A.C.Vs IN CANADA: THE NEED FOR A FRESH APPROACH

BY KENNETH F. DYER*

The twentieth century has been a remarkable one for transportation when one considers the technological progress that has been made during that time. These successes were due in large measure to the invention of the internal combustion engine which has contributed to the improvements made in air, land and sea transport. While much has been spoken in praise of the advances in technology that the internal combustion engine has brought about, very little concern has been shown until recently over the way in which these technological successes were achieved. Man now seems to be asking himself what the effect of these successes will mean in terms of the quality of his life. In effect, modern planners who believe in this approach, weigh the technoligical advances with the resulting effect upon man in his environment. If a particular proposal lacks in the latter respect, it will be rejected even though significant advances in technology would have been possible.

Such an approach to the problems of modern transportation is called systems engineering. The credit for its development goes to the aerospace industry, which made the first practical application of it. Its measurement of the results produced by computer technology and humanistic philosophy has special significance for the Air Cushion Vehicle (ACV) industry. Like the aerospace industry, it is recently begun, and so provides this novel approach with an opportunity to show the results it can bring about when applied from an industry's inception.

The use of this approach, if consistently applied, could help the public avoid the unfortunate side effects that the auto industry has brought about in its development to date. Among these side effects are the sizeable demands for real estate that the automobile and its supporting highway system has produced, the blight of advertising signs that has cropped up along the roadways, the industry's planned obsolescence that has resulted in auto junk yards, the resulting air and noise pollution, the devastating highway fatality rate, the time consuming traffic jams and the expensive theft and vandalism associated with the private car.

Nor it is unlikely that systems engineers would have been swayed by the argument that the auto would suffice until something better came along. They might have foreseen that once entrenched, the industry claiming cost

† B.A., Carleton University, Ottawa, Ontario (1968), LL.B., Osgoode Hall Law School, York University, Toronto, Ontario.

expense would have been unwilling to alter its position without a long and bitter struggle.

In short, what I am trying to make clear is that the introduction of the ACV industry into the transportation spectrum of to-day will have to conduct its operations according to the systems engineering philosophy. When it does so, it must make sure that it understands the basic premise on which it is based; that the movement of people and goods, is really one problem. This is in fact a way of saying that transportation is one of the most powerful influences in our society to-day; it literally shapes the world we live in. The ACV industry should bear in mind that any transportation business has the potential to cause undesirable side effects as those that were created by the auto industry. It should take comfort, however, in the fact that such an industry has the power to strengthen and invigorate; and can thus create a beneficial result for society if conducted according to the above-mentioned theory.

The question that must be asked at this point is whether the government and the industry in Canada have proceeded with their respective contributions in accordance with this approach. The government's contribution in this regard may be measured by its stated policy objectives for regulation and control of the industry and the craft it produces. It becomes important to know, for the proper development of the craft, if there is a sanctioned policy for development and whether or not it is consistently applied. Likewise the industry's role may be seen through its type of development of the craft for public use. Again it becomes important to ask whether the industry has fulfilled its obligation in producing its craft for whatever purpose in accordance with standards of operation and safety that suit the public interest. The test of whether industry is measuring up to its responsibility may be seen in the characteristics of the craft that it produces. Its capabilities must measure up to such a standard that they will be convenient and safe for the public to use. This double barrelled approach to the problem should indicate to the public the relative merit of the ACV program and the worth of its polices and objectives for the future. It will also be indicative of the areas in which the present program is defective.

It is my belief that this present ACV program is applied without any preconceived policy for its regulation and control in Canada. This becomes especially apparent when one reviews the legislative history of ACVs in Canada to date. The attempt at classification for legislative purposes of the ACV as either a ship, aircraft or a motor vehicle, has not proven satisfactory for the government or the industry. This approach has led to inconvenience for the government in making statutory adjustments,

even to the extent of changing the definition of the craft from one statute to another. For the industry it has meant uncertainty and indecisiveness at a critical stage in its development, as it is especially difficult to manufacture when the operational and safety regulations are still to be written. In effect, the present approach to legislate for ACVs in terms of other vehicles is not answering the fundamental differences that exist between these craft and other vehicles. These differences exist in the areas of operation and safety considerations for the craft. The craft would also seem to require a unique approach in its scheme for passenger and property liability. I selected these areas for specialized consideration because they appear most pressing at this stage of the industry's development. There are other considerations that will emerge and require solutions in turn as the craft are produced on a larger scale, but which are not readily apparent at this moment.

In order that these issues may be better understood, I will set out the technological distinctions that make ACVs different from other vehicles. From these distinctions will come the unique capabilities of the craft that will help to elucidate the issues outlined above.

II. The A.C.V.; its operating principle, environment and development.

An air cushion vehicle is a machine that floats on a self-expelled cushion of air[1] with little or no aerodynamic lift.[2] The term 'air cushion vehicle' is

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1. *Air Cushion Vehicles: Their Potential For Canada.* Cat. No. NRCC 10820 - Dec. 1969, 513.

"An A.C.V. is a surface vehicle that in operation is wholly or partially supported above the surface over which it is traveling, irrespective of the movement of its lifting area, by a self-generated pressurized cushion of air that is retained beneath the vehicle."

Bill to Define the Legal Status of Hovercraft
7 Hovering Craft and Hydrofoil 27 (9, June 1968)
From House of Commons Debate, 764 Hansard 119 (16/5/68)
British Hovercraft Corporation's definition in precise terms: "A hovercraft is an air cushion vehicle.
"An air cushion vehicle means a vehicle or craft which depends for its functioning on ground cushion effect and is incapable of rising into the air to a height greater than that at which, in respect of any such vehicle or craft, the ground cushion effect ceases to have any, or substantial influence. For this purpose, the expression 'ground cushion effect' shall mean the load bearing and lifting propensities exhibited by a mass of air or other gas vapour when compressed and constrained to interpose itself as a cushion between the underside of such vehicle or craft and substantially within its platform and the surface over which it is intended to operate."
Norway's Hovercraft Legislation Ministry of Trade and Shipping
Odelsting Bill 26, (1965-66). 15 Hovering Craft and Hydrofoil[22] (1, August, 1966)

generic[3] as is the term 'hovercraft' and both may be used interchangably.[4] The essential point is that these terms describe a machine in terms of the general air cushion propulsion.[5] This distinction is often difficult to make as scientists have sometimes used generic terms to describe the methods of propulsion and vice versa.[6] This verbal imprecision by the scientists has

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"Air Cushion craft are characterized by the fact that they rest on a cushion of air when in motion.

The craft are not intended or designed to move in water like conventional craft, or on land or ice like ordinary vessels. They can, however, in an emergency, land in water and keep afloat on tanks while moving at a slow speed. "Furthermore the craft can in certain circumstances also move on (over) land and ice. The ordinary operational field of the air cushion vehicle is, however, the air, with the craft freely raised above the surface at a limited distance (height)."

2. *Air Cushion Vehicles: Their Potential for Canada*, 514. See also 19.

3. This term is the one Canadian technicians and Government officials use most often to describe the craft.

4. Many other terms are freely used by different countries. For example, the air cushion vehicle has also been called a Surface Effect Ship, a surface effect machine, a ground effect machine, and a captured air bubble.

5. *Air Cushion Vehicles: Their Potential for Canada*, 515. Some of the more common air cushion propulsion methods are: 1. The Sidewall or Surface Penetrating Air Cushion. An over water craft with rigid sidewalls that penetrate the water. The air cushion is contained laterally by the sidewalls and by flexible seals located fore and aft.
Fielding, P.G., *Twentieth Century Yankee Clippers*, 6 Air Cushion Vehicles 6, (No. 42 Dec. 65).

"The C.A.B. resembles the Denny Sidewall craft in that air is pumped into a cavity bounded by longitudinal skegs and fore and aft planning surfaces capable of moving with the motion of the surface. Combined air and marine propulsion systems are projected. Speeds in excess of 100 knots in calm water at relatively low installed power are expected."

2. The Annular Jet.

"The Annular jet with flexible extensions maintains an air wall to retain its air cushion. In many ways this concept is somwehat similar to the C.A.B., with the exception that higher installed power is needed due to the need for a continuous flow of air. No surface contact is required, however, thus "making air propulsion feasible at considerable lower installed power."

Air Cushion Vehicles: Their Potential for Canada, 514. 3. "Peripheral Jet Cushion System.

A cushion system in which the cushion is created by a peripheral curtain that maintains the cushion at above ambient pressure by the horizontal change of momentum of the curtain.

4. Plenum Chamber Cushion System. A cushion system in which the pressure is maintained without the use of curtains."

6. 18 Hovering Craft and Hydrofoil, 4 (No. 10, July 1969).

