vantages. Then, when change comes, it may destroy virtues along with faults.

There is, of course, one formidable obstruction to any change at all. Any alteration of structure necessarily involves constitutional amendment, and this can only be initiated by the concurrence of a two-thirds majority in both houses.

The Parts vis-à-vis the Whole

Largely because no one expects legislators to open the way to any loss of their prerogatives, proposals are frequently made, many of them by experienced legislators who fear for the institution to which they belong, for less drastic reforms.

One of the less admirable facts to be considered is the legislator's loyalty to local and private interests. This goes to the theory of representation. Is it true that the pursuit of these interests adds up to the interest of the whole, as the Fathers assumed? If matters have so changed in a century and three quarters that the whole has absorbed and personifies the overriding desires of citizens for wellbeing and security, then a system that allows the parts to control the whole has become obsolete. This is not pluralism but hidden dictatorship.

The great debate concerning government in the coming decades may well center in this question. It was not Harris' purpose to proceed so far, and it is perhaps inappropriate to suggest such an extension of his conclusions here. He meant only to show how formidable the administrative controls by the Legislative branch have become and how they reduce governmental integrity and hamper its modern mission. But the total effect is devastating. The perversion of the appropriations procedure is a good example of powers used for other than public purposes. But examination of other devices, originally intended as reforms, shows how often efforts are defeated by subterranean machinations. There is, for instance, the audit procedure.

A Comptroller General, responsible to the Congress, was established in the same bill as the Budget Bureau. He was expected to be an auditor, but soon began preauditing; and this enabled him to interfere in administrative decision making. His interferences are responsible for innumerable delays and subterfuges, all stemming from the extrapolation of powers that the legislators refuse to define and from his desire to follow the wishes of congressional insiders who desire to determine policy.

A device of a different sort is the legislative veto. When Roosevelt signed the Reorganization Act (1939) that gave him the right to rearrange agencies, he assumed that he had gained an important initiative. He was to act and the Congress was to disapprove within a limited time; otherwise what he had done would stand. Students felt that the helplessness of Congressmen in dealing with numerous complex issues had at last had some recognition. It was not exactly a new device; it had been tried in other jurisdictions, but it was new to the federal government.

But see what the old hands in the Congress did to it when they went to work. The rearrangement of the Executive establishment was allowed to involve only those agencies in which Congressmen had no strong interest. First one limitation and then another was attached, all calculated to direct the process. Since 1940 more than 40 bills with legislative vetos have been passed with such conditions. From the total exemption of certain Bureaus, the legislators progressed to allowing the subcommittees, rather than the Congress itself, to control the reorganizations. Finally, certain chairmen were authorized to supervise without reference even to their committees. But even beyond this there are a long line of "come into agreement" provisions, whose effect is to associate a committee or its chairman with actions to be taken by administrators. This is not supervising: it is participating; it is not legislating: it is administering.

Harris points out the usefulness of this device in placing the offices of governmental installations in a chairman's district, in protecting certain interests in his locality, and in favoring certain policies that he may wish to impose.

If even such devices for reform can be turned so easily to local or private uses and if repeated attempts at internal reorganization—such as the La Follette-Monroney Act of 1946—can be defeated by obstructive tactics or simply by ignoring the law, some more general pressure from outside would seem to be the only recourse.

Whatever the means used, the end clearly to be kept in mind is the separation of legislators from their local and private affiliations in order to turn them toward the national interest. This need not destroy legislative oversight. Harris states succinctly the desired effect; it should, he says, "seek to galvanize the internal disciplines of the Executive establishment rather than to impose external controls"; it "should set the general direction and limits of policy"; and it should then have the means for holding administrators accountable.

What he proposes for the purpose is a legislative-executive commission "to examine the essential meaning of the oversight responsibility . . . and conduct a searching inquiry. . . ." If this seems a weak proposal after all the assembled evidence, it is possibly because the more rigorous proposal of a citizens' reappraisal seems to him, as it has long seemed to political scientists, unlikely to happen.

The Congress is so well protected from any reform at all that only the second method of amendment provided in the Constitution could conceivably be effective. Amendments have traditionally begun with the familar two-thirds majority resolutions; but another means is authorized by the constitution. This would allow the legislatures of two-thirds of the States to demand a convention for proposing amendments, which would be valid when ratified by three-fourths of the states. It is a formidable procedure; but a persistently recalcitrant Congress might cause it to be used.

An Authoritative Introduction

Radio Astronomy Today. H. P. Palmer, R. D. Davies, and M. I. Large, Eds. Harvard University Press, Cambridge, Mass., 1963. viii + 242 pp. Illus. $6.

In the summer of 1962 a school was held at Jodrell Bank by the University of Manchester for the purpose of presenting a general introductory course on radio astronomy. The papers presented by the distinguished group of lecturers have now been published in this pleasing book. In all there are 20 contributions on a variety of topics.

