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1. HELICOPTER SIMULATOR STANDARDS

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I will reiterate some of the things that Jim Erickson said, but my main purpose is to discuss the work that has been done on the Helicopter Simulator Advisory Circular, 120-XX.

First I would like to thank all of you for being here and for supporting this activity. I know it is quite an effort for you, and not without expense. But, as Jim said, we in the regulatory business certainly need your support and input; in fact, we can't do our job without it.

I would also like to recognize that we have a good deal of international support. We have friends and representatives here today from New Zealand, the United Kingdom, Canada, and France. That is a fine representation, and it is appreciated. If I failed to mention a country that is represented it is only because I didn't meet that representative this morning.

I want to briefly describe where we are on helicopter simulator standards. As Jim said, the advantages of simulation have long been enjoyed by the airplane community, and the use of simulators has expanded steadily. Since 1980 there has been an average annual increase of 14% in the inventory of airplane simulators used by the entire U.S. Air carrier and corporate aviation industry. I think that is pretty remarkable: there were about 88 simulators in 1980, which were, by today's standards, not very sophisticated, and just a month or so ago we exceeded 300 simulators that are in service to U.S. industry. But that capability has not been available to the civil helicopter community. I know a good deal of simulation capability has been available to the military services but not to the civilian community.

The need has been pointed out in previous meetings and workshops, and I think it is becoming obvious. In fact I just read on the way out here that some people are referring to aircraft as part-task trainers. And I think that is true. As Jim mentioned, there are so many things that one can do in simulator training and checking that simply cannot be done in aircraft. At a recent meeting, a paper from Norway described an incident in a Super Puma.

There was a tail-rotor failure at hover, but the crew recognized the failure immediately, recovered with no damage to the aircraft and no injuries to the crew. Complete credit for that quick failure recognition and quick recovery was given to the crew's practice of that precise failure in the simulator. It is this kind of event that causes the aircraft to be called a part-task trainer. You cannot do the whole job of training in the aircraft. Moreover, there is a big and favorable cost factor involveu ;.1 simulator training.

But getting on with this, the history of trying to establish some civil standards for helicopter simulators goes back at least to the meeting we had in Atlanta in 1984, at which time we had a fairly general review of the state of the technology. The following year we had a working group that did produce a draft advisory circular for helicopter simulator standards, but it never progressed. One of the reasons, I think, was because the federal regulations that control training and checking for airmen do not recognize any credits for helicopter simulators.

Then just last year the Royal Aeronautical Society had a seminar on helicopter simulation and again the interest and the need were indicated and the use of simulation at that time in North Sea oil operations was pointed out. Of course that is more of interest, you might say, to the United Kingdom and, in this case, Norway, where a number of simulators are in use. But there are only two civilian helicopter simulators in use in the United States, and I think that is because the FAA permitted use of helicopter simulators for pilot certification only by exemption. So there is no general credit. Consequently there are no current standards, which is why we are here.

Those two simulators, although being limited in their applications, still are quite valuable in their use. The Bell 222 has no hover credits, and it was qualified by using an old interim standard that we were working on. What we really did was have four expert pilots (I think Jim Erickson might have been one of them) who flew the aircraft for a few minutes and then performed the same

task in the simulator. They then went back to the aircraft and then back to the simulator.

Those of you who have in the past been involved in handling-qualities work understand, I am sure, that after 20 minutes you might as well get out of that device and into the next one since pilot adaptation time is usually quite short.

The next one was the S-76. At that time we did have the interim draft standard that was produced in 1985. But because nobody expected that, there really were no data for the aircraft, at least not to the extent that we needed them, so we used what data were available. We did the same routine that I just mentioned with some expert pilots, and we qualified the simulator and developed an exemption through a petition from FlightSafety for credits for that simulator. And in fact, you can do most of an ATP certification check in that helicopter simulator with only about three or four follow-up maneuvers for validation in the aircraft. So we know it can be done.

So why try again now? We still only have two simulators. I think in the last five years we have certainly increased our knowledge and our experience. Some of the questions we had about standards five or six years ago, we now have answers to. One small example is control loading. Six years ago when we said you have to simulate the break-out forces in a helicopter control system, most people in the business said we couldn't do that. But I know for a fact that today we can do that and that we can do it quite well. And it will stay constant, not changing as each person uses the machine.

I think here today we are going to follow up on these past issues. But another very important thing is happening: the FARs are being revised. There is a new draft Part 142 that primarily addresses training centers. The notice of proposed rule-making for that effort will be available this summer with, we hope, a rule by some time in late 1992. It will permit training and checking credits for helicopter simulators. I think that is primarily going to be started at the higher levels of pilot certification. But at least that is really where we are in airplane simulation. There are not many simulator credits for the lower levels of pilot certification; they are all pretty much at the upper levels.

One objective of our efforts this week is to form a working group of experts who will meet as necessary to address these issues and to establish standards and guidance. This process has worked exceptionally well, although slowly, with airplane simulators. And the development process for airplane simulator standards is cer-

tainly applicable to helicopter simulators. Over the past 15 years the standards for helicopter simulators have progressed such that they are almost as remarkable as the technology, but the idea has been to keep them in step with the technology.

In 1978 we did the first crude landing approval in a simulator. And now we are doing total pilot training and checking in simulators, and the standards have been revised to reflect that. The working group process has worked; in fact it worked to the extent on the lastest airplane standard that that standard has been accepted as the core of international standards for airplane simulators. We hope that will become an International Civil Aviation Organization (ICAO) policy or handbook for international use for commonality and qualification of airplane simulators. The point is the process should be equally applied to helicopter simulators.

It is hoped that the working group membership we seek will represent a broad range of the community of aircraft and simulator manufacturers, users, and operators. And, of course, the final customers, the training experts, the technical societies, and the regulatory authorities must be represented. We would like the group to be limited to about 30 members; our experience shows that with more than that, it is very difficult to make progress. In fact, on the international working group, Brian Hampson, who is the chairman for the Royal Aeronautical Society, has made a special effort to limit the size of the group. I thank him for that, and I think a great deal of the progress that has been made is a result of keeping the same members meeting after meeting and because we have limited the group to those same members. Even so, we still rehashed a lot of stuff.

As Harry Reasoner once put it, helicopters are different. Some pilot tasks are more demanding in the helicopter simulator than they are in helicopters. We have noticed that the hover and low-speed tasks have been the most challenging to simulate. That is one reason the Bell 222 is not qualified for that, although it probably could be with some updates. Progress was made in that area, however, so that the S-76 is so qualified. Not all pilots agree that that should be true, by the way, but that is the nature of these kinds of activities, I think.

Not all simulators need to be qualified for all tasks, so we will be looking at a number of levels of simulators. We have tried to keep those levels aligned with what has been successful for airplanes, mainly so we can keep the record straight. And v"' be working later in this

Workshop to form the group that will follow through with this effort.

So, if you would be kind enough, then, please review the draft document. It is modeled, in terms of general policy and structure, on the airplane document. But that is a matter of style, not content. And we would like to pursue that approach because we have spent years actually finalizing that format and structure. Nevertheless, the technical content is certainly something that needs to be addressed, and addressed in fine detail. I will look forward to hearing from you on Thursday when we form the standards working group. Thank you.

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