"There are, however, other ways of hovering near the earth. It can be done by a fluid jet; it can be done by a magnetic repulsion; it can be done very effectively as Professor Laithwaite has shown in recent lectures by electromagnetic means. The rate of invention and development is so fast in these days that I am sure it will not be long before practical hovercraft employing means other than an air cushion will be made.

created a great deal of unnecessary confusion for legislators who have had difficulty enough in comprehending the various thrust principles.[7]

The essential point which must be grasped from the above distinction between the air cushion principle and the method of propulsion classifications is that the former includes all vehicles which operate on the principle, while the latter refers only to craft which utilize the air cushion principle with its particular method of propulsion. I think it important for these craft to be recognized by the principle on which they operate because it avoids the problem of creating a classification of craft that is riddled with exceptions. If all air cushion propulsion systems are included within the classification, a measure of consistency will be achieved amongst the myriad of complex scientific descriptions that currently baffle lawyers and laymen alike.

The issue is further compounded because of the fact that at certain speeds hovercraft operates with slight aerodynamic lift[8] or in the state of

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7. *Bill to Define the Legal Status of Hovercraft*, 32

Mr. Rees-Davies:

"Can we or ought we to attempt to have common basic rules for the conduct, safety and legal status of all applications of the air cushion principle, or should they be treated case by case? The Bill recognizes that the hovercraft is a vehicle of a new kind, but in the illustrations of present development which I have given, I go a great deal further and suggest that what is new here is the air cushion principle. This is the centre of the new development. It is a new method of propulsion. Its potential application goes wider even than hovercraft as we understand it today, and I have given some examples.

"I compare the air cushion principle with the principle of the internal combustion engine. We all known that the internal combustion engine was originally used as a motive power for locomotion. We also know that the internal combustion engine can be used as a motor to drive an electric generator. This is a very common use of it. Nobody would suggest that the rule of the road which applies to an internal combustion engine in the form of a motor car or a lorry should equally apply to the use of an internal combustion engine as an electric generator.

"I suggest from that example, with which the government departments and the law are non-familiar, that we apply the same approach to the air cushion principle. If, in deciding how to frame all this the Minister and his Department think not in terms of hovercraft, but in terms of the air cushion principle, I think that they may find it a little easier to distinguish between the various applications. I prefer to approach the problem by securing a legal status for what we have been calling hovercraft case by case.

". . .Thus the legal status would be defined according to the particular use, or let us say, the primary use to which the air cushion principle is applied in each case, and, what is equally important, according to the environment in which it operates."

8. See 10,11.

'ground effect'.[9] This flight state is only temporary and never replaces the hovercraft's primary lift source, and thus has been noted by scientists with little more than passing interest.[10] For lawyers, however, it created definitional problems[11] which could not easily be resolved.

Again, the use of the general classification of the craft in terms of the air cushion principle would seem to achieve consistency and order. While it cannot be denied that the phenomenon of ground effect exists, it can be easily dismissed as an inconsistency to the air cushion principle if it is viewed in terms of its effect upon that principle. Ground effect only lasts for a short time, at a certain speed when the craft is descending from the air cushion and causes no interference with the primay thrust, the air cushion, in the operation of the craft. Ground effect may thus prove to be worthy of scientific note but, because of its relative insignificance in the operation of the craft, it need not prove to be any more of a difficulty for the use of the air cushion principle in classifying these craft.

Vehicles which rely wholly upon the aerodynamic lift principle are not air cushion vehicles.[12] Examples of this type of craft are the ram wing,[13]

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9. See 10, 11.

10. *Bill to Define the Legal Status of Hovercraft*, 27.

Mr. Mallalieu for the Government:

"I am told that the definition, while broadly defining a hovercraft, excludes a hovercraft such as the SRN 6 when it is operating in what they class the "trapped air mode" — that is, when it is entering harbour. I am told by the designers that in this condition it does not expel air but merely maintains it under pressure beneath the aircraft. This is a "point but we must take it into account if we are to get the definition accurate."

11. See 10.

Bill to Define the Legal Status of Hovercraft, 27

The B.H. Corp. has stated that

"The vehicle should be called an ACV and it is necessary in the definition to define a technical term known as ground effect."

Bill to Define the Legal Status of Hovercraft, 29

Mr. A.L. Williams stated:

". . . When a hovercraft is moving off the beach and going on to water, it often travels on trapped air other than air which it has itself expelled. This puts it, so to speak, on all fours with the ordinary planning speedboat, the pleasure speedboat which whizzes around off our shoresund is generally slithering along a carpet of bubbles trapped between itself and the water. We want to make sure that the definition of hovercraft does not by any mischance include that sort of thing."

12. *Air Cushion Vehicles: Their Potential For Canada*, 514

13. 8 Air Cushion Vehicles 75 (No. 54, Dec. 66)

". . . the ram wing concept uses the longitudinal sidewalls of air and an aerodynamic lifting body to support the ship at high forward speeds. Power requirements for the air cushion mode of operation are the same for this concept as for the annular jet; however, as speed increases the fore and aft jets are swept

and airplanes flying in ground effect. At the present time, vehicles which operate exclusively on this principle have not been reduced to practical application; their existence remains in conceptual form on the drawing board.[14]

If there was any doubt about the way in which the ground effect phenomenon should be approached, there was little of the same regarding the exclusion of the ram wing craft. The clear distinction between the technical *modus operandi* of the two systems appeared to be decisive. The fact that the ram wing does not derive any support from a self-expelled thrust of air appears to keep it, even on a liberal interpretation of the definitions, from being included within the air cushion principle definition. This definite distinction between the two methods of operating principles indicates in very clear terms the bounds of the air cushion classification with respect to other recently innovated transport principles.

The use of the air cushion principle as a means of vehicle classification appears to give the craft included within the definition a uniformity and preciseness in their description clearly delineating, with one minor exception, the uniqueness from other craft similar in appearance.

The air cushion vehicle is adaptable to the environment. It can travel over water[15] or land[16] or both.[17] The only physical limitations restricting its travel where the terrain consists of such natural barriers as trees[18] or mountains or heavy seas. Constant changes, however, improve the efficiency of the operation of existing parts for better performance in the environment.[19]

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rearward and eventually shut off. Air propulsion is contemplated for this concept."

14. Doherty J., Chief, Air Cushion Vehicle Division, Dept. of Transport, interview, August, 1970.

15. *Air Cushion Vehicles: Their Potential for Canada*, 513

16. See 21.

17. See 21.

18. German, A.B. *ACV Development and the Operator*, 5 Canadian Aeronautics and Space Journal, 16 (1 January, 1969).

"Hoverwork Canada's N6 'tree bashing' near Fort Churchill. This was a deliberate exercise to determine the degree of immunity to damage from isolated trees. In the very low temperatures encountered trees up to 5 ins. in diameter would snap off quite easily. No damage was caused to the craft but a judicious approach is recommended."

19. *A New Concept for Hovering Craft*, 8 Hovering Craft and Hydrofoil 12, (2 December, 1968).

"With the development of the hovercraft a new dimension in travel is realized with potential for passenger, freight, private and military transport. Although the principle is simple and is being applied by advanced technology in fluid dynamics

Scientists have been quick to apply the air cushion principle to improve both currently effective[20] as well as older outmoded methods of transportation[21] in various environments. In addition, they have developed by concentrating on the air cushion vehicle as a load lifter, the innovation of "clip on hoverpads."[22] This method of bulk lifting is unique in the sense

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and propulsion, there appears at present to have been little imagination or creativeness applied to further the original concept. Modern hovercraft are but bulbous in conforming to the shape of their supporting skirt, thus appearing almost invariably oval in shape and clumsy in appearance. For this reason effective streamlining is practically non-existent and much power is wasted.

". . .The key to the hybrid design is that the craft is supported by legs, as are some hydrofoils, except that they would be kept buoyant by hoverpads. These pads would be similar to conventional hovercraft skirts, with each pad supporting a leg and thus the craft. An important feature is that the legs are telescopic incorporating damping and return springs similar in principle to the independent suspension systems used on cars. The legs will shorten and lengthen corresponding to each trough and "crest. To assist in reducing air and water resistance, the legs may have fairings. The main joint between the supporting pads and their legs would enable the entire pad to swivel and so allow the pad to conform to the major undulations of the water surface."

20. 14 Canadian Aeronautics and Space Journal 355 (9, November, 1968).

"Within the past fifteen years there have been several notable efforts to incorporate the annular jet into an airplane, dispensing with the wheel gear. These approaches have all been rather radical, involving an unusual aircraft design.

The concept considered here in relation to civil air transport is more rudimentary and is no more than a direct substitution for the wheels. It is not an integrated lift propulsion system, but an independent sybsystem. It has little or no effect upon the aircraft aerodynamics. In ordinary circumstances, it will have little to do with take off and landing distances except that it will permit these to become generally longer."

21. *Britain's Flying Train* 2 Hovercraft World 153 (6 Nov.-Dec., 1968)

The replacement of passenger trains with tracked air cushion vehicles. "So far the experimental aerotrain has only been tested on the surface track which was laid down between Gometz-la-Ville and Limours, about 15 miles southwest of Paris. On this 3¾ mile experimental track a good deal of testing has been done and on several occasions during the last year it has attained speeds comfortably in excess of 200 m.p.h. with rocket assisted turbojet propulsion.

