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Discussion - Session Two

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DISCUSSION — SESSION TWO

The comments made by the speakers are their own remarks and do not necessarily represent the official view of any organization or agency they represent.

MR. EUGENE JERICHO: Could you give us, Mr. Rudick, some idea of what you envision in future flight recorders as to the number of additional parameters that will be recorded and some examples of them?

MR. ROBERT RUDICK: Right now they are talking about a total of about 20 parameters totally, which will give us, in addition to the present four, such things as flight control positions, lateral as well as vertical acceleration, and some engine parameters—power, rpm, and enough other data to analyze the engine power as well as the flight control positions at the time of an accident.

MR. EUGENE JERICHO: When do you anticipate that those might be in service?

MR. ROBERT RUDICK: This type of recorder will be required for the 747 and later aircraft. Because of the necessary plumbing on existing aircraft, and some revisions necessary in the plumbing and wiring of aircraft that are on the drawing board, there will be an effective date, probably a couple of years from now, by which time they will be mandatory.

MR. TRUMAN ATKINS: This is for Mr. Sawyer or Mr. Rudick. We keep hearing rumors of the so-called ultimate recorder or ultimate weapon in the cockpit—the video tape recorder. Any plans, concrete or otherwise?

MR. ROBERT RUDICK: Well, we have seen demonstrations of video-type recorders. A basic limitation of this type of recorder is that the data derived therefor is only as good as the instruments and faces of the instruments that they are photographing; whereas in some of the other types of recorders, you are getting sensing directly from the source itself. Nevertheless, nobody of whom I am aware at present is looking toward video-type recording in the next few years.

MR. ROBERT SAWYER: I think that is about our attitude on it; we are not seriously considering that type of recording at the moment. There are, in addition to the normal flight recorders, so-called maintenance recorders which go up into as many as several hundred parameters. Part of the program may be to make all data survivable in an accident, or it may be that we will pull out some 20 or 30 parameters that need to be survivable and still use the rest of the data. There are many uses for recorded data in areas other than accident investigation; they would be very helpful and we are all pursuing that field right now.

NARRATOR: To those of our audience who are interested in supplementing their knowledge on this subject, can you suggest any source material, any written source material or library material that they might acquire?

MR. ROBERT SAWYER: Our technical library at Braniff contains many proposals from many manufacturers that I am sure could help. To my knowledge, all we have now is sales-type material which describes these systems; we would be glad to give you access to it.

MR. ROBERT RUDICK: I have written a couple of papers that need a little revision on some of the work that we have been doing, some of the results we have been getting and some of the things you can and cannot get from a voice recorder; it is my intention to up-date these papers. I would say that within the next three or four months voice recorders might be available from the Safety Board.

NARRATOR: In the field of flight recorders, approximately how many men in the United States do you think have expertise in read-out and read-out assistance?

MR. ROBERT SAWYER: To the degree that the NTSB does it, there are very few because of the great accuracy that they must have; I think that each airline prob-

able has three or four people. However, it is one thing to read the tape and put the graph down, but the interpretation of what it says is a special field all of its own.

NARRATOR: Is the interpretation the great part of the art as distinguished from the science? Which is the most difficult of the two?

MR. ROBERT SAWYER: Well, the reading of the tape is a very tedious job. Since it takes about as long to read as it does to make, it requires a certain amount of patience and very, very careful work. I guess the actual interpretation is a little more difficult than the reading is.

NARRATOR: During the takeoff run, what is the exact percentage of accuracy as to the knots per hour and altitude upon initial stages of arising?

MR. ROBERT SAWYER: That is going to depend somewhat on the aircraft. Some aircraft have larger errors in their flight recorder data because of the errors in the static system due to ground effect. This information has to be known, tested and calibrated for each aircraft. For the takeoff roll itself, I would hate to give you the statistics; maybe Bob knows the percentages. It is in the Technical Standard Order

MR. ROBERT RUDICK: Bob, I might qualify your remark. Apart from the peculiar effects of ground effect on the data being recorded, as either cumulative or subtractive, you have the accuracy values of the recorder itself; therefore, you have to consider both aspects. For example, at sea level the altitude accuracy of the recorder is something like plus or minus 100 feet; there is some value in this small part.

NARRATOR: Taking for instance the DC9, specifically how accurately could you predict V1, V2 and VR off the recorder?

