automotive parts from Canada

PART ONE

ORIGINAL EQUIPMENT APPLICATION

Government of Canada
Industry, Trade and Commerce

Gouvernement du Canada
Industrie et Commerce

Ottawa, Canada
K1A 0H5

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INTRODUCTION

In April 1980, a preliminary draft of this document was prepared, mainly for the guidance of officials who are involved in the forward planning of the industry sector but are not fully conversant with its detailed make-up and operation. The draft was based entirely on the knowledge of the writer and the assistance of the vehicle company procurement staffs was then sought in order to refine the content. During the latter half of 1980 it was discussed in detail with the purchasing staffs of:

American Motors (Canada) Ltd.
Chrysler of Canada Ltd.
Ford Motor Co. of Canada Ltd.
General Motors of Canada Ltd.
Canadian Kenworth Co.
Freightliner of Canada Ltd.
Himac Motors Ltd. (Hino)
International Harvester of Canada
Mack Canada Inc.
Pacific Truck and Trailer Ltd.
White Motor Corpn. of Canada Ltd.

Their assistance, as always, was most generously provided and from their input it has been possible to produce here a much more accurate record of current capabilities and capacities. I would like to put on record an appreciation of their help and guidance. Some were friends of long standing, others were new to their appointments since I had previously been involved in OEM sourcing, but all were equally helpful and patient.

Some short words of explanation might be in order so that the document is better understood.

(a) The component breakdown generally follows a GM uniform parts classification, modified to minimize detail. It has some shortcomings but is still the best format available and also follows the form in which the writer maintains an on-going record of the sector.

(b) With some limited exception, company names have not been identified. This serves to preserve confidentiality and permits wider distribution. Further, it is recognized that the major company identities will be readily apparent to those intimately connected with the industry sector.

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(c) The Ministry of State for Science and Technology had a study prepared in 1979 entitled "Opportunties for Canadian Research and Development directed towards the needs of the North American Auto Market". Frequent reference is made to that study since it attempts to anticipate potential opportunities for Canada.

(d) This document is in 2 distinct sections; first the detail on automobiles and light duty trucks and then a second section related to heavy trucks. It may well be that some readers are involved in only one of the two sections and will have less interest in the other, but there is considerable overlap and so the document has been issued as a single unit.

(e) The assessment of the Canadian potential, indicated under 5 categories on the index, is somewhat subjective and is only offered as a rough guide. Any component category can be quite diverse and contain several items where opportunities vary from one extreme to the other of those 5 categories.

(f) At the earliest opportunity a second part to this document will be prepared. It will list all the Canadian based companies currently supplying OEM parts with an indication of their products.

(g) Should you have any questions on the content or wish to discuss the listed opportunities you can contact the writer at (613) 995-3201 at any time.

H. Corthorn.

H. Corthorn
Ottawa - January 1981

PASSENGER CARS
AND
LIGHT DUTY TRUCKS

INDEX

(with indication of growth potential)

A - Growth opportunities which can be handled in existing facilities.

B - Canadian capability exists and identified expansion opportunities involve modest capital costs.

C - Canadian capability exists and identified expansion opportunities require major capital investment.

D - Little or no capability presently in place in Canada but development of appropriate facility is of real interest and importance.

E - Canadian involvement appears unlikely.

