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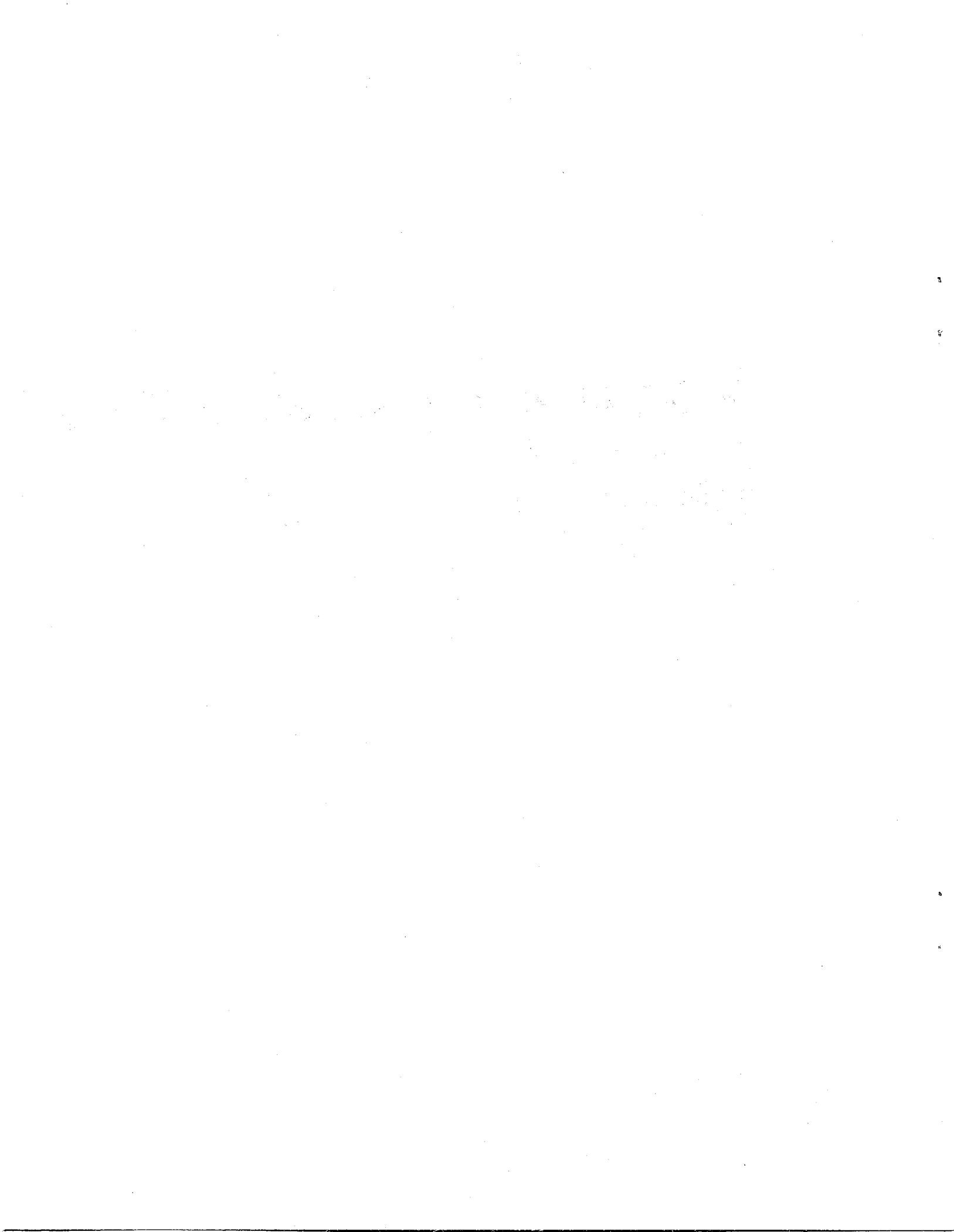
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LEGAL EDUCATION AT SEA VIA ATS-1

AN EVALUATION OF THE T/S GOLDEN BEAR EXPERIMENT

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SUMMARY

A course in maritime law was provided via ATS satellite to law students sailing with the California Maritime Academy's Training Ship, *Golden Bear*. Classes originated at NASA's Ames Research Center, Moffett Field, Calif., and were received while the ship was on the open seas and in the various ports visited. A half-duplex audio channel provided the primary communication mode.