On the ground level track, the upright member of the inverted T section was some 2 ft. in height. For the elevated track, this measurement has been increased to 3 ft. presumably to provide an added factor of safety, this being the member that guides the train and prevents it leaving the track on a curve. The aerotrain runs on four air cushions, two forward and two aft, on either side of the vertical guide member. Four more air cushions bear inward on to the surface of the vertical member itself. All eight air cushions are of the high pressure plenum chamber type, with seals, like miniature skirts, to prevent excessive air leakage."

22. Winter, P.H. *Industrial Applications if Air Cushion Technology* 15 Canadian Aeronautics and Space Journal Supplement 130, (4, April, 1969)

that the bulk cargo, whatever the environment, can virtually move itself as a truck or a ship would be simply attaching its "clip on hoverpads."[23]

A discussion of the air cushion principle in terms of the environment

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". . . In all cases the power required for practical purposes depends to a very great degree on the type of surface and the type of skirt. Although no definite conclusions have yet been reached on practical values, general requirements can be inferred from the few examples of large, heavy loads which have been hoverlifted. A spectacular example of the large pallet is the movement of complete oil rigs on air cushions. As oil is discovered in successively more remote areas often in swamp, shallows, or muskeg, it seems air cushions could well become a basic means of movement.

". . . Movement is, of course, an essential of the hover principle, and the current revolution in transport towards containers means corresponding rapid handling of containers at interchange points. Air support has something to offer here. A system of clip-on pads for containers has already been developed and when operated by airline pressures could be useful for limited movement.

"Alternative similar clip-on units with their own power source could be used, but this is an expensive and not too convenient method. A mobile master power source, comprising engine-fan units, may serve clip-on pads which remain on the containers as required."

23. Winter, 131

"In a new installation, however, a system of container ways could be installed consisting of hoverpads in reverse. A series of pads similar to those employed on the high pressure pallets are set in the ground and all supplied by a common 'inground' air supply. Each of the pads is pressure activated so that no air is supplied unless there is a load present. Containers need only have a smooth bottom surface or sit on simple flat plates. Trains of containers could be transported considerable distances in dock or marshalling areas with great economy and individual containers maneuvered for loading.

"This principle was demonstrated a few years ago by the spectacular hover dodgems of Disneyland where very simple powered hovercraft were supplied with air from under the floor. Use of pressure sensitive air supplies has been made in Elliotts Aeroglide conveyor, where discrete objects are made to slide down a chute by supporting them on a film of air. A logical extension of conveying single objects is the continuous air supported belt type of conveyor, and this could become a major bulk transport system of the future. Conventional conveyors are getting larger and larger as other transport systems, mainly road and railway, become more and more expensive to build. This is particularly important for places where there is no existing transport, yet world economy demands that natural resources are sought in succeedingly more remote areas. Belt conveyors are limited at the moment, both because of the extreme number of moving mechanical parts involved in very long distances, and also by the strength of the belt. An air supported conveyor offers the potential of extremely low friction and, therefore, correspondingly low traction power and belt tension. The maintenance problem of the large number of rollers is also eliminated. These advantages have to be balanced against the power to supply the air support and the engineering of the air

prompts me to ask whether or not the emphasis placed on this principle could be shifted instead to classify the craft in terms of the environment in which it operates. In other words, instead of looking at a craft in terms of its method of propulsion, one might classify it in terms of the environment in which it travels, regardless of its operating mechanism. Thus, ships, ACVs and ram wing craft, would all be classified together because of their common use of the marine environment. The same considerations would apply overland. Automobiles, ACVs and ram wing craft would share the same classificaton. The obvious advantage of this approach is in its reduction of the number of potential classifications for vehicles to just a minimum of three; namely, the air, land and sea environments. Thus, the invention of a new type of vehicle, such as the ram wing a few years from now, would not make redundant any existing classification based on operating principles and thus necessitate the creation of a new classification.

I see two weaknesses in using this approach. The first involves the inconvenience of classifying ships, ACVs and ram wing craft under one general heading. There are few operational similarities between ships and ACVs. The latter craft move more quickly are more manoeuverable and are more affected in their course direction by the wind and less by the waves and the ocean currents than is a ship.

In addition, there is the public interest to consider. I think it is safe to say that it would not be served if passengers on board a ram wing craft were given safety measures created for a ship designed several years earlier to take effect under far more different operating conditions. Likewise, I do not think it would be in the best economic interests of the public to restrict 100 kt. transport ACVs to standard shipping regulations governing the operation of present ocean freighters.

A second consideration would be the difficulty in determining whether

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distribution. To be truly economic, the air supported belt would have to run with only a few thousandths of an inch clearance, and it has yet to be shown whether this can be achieved practically.

". . . These are some of the industrial applications which appear to be feasible at the moment and perhaps because there has been a concentration of available "effort to date on the development of the transport hovercraft, many of them have yet to get to the stage of serious production. A few specialized services have shown some success, among them the Hoverbed where patients are supported by a warm drying cushion of air, and the Hoverkiln, where ceramics are air floated through a kiln, and have shown the versatility of the hover principle. In spite of the glamour of the high speed marine hovercraft, perhaps the most successful application has been the ubiquitous Flymo hover lawn mower."

ACVs and ram wing craft would be operating in the air or in the marine environment. The difficulty would arise in trying to measure at which point one environment begins and the other ends. Presumably the problem would not arise for ACVs because, by their very operating nature, they are incapable of rising more than a few feet above the earth's surface. Ram Wing craft, however, can supposedly transfer from one to the other, so that the problem would be a very real one for them.

The essence of my argument is that, in order to function properly, ACVs, as well as other craft, must be recognized by an operating principle that gives full scope to the craft to function according to the respective peculiarities of each. A system of classification, the bounds of which are wide enough to include different modes of craft in the same environment, will, in my opinion, act to the detriment of the operators, the customers, and the public. I do not think it would be in their best interests to classify ACVs in this way.

III. The ACV in a Legal Context: Two conflicting theories.

The legal analysis of the ACV to date has attempted to classify the craft in terms of its operating principle rather than the environment in which it operates. The question lawyers have posed to themselves in adopting this approach is technically oriented; namely, is the operating principle of the ACV similar to those principles on which aircraft, ships, or motor vehicles operate, or is it unique in its functioning? Most lawyers have had little difficulty in appreciating that the ACV is technically different from those three other modes in its operation, but they have disagreed as to the best method of recognizing this technical distinction in law.

The one view is that, even though the ACV may represent a new mode of transport in fact, it does not necessarily follow that it should be recognized *sui generis* in law. Instead, the hovercraft should be classified within one of the existing modes of transport and considered merely as an offshoot of the major mode. The legal system provides statutory definitions of the three existing modes, labelling existing transport vehicles as "aircraft", "vessels" and "motor vehicles". An examination of these terms shows that each possesses an adequately wide scope to include the ACV; equally so it is suggested that regulations issued pursuant to the defining sections contain enabling powers broad enough to include sufficient regulation of the ACV. In short, the proponents of this view feel that it is time wasted when a statute is created for a vehicle that can be accommodated within existing definitions; that the addition of another statute to the field of transportation law will create repetition in some

areas and overregulation in others. The net effect of this result would be harmful, not only for transportation law but for the industry as well.

This group acknowledges that there will have to be amendments made to existing statutes and regulations; this is only natural when one considers the speed and manoeuverability of the craft in operation. Likewise, there will have to be changes in safety standards and in the liability of the operator to the passengers and to third parties. The changes in these areas will not be difficult to bring about because a combination of existing navigational procedures, safety regulations and liability legislation can be adopted to suit the needs of ACVs.

The antithesis of this view is that the law should follow science and recognize this new technology with separate legislation. Proponents of this view argue that it is only logical to recognize *sui generis* in statute what the scientists have treated as unique in technology. They contend that for the ACV to adequately develop and operate there must be separate recognition in law of the operating mechanism. From this it follows that any deviation from this norm will bring about innumerable problems both for the administrators and manufacturers, and operators alike.

The argument continues that the greatest number of these problems will occur in the field of operations, safety regulations and in the liability of the operator towards his passengers and other ships or hovercraft. While these areas by no means limit the difficulties that will occur for the craft, they do represent the three areas that will make it difficult for present legislation to cover, especially because of the craft's size, design, speed and manoeuverability. This group's view is that these problems will inevitably occur because the craft is a new creation and, as such, cannot be adequately regulated under any statute until all the problems become apparent. These problems can be kept to a minimum, however, if they are resolved within a legal framework that was designed to cope with them.

The views expressed in the former group were those that were initially espoused by the British and Canadian Governments. Both administrations have subsequently changed their policies substantially; the British now have newly enacted hovercraft legislation, while Canada has issued an official statement of intent to do likewise in the future.

I will attempt to show at this juncture that it does not matter how either the British or the Canadian Government classifies these vehicles if they insist in doing so within a narrow definitional framework which does not deal with the issues which make ACVs different in science and thus in law. I have been unable to find in my research any analysis of the particularities that I think would justify the claims some lawyers are making for an independent statutory approach for ACVs. In the ensuing

discussion, I will identify these crucial issues and discuss their distinguishing features, and then suggest to what extent they should be regulated in law, if they are permitted to exist at all.