MR. ROBERT SAWYER: The larger the airplane and the higher the V1, V2 and VR, the more accurate it would be. Being very hesitant, I think we are talking within a couple of knots. In areas above 100 knots, I think you might have accuracies within a knot or two, assuming that the recorder is only recording what the instrument system is telling it; also, you would have to take into account the accuracy of the instrument system under those conditions.

NARRATOR: Can you give us some indication of what the aviation industry is doing to have reliability assurance programs prior to departure?

MR. ROBERT SAWYER: Well, there is a check-out by the flight crew on both the flight recorder and voice recorder, and we do have a signal which tells the pilot that the tape is moving through the recorder and is recording.

NARRATOR: Does this also assure the flight crew that equipment is recording reliably and accurately, or just that it is in motion and in activation?

MR. ROBERT SAWYER: All this tells them is that the tape is in fact moving through the machine; it does not say that each parameter in itself is being accurately read.

NARRATOR: Is there any customer standard in the industry for routine preventive maintenance or inspection to assure reliability of the instrumentation?

MR. ROBERT SAWYER: Yes. When we take the tapes out of the recorder, the tape is examined at that time to be sure that all the parameters and traces are in reasonable positions and are recording well.

NARRATOR: In the non-crash environment, is there a periodic screening or survey to assure instrument reliability?

MR. ROBERT SAWYER: Yes.

MR. LLOYD ERICSON: In your case you mentioned the tape speed change from the influence of the roll rate of the aircraft. Once you have determined the rate of roll, did you go back to recalibrate your time base on your voice tape?

MR. ROBERT SAWYER: Yes. We started out with our time base to know how long it had taken for the shift in frequency to occur. We then took our see-saw and moved it in order to get this same time period shift. The shift, you understand, occurs during the time that the aircraft is accelerating; therefore we are talking about a very short time period—two or three seconds.

NARRATOR: Mr. Miller, I think you had your hand up?

MR. C. O. MILLER: I feel that there is a characteristic with CBR that ought to be brought out a little bit more because I think in the future you are going to see that this is going to become very significant. I am referring to that very difficult task of trying to find out whether the human operator erred or just exactly what it was that contributed to his actions. Before the CBR, we had no investigative techniques to assess this man's conditions—this part of the man-machine loop. We now have it and I am only saying that we are just barely scratching the surface in understanding and getting behind the so-called human error. That in itself is a greater breakthrough than either of these units. You have to hear some of the recorders to realize, for example, that a man does not know that he is going to be dead one and one-half seconds later; the very fact that he does not know is of tremendous value in the investigative sense in understanding what is going on between the man and machine. It is my own personal view, that in many, many forms of transportation, if you want to find out why people make mistakes, you are going to have to go to this kind of an operation. Nevertheless, I can assure you, we have only scratched the surface in this application of our investigative techniques.

NARRATOR: Thank you.

MR. ANDY YATES: In addressing myself to the voice recorder and flight recorder problems with which I have been working for several years, I would like for you to understand the outlet itself is not opposed to the use of the flight and voice recorder in accident investigation. We do support the proposed rule-making of the fourteen additional parameters that are going into the flight recorder. We would also like the additional protection of seeing the voice and flight recorders ejectable, floatable and locatable. If they go down in a thousand feet of water and they are neither ejectable nor floatable, you have extreme difficulty in the recovery of the units in order to be able to examine them. Fortunately, in one crash off Los Angeles, they were able to locate and recover both units in about a thousand feet of water with the aid of underwater television equipment. There was another incident where we were not so fortunate.

In addition to this, the Code of Federal Regulations, Title 14, section 121, protects only the crew from any punitive action by the FAA; it does not protect any other individual. Of course, this is one of the things that we would be desirous of having—that we have further protection from the indiscriminant views of the information.

ANONYMOUS: Mr. Rudick, could you discuss the future of the telemeter recorder? What does the future look like in that area?

MR. ROBERT RUDICK: In one word, bleak. There is a very simple problem in that too many people who have been propounding mass telemetry of recorded data from air carrier aircraft choose, either by lack of knowledge or by design, to overlook the fact that our air space, our fresh water, and our fresh air are our fastest disappearing natural resources; in fact, our fastest disappearing natural resource is the frequency spectrum. It is gone. There is just not enough room to telemeter enough meaningful data to the ground from the aircraft of the transport fleet to effectively utilize this technique.

End of Thursday afternoon panel discussion.