All participants judged this pilot study to be extremely useful. Students were able to pursue their course work and to have the benefits of research guidance from academic advisors, while gaining practical, hands-on experience at sea. Continuing education is required of many who must spend time at sea. This study demonstrates that providing classes via satellite is an option to be explored in meeting that need.

INTRODUCTION

On January 20, 1981, the T/S *Golden Bear*, the training ship of the California Maritime Academy, set sail from Vallejo, Calif., on its annual student cruise. The 2-month cruise was to take the student mariners to Hawaii, Tonga, New Zealand, and Samoa before returning to the Bay Area on March 27.

Although similar in many ways to previous training cruises, this one differed in one important respect. Onboard were two students from the University of California at Davis who were in their last semester of law school. Their purpose in making this cruise was to gather data and to gain practical experience in maritime law while studying maritime law and its analog, space law (Glazer, 1974, 1978, 1981). As part of their study program, the students were to participate remotely in classes dealing with various topics related to maritime and space law. They were also required to conduct classes for the student mariners on board. Arrangements were made by the Davis Law School, the Chief Counsel's Office at Ames Research Center (ARC), and the California Maritime Academy to meet educational and research requirements. Central to this experiment was the requirement that the law students be able to "attend" class on a regular basis. Arrangements were made through NASA Headquarters and ARC to provide the satellite communication link and the technical assistance for this part of the project. The project was partially supported through a Joint Research Interchange, which included ARC and the California Maritime Academy.

It has been almost 20 years since the first communication link was established between a satellite (Syncom 1) and a mobile ship station (USNS Kingsport, docked in the harbor of Lagos, Nigeria). Since then, various experiments, many of them using the Applications Technology Satellite (ATS) series, have demonstrated the feasibility of satellite communications between land and mobile stations, including ships at sea.

The importance of the present experiment lies primarily in the fact that a formal, instructional program was provided to mariners while they were at sea. Although this has not been attempted previously, a related and interesting experience comes from the activities of the *Good Ship Hope*. Using Intelsat IV, a voice channel was used to transmit a single lecture from a physician onboard to an audience at the Mayo Clinic (personal communication, Kim Kaiser, COMSAT). The audience viewed slides, which had been sent in advance of the presentation, while they listened to the lecturer's description. Apparently the presentation went very well, with each call for the "next slide" resulting in the appropriate visual, a condition rarely achieved even with the lecturer in the same room. In the present experiment, the question to be examined was whether course material (i.e., information in which individuals later would be required to demonstrate competence) could be adequately conveyed under the conditions of a regularly scheduled satellite link to a ship at sea.

COMMUNICATION LINK

Space Segment

The satellite used in this experiment was ATS-1. On occasion, when difficulties were encountered on ATS-1, ATS-3 was brought into service to establish contact and to check out equipment. The ATS series, of which ATS-1 and ATS-3 are the only remaining satellites in operation, is managed through the Communications Division of the Office of Space and Terrestrial Applications, NASA Headquarters. ATS-1 was launched into geostationary orbit in December 1966. It operates on a VHF receive frequency of 149.22 MHz and a transmit frequency of 135.6 MHz. The satellite is located at long. 149°W, providing coverage over the western United States and Pacific basin.

Ground Equipment

The satellite exchange took place between the T/S *Golden Bear* and Ames Research Center, Moffett Field, Calif. All equipment used on the *Golden Bear* was loaned by ARC. This equipment consisted of a transmitting antenna, a receiving antenna, a Magnafax unit and coupler for facsimile transmission, and a General Electric Mobile Base Station. The mobile base station is a self-contained unit, which includes a telephone press-to-talk handset, speakers, and a speech processor, along with necessary electronic components. Transmission power from the T/S *Golden Bear* was 90 W; ARC transmitted at 300 W. The students onboard the *Golden Bear* transmitted from the ship's radio shack, a small enclosure that could accommodate only three or four individuals.

At ARC, two lecturers shared the teaching duties, with a guest lecturer providing a special session on cargo law. Lecturers routinely used one of two office locations, with one additional lecture originating from a nearby conference room. Lecturer equipment consisted of a bar-type press-to-talk microphone, a small tabletop speaker, an intercom for communication with the ground station, a digital clock, and a paper prop for keeping the lecturer's notes at a proper reading angle. The ARC facsimile equipment was housed at the ground station.