IV. Two Unique Features: Operation and Safety Requirements.

The operating characteristics of the ACV combine both shipping and aircraft considerations to different degrees, depending upon the weather conditions and the environment. Because the craft rides on a cushion of air it has little contact with the surface over which it travels. Accordingly, the surface of the tide or river currents in a marine environment is minimal. This leaves the wind as the greatest influence upon the operation of the craft over any surface. It has the same effect upon the operation of the ACV as it would have upon an aircraft. The craft is slowed in a headwind and speeded up in a tailwind. But most significant of all is the influence of the wind in causing the craft to slip sideways. This factor must be allowed for by the ACV operator not only so that he can arrive at his destination in the shortest possible time, but also so that he may prevent accidents with other vessels.

Sideslipping is very difficult for other craft approaching an ACV to detect because their course is not affected as much by the wind. The ACV may slip several feet sideways in a momentary gust that may not be realized by an approaching ship at several hundred yards. Add to this operating characteristic a cruising speed of 70 kts. for ocean passenger ferries and the navigators of both craft are faced with a potential collision situation. Aircraft have had this problem rectified considerably for them by having the direction of the flight plan determine the height at which the aircraft will fly. ACVs do not travel over water with this advantage and could certainly cause collisions with other high speed ACVs and other slower vessels.

ACV operators have arrived at a partial solution to this problem by attempting to reduce the crash potential which is increased at night. With ordinary ships' navigational lights an ACV in the dark would appear as another ship and so not give the approaching vessels the added knowledge that the ACV could be side slipping. In order to prevent a collision in this situation, ACV operators have adopted the use of an all round flashing yellow light by day and by night in addition to the normal navigation lights at night. It is hoped that the implementation of this measure will make other mariners aware of the sideslipping potential so that they may steer clear and avoid a collision.

The use of the flashing yellow light at all times is certainly an

improvement over the use of no identifying indicator at all. It does not, however, answer the problem satisfactorily. When visibility conditions were less than normal there would be no means of determining any approaching ACV other than by the noise of the craft. Thus the effective use of the yellow light is conditional upon clear weather by day or by night. What would seem to be more appropriate would be the segregation of ACVs, certainly in crowded harbour areas into their own access routes to landing pads. In a sense this would be the equivalent of allotting aircraft different heights for different directions of travel. ACVs could avoid the necessity of giving way to other vessels. In addition, their use of these lanes could be allocated by direction which would allow all westbound and eastbound traffic to travel relatively unhampered at high speeds without fear of collision. Course directions could be established as aircraft flights are now charted and craft controlled with the extensive use of radar directional equipment. Even if the use of designated shipping lanes as suggested became too impractical to enforce, the vehicles would still be better controlled by shore based radar in harbour approaches.

An additional operating feature of the ACV which makes it resemble an aircraft is its sensitivity to weight. This sensitivity varies with the surface over which the craft travels. For example, a craft can support more weight on land or ice than it can on water because the support offered by land is greater than it is on water as the thrust of the air cushion displaces the water from beneath the craft. An overweight ACV on water is unlikely to overcome "hump drag" and thus achieve over-hump speed. This speed varies with the type of craft but is between 7 to 15 knots.

By itself, this characteristic is just of passing interest, but when considered with the related characteristic of stability it can create a problem. Stability is critical when operating on water or in transferring from land or ice to water. On water the maximum load is limited by the maximum weight the craft is able to bear to overcome hump drag. If the craft is in the water and is carrying too much weight, it will simply not overcome hump. On land or ice the craft could probably support the same weight without difficulty. If, however, the craft transferred from these surfaces to the water the excessive weight could cause the craft to plough in or worse to overturn. The likelihood of this occurring is increased directly in proportion to the craft's speed over land or ice surface until the point where it hits the displacable water surface.

This problem would certainly be solved if it is ever forbidden for ACVs to traverse at high speeds from land or ice to water. A further solution might be to limit the weight of the craft at all times to the minimal amount that may be supported on the least resilient surface,

water, and avoid the constant weight changing requirements that might arise if two or more suggested standards were used. Additional requirements might also be imposed, making the design of the craft less balance sensitive, possibly by increasing the stability of the craft in lowering the centre of gravity. In any event, the amphibious operating characteristics should not be regulated out of existence, but should be preserved. It would be ideal if regulations could control it to the extent that the public would be able to use it without serious danger.

Because the surface of the water acting on the skirts increases drag, the ACV is not able to achieve as great a speed on water as on land or ice surface, but it does provide it with an almost immediate stop. This procedure, known as "plough in" occurs when the air cushion is deflated causing the encasing skirts to collapse and the craft to pitch forward into the water. Ploughing in is not normally dangerous if intentionally induced with the craft set in the proper direction and the passengers braced for the impact. The difficulty is that plough in is not always deliberately induced and is therefore unexpected when it occurs. For example, it may be caused in making a turn travelling down wind across the wind direction if the craft does not bank in the direction of the turn. Equally, ploughing in can occur travelling at very high speeds over calm water if a fore and aft rocking motion is induced by the passengers or any external disturbance, such as the wake created by other vessels. In this latter instance, ploughing in can be eliminated by reducing speed in time, and entering the wave formation at the proper angle.

The danger of ploughing in is that the craft is unstable and under certain conditions can overturn especially when it happens unexpectedly. Death could result from either the initial impact if the craft overturned unexpectedly at high speeds or it could be caused by the drowning of the passengers. Even if the craft does not overturn when it ploughs in, it may still cause injury to the passengers inside. If not secured in their seats with seat belts, passengers would likely sustain a serious injury from the sudden stop. In this respect, the plough in conditions facing the ACV are similar to bad weather conditions facing an aircraft. The aircraft pilot and the ACV operator may warn their passengers in advance of the impending storm or plough in conditions, and require the passengers to wear seat belts. Perhaps the passengers should also be prohibited from moving about when the ACV is in a crowded environment where the need for sudden stopping would be increased. Some such regulation would seem to be required as ploughing in could cause injury to passengers.

Probably the most obvious way for plough in to be restricted and thus limit the danger of overturning would be to restrict the speed at which

ACVs would be permitted to travel. Again, what must be weighed in the public interest is the desire of the public to use the ACV for its high speed amphibian capabilities with the public's desire to be protected from unnecessary damage to people and property. One might think that the ACV is an unnecessarily dangerous vehicle for public transport. If improperly designed and handled, this could be the case. A properly executed bow plough in, with the passengers alerted and secured by seat belts would enable the craft to come to an extremely rapid stop in an emergency situation in order to avoid a collision.

If any form of plough in should be avoided it is a sideways plough in. A feature of hovercraft is that they can turn 180 or pirouette (turn 360) on reasonable surface conditions without any difficulty. If, however, these turns are carried out without regard to the height of the waves or contours of the land a sideways plough in could occur.

The introduction of regulations to prevent the execution of 360 pirouettes might seem to be the answer; this in fact has been done for the larger craft such as the SRN-6s and the SRN-4s. This may not necessarily be requird for all ACVs, however. Just as the manoueverability of an aircraft is restricted by the design of the craft and the ability of the pilot, so might the manoeuverability of an ACV be regulated according to the capabilities of its design, and the skill of its operator.

In the end result it would seem that the serious effects of plough in such as overturning could be effectively reduced with a reduction in permissable operating speeds. This would seem to be an area in which the state could exercise its influence in the public interest before the use of these craft becomes widespread, and negligent operation of the craft creates the damage to life and property that is associated with the skidoo.

In a more general discussion of an ACVs speed, it is important to remember that the faster an ACV goes the less wake it makes. Conversely, the slower it goes the more it makes. This characteristic would seem to justify the use of high speed access routes to harbour ports which would be free of other craft and thus allow the ACV to operate without having to reduce its speed and increase its wake. The argument that had been advanced against larger ships' high speed in canals and harbour areas would not hold because no property damage could be done by the ACVs wake at high speed. In this respect there would seem to be no purpose in restricting ACVs to shipping regulations which could be considered a hamper to the craft's effectiveness.

If ACVs are generally distinguishable as craft with little or no wave making characteristics, it is another equally peculiar operating characteristic that forces them to make concessions to other marine

vehicles because of the waves they create. Power boats, motor launches and ships create waves, large wakes which usually consist of a train of high waves of short distance between the crests. In response to this problem the ACV operator would do well to reduce speed, increase hover height and turn the craft so that it can ride over the waves at 45 to their angle of approach. This action would increase the distance between the crests and allow the craft time to ride over them safely.

The answer to reducing various operating problems could be found in qualifying ACV operators to cope, because, if handled properly ACVs are quite stable. If ACVs are improperly handled the operator could cause the craft to capsize. ACV operators should therefore be required to qualify and pass a test to operate any hovercraft, large or small. A license could be issued after the potential operator has taken a course in ACV theory and has operated a particular craft for a certain number of hours.

