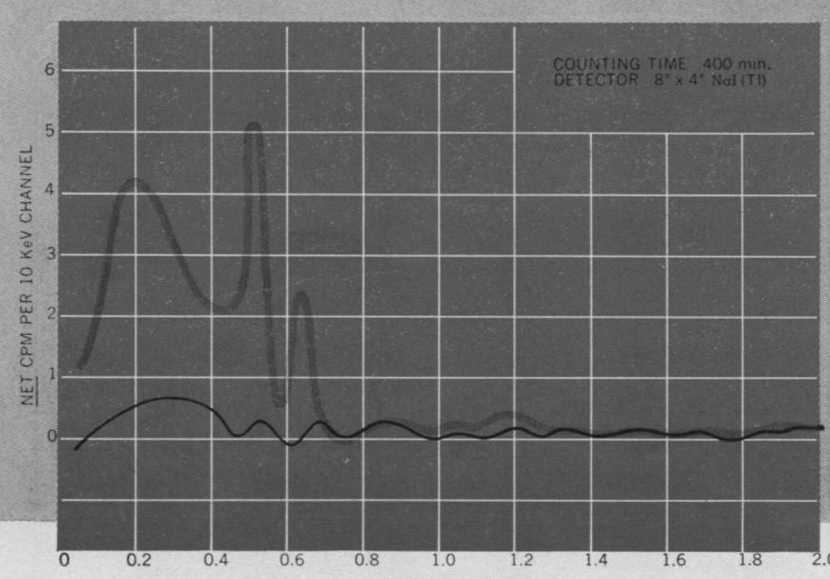
Comparison of the background radioactivity of a typical sample of current commercial production steel (upper curve) and sample of Packard **CLEAN STEEL** (lower curve)



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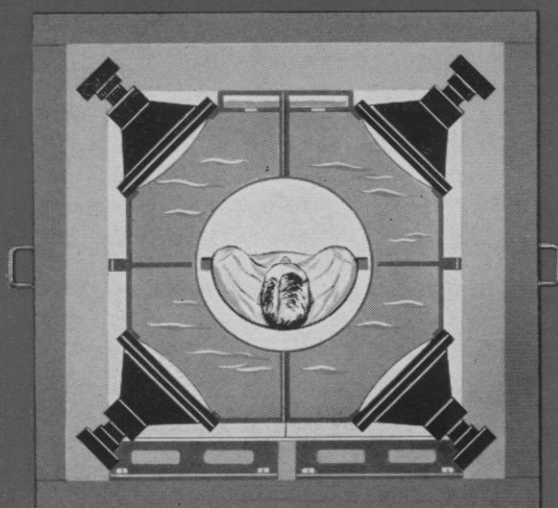

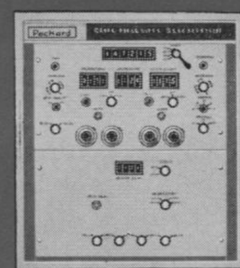

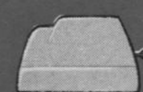

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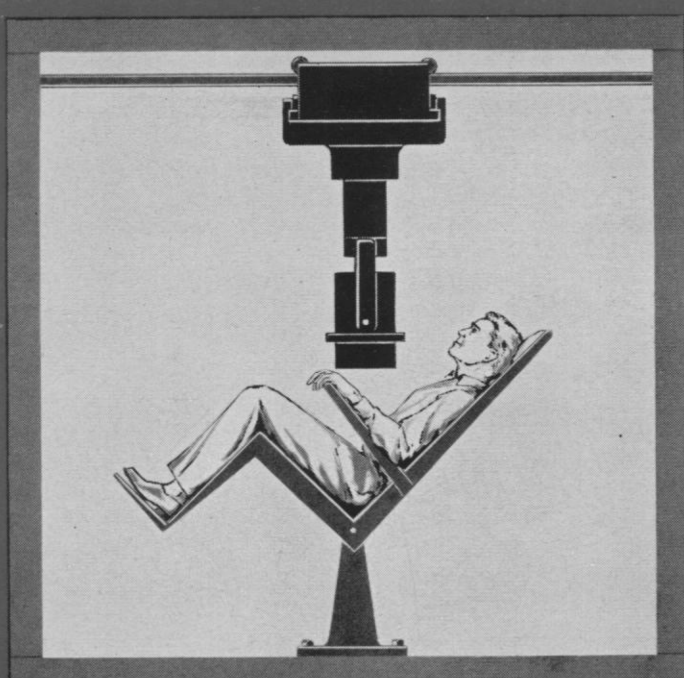

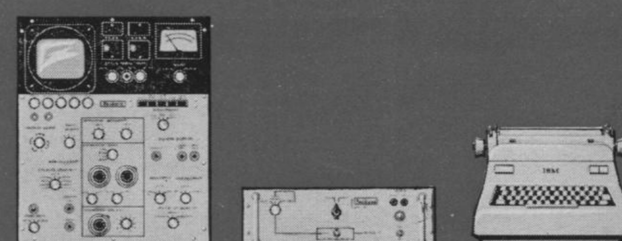

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