Training

A NASA engineer installed the equipment onboard the *Golden Bear* and trained the students in its use. The engineer sailed with the ship on the first leg of the voyage to ensure that all systems were functioning properly under operating conditions. This period provided time for various exigencies to develop and for solutions to be devised. Continued technical support and advice were given the students throughout the cruise by the ground-station technician at ARC.

Procedures

Two days each week were set aside as lecture dates. Contact was to be made at 10 a.m., P.s.t., with signoff at 10:59 a.m. Each weekday between lectures contact was to be established at 10 a.m., P.s.t., for the purpose of resolving any equipment or administrative problem, or to provide instructions related to the course work or the research assignments.

The course charted by the T/S *Golden Bear* is shown in figure 1. The O's indicate locations where lectures were conducted on the outbound portion of the cruise; Δ's indicate similar points on the return route; solid circles within open circles indicate locations where two lectures were conducted on the outbound route.

It was arranged that each contact would be initiated by the *Golden Bear*. An ideal session would proceed as follows. The students would contact the ground station at ARC. The ground-station technician would then talk briefly with the students and, when all equipment had been checked and adjusted, he would hand the contact over to the lecturer. The lecture-discussion portion would then continue for about 45 min, with the lecturer interrupting his presentation every few minutes to ask the students if they were copying adequately. The arrangement was half-duplex so that the control had to be handed back and forth between the ship and shore. At approximately 10:55 a.m., the contact would be given back to the ground-station technician for final checks and signoff.

RESULTS

Results were gathered from observations made during the course of the experiment, from reports submitted by some of the participants, and from interviews conducted with all study participants. Those interviewed were the two students who had sailed with the T/S *Golden Bear*, the three lecturers who had participated at the ARC node, and a legal aide who had observed all lectures and who acted as liaison with the students, conducting relevant business with them by means of the satellite on those days when lectures were not scheduled.

Table 1 provides a breakdown of the times, conditions, and durations of each class. It can be seen that the sessions started off roughly but soon improved to an acceptable level. Table 1 also shows the general trend throughout the experiment for reception on the T/S *Golden Bear* to be better than that at ARC. This latter result is due, in part, to interference in the vicinity of ARC.

The overall result based on reports of all study participants was that the experiment was extremely useful. The students were able to pursue their course work and to

