Letters

Clean Engines for Stratospheric Aircraft

Whether Concorde landing rights are denied or not, it is important for the nations to act now to protect the stratosphere from the effects of whatever future growth in high-altitude flight operations could possibly develop—anywhere, anytime. Therefore, before the question of landing rights is addressed, we should expect each nation involved to have committed itself voluntarily to a firm schedule for setting and enforcing clean engine standards that will guarantee the protection of Earth's ozone shield under any future circumstances.

As the person who started and made happen the Department of Transportation's Climatic Impact Assessment Program (CIAP) (*1*), I wrote Secretary of Transportation Coleman to this effect last month. In my letter I reiterated the understandings gained from CIAP that

1) Preservation of our ozone layer is imperative in order to shield us from biologically harmful ultraviolet radiation from the sun.

2) Any really large-scale commercial operations in the stratosphere (supersonic or subsonic) anywhere in the world would have to include strict engine-cleanliness standards in order to avoid significant worldwide reduction of the ozone layer.

3) Clean engine development is feasible, technically and economically, but will require a lead time of at least 10 years.

These understandings were confirmed by a committee of the National Academy of Sciences and the National Academy of Engineering (*2*). The possible danger of ozone reduction due to emission of NO_x by high-altitude aircraft was emphasized by Johnston in 1971 (*3*). The CIAP results have now shown his concerns to have been valid ones.

As a result of these findings, and even though current operations are not a significant threat, ironclad commitment to appropriate future engine cleanup should come from each nation before any further expansion of stratospheric operations. Included are France and Great Britain, now seeking landing rights for the Concorde; the Soviet Union, operator of the TU-144; and the United States and any other nations contemplating extensive *subsonic* operations at altitudes above those now customary.

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References

1. R. H. Cannon, *Bul. Am. Meteorol. Soc.* **52**, 836 (1971); A. J. Grobecker, S. C. Coroniti, R. H. Cannon, Jr., *Report of Findings: The Effects of Stratospheric Pollution by Aircraft* (Department of Transportation, Washington, D.C., 1974).
2. Climatic Impact Committee, *Environmental Impact of Stratospheric Flight* (National Academy of Sciences–National Academy of Engineering, Washington, D.C., 1975).
3. H. S. Johnston, *Science* **173**, 517 (1971).

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Trend of the U.S. Birth Rate

June Sklar and Beth Berkov suggest in their article (29 Aug. 1975, p. 693) that "the decline in the nation's birth rate is coming to a halt and that an upturn is in the making." This interpretation seems to rest largely on a 2 percent increase in the California fertility rate between 1973 and 1974. National data show, however, that annual changes in the direction of the fertility trend have occurred many times before, only to be reversed a year or two later. Sometimes such temporary reversals occurred when the larger, secular trend was downward, sometimes when it was upward, as may be seen in the accompanying table (*1*).

Not only have there been annual reversals, but monthly data for the United States show that there have been many briefer reversals over time. For example, the national fertility rate increased, on a seasonally adjusted basis, for a few months in the latter part of both 1971 and 1972, but the increases were not sustained. Instead there was an overall 1 percent decline between 1973 and 1974, a point the authors ignored. And since then, through September 1975, there has been no evidence of an increase in the fertility rate for the United States as a whole (*2*).

Period	Size of reversal (%) during a period of	
	Downward trend	Upward trend
1856–58	0.8	
1890–92	3.6	
1919–21	8.0	
1938–39		2.3
1947–50		7.5

Two other pieces of statistical evidence, both cited by Sklar and Berkov, are incompatible with a strong resurgence in the U.S. fertility rate: (i) the continuing reduction in the proportion of women who are married and living with their husbands (*3*) and (ii) sustained reductions in the childbearing expectations of young women. Surveys conducted by the U.S. Bureau of the Census (*4*) show that married women 25 to 29 years of age reduced their total childbearing expectations by over 25 percent between 1967 and 1974, from 3.04 to 2.34 children. It has been shown that, in the aggregate, such expectations are a reliable guide to the average number of children women will actually have (*5*). To the extent that current fertility rates of younger women are below their stated expectations, one could expect temporary increases on the order of brief reversals in the past. However, these are likely to be swamped in the long run by the overwhelming demographic consequences of continued reductions in proportions of women married and in the number of children they expect to have. Sklar and Berkov correctly point out that the age structure of the female population, swollen with young women born during the 1950's, may contribute to an increase in the crude birth rate, or at least may sustain it above levels associated with a less fertility-enhancing age composition. But they have not made a convincing argument—in view of the other evidence—that the 1973–74 increase in California has potential national significance.

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References

1. From A. J. Coale and M. Zelnik, *New Estimates of Fertility and Population in the United States* (Princeton Univ. Press, Princeton, N.J., 1963), p. 36.
2. National Center for Health Statistics, *Monthly Vital Statistics Report* (National Center for Health Statistics, Rockville, Md., Nov. 1975), vol. 24, No. 9, p. 2.
3. Bureau of the Census, *Current Population Reports*, Series P-20, No. 271 (Government Printing Office, Washington, D.C., Oct. 1974), table 1.
4. ———, *Current Population Reports*, Series P-20, No. 277 (Government Printing Office, Washington, D.C., Feb. 1975), table 1.
5. H. M. Rosenberg, R. E. Thomas, R. W. Cote, A. J. Kuntz, in *Proceedings of the American Statistical Association, Social Statistics Section, 1975* (American Statistical Association, Washington, D.C., in press).

It is undeniable that the decline in the American birth rate virtually stopped by 1974, as Rosenberg implies. Whether the rate rises or falls slightly in 1975, we