The continuing balance between the speed and safety considerations in the operation of the ACV take on a new perspective when they are viewed in regard to small craft used for recreational purposes. In the interests of swimmers, canoeists, and yachtsman who are at a considerable disadvantage when it comes to manoeuvering for safety in a dangerous situation, a restriction on the speed of ACVs when in proximity to recreational centres would seem necessary. This restriction could be imposed when the craft came within a certain distance of swimmers. The setting of such an arbitrary figure is unsatisfactory to an extent because of the variables of wind and water speed which affect the control of the craft considerably from day to day.

The other consideration that cannot be forgotten is the effect of plough in an emergency situation to bring the ACV to an abrupt stop. If it was decided that plough in was to be an effective device, the use and proper execution of which was to be expected of every ACV operator, the authorities might decide that higher speeds in these areas would be permissible. I rather doubt that such high expectations could be held out for the operators. It would be much sounder, in my opinion, to prevent the potential accident situation from occurring by limiting the speed rather than by allowing a high speed usage of the ACV requiring emergency measures to avoid an accident situation.

The major problem with the recreational use of ACVs over land is that there exist no rules of the road by which they should be operated. These rules do not exist because most of the use of vehicles over land has, up until now, been conducted on highways. With the increase in the use of All Terrain Vehicles (ATVs), dune buggies, snowmobiles, and ACVs, and the exclusion of these vehicles one by one from the highways, we are only a

short step away from a repeat of the misfortune and disaster that has struck because of the unregulated use of snowmobiles.

The development of rules of the road would be most advantageous in determining the right of way between vehicles in close proximity to one another. Perhaps the right of way could be established upon the operating characteristics of the vehicles, so that the more mobile vehicle would give way to the less manoeuverable. In effect, this would approximate the rules at sea where powered vessels are required to give way to sailboats. Or, the rules could be drawn up without regard to the particular characteristics of the craft. If this were decided upon, these vehicles might be regulated solely by the direction the vehicle was traveling in, with the only concessions being made on that basis. Then, if these provisions fail to do the task, it may become necessary to segregate the vehicles by direction or mode, thus further restricting their potentially unlimited use.

V. The Third Issue: Legal Liability

The third area in which a fresh approach needs to be taken for ACVs is in liability legislation. A brief look at existing schemes is helpful as a familiarization with the essentials involved.

In discussing liability in international carriage by air, one is concerned with principally two agreements—the Warsaw Convention and the Hague protocol (1955) to which most countries are signatories. The effect of these agreements is that passengers need not prove negligence in the event of a claim which is fixed in its limits and that the carrier is unable to contract himself out of liability.[24] There are exceptions to these rules; if the carrier can disprove negligence on his part, he may escape liability while the passenger in turn may recover more than the limited amount if he is able to prove willful misconduct on the part of the carrier, his servants or agents. These exceptions are rarely useful because of the difficulty of proof in air line accidents in which witnesses and evidentiary material are rare.

In the field of shipping, the individual's freedom of contract has been preserved intact so that it is still possible for a shipping company to relieve itself of all liability for negligence in a contract with its passengers.[25] As to liability for property, an international convention, namely, the Hague Rules embodied in *The Water Carriage of Goods Act*, limit the amount to be claimed on each package unless its contents are declared before the

24. Beckett, W.C. *Legislation for Hovercraft* 14 Canadian Aeronautics and Space Journal 382 (10, Dec., 1968).

25. Beckett, 382.

voyage.[26] The third and most unique aspect of shipping liability is that, in accidents with third parties, an overall limit of liability is imposed for loss of life, personal injury or property damage based upon the ship's tonnage.[27]

It is useful to examine how Great Britain dealt with this mix of liability legislation in *The Hovercraft Act 1968*. Authorities chose to follow the airlines scheme for personal liability while property liability was to be based on the shipping concept of carriage of goods by sea.[28] In relation to personal and property liability incurred in a collision with other ships or hovercraft, an overall limitation was considered for the hovercraft's all-up weight as opposed to tonnage.[29]

The above mentioned liability schemes for existing transport modes have been compromised to a certain extent in the *British Hovercraft Act* in an attempt to produce what is felt will be an equitable liability scheme for ACVs by drawing elements from each of the existing systems. The difficulty with this is that it assumes that each of the liability schemes is satisfactory in its own mode and that as such it will be satisfactory for ACVs. That this is a false assumption is borne out by lawyers who argue that aircraft liability agreements based on national boundary lines are inequitable; that the difference in liability claims should be based on something more than the destination printed on the passenger's ticket. Even more fundamental to this discussion of liability is the question of whether claims should be limited at all, regardless of the destination or mode of transportation. These become relevant considerations when one is pondering the creation of a liability scheme for a new and unique vehicle.

If one starts with the basic common law premise that one should be free to contract, then logically one should not be prevented from limiting or contracting out of one's own right to liability claims. This notion of freedom of contract is still permitted in personal liability in shipping contracts between the carrier and his passengers. It presumes, as one of its basic tenets, that the contracting parties will negotiate and come to terms in a final agreement that will result in a compromise of the best interests of each. The difficulty with this theoretical belief is that it does not work in practice; the result usually being that the carrier dictates the terms in a standard form. The average prospective passenger is unaware of his rights or unwilling to bargain for them even when he is aware of them because he

26. Beckett, 382.
27. Beckett, 382.
28. Beckett, 382.
29. Beckett, 382.

is afraid of being faced with a take-it-or-leave-it situation. The result usually is that for whatever reason, the carrier decides on the terms of the liability for the journey and the other party, probably in a hurry, accepts them without question. The passenger is thus denied, in a crash situation, by his own signature on the contract, the right to sue beyond a certain amount or even at all.

Initially, the signing of such a standard form contract may seem to produce only negative effects, but really the signing of such a liability scheme has a beneficial effect upon both signatories. Supposing that a limitation is placed upon the amount that a carrier has to pay in the event of a collision, the carrier's insurance company will take this into consideration when adjusting its premium rates. The company, in turn, will not have to pass on to the passenger the cost to it of unlimited liability in the price of the ticket. In effect, when the passenger limits or denies himself liability rights whether he knows it or not, he reduces the price of his ticket. He is exchanging his rights to sue in the event of disaster for the commercial advantage of a reduced fare.

The issue that must be determined by the public when formulating a scheme for liability is at what particular point does the commercial advantage gained through low insurance premiums cease to exceed advantages of the right to freely contract one's own terms of liability? In other words, to what extent is the public willing to sacrifice its commercial advantages for the right to sue for an unlimited amount in the event of disaster? I think the feeling is growing amongst transportation lawyers, and I share this belief, that it is not in the public's interest to be motivated by its monetary interests; on the theory that it is the duty of the carrier to its passengers to transfer them safely as well as economically. Thus, if the onus for safe passage of its passengers is deemed to be the paramount policy consideration for the carrier, it only follows that unlimited liability for the passenger should be preserved, if necessary, in legislation. In effect, this legislation would be enforced freedom for the passenger's right to sue for unlimited compensation. The carrier would not be allowed the freedom to limit or eliminate the passenger's right to sue. The only recourse for the carrier would be for him to improve the safety features and evacuation procedures in an accident situation so that such a costly event might never occur for him. With this extra concern for safety measures the insurance companies would probably be willing to lower their rates, especially if the program resulted in a reduced or accident-free record. In turn, the public interest would be served, because the onus would be returned to the carrier from whom it had strayed in shipping personal liability contracts. The public would be receiving for slightly

higher travelling costs the substantially more worthwhile saving of lives and property through the onus of the unlimited liability scheme upon the carrier.

The issue of property liability could be decided on the same basis, as between passenger and carrier, but there would be complications if this rule was to be extended to carrier-carrier relationships. Here the public concern would centre not between an unprotected passenger and a financially oriented carrier, but would involve two parties in an accident anxious to claim against one another for the damage inflicted.

The determination of such a liability scheme in the event of collision between two carriers turns on two factors. First, the use of tonnage as a multiple in the calculation of a liability claim is open to criticism because it assumes that all vehicles being subjected to this test are comparable when in fact they are not. For example, an SRN-6 passenger ACV, the actual liability tonnage of which is only 12 tons, is diminutive when compared with the tonnage of an average sized passenger ship. Even with the arbitrarily imposed minimum standard of 300 tons,[30] the SRN-6 liability tonnage is considerably below that of the standard passenger vessel.[31] The use of liability tonnage, then, would seem to create too great a disparity between the large and small sized craft and thus make a loss distribution between them based on this difference inequitable.

The second variable factor that may create widely disparate results in the compilation of a liability claim relates to the number of passengers making claims. Thus, depending upon the situation, the number of claims will vary from all of the passengers carried on board to a minimum of a single claim. It only stands to reason that if a single claim is made under this system, instead of several hundred, the claimant has the potential for a much larger liability settlement.

If these factors have built-in prejudices of their own, then they certainly cannot be expected to produce a fairer result when combined in calculating the claims per passenger. A calculation of liability claims based upon these variables would only illuminate further the inequities that these factors could produce when the liability of passenger ships and ACVs were compared.