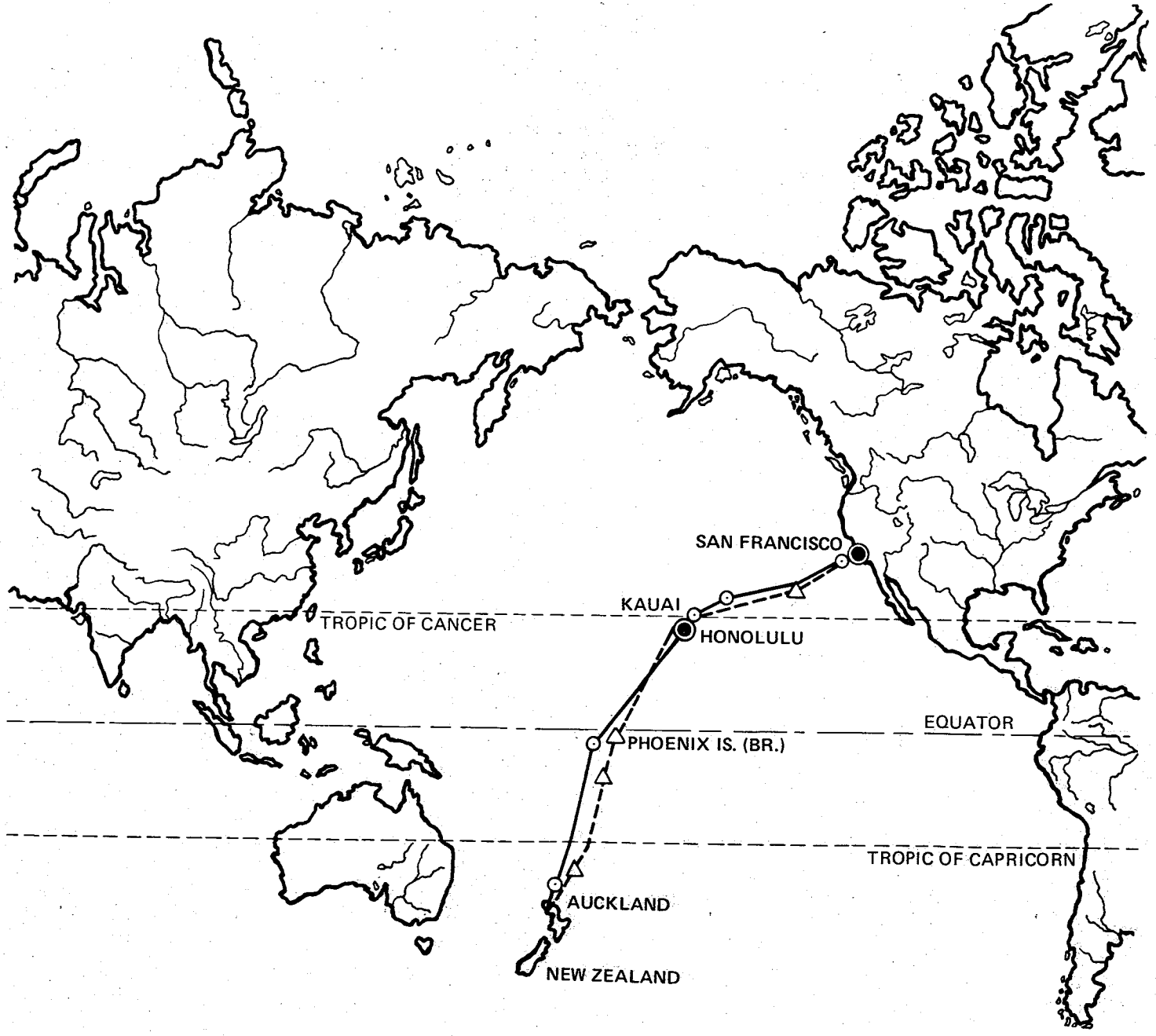


Figure 1.- Course Charted by the T/S *Golden Bear*.

TABLE 1.- CONDITIONS DURING CLASS SESSIONS

Session	Date, 1981	Ship location, lat./long.	Ship local time	Reception quality		Length of lecture, min	Contributing factors
				ARC	Ship		
1	1/20	(Dock - Vallejo, Calif.)	1000	Fair	Fair	25	Ship superstructure
2	1/20	(Dock - Vallejo, Calif.)	1400	Fair	Poor	---	Ship superstructure
3	1/22	35.35 N 126.45 W	1000	Poor	Poor	15	GB in storm
4	1/26	24.10 N 151.21 W	0800	Good	Fair	35	
5	1/27	21.14 N 156.16 W	0800	Fair	Good	40	Rough seas
6	2/3	(Port Hawaii)	0800	Good	Excellent	50	
7	2/5	(Port Hawaii)	0800	Good	Good	45	
8	2/12	3.05 S 168.16 W	0700	Good	Excellent	50	
9	2/24	33.21 S 177.35 E	0600	Good	Excellent	50	
10	3/5	27.62 S 178.05 W	0700	Good	Excellent	50	
11	3/10	8.58 S 170.09 W	0700	Excellent	Excellent	100	
12	3/12	1.41 N 165.58 W	0700	Good	Good	50	
13	3/24	30.26 N 137.08 W	0900	Good	Excellent	40	

have continuing research guidance while gaining practical, hands-on experience aboard ship. The consensus was that this could not have been accomplished readily in any other way.

Responses of participants to particular aspects of the experience were solicited; those responses are summarized below.

Equipment and Facilities

Onboard, the students reported little trouble with their hand-held equipment, developing a protocol where one student manned the equipment while the other took notes. At ARC lecturers reported their equipment to be adequate; however, they would have preferred a microphone with a locking mechanism. Holding the press-bar proved somewhat laborious and limited the paper shuffling that the lecturer could engage in. One lecturer suggested that a foot-operated microphone might provide even greater flexibility.

