letters

the AAPT was one attempt to alleviate this problem by collecting lists of important references (with annotations) on various subjects of current interest. The AAPT Selected Reprint series is a similar attempt. Recently, A. Fraknoi published a "Subject Index to Astronomy Articles in *Scientific American* Magazine (1960–1976)" in *Mercury*,[2] a publication of the Astronomical Society of the Pacific. Although this contribution was aimed at enlightening lay people and amateur astronomers, it will nevertheless be extremely useful to students and teachers of astronomy as well. Following the lead of Fraknoi we have compiled a subject list to astronomy articles in PHYSICS TODAY.

This index is comprehensive in that it contains references to every astronomy-related (including astrophysics, astronautics and geophysics) feature article published in PHYSICS TODAY during its first thirty years of publication (1948 through 1977). It does not, however, include book reviews, letters, or brief reports in the "Search and Discovery" column. The compilation is extensively cross-referenced and is organized by subject headings that correspond closely to those employed by Franknoi. Thus this index will complement his.

References

1. Anonymous, *Am. J. Phys.*, **38**, 1053 (1970).
2. A. Fraknoi, *Mercury*, **6**, no. 1, 20 (1977).

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Readers may obtain copies of Harney's subject index by writing to PHYSICS TODAY enclosing $2.00 in check or money order for each copy.
The Editor

Opposes MBO

Thomas M. Tobin, in his letter on management by objective (February, page 83), used a phrase in his third paragraph that indicates the real source of trouble in applying MBO in a research laboratory. The phrase is "delegation of responsibility." Any ROTC student learns that one can delegate authority but not responsibility. The two concepts are radically different in meaning. All too often it seems that bench scientists have responsibility for everything and authority over nothing. Accountability is little more than harrassment if the person who is held accountable does not have the discretionary authority and support in securing the resources to accomplish his objectives.

Advocates of MBO presume some sort of idealized environment in which supervisors are visionary and competent, in which organizations are willing to take suggestions from the bench, and in which there is a willingness to take risks and fail. It is also presumed that those who apply MBO know the difference between planning an investigation and predetermining success. (It would not be research if it were possible to program a successful result.) The inclusion of the Peter Principle into the consideration may lead one to question the efficacy of MBO. MBO becomes an instrument by which those who have the least say in what they do (and the most responsibility) become bullied into becoming scapegoats by those who have retained all of the authority.

The real-world misapplication of MBO leads to a decline in innovation. The bench scientist, who is made ultimately responsible, learns early that there is no room for failure. If he manages to keep his job past his first failure, he learns that success or, at least, the *illusion* of success is required. Extend these attitudes to a larger scale and one will see only "safe" projects being taken, risk and failure avoided, and real progress disappearing.

It is a remarkable coincidence that the advocacy of MBO has occurred while many scientists have been and continue to be underemployed and unemployed and, at the same time, the leadership of American science has been evaporating. Maybe it is time to discard useless management systems like MBO and hire people to do *science*.

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Catastrophe theory

Schulman's review (January, page 75) of two "catastrophe theory" books is excellent in the main, but I would take issue with one assertion: that optical caustics as catastrophes "do not represent an application of Thom's theorem because that theorem applies only to finite dimensional 'state' spaces." They do represent such an application, by way of a rigorous, finite-dimensional treatment of oscillatory integrals. (The most complete technical account is in J. J. Duistermaat, *Comm. Pure Appl. Math.* **27**, 207 (1974).) My point in the essay cited was that a version of Thom's theorem valid in infinite dimensions would give a natural way of seeing at the ray-theoretic (or classical-limit) level why caustics "should" be catastrophes, though the physical information or "quantum flesh on the classical bones" available by the existing method would be missing. Moreover such a version would be applicable to a wide range of other problems.

Since "Thom's theorem" actually represents a cluster of results, an infinite-dimensional version naturally appears piecemeal. The main results on truncation of Taylor series and insensitivity to