

experience the institution provides. A group of very able students sharing a sense of belonging to a privileged minority live in close association under semi-military discipline and follow a single, very demanding course of study. Teachers are very good, and the staff-student ratio is much better than that in the university faculties—perhaps 1 to 3 or 4, as compared with 1 to 15 in the science faculties. A small percentage of graduates follow army careers, but the rest are assured a fine entrée to industry and can expect alumni of the Polytechnique to provide the same sort of assistance that the public school “old-boy network” does in Britain.

The *Grandes Ecoles* tradition of producing a managerial elite means that a high proportion of France's most talented students in mathematics and the natural sciences are lost to research and teaching. The Ecole Normale, whose historic role is that of providing teachers for higher education, is the

only one of the *Grandes Ecoles* where some students concentrate on the humanities. It has also attempted to redress the balance in fundamental research. Alfred Kastler, Nobel prize winner in physics, is associated with the physics laboratory of the Ecole Normale, and the institution's laboratories in such fields as optics, radio-astronomy, nuclear research, and geophysics have a reputation for high-quality advanced research.

The parallelism in the structures of the universities and the *Grandes Ecoles*, and the mutual reserve this engenders, has made crossovers difficult. Moreover, the fact that the universities are administered by the Ministry of Education and the *Grandes Ecoles* are administered by a variety of other ministries inhibits integration.

Most of the *Grandes Ecoles* engineering courses, which take 3 years, on the average, put heavy stress on theoretical subjects, but the schools are not organized to provide graduate

training in the sense of work for research degrees. Many *Grande Ecole* graduates do go on to the equivalent of university third-cycle study, but in the advanced schools linked to the *Grandes Ecoles* and providing a year or 18 months' further training for graduates in their specialties.

It is generally conceded that the attraction of the *Grandes Ecoles* for top students has retarded the development of university science and engineering. Because the graduates of the *Grandes Ecoles* have flowed into managerial jobs, research and engineering are inevitably deprived of some of their potentially best people.

Weakness in applied research and the problems in engineering education are often cited when the state of French technology is discussed. Recently there have been some well-publicized technological embarrassments. The government has had to undertake a rescue operation of the computer industry with its Plan Calcul, and the French

Sonic Boom: Regulation Left to the FAA

The Senate last week completed congressional passage of legislation to have the Federal Aviation Administration (FAA) measure and attempt to control noise generated by civil aircraft. Besides being addressed to the existing problem of aircraft noise, the new legislation is concerned with a major problem of the future—the sonic booms which will be generated by the commercial supersonic transports (SST's) when these vehicles are put into operation in the 1970's. A few senators, chiefly Clifford P. Case of New Jersey and William Proxmire of Wisconsin, felt that Congress itself should simply ban all non-military supersonic flights over U.S. territory. The ban could be lifted, they said, once there was scientific evidence that such flights would do no harm.

But the Case-Proxmire proposal was voted down 55 to 12, and the question of whether supersonic flights overland are to be permitted was left to the FAA. Leading the opposition were Senator Mike Monroney of Oklahoma and Senator Warren G. Magnuson of Washington, sponsors of the noise-abatement bill and key supporters of the U.S. supersonic transport project. The Boeing Company of Seattle will develop the SST, and Magnuson clearly has a political stake in this project's success.

Essentially, the Case-Proxmire argument was that, as the agency responsible for promoting the SST's commercial development, the FAA would be biased in favor of keeping restrictions on supersonic flight to a minimum. “In the circumstances, to place upon the FAA the responsibility for restrictions on overland flights is

like putting the fox in the chicken coop,” Senator Case said.

Sonic booms are disturbing to many people, and their potential destructiveness was ironically demonstrated not long ago when one shattered windows at the Air Force Academy. The FAA's study last year of the SST's economic feasibility was predicated on the assumption that the SST would be essentially a transocean aircraft which, insofar as it operated overland, would fly at subsonic speeds. Although the FAA concluded that an SST designed for such service would find a profitable market, a study made for the agency by the Institute for Defense Analyses indicated that sales would fall short of the break-even point.

In Case's view, Congress “must make the final decision on overland flights because it is the only institution of government which can integrate all the needs of society into such a profound policy decision. Such decisions cannot,” he added, “be left to the agencies of government which are understandably prone to a philosophy of project-success and self-perpetuation, and also vulnerable to pressures by narrow and parochial interests.”

Many of the senators who voted against the Case-Proxmire proposal may have been persuaded by Monroney's argument that the fear of damage suits, if nothing else, would keep airlines from conducting supersonic cross-country flights. Monroney acknowledged the problem of the sonic boom, but discounted the possibility that SST's would ever be scheduled to fly or permitted to fly at supersonic speeds over populated areas.—L.J.C.