Ideally, the lecturers would have preferred a permanent location, one removed from the noise and interruptions of an office environment, rather than the temporary, centrally located facility in which they were housed. However, the location did not prove to be a particular problem. At ARC there were always one or more individuals in attendance at the class sessions. Lecturers found that this audience enhanced their overall presentation in that these individuals provided a certain amount of feedback during the satellite contact and often engaged them in lively discussions of the material following the class session. The lecturers expressed a preference for a small facility - one just large enough to accommodate the assembled group. This room "fit" seems to facilitate the exchange, probably by reducing the formality inherent in mediated communications (Hough, 1977; Connors et al., 1976). Onboard ship, the students were plainly cramped and would have preferred a somewhat larger and better ventilated facility. Except for the rare visitor, the students were the only class participants. Although a slightly larger group might have been helpful, the two students were able to handle their duties and provided each other sufficient support to make the exchange relatively comfortable.

Although facsimile equipment was used on occasion, it provided neither sufficient reliability nor sufficient resolution to be more than minimally useful during the experiment; the exchange of information took place almost exclusively over the audio channel. A more useful facsimile arrangement would have required greater attention to fine tuning the antenna-receiver-facsimile system.

Transmission

The most demanding aspect of the experiment for lecturer and student alike was the uncertainty associated with the exchange. When the ship was in port, permission to transmit had to be sought from the local authorities. It was sometimes unknown until the actual call came, whether or not permission had been obtained. Also, on one occasion the navigation officer onboard ordered that the exchange be terminated, since the ship was close to shore and he believed that the transmission could interfere with his responsibility for safe navigation. But the greatest uncertainty involved the quality of the exchange itself. Having primed himself for a presentation, a lecturer might find that the audio quality was not adequate and that he had to be rescheduled.

Problems of this nature occurred primarily during the early part of the cruise. However, the quality of the audio varied over the entire experiment so that no session could be approached with absolute confidence.

Where transmission problems occurred, they usually involved one of the following: obstructions between the onboard antenna and the satellite, ocean wave motion, or pointing errors onboard the T/S *Golden Bear*. When the T/S *Golden Bear* was at sea, the ship could be turned to gain a clear path to the satellite. Close to shore or in port, however, obstructions such as the ship's superstructure caused transmission difficulty. The problems of obstruction and wave motion must be tolerated, at least for the present; however, problems with pointing errors could be reduced. Although the students were given some precruise training in this area, greater opportunity to practice acquiring the satellite should be given prior to embarkation.

It became apparent during this experiment that contact procedures, which take into consideration the possibility of transmission problems should be worked out and understood in advance of sailing. Both sides should agree on how long to persist in attempting contact under difficult conditions and how frequently attempts should be made. Having a scheduled plan of how to proceed eliminates much of the embarrassment of random and repeated "do-you-read" messages.

Although many sessions were relatively trouble-free, there were frequent occurrences where the transmission dropped off in the course of the session and the lecturer had to retrace his argument and repeat. This proved somewhat difficult since the lecturer was generally unsure of just how much the students had missed and how much needed repetition. A full-duplex arrangement, which would allow either side to "raise their hands," would be an invaluable aid to circumventing such occasional transmission difficulties.

Dynamics of the Exchange

In the present experiment the exchange was heavily weighted in one direction - that is, from ARC to the T/S *Golden Bear*. Due to the nature of the material, there was little occasion for discussion, and the usual session would proceed in the lecture mode, with only an infrequent question or comment from one of the students. In this mode, the lecturer would hand-over to the *Golden Bear* every few minutes. This way he gave himself a short break while involving the students in the discussion and assuring himself that they were still copying. This procedure proved very reassuring to the lecturers who were never fully confident that they were being heard or understood. However, the students found that the frequent checks disrupted the flow of the lecture and, as long as they were hearing and understanding, they would have preferred few or no checks. Again, a full-duplex arrangement would have obviated the need for interruptions, at least for checking purposes.

All participants reported that the medium was quite adequate for conveying the kinds of materials presented. However, the level of the material presented, being essentially basic and therefore unidirectional in nature, was probably not the best use of the interactive satellite link. The lecturers agreed that a better use of the satellite link would involve more advanced materials than those used in the present study. If students had a solid background in the basics of the subject before sailing, satellite time could be used more interactively. The lecturers also felt that more familiarity with basic materials before sailing would help the students gain more from their onboard experiences generally.