The entire range of radio emissions from the sun is summarized by Paul Wild; after this there is a corresponding report on planetary emissions, by F. T. Haddock, and a discussion of interplanetary radar, by J. H. Thompson. Emission from Mercury, Venus,

Mars, Jupiter, and Saturn has been detected and promises interest for the future; indeed, the study of Jupiter has already revealed such fascinating features as a Van Allen type belt, with an associated magnetic field of at least about 7 gauss, which emits polarized decimeter waves, and powerful meter-wave outbursts that come from certain fixed regions. The steady rotation period of 9 hours, 55 minutes, 29.37 seconds, is presumably the period of the solid surface of the planet, but it seems that the emission must come from an ionized atmosphere.

Techniques of radio astronomy are treated by E. J. Blum. We learn that a sky survey with a beam width of 1 minute of arc would take 20 years to complete; hence the interest in radio image-forming techniques that depend on multiple lobes such as Blum himself has demonstrated.

F. D. Kahn summarizes information about interstellar matter; he refers to the cycle whereby material is blown from stars and, in due course, swept up to be processed again. Radio astronomy has had a direct impact on this subject, through studies of the 21-centimeter and continuum emission of interstellar hydrogen, and with studies of the radio emission from supernova remnants, and the galactic halo is contributing to an understanding of the evolution of a galaxy. The structure of the galaxy and gas motions, including the general outflow from the central region, are discussed by D. S. Heeschen. V. C. Reddish briefly explains the theory of 21-centimeter emission and then applies it to the calculation of the neutral hydrogen content of a galaxy. Detection of the galactic magnetic field by Zeeman splitting of the line is then discussed by Rod Davies.

Mechanisms of radio emission are presented by M. I. Large, and R. G. Conway describes radio source spectra and expresses the hope that spectral features might enable red shifts, and hence distances, to be measured.

From its beginning, radio astronomy has been concerned with the angular sizes of radio sources, and much ingenious instrument design has been stimulated thereby. Observational techniques and results for angular sizes are explained by H. P. Palmer, and the more general question of source brightness distributions is taken up by B. Rowson.

G. R. Burbidge describes the calculations which lead to the conclusion that astonishing quantities of energy are being released by the strong radio sources. Burbidge also discusses the various theories for the source of the energy (these theories were shortly thereafter abandoned by many of their proponents in favor of gravitational potential energy).

A technical discussion of the optical identification of radio sources, by D. W. Dewhirst, is accompanied by practical advice on how to determine celestial coordinates from the Palomar Sky Survey. Finally, the application of radio source observations to cosmology is taken up in a series of contributions by Ryle, McCrea, McVittie, and Palmer.

There is a good index; the book can be recommended as a clear and authoritative introduction to radio astronomy by leaders in the field.

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Applied Science

Light and Heat Sensing. Harrison J. Merrill, Ed. Pergamon, London; Macmillan, New York, 1963. xii + 457 pp. Illus. $20.

This book contains 27 papers presented at the sixth meeting of the Avionics Panel of AGARD (the Advisory Group for Aeronautical Research and Development) of the North Atlantic Treaty Organization in July 1962. The vastness of the field of sensing is reflected by the great variety of subjects treated in the papers, which are grouped by subject in six sections: (i) Sensors (papers dealing with the entire spectrum, from the ultraviolet to microwaves, as well as those on the information capacity of sensors and the limits of imaging at low brightness); (ii) Atmospheric Effects (the concentrations and size distributions of atmospheric particles, the resultant optical scattering, as well as a method of using stars to estimate atmospheric attenuation); (iii) Imagery Effects (dector considerations extended to the two-dimensional imaging case, including theoretical analysis of image intensifiers, problems of using human vision for air-to-ground detection, the uses of spatial filters to modify the transfer function of an optical system and remove unwanted patterns such as the lines on a TV screen, and the use of color photography for quantitative measurement of the surface temperatures of luminous bodies); (iv) Lasers (basic principles of gaseous, solid-state, and semiconductor lasers, applications to communication and optical ranging, and a discussion of methods of modulating infrared radiation); (v) Fiber Optics (a survey paper as well as some applications and descriptions of optical systems using fiber optics); and (vi) Sensor Systems (six papers dealing with various military and space applications).

The length of the individual papers varies from 2 pages (really a summary) to 31. Most are followed by a few references and brief comments or discussions by the conference participants. There are author and subject indices. Six of the papers are in French, the others are in English. Bilingual summaries at least of the articles in French, would have been useful. The papers were chosen for extensive coverage rather than intensive treatment in any one area. There is little duplication in the material presented by the various authors. In view of the sponsorship of the meeting, military and space applications are emphasized. For example, atmospheric scattering is treated in terms of its effects on aerial photography, and the communications aspects of lasers are stressed, rather than their uses as a tool in fundamental research. Nevertheless, developments that may have been motivated by military and space requirements often have repercussions in everyday life.

Many of the papers are of an analytical nature or describe specific devices or techniques that will continue to be useful for at least several more years. There are also many useful tables. The time lag is really noticeable in only a few cases—for example, in the rapidly developing field of semiconducting lasers which, at the time of the conference, were only a speculative possibility.

The typography is attractive and the photographs and figures are clear. There are a few misprints, and these seem to be more frequent in the French articles.

The "List of Symbols" at the beginning of the volume is largely honored in the breach. For example, in Fig. 1 of the very first article, "A" is used but not defined. The "List of Symbols" denotes "A" as "area," which quite obviously does not apply in this figure. Several pages later we find that "A" signifies the "mean number of ambient