SECTION I - BODY

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1C	Doors, hardware		X			
1D	Seating, seat mechanisms		X			
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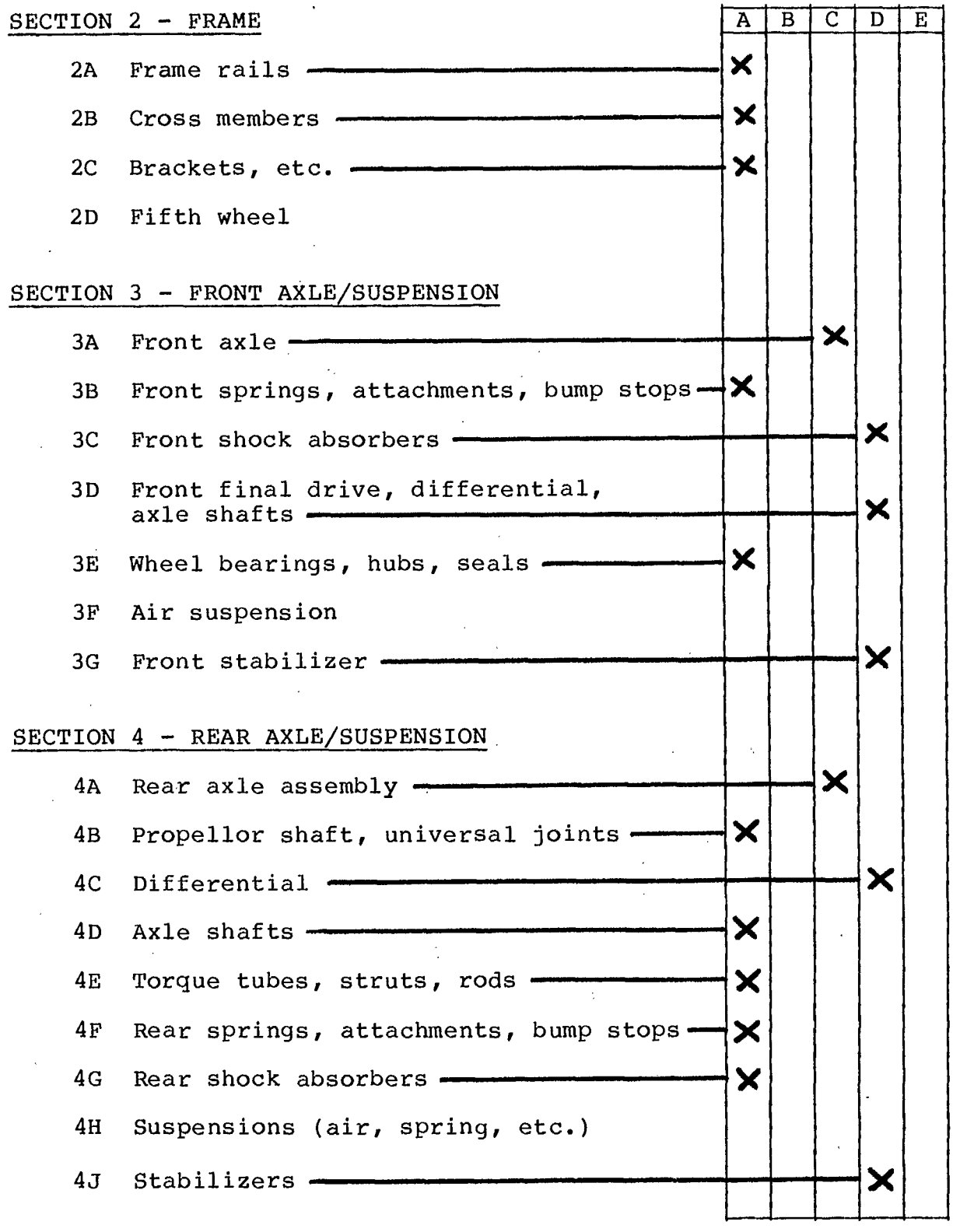
1G	Restraint systems	X				
1H	Ornamentation, emblems, mouldings		X			
1J	Ventilation, air-conditioning				X	
1K	Windshield wiper/washer system		X			
1L	Mirrors, visors			X		
1M	Roof vinyl, skylight, etc.		X			