Planning and Effort

Participants in this experiment reported that satellite classes took more planning and involved more effort than comparable face-to-face classes. This report is in keeping with the general finding that mediated communications require more organization and are more focused and tiring than direct meetings (Short, 1973). There are fewer cues in an audio-only meeting than in a direct meeting, and individuals must work to project and to pick up on those cues that are available. An audio communication also puts pressure on participants to avoid "dead time." In this experiment participants were keenly aware of using valuable satellite time, which they did not want to waste. Filling what would normally be breaks in an interaction accelerates the exchange and fatigues the participants. In the present case, lecturers not only had to carefully organize their presentations, they also had to determine what materials to exclude in the event that the full 50 min were not available to them. For their part, the students had to deal with the medium, not in the comforts of a stable surrounding, but on a moving vessel, a situation in which many individuals find concentration extremely difficult. Nevertheless, both sides found the results to be well worth the additional effort, while the students reported that the regularly scheduled contacts with shore provided a welcome relief from shipboard activities.

Although there was some variability, the general feeling was that a 1-hr contact, as scheduled, was the appropriate session duration. Any longer would have been overly taxing to participants, and a shorter session probably would have been inadequate to the task.

Most of the participants reported that they adapted to the medium rather quickly, feeling as relaxed as they were going to get by the end of a single session. One participant commented on the difference between comfort adaptation, which occurred within a session, and learning to use the system well, which she thought took several sessions. The most significant obstacle to adaptation was simply using the microphone and overcoming the reluctance of the uninitiated to engage in radio lingo. The need to use terms like "do you copy," "affirmative," and "over" can result in hesitancy to speak at all; however, once the individual repeats these phrases a few times, they become a natural part of his conversation.

Preparations

Various comments related to the fact that more attention to procedure prior to departure could have eased the transition. Ideally, participants should be assembled in advance for a step-by-step dry run. Such a session should serve to clarify, for example, the necessity of speaking slowly, of properly positioning the microphone, and of completing a transmission before releasing the talk button. Such a session would also be useful in overcoming any reluctance to use the equipment or to speak, and in working out procedures that would be acceptable to all participants. For instance, after the fact, participants felt that they should have kept a log at both locations, while the students realized that they should have brought a tape recorder onboard to ease their note-taking chores. These and similar details could best be worked through during a dry-run session. In particular, signoff procedures should be rehearsed. New users are not accustomed to a communications link that disappears precipitously when time has expired. They must be instructed and reinforced, on ending their exchanges on time and in handing control back to the ground station so that final checks can be made.

Left alone with equipment whose operation they only partially understood, the students relied heavily throughout the cruise on instructions provided by the ground station technician. The role of such a "linking" individual has received considerable attention recently in relation to spaceflight requirements.¹ This person must be able to instruct less experienced users in a manner they can understand and follow, while at the same time he must convey an attitude of calm control. The ground station technician in the present study fulfilled all these requirements and was a key element in the success of this experiment.

DISCUSSION

The participants in this study concluded that legal course material, transmitted by means of satellite to a ship at sea, is a viable and workable concept. Although the level of reliability that would be necessary for a fully operating system is not yet present; nevertheless, this initial effort more than met the expectations of the participants. It is noteworthy that because participants saw the potential importance of the experiment to the future of maritime law, they were willing to adjust themselves to the vagaries presently inherent in a satellite link to a moving ship. Their satisfaction with the experience was due at least in part to their accurate appreciation of what the system could and could not do. The participants further concluded, for a variety of reasons, that the satellite link should be used as a part of, and as a supplement to, a fully structured program, rather than as the sole educational method.

There is a growing need, perceived by both those who sail merchant vessels and those who direct their operations, to provide continuing education at sea. For instance, tanker personnel have recurring requirements to update their ratings. Management does not wish to rotate these individuals more than necessary, and the mariners themselves do not wish to spend their shore time in class. In addition, there is ample time for instruction at sea. The proof of concept that has been developed through this initial effort involving a satellite link provides the basis on which future maritime requirements can build. And the possibility of conducting training sessions with numerous vessels simultaneously could make the satellite link economically attractive. It is impractical to carry instructors aboard most ships; moreover, even if it were possible, this might not be a preferred option. Groups confined together for prolonged periods of time develop methods of interacting that are generally not conducive to onboard training (Smith, 1969; Gunderson and Nelson, 1963). It would be expected that outside involvement would be more readily accepted, and certainly more welcome. From the experiences of this study it appears that the onboard remote classroom provides a point of contact with home and a diversion that is happily anticipated.