There appear to be two possible remedies to the problem. The first alternative would be to change the tonnage factor for ACVs and fix it at

30. *An Act to Amend the Canada Shipping Act*, S.C. 1969 c.39 s.66(10)(a), dated March 18, 1969.

31. See attached sheet. These comparative figures were calculated by Captain Doherty and I am indebted to him for the use of them here.

an artificially high level in order to achieve the shipping equivalent when calculating the liability tonnage. The difficulty with this is that it is perhaps too misrepresentative of the truth when in order to achieve this consistency the liability tonnage must be placed at, say, 30,000 tons, when in fact is only 400.

The second potential solution is to switch from liability tonnage as a measurement factor to the ACVs all-up weight. This switch from measurement of cubic space to the weight of the vehicle might prove to be another form of equalizing the difference. It might prove to be rather confusing, however, in administering these different schemes, especially when a standard such as tonnage has been used for such a long time. With this in mind, it might be better if the same standards were maintained and changed from within, instead of confusing the issue by creating a new classification.

VI. The Legal Approach to ACVs in Great Britain; from Administration and Regulation to Legislation sui generis.

As stated earlier, the thinking of British authorities when considering the legal classification of the ACV was to regulate it within the bounds of existing transporation statutes.[32] There were two motivating factors behind this policy. In the first place, a thorough examination of the scope of existing definitions in air, sea and land law would bring to light the existence of any reference to the vehicle. Even if no mention of ACVs were made, legislators could still determine the scope of one of the definitions to be wide enough to include them. Either way, this approach would eliminate the fears of those officials apprehensive about the creation of unnecessary legislation in trying to recognize a vehicle already described in terms of existing law. The attention of these men could then be focused upon the less onerous task of amending existing Acts.

The second reason for an in-depth examination of existing definitions is supplementary to the first: it goes to the question of whether there is an enabling power under existing legislation to make rules and regulations for hovercraft or whether a fresh specific power is needed for the purpose.[33]

The examination produced ramifications that were felt outside Britain in that the analysis represented the first such attempt of its kind among

32. See attached sheet. These comparative figures were calculated by Captain Dohefty and I am indebted to him for the use of them here.

33. See, for a greater discussion of these Acts, Martin Peter, *The Hovercraft in Law: A Lawyer Examines The Current Situation*, 6 Air Cushion Vehicles 85 (No. 42, Dec. 65).

common law countries. While this fact alone makes it significant, the study becomes all the more notable because of the thoroughly intensive manner in which it was carried out. These two factors combine to provide a third reason why this study is important; namely, the immeasurable impact it will have had on the minds of the governments of other common law countries such as Canada, where the statutes concerned are very similar to the British legislation.

In attempting to answer the question, is a hovercraft a ship, one is immediately discouraged from reaching a conclusion in the affirmative. The primary cause for this difficulty in producing an affirmative answer to the question, lay in the lack of definition of the necessary classifications in the first instance and the lack of definitions at all in the second. For example, in the *Merchant Shipping Act 1894*,[34] the term 'ship' is defined as "every description of vessel used in navigation not propelled by oars."[35] The term 'vessel' is not much more clearly defined. It is defined as 'any ship or boat or any description of vessel used in navigation.'[36] The fact that these terms were so imprecise, coupled with the fact that the term 'steamer' was not even defined,[37] leads one to believe that hovercraft could not possibly be included within these definitions.[38]

By another analysis, however, the reasons for rejection of a hovercraft as a ship were different. In examining the standard domestic definition of a 'ship' as above,[39] it is possible to find the phrase 'in navigation' of vital significance, in that it could be said that marine hovercraft that were used at sea were used in navigation and thus would be within the definition.[40] The major problem with this approach is that this definition ignores the inherent amphibious nature of hovercraft, which would probably raise strong enough doubts as to whether the craft could still be considered a ship.[41]

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34. Beckett, 379.

> "From a lawyer's point of view the question, 'Is it a ship or an aircraft?' goes essentially to the question whether there is an enabling power under existing shipping or aviation or other means of transport legislation to make rules and regulations for hovercraft or whether a fresh specific power needs to be sought for this purpose. In this context, therefore, it is worthwhile looking at existing definitions of ships and aircraft to see "whether a hovercraft falls within those definitions."

35. Martin, 85, sections, 742, 271, 743 were relevant.
36. See 44, s. 742.
37. See 44, s. 742.
38. Martin, 85.
39. Martin, 85. "We therefore have a situation where it seems most unlikely that an ACV is a ship . . .".
40. A British legal expert on Hovercraft.
41. Beckett, 380.

The second question to be asked, 'is the hovercraft a motor vehicle' falls prey to the same pitfalls as the former question does. Keeping this in mind, it was surprising to find that the *Road Traffic Act 1962* already contained references to 'hover vehicles.'[42] A hover vehicle is a motor vehicle, whether or not it is adapted or intended for use on roads, but at the same time is not a motor car, motor cycle, a light locomotive or a heavy locomotive defined in the previous *Road Traffic Act.*[43] Also of note was the fact that there were provisions in this Act and one other, for the Minister to make regulations for hovercraft or to exclude them from regulation but, to this date, no action had been taken under this provision.

The difficulties of considering an air cushion vehicle as a "motor vehicle" within the Road Traffic Act 1962, were obvious. The craft possessed operational capabilities peculiar to it, not the least of which was the amphibious quality which would allow it to operate on more than one terrain without difficulty. The Act, of course, would only be applicable when the craft was on the highway[44] which poses limitations to say the least. Secondly, although the Act stated that hover vehicles would be covered by its provisions "whether or not it is adapted or intended for use on roads",[45] its primary overland usage has always been designed for non-highway routes. Any transportation system of the future designed to transport people at high speeds between two points overland will almost certainly involve the operation of the Tracked Air Cushion Vehicle or the Hovertrain. There are no plans as far as I am aware, for hovercraft to be used on highways.[46]

The third and final question that can be posed, namely, is a hovercraft an aircraft, was ultimately the one British authorities decided to answer in the affirmative. The initial decision was made well before the question was formally posed, but the form of the decision did not call for an official statement of the government's position, but rather called for a *de facto* application. The reason given for this unofficial *de facto* recognition of air cushion vehicles as aircraft was that the Board of Trade did not want to risk invalidation of operation by virtue of an after the fact announcement that retroactively made hovercraft aircraft.[47] The government's means of achieving this end were ingenious. By insisting that each hovercraft

42. Beckett, 380.
43. Martin, 85.
44. Martin, 85. *The Road Traffic Act, 1960.*, s.253 (2).
45. Martin, 85.
46. Martin, 85, *The Road Traffic Act, 1962*, s.19(1).
47. Planners consider that ACVs used for travel overland between two points are best off on tracks. See 44.

operate according to the provisions of the *Civil Aviation Act, 1949*, which stipulated that each craft must have a certificate of airworthiness before flying, the government effectively dealt with air cushion vehicles as aircraft.[48] If this provision were not complied with, the Minister would simply have to make an Order in Council prohibiting the craft from operating, as he was empowered to do under the Air Navigation Order of 1960.[49] The most curious aspect of all, however, is the fact that neither of these two Acts defines the term 'aircraft.'[50] This surprising fact tends to confirm my conviction that the decision to recognize hovercraft as aircraft was based on regulatory policies that emphasized continuity and convenience of administration for the government's agencies. I do not believe that the government made any attempt to objectively examine the needs of the industry.

In the absence of any domestic definition, it was deemed only logical to turn to international law for the answer. Authorities turned to the charter of the International Civil Aviation Organization for it because Britain, as a signatory to the original charter of the Chicago Convention of 1944, was subject to it. The charter does not define the term 'aircraft' but an annex to it does.[51] In it, the term 'aircraft' is defined as "any machine that can derive support in the atmosphere from the reaction of the air." Two interpretations seem possible from this wording.[52] The first is that a

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48. Beckett, 380.

"The issue of a permit to fly in respect of hovercraft was against the possibility that it might be so regarded, and, accordingly, without a permit operations might be held to be unlawful. This *de bene esse* treatment of hovercraft as aircraft—if held to be an aircraft the permit would be a very necessary legal document to possess, but if not so held the permit would nevertheless do no harm—provided the only means of control of hovercraft constructional and operational requirements."

49. Beckett, 380, see 65.

Lords Debate on Hovercraft, 9 Hovering Craft and Hydrofoil 24 (2, Dec. 1969).

"Lord Kings-Norton, Chairman of the Air Registration Board, said that "for the last ten years, at the request of the Government, the Board had taken on the responsibility for the worthiness of hovercraft. This had always been on an informal basis and this arrangement had been unsatisfactory in its informality. The Board and everyone concerned with this difficult and unusual kind of worthiness would welcome it if the Air Registration Board was given a more formal mandate.

When any new hovercraft authority is set up it should be given a wider title and the wider responsibility for all high speed over-water craft. This should include hovercraft, hydrofoils and fast boats."

50. Beckett, 380.
51. Martin, 85.
52. Martin, 85.

hovercraft fits within the definition because the craft operates "from the reaction of the air" if a strict interpretation of the reading is made. The detractors of the idea argued that in order for there to be a "reaction of the air" there had to be a surface for it to react against, which was not necessary for the operation of "real" aircraft.

Apparently convinced by the arguments of the proponents, that a hovercraft could fit within the ICAO definition of an aircraft, the British Government decided for its purposes, the air cushion vehicle was an aircraft.[53] The practical results of this decision are best described in terms of its effect upon the construction and operation of the craft in the small but developing industry.

The industry's reaction to the government's proposal were never favourable and yet were not initially negative.[54] This was understandable if one takes into account the preoccupation of the industry at the time with survival as capital was in short supply and initial operating costs high. In these circumstances the industry failed to organize a united front on the issue of the craft's recognition and regulation in law.

As the industry began to stabilize itself and production and operation increased sufficiently, the industry could turn its attention, still on an individual and not on a collective basis, to probe the relevance of aircraft legislation to hovercraft. Criticism of the Government's action was directed to three areas.

First, the treatment of the craft as an aircraft did not take into account the non-amphibian models such as the HM-2 sidewall passenger ferry.[55] Mr. Norman Piper was concerned at the inconsistency of treatment this would cause the HM-2[56] as a common sense approach would show that it should not be considered an aircraft in its exclusively marine environment. Nevertheless, the Government was not swayed by this criticism; it chose to

53. Martin, 85.

> "This definition gives rise to a great deal of argument. There are those who consider that an ACV is an "aircraft" within the meaning of the definition because it cannot move without the presence of the cushion of air which it creates and that this satisfies the term "reaction of the air", and there are those who say that a hovercraft cannot be an aircraft within this definition because, although the ACV cannot move without the cushion of air, it cannot, equally, move without the existence of the ground or water against which that cushion of air is created and sustained. This, they claim, makes it a surface vehicle."

54. Martin, 85.

55. *Bill to Define the Legal Status of Hovercraft*, 24.

56. Interview with Mr. Norman Piper, Sales Manager, Hovermarine, Ltd. (U.K.), July, 1969).

continue classifying ACVs as aircraft.[57] The failure of the Government to respond to Hovermarine's request for what its management felt was a matter for urgent reclassification left them dissatisfied and uncertain about the future.[58] They were not at ease being regulated under an aircraft classification and they were apprehensive as to how these regulations would cope with the unforeseen problems of the future.

The second complaint made against the Government's action dealt with safety regulations. Operating as aircraft the hovercraft would be subject to the air safety regulations which some observers felt were not designed with the idea of saving "all souls on board" as were marine regulations.[59] This argument was devised with the idea in mind that in an air crash there would only be a handful of survivors because air casualty results show that this is the likely survival rate. The fact also remains that most aircraft disasters occur high in the sky or, if low to the earth's surface, overland. It is not likely then that a great deal of attention has been given to crashes that might take place at low level over water, especially when the other party in the collision is a ship.

The third criticism made of the proposal was that ACVs as aircraft would be subject to the provisions of the Warsaw Convention and the Hague Protocol (1955) governing the liability of international carriage by air.[60] The effect of these conventions is that the passengers need not prove negligence in the event of a claim which is fixed in its limits.[61] While there is nothing unusual about this approach in itself, the maritime context in which it is set makes in inappropriate. The legislation was not written with disasters at sea in mind. The most striking example of this is the lack of a provision for liability to third parties which is a standard consideration in shipping conventions.[62] ACV operators were naturally concerned about those inadequacies in the law itself but were also wary about the effect it would have upon their insurance rates. The operators knew that any

57. Mr. Piper, former Managing Director of Hovermarine, Ltd. was one of those businessmen dissatisfied with the Government's course of action, particularly so because of its classification of sidewalls as aircraft.

58. See 65.

59. See 65.

60. *Bill to Define the Legal Status of Hovercraft*, 28.

Mr. Gresham-Cooke.

"I must say that I much prefer the marine philosophy of trying to save every soul on board. The aircraft philosophy is not so exacting. If there is an air crash, frequently one feels that the operating company think that they have done very well if they have saved four or five people."

61. Beckett, 382.

62. Beckett, 382.

suggestion of unlimited liability could cause their insurance premiums to price them out of business.[63]

Just what the practical results of the application of this legislation will show is only speculation at this juncture. What can be stated with a degree of certainty is that the confusion would be lessened if the issue of aircraft based accident claims were not utilized in an essentially marine crash situation. Aircraft based liability claims bear no relation to the environment in which an accident might take place and thus should not be employed in situations for which they were never written.

The above criticisms of the government's treatment of air cushion vehicles as aircraft were, in effect, rendered insignificant, when in 1967 the ICAO amended its definition of 'aircraft' to effectively exclude hovercraft.[64] The amendment added "other than the reaction of the air against the earth's surface" effectively dispelling doubts that were created by the earlier wording.

The effect of the ruling had profound consequences for those nations which were signatories to the charter. It meant that any countries that had classified hovercraft as aircraft would have to redefine the vehicles or remain at odds with the international legislative body. At least two countries, Great Britain and Canada, were in this category. Other countries, such as the United States and Japan, which had classified their air cushion vehicles as ships, did not need to make a change.

For those countries that were forced to change, there were two options open. If they wished, they could treat their hovercraft as ships and thus achieve uniformity with two large maritime nations. In the alternative, they could strike new legislative ground and recognize hovercraft *sui generis*. Canada decided to treat the hovercraft as ships with plans to enact separate legislation in the future.[65] Great Britain was the lone forerunner of a new experiment in transportation law; the recognition of hovercraft *sui generis*.

An analysis of *The British Hovercraft Act 1968* at this juncture would serve no useful purpose because although it represents the first attempt by a country to legislate for hovercraft *sui generis*, it is largely enabling in character. Thus aside from the definition[66] of the craft, the statute contains little or no reference to the operational safety and liability aspects discussed above. Thus at this stage of its development it remains a

63. Beckett, 382.

64. Doherty, J. *ACV Legislation*, 15 Canadian Aeronautics and Space Journal 14, (1, Jan., 1969).

65. Beckett, 380.

66. Doherty, 13.

statutory shell conceived as a legal respository for these vital issues yet to be settled.

To this point the discussion of the legal status of ACVs has been centered about the British methods of legislation and regulation. By making reference to their experiences and the legislative means by which they sought to regulate hovercraft one can approach the issue of legal control of ACV development in Canada with a much greater understanding. It is appropriate that the Canadian review follows the British development from a chronological standpoint; major development and control in that country was several years in advance of the state of the art in Canada. One can reasonably say, then, that the British background serves as the source upon which Canada was able to draw when first formulating a legislative scheme for ACVs; it also serves as the most advanced example that Canada can look to when devising hovercraft regulation in the future.

VII. ACVs in Canada: Past and Present Legal Regulation.

Hovercraft first came to Canada in 1963 when an SRN-2 underwent trials on the St. Lawrence River and was successful in negotiating the Lachine Rapids.[67] While this event was of purely scientific and not legal importance, events which took place in preparation for it were. Realizing that a legal vacuum existed for the recognition of these craft, the Department of Transport, under whose auspices the trials for the craft were being conducted, sent a letter to the Justice Department requesting an opinion on their legal status.[68] The presumption was, and this was ultimately confirmed in the opinion, that an air cushion vehicle was an aircraft under the definition of the *Aeronautics Act*.[69] This definition, just as in the British scheme, was derived from the Annexes to the ICAO Charter of 1944.[70] Justice Department lawyers were primarily interested with the wording of the definition, which, as pointed out earlier in the British case, was open to this interpretation before the amendment in 1967. Mr. Lochhead[71] suggests that the Department may have also been

67. *The Hovercraft Act 1968*, c.59, s.4(1).
"In this Act
"hovercraft" means a vehicle which is designed to be supported when in motion wholly or partly by air expelled from the vehicle to form a cushion of which the boundaries include the ground, water or other surface beneath the vehicle;"

68. Lochhead, I.G. *The Legal Status of The Air Cushion Vehicle in Canada*, 2 (unpublished, March 1, 1970).

69. Lochhead, 5.

70. Lochhead, 5.

71. Lochhead, 5.

influenced by the effects of insurance and liability schemes which would vary with the craft's status.[72] Undoubtedly, too, the British precedent in classifying ACVs as aircraft must have influenced the Department's decision to a certain degree.

The full consequences of this ruling were not felt until Hoverwork Canada, Ltd. applied for a license to operate a commercial hovercraft service at Expo 67.[73] The confusion that arose when several regulatory agencies each sought to apply a measure of control through taxation or safety regulations,[74] indicated the worth of the Justice Department's decision. Quite clearly the classification of the Air Cushion Vehicle as an aircraft under the Aeronautics Act caused unforeseen administrative problems, and the ones that did arise could not be properly handled by the Flight Standards Branch, its regulatory agency.

