

Prices for physics equipment outstrip inflation

How has inflation affected the prices of laboratory equipment? What is the economic burden that results from the ever changing "state-of-the-art" in measurement and instrumental techniques? These questions provide different answers, depending on whether they are asked, for the instructional laboratory or the research laboratory.

To determine the effect of inflation on the instructional laboratory, standard items whose specifications have remained static—for example, a meter stick—were randomly selected from the catalogs of the Central Scientific Company and the Sargent-Welch Scientific Company (previously the Welch Scientific Company). The prices of fifteen such items from Central Scientific have increased by an average of 174% over the period 1950-73. Similar items were selected from the catalogs of Sargent-Welch. For twenty items from Sargent-Welch, the prices have increased by an average of 200% over the period 1949-73.

How do these percentage increases compare with other economic indicators? Over essentially the same period, 1950-72, the Consumer Price Index (CPI), based on the prices of about 400 items selected to represent the movement of prices of all goods and services purchased by wage earners, has gone up by 75%. The price of a standard model Chevrolet (no accessories) has increased 125% over the 1950-73 interval. Textbooks have gone up in price by approximately 105% over the same period.

Because of the dynamic character of the product lines of those companies serving the research laboratory, it is harder to assess the effect of inflation. Therefore, we have examined a shorter time interval: 1961-73. Items whose specifications remained essentially unchanged were selected from the catalogs of General Radio Company, Hewlett-Packard, and Tektronix, Inc. For the period 1961-73 the results are as follows: for twenty items from General Radio the prices increased by an average of 90%; twenty items from Hewlett-Packard increased in price by an average of 62%; and the increase in price of twelve items from Tektronix averaged 79%. Over the same period the CPI increased by 39%. The teaching-oriented companies are compared

PRICE INCREASES OVER PERIOD

1961-1973

	Average increase (%)	Increase per year (%)
CPI	39	3.25
Central Scientific (15 items)	99	8.25
Sargent-Welch (20 items)	122	10.16
General Radio (20 items)	90	7.50
Hewlett-Packard (20 items)	62	5.17
Tektronix (12 items)	79	6.58

with the research-oriented companies in the table. As can be seen, the ills of inflation have afflicted metersticks *et al.* more severely than oscilloscopes *et al.* We wonder why this should be so.

The question concerning the state-of-the-art has two aspects. The first derives from the fact that new forms of equipment become available. The second is a matter of style. Certain experimental techniques become fashionable, with the result that yesterday's luxurious frill becomes today's basic necessity. For example, 100% of the physicists we polled regarded an oscilloscope camera as an essential teaching tool. It is doubtful that it would have been so regarded a dozen years ago.

To examine the state-of-the-art question in the teaching lab context, we have focused on specific experiments and equipment. For example, by 1960 Fletcher's trolley had logged many miles as it rolled in freshman laboratories demonstrating the principles of dynamics. Today, teachers would undoubtedly opt for an air track and would employ photocell gates or stroboscopic photography to take the data. The 1960 car-and-track version cost \$234 as compared to the 1973 frictionless-glider-system price tag of about \$850—a 263% increase.

Or consider a general-purpose oscilloscope. Again we polled several physicists. The result: Today's acceptable

scope for teaching purposes is about 180% more costly than the 1961 model. From these and other specific situations we have examined, it appears that in 1973 the physics teacher can expect to pay about 371% more than in 1961 as a direct consequence of the state-of-the-art.

How does the state-of-the-art affect the researcher? We have answered this question by assuming that supply is created by demand and therefore we have looked at top-of-the-line instruments. We have again focused on specific situations: fastest oscilloscopes, most accurate digital voltmeters, and so on. For those instruments we have examined, the prices of top-of-the-line instruments have increased by an average of 262% during the period 1961-73.

To summarize, the budgets of physics departments are hit about three times harder by the state-of-the-art effect than they are by inflation. However, the rate of inflation over the 1961-73 period is three times greater for teaching equipment and two times greater for research equipment than the average inflation rate for other consumer items. Further, the data somewhat surprisingly suggest that keeping up with inflation and staying abreast the state-of-the-art may be harder for the physicist *qua* teacher than for the physicist *qua* researcher. These data make abundantly clear the stress our departmental budgets are enduring. The resulting strain makes it harder to do our jobs. Anyone for mathematics?

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Indexing astronomy

The recent editorial on "Indexing the physics literature" (July, page 96), was a useful means of bringing AIP efforts in this area to the attention of the readership, but perhaps it is possibly a bit misleading as to the current operability of the system. Recently, several members of the University of Texas astronomy and physics departments, who are participating in a SPIN evaluation here, met to discuss performance. As an astronomer (and a peculiar one at that!), I expected my experience to be