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### COMMENTS ON OCEANOGRAPHIC INSTRUMENT DEVELOPMENT

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The major oceanographic institutions also need to find ways to support innovative instrument development engineers, in close collaboration with scientists, but with their own reward system and encouragement to innovate on their own. There are a number of clever engineers to be found in the oceanographic community, but they are not very conspicuous; they are often confused with "applied oceanographers," and they are rarely recognized even by their own institutions (at least one of our large oceanographic institutions insists that all its staff must be labelled "scientists" even if they are really engineers—a rather brutal statement of values). Engineering culture is not oriented toward publication the way the science culture is; measures of achievement appropriate for a physical oceanographer—meant to be doing and publishing

science—are often inappropriate for an engineer, whose product is a new instrument that someone else will use to do science. Indeed, one good measure of a successful engineer is the number of people, outside the original group, who have successfully used one of his new instruments. Some modified reward structure, established to sustain innovative oceanographic instrument development, would surely go a long way toward ameliorating this situation. It is true that oceanographic-instrument engineering, if done independently of working scientists, can go off into sterile directions (the same is true of theory done in isolation from observations). But there are good, creative instrument engineers with the common sense to stay in close touch with the scientists who would need to work with the data. At the present time, the insti-

tutional/funding system almost demands that such people can at best be junior partners of the scientists.

To encourage true engineering innovation, the system has to be willing to invest in a few talented individuals and bet on their ideas for about a decade at a time. It would be expensive—but all field oceanography is expensive—and probably cheaper in the long run than the present piecemeal, short-term system.

There are probably other, better remedies than these. Perhaps The Oceanography Society could take a lead in trying to define ways to sustain the technical developments which seem so central to the health of our science.

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### DUAL-CAREER COUPLES AND SCIENCE: OPPORTUNITIES, CHALLENGES AND STRATEGIES

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