Letters

Defense Research

E. P. Wigner and R. K. Adair (Letters, 28 Jan., p. 356) conclude that the Federation of American Scientists (FAS) does not want to strengthen our defense research "if there is a chance that we will be safe," that we want "no defense measure adopted" unless it can be "shown with certainty" to be necessary, and that we require *"absolute"* proof before approving research funds.

These wholly inaccurate statements are, incredibly, based on an FAS report that did not recommend in any way, shape, or form that any defense expenditures be cut. Our report, "Is there an R & D gap" (*1*), simply attacked assessments of the Soviet research and development threat that have been highly controversial inside the government itself for years. Indeed, in discussing this report, a *Christian Science Monitor* editorial (*2*) called the FAS a "public front for the opposition inside the Administration. . . ." If our assertions had been the product of any peculiar appraisal of goals or of our value system, the U.S. Senate Subcommittee on Research and Development would never have given us the unprecedented public hearing that it did. We urge all concerned to read our report. If you agree with us, join us.

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References

1. *Congr. Rec.*, 5 November 1971, p. S6517.
2. *Christian Science Monitor*, 12 May 1971, editorial page.

Cost of the Space Shuttle

The space shuttle (see News and Comment, 28 Jan., p. 392) deserves to be carefully evaluated before the nation plunges ahead on a space project whose cost may well eclipse that of the Apollo program. "A total annual payload of about 1000 tons" reckoned on a 10-year schedule, equals 20 million pounds placed in orbit. Before we become absorbed in the possible cost-effectiveness of shuttling things to orbit, which NASA claims can be accomplished for $100 per pound, we need to determine what this immense payload will cost and what it is aimed at doing.

When he testified before the U.S. Senate Committee on Aeronautical and Space Sciences, NASA Associate Administrator Dale M. Myers (*1*) stated, "The costs of today's satellites run around $20,000 a pound, including research and development costs, and some are considerably higher." It can be argued that few-of-a-kind satellites are inordinately expensive, but Intelsat satellite serial units cost $9000 a pound (*2*). The argument that the shuttle's size will allow use of heavier, cheaper-per-pound instrumentation is not confirmed by data on heavy military satellites (*3*). If we make the extreme assumption that NASA's payload costs can be slashed to $2000 a pound, then 20 million pounds in orbit represent a national investment of $40 billion.

To this $40 billion we must add the shuttle costs. President Nixon stipulated (*4*) a $5.5 billion development cost for a modified shuttle that has an ocean-recoverable booster. A booster will cost $50 million and its reusability remains uncertain; unless it can be reused ten times, then over 500 missions will require more than 50 boosters at a total investment of $2.5 billion. I estimate that development, deployment, and operation of the shuttle system will cost from $11 to $16 billion. If we add up all the costs, the shuttle-related space program will cost from $51 to $66 billion.

NASA's contention that the cost of lifting a pound of payload from earth to orbit can be reduced to less than $100 is easily disputed. Simply take the minimum estimate of $11 billion (*5*) for the shuttle cost and divide it by 20 million pounds. That's $550 a pound and not much less than the $700 per pound that existing NASA launch vehicles cost (*6*). To focus on transportation costs, rather than payload costs, is like suggesting to Tiffany's that it concentrate on devising a low-cost method for diamond shipments. Only if orbital payloads can be reduced so they cost only several times more per pound than gold, is it meaningful to seek cheaper space transportation. Even then the nation ought to be asking what kind of space program is the space shuttle designed to support.

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References and Notes

1. U.S. Senate, Committee on Aeronautical and Space Sciences, *Authorization for Fiscal Year 1972* (92nd Congr., 1st sess., 1971), part 1, p. 143.
2. Data derived from *COMSAT Annual Report to the President and the Congress* (Communications Satellite Corporation, Washington, D.C., 1971).
3. Testimony of R. C. Seamans, Jr. (*1*, p. 347) referring to Titan III-C launch vehicle and payload costs for unit production of reconnaissance satellites.
4. *Congr. Rec.*, 19 January 1972, p. S46.
5. This figure is smaller than the $13 billion total cited by NASA in 1971 for the shuttle using the manned booster. The latter would involve higher R & D costs, but presumably would be cheaper to operate. If the new shuttle's booster is limited in reuse, then it will be more expensive than NASA's original shuttle concept.
6. See (*1*, pp. 389 and 469). It should be noted that NASA's total 3-year budget ending 30 June 1972 is $10.4 billion, of which launch procurement costs add up to $0.38 billion or less than 4 percent of the total budget.

AAAS Meeting

At the 1971 annual meeting of the AAAS in Philadelphia, two important events occurred which were not mentioned by John Walsh in his summary report (News and Comment, 7 Jan., p. 42). First, a women's caucus was organized, and second, a motion introduced by Hazel Fox of the University of Nebraska on behalf of the AAAS women's caucus was passed by the AAAS council, the chief policy-making body of the AAAS. The motion was as follows:

WHEREAS the talents and contributions of women in science are not fully recognized, and

WHEREAS there is no central listing of women in science,

I move that the Council request the Board of the American Association for the Advancement of Science to consider establishing an Office for Women's Equality to