1N	Truck cabs, wind deflectors					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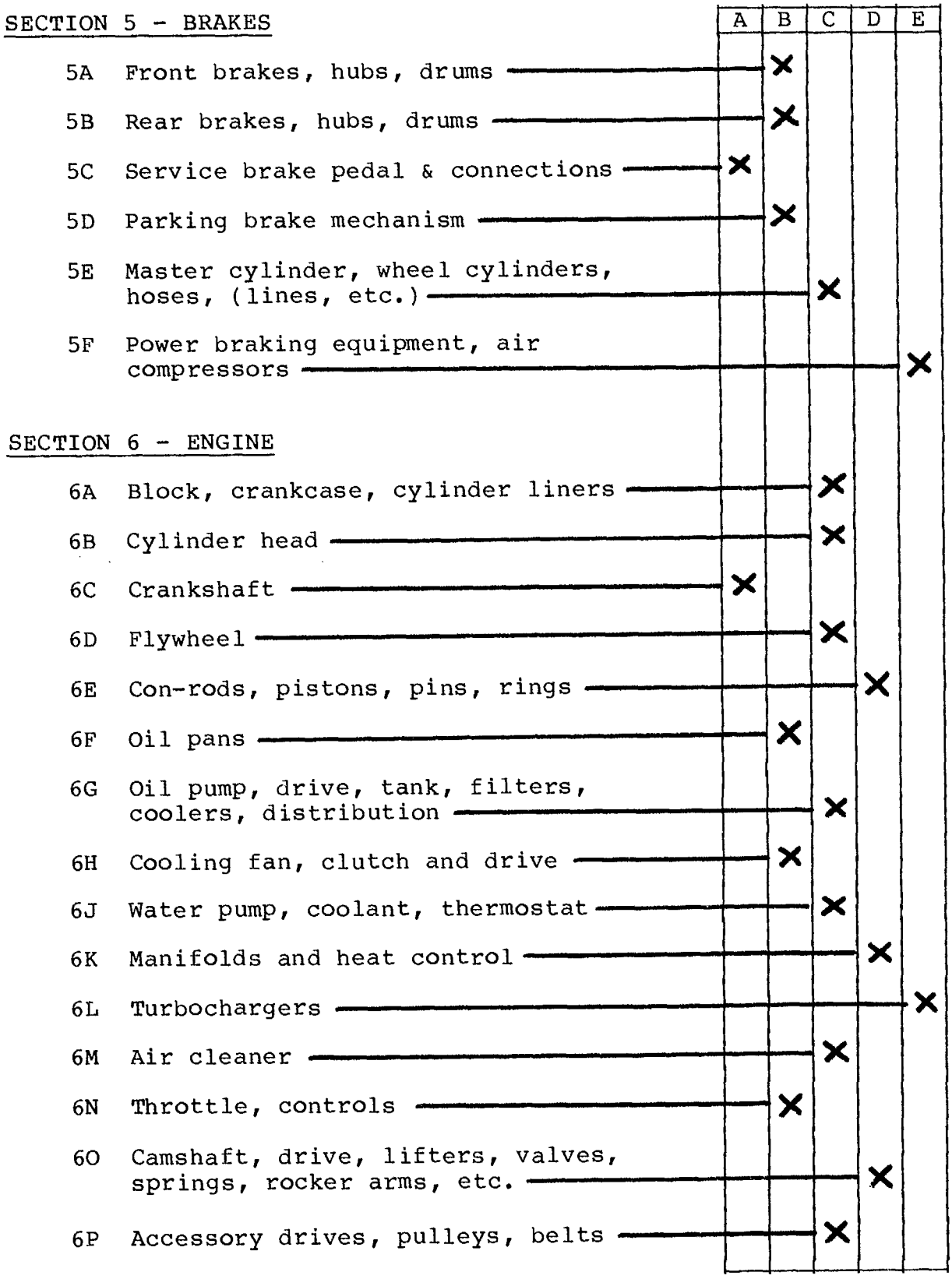
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6L Turbochargers
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7F Transmission oil coolers		X			
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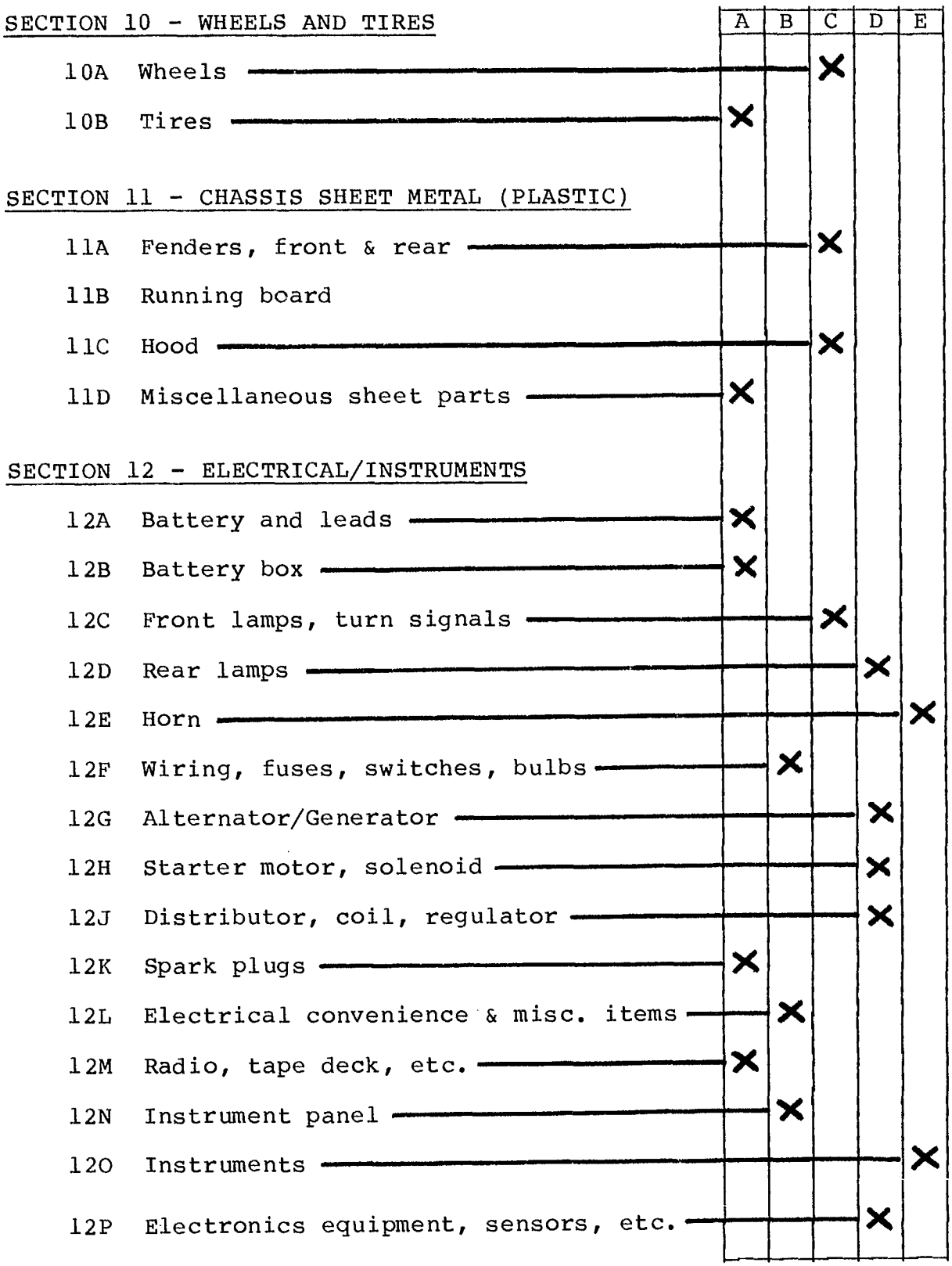
9B Steering wheel	X				
9C Linkages, arms, ball joints, knuckles, tie-rods, etc.				X	
9D Power units					X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SECTION 1 - BODY

1A. Main sheet metal (plastic) components

These have traditionally been produced in-house, in the USA, for self-evident reasons. By and large this pattern will continue but some new vehicle components will be Canadian produced. They will probably remain sole-sourced within the motor company.

The growing use of plastics parts will create changes in sourcing patterns with some opportunities for outside suppliers, on specific items. Here again, though, in-house supply will likely be the general rule on a long term basis.

1B. Floor and sill parts

Generally as at 1A and there is no indication that any parts will be produced in Canada in the immediate future.

1C. Doors, hardware

Doors, too, are generally produced in-house at US plants, and there is limited opportunity for Canadian involvement.

Much of the hardware (hinges, handles, latches, locks, etc.) is produced in Canada and is used by the vehicle builders. There is room for growth in most areas and particularly in door lifts, lock-sets, tailgate cables, moulded sponge seals, etc. The business is highly competitive and the traditional suppliers could be difficult to displace without advanced equipment and production techniques.

1D. Seating, seat mechanisms

On both items, Canada appears to have enjoyed a fair share of the business. Canadian vehicle production uses mostly Canadian seat frames and foam pads and some production is exported. Seat assemblies for light trucks seem to offer good potential.

Mechanisms will tend to increase in complexity and will have sensed automatic positioning. The development of such items is not taking place in Canada but Canadian suppliers have won early model production orders. Development of these mechanisms is well within Canadian capability.

There is a shortage of soft cloth suppliers and potential exists in various types (eg. velour, napped knit and woven) as well as leather die-cut sets. Buttons, thread, dielectric padding and vacuum sheeting all offer additional opportunities.

There could be a growