copters for this? I do not know whether or not your firm would include the new helicopter company opening up in Picton as part of your group.

Mr. Golden: I would hope so. Mr. Richmond knows more about helicopters than I do.

Senator Phillips (Prince): Are they not in operation in the United States for that very purpose?

Mr. Richmond: Yes. I hate to say this, because United Aircraft is also in the helicopter business. We sold several of them up here for the Royal Canadian Navy. The problem to date has been that the operating costs of helicopters are such that the commercial operator cannot attract passengers at the fare necessary to pay for the operating costs and some margin. Thus the ones in the U.S., to my knowledge, are operating under a direct subsidy from the federal government, although I think that is phasing out, and what is starting to take its place is the subsidy from the major airlines. The reason for this is that the airlines will underwrite the operation of these helicopters on the basis that the customers will use the helicopter to get off at the main terminal to get to a major trunk line. It does not appear that within the present state of the art helicopters will ever be as economical to operate as a fixed wing airplane.

Mr. Golden: In fact, recently some helicopter services in the United States have been suspended and replaced by airlines flying aircraft such as the De Havilland Twin Otter powered by PT-6's.

Mr. Richmond: That is right. New York Airways is one of them.

Mr. R. J. Ross, Chief Development Engineer, Canadair Limited: I would just like to add a few words to those mentioned by Mr. Richmond concerning the aircraft needed to meet the ever-increasing congestion in the urban areas. The short take-off and landing aircraft has already made very sizable inroads in this area. As the inter-urban areas become more crowded then the needs are going to become more difficult, the space available is going to become more difficult. We shall probably find ourselves in a situation where just short take-off and landing aircraft may not be the total answer to the problem. We may need eventually to include in our system aircraft which can land and take off vertically. I am not referring here just to helicopters. Helicopters in themselves do have limitations with respect to the speed at which they can operate and then accordingly the productivity which they can generate. I am referring here to aircraft which are somewhat faster but can still operate vertically. Canadair has been engaged in the development of this class of airplane for more than ten years. Now, this work has been going on with the support both of the company and assistance from the Canadian government. We are already at the point where we have a successfully flying vehicle. I would simply like to put on the record at this point that we believe that this is a two stage operation where we have short take-off airplanes and eventually we will need vertical take-off airplanes in order to meet the total needs which are developing, especially as the urban areas become more and more congested.

Senator Phillips (Prince): By vertical take-off you are referring to jets?

Mr. Ross: In our particular case we use propellers. We tilt the one wing, the engines and the propellers so that in a way it looks like a helicopter with some small sized rotors when it is vertical. In normal flight the wings tilt down and it operates and looks like a normal airplane.

Mr. Richmond: This opens up a whole new generation of aircraft which probably is best classed as hybrids. Some will have a configuration such as Mr. Ross has described, some will have rotors which look like helicopters but will have wings on them as well, and some will have jet engines which simply lift the aircraft vertically. The big disadvantage currently with the latter is how to deal with the noise problem in congested areas and the debris that gets thrown up.

Senator Blois: Mr. Bobkowicz, on your spinning equipment are you planning to put up a plant to do the spinning, or simply to manufacture the machinery?

Mr. E. Bobkowicz: Our purpose is to build the machinery and to make it available to everybody in the spinning business.

Senator Blois: I thought from what you said that one piece of your equipment would be too large for a small plant. You said something about it being a continuous operation.

Mr. E. Bobkowicz: Our process will actually for the first time in the textile industry enable—up to now the concentration in the