The results of this study have relevance to another application of satellite technology to the law of the sea: maritime law allows advanced law students, at the request of the captain, to act with full legal authority in conducting onboard investigations. However, this provision requires that these students be supervised by a fully accredited attorney. The satellite link provides a means by which such supervision could be exercised.

¹Connors, Mary M.; Harrison, Albert A.; and Akins, Faren: Organization and Management in Human Requirements for Extended Spaceflight. NASA RP (in preparation).

A rationale for the present study was that the law of the sea provides a close analog to the emerging law of space and, more broadly, that sea travel provides a close analog to space travel. Studies using supertanker crews to anticipate problems of long-duration spaceflight are now being conducted (Helmreich, R. L.; and Wilhelm, J. A.: Studies of Supertankers as Models of Spaceflight, U. of Texas, in progress). With reference to communications, extended spaceflight reverses the usual Earth situation in which primary relationships (i.e., contacts with family and friends) are direct, and secondary or business-type relationships are often mediated. The space situation raises such questions as how mediated interactions with family and friends at home influence direct interactions among crewmembers (Connors et al.¹; Gzenko, et al., 1977). Although the present study did not address these kinds of issues, it is clear that the maritime model with the satellite communication link could be a useful method of exploring communications questions of direct relevance to future long-duration spaceflight.

RECOMMENDATIONS

This study demonstrated that legal course material could be conveyed adequately through a regularly scheduled satellite link with a ship at sea. As a result of the experiences acquired during this study, the following recommendations are offered for consideration on related future efforts:

1. Implementation of a feedback mechanism that will allow the speaker to monitor reception at other nodes. This mechanism could take the form of a fully duplex audio link or it could involve a separate link that allows listeners to indicate their desire to talk.
2. Establishment of procedures for dealing with transmission difficulties. These protocols would include agreed-on lengths of time when contact would be attempted, frequency of attempts to contact, etc.
3. Pretest of the facsimile system to ensure that it is sufficiently tuned to provide reliable copy under a range of operating conditions.
4. Conduct of a dry run of a session, using actual equipment, preferably with the groups separate, but at the same location. Such a full rehearsal should uncover potential problems related to equipment use, radio lingo, or procedures.
5. Selection of subject materials to make maximal use of the interactive capability of the satellite.

Participants in the present study reported a high level of satisfaction with this demonstration. This does not mean that the experiment was without problems, but rather that the participants understood the problems and were willing to work around and through them. A question remaining concerns the level or levels of system performance and reliability that would be acceptable to less-motivated participants. This is an issue that would need to be addressed before satellite links to ships at sea could be considered a practical solution to the educational requirements of mariners.

¹See footnote, p. 9.

REFERENCES

- Connors, Mary M.; Lindsey, Georg; and Miller, Richard H.; The NASA Teleconferencing System: An Evaluation. NASA TM X-74,160, 1976.
- Gazenko, O.G.; Masnikov, V.I.; Ioseliani, K.K.; Kozerenko, O.P.; and Uskov, F.N.: Important Problems of Space Psychology. Institute of Biomedical Problems, Moscow, 1977.
- Glazer, J.H.: The Maltese Initiatives Within the United Nations - A Blue Planet Blueprint for Trans-National Space. Ecology Law Q., vol. 4, 1974, pp. 279-341.
- Glazer, J.H.: Domicile and Industry in Outer Space. Columbia J. Transnational Law, vol. 17, no. 1, 1978, pp. 67-117.
- Glazer, J.H.: The Maritime Analogy in Outer Space. Paper presented at the 7th Annual Maritime Industry Symposium, Vallejo, Calif., May 19, 1981.
- Gunderson, E.K.E.; and Nelson, P.D.: Adaptation of Small Groups of Extreme Environments. Aerospace Medicine, vol. 34, 1963, pp. 1111-1115.
- Hough, Roger: Teleconferencing Systems: A State of the Art Survey and Preliminary Analysis. Stanford Research Institute, Menlo Park, Calif., 1977.
- Short, John: The Effects of the Medium of Communication on Persuasion, Bargaining, and Perception of the Other. Communications Studies Group, Paper E/73100/SH, London, England, 1973.
- Smith, S.: Studies of Small Groups in Confinement. Sensory Deprivation: Fifteen Years of Research, J.P. Zubek, ed., Appleton-Century Crofts, New York, N. Y. 1969.

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