Realizing that corrective measures had to be taken, the Department of Transport reacted to the situation by making two important changes within the Department. Both changes were administrative in nature and did not alter the recognition of the vehicles in law. The first change involved the recognition of hovercraft as separate transport vehicles and, to this end, the Air Cushion Vehicle Division in the D.O.T. was established.[75] Captain Doherty was appointed to head this new section, which was to deal exclusively with ACVs. Even though this move was non-legislative, it was the first government recognition of these vehicles as distinct from aircraft up until this time.

The second, and equally important change involved the transfer of the responsibility for hovercraft within the Department from the Flight Standards Branch to the Marine Regulations Branch of the Department.[76] According to Mr. Lochhead the transfer was motivated by the application

72. Mr. Graham Lochhead is a government official in the Department of Industry who is responsible for the development of the hovercraft industry in Canada.

73. Lochhead, 5.

74. Lochhead, 5.

75. Lochhead, 5.

> "The craft was imported to Canada, classed as an automobile. It was placed on the Civil Registry of Aircraft, aircraft, identification stencilled on its rudders, and an operator's certificate obtained from the Air Transport Board. It was inspected and approved for use by civil aviation officials, Canada's Steamship Inspectors, and the Montreal Harbour Board. A land mobile radio operator's license was obtained from the Department of Transport and the small docks where the vehicle landed were licensed as airports. The final blow came when the Quebec government applied its diesel fuel tax on the premise that the hovercraft was similar to a truck.

76. Air Cushion Vehicle Division, Marine Regulations Branch, Hunter Building, Ottawa, Ontario.

of a commercial operator's license for travel between Vancouver and Victorial by Pacific Hovercraft.[77]

D.O.T. felt at this time that hovercraft operating solely in the marine environment would be better regulated by an agency with marine and not aeronautic interests. The Government's decision was prompted in part by interested observers in the industry, familiar with the degree of control that the Air Registration Board in Great Britain exercised over what was an essentially maritime use of the vehicles in that country, and who were anxious to avoid the recurrence of such problems here.[78]

The net effect of these changes was to leave the situation unclear. If one looked only to the fact that hovercraft were subject to a new section within D.O.T. that dealt exclusively with hovercraft in the Department, one would tend to believe that ACVs had achieved a measure of autonomy. The proof that this was not so, however, was in the defining section in the Aeronautics Act which classified a hovecraft as an aircraft. This assumption was, in turn, negated to an extent when the Marine Regulations Branch was appointed the new regulatory agency for hovercraft. Thus hovercraft were to be considered aircraft in law and air cushion vehicles in general administration with a nautical influence because of their use in a mostly marine environment.

Once again, realizing that its administrative scheme was inadequate, the D.O.T. decided a change was in order. In point of fact it used the occasion of a government inter-departmental committee which was originally set up to assess the performance of ACVs in previously held trials to announce that ultimately air cushion vehicles would be subject to their own legislation and regulatory agencies.[79] The initial steps that were to be taken to achieve this long range proposal would eliminate the dual recognition[80] of amphibious air cushion vehicles as aircraft and sidewalk hovercraft as ships and would substitute in their places the recognition of air cushion vehicles under amendments to the Canada Shipping Act.[81]

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77. Lochhead, 6.

78. Lochhead, 6.

79. *Bill to Define Legal Status of Hovercraft*, 24.

80. Lochhead, 6.

81. *D.O.T. Air Cushion Vehicle Legislation and Regulation, January 28, 1970.* Doherty, 13.

> "Recently, Mr. Hellyer announced that the responsibility for ACVs had been transferred from Air Service to the Marine Regulations Branch. This time many of my friends asked "Why on earth had D.O.T. called an ACV a boat?" For the record, it is not a boat: the Marine Regulations Branch will regulate ACVs under the Aeronautics Act. The Department, however, has every intention of proposing legislation changes that will remove ACVs from the Aeronautics Act, and which

These new provisions are supposed to provide the hovercraft with a distinct statutory definition and thus recognition of its own,[82] albeit within the confines of the Canada Shipping Act. The Government feels that any separate recognition of hovercraft beyond this is unnecessary considering the fledgling state of the industry at this time.[83]

In making my concluding remarks, I have shown the extent of existing legislative attempts at classifying ACVs and how I think these approaches have fallen short of what the public, the industry and the government requires for the development of the craft in accordance with the systems engineering concept. I think the development of legislation, both within existing modes and even when attempted *sui generis*, have reflected this failure, because to date, lawyers have been too preoccupied with the

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will permit them to be controlled when operating in the Marine environment under the Canada Shipping Act."

"At present in Canada amphibious air cushion vehicles are classified as aircraft and are subject to the Aeronautics Act and Air Regulations.

"Air cushion vehicles which have underwater propellors and operate in the water at all times are classified as ships and are subject to the Canada Shipping Act and Regulations made under that Act."

82. *An Act to Amend the Canada Shipping Act*, S.C. 1969 c.53 (assented to 9th July, 1969).

In the explanation of these amendments the D.O.T. published the following statement.

"The classification of air cushion vehicles as aircraft or ships will in the near future be no longer applicable. The reason for this is that legislation changes have been passed which will remove Air Cushion Vehicles from the jurisdiction of the Aeronautics Act and allow them to be regulated under the Canada Shipping Act."

D.O.T. release January 28, 1970. 1

Lochhead, 10.

"This separate treatment of the air cushion vehicle, albeit under the statutory authority of the Canada Shipping Act, is most significant and augurs well for the future development of entirely separate legislation. It treats air cushion vehicles sui generis: it recognizes its right to an identity quite separate from aircraft, ships or motor vehicles or any other known form of transport, and therefore will give the courts clearance to regard it in a clear minded way, unhampered by precedents established through past litigation and regulation of existing transportation."

D.O.T. release 1/28/70, 1.

"The amended legislation defines an air cushion vehicle as a specific "type of vehicle, not as a vessel, applies what are believed to be appropriate parts of the Canada Shipping Act to ACVs and provides statutory authority for the making of special air cushion vehicle regulations . . .".

83. Doherty, 13.

"To summarize, our policy is to continue to regulate ACVs under existing statutes, suitably amended to cover their unique qualities, until such time as we have gained sufficient experience to prove if separate legislation is necessary."

definition of the craft. They have been concerned more with the evantual location of the definition in the statutory transportation framework than they have been with the key issues which really point out the uniqueness of the ACV. What I am saying, in a sense, is that it does not matter how the craft is classified, either *sui generis* or otherwise, if the problems facing ACVs in their operation are not dealt with. I have shown that operation, safety and liability considerations are unique when compared with their equivalents in other transportationmodes and that they can only be recognized in law with an approach which is unfettered by existing concepts.

Thus I am asserting that the ACV must be recognized *sui generis* in law with its own statute; but I feel that this approach to the problems of ACVs would only be beneficial if the issues as I have outlined above were solved. The provision of a new statute in the form of a shell within which these ACV problems could be grouped together, and attempted to be solved according to existing concepts, would not advance the legal state of the art; it would simply reidentify the problem. But by first exposing and solving these issues with a fresh approach and by providing them with a separate legal sphere within which to develop, I think the recognition of ACVs *sui generis* would have a beneficial result. The ACV statute in effect, would take on a more original appearance as new issues requiring special treatment became serious. Only if it was constructed in this way would the statute serve a meaningful purpose in presenting to the public, the industry and the government, a legal framework constructed according to the needs of the vehicle.

SHIP/ACV — COMPARISON OF LIMITING LIABILITY UNDER CANADA SHIPPING ACT

Name	Type	Construction Date	Liability Tonnage	Construction Cost	Max. Pass. Liability $	% Pass. Liability to Const. Cost	Max. Property Liability	% Property Liability to Const. Cost	Remarks	
Ambrose Shea	passenger	1967	8,485	$ 11.8 m.	$1,877,676	16.1%	32.5% of Passenger Liability	5.2%	Pass. Crew	310 98
Atlantic Gennis	Fishing Trawler	1967	1,284	$ 2.45 m.	$ 285,048	11.6%	"	3.7%		
Canadian Progress	Seaway Bulk Carrier	1968	20,196	$ 12.55 m.	$2,241,867	18.9%	"	6%		
H1070	Cargo	1966	18,937	$ 11.95 m.	$2,102,007	17.6%	"	5.7%		
Our Polaire	Tanker	1963	4,312	$ 4.2 m.	$ 478,632	11.4%	"	3.8%		
SRN-6	Pass. ACV.	1966	300 (actual 12)	$350,000	$ 66,600	19%	"	6%	Pass. Crew	35 2
SRN-4	Pass. ACV.	1968	410	$ 4.7 m.	$ 91,020	1.9%	"	.61%	Pass. Crew Cars Pass. Crew No Cars.	254, 12, 30, or 600, 20,

Notes: (1) Passenger liability calculated on $222. per ton
(2) Passenger liability 3,100 Gold francs per ton.
Property liability 1,000 Gold francs per ton.
(3) If all passengers in Ambrose Shea lost, maximum average - $6,025.
If all passengers in SRN-4 lost, maximum average - $ 358 for 254 passenger version
- $ 152 for 600 passenger version

Transportation Law Journal, Vol. 3 [1971], Iss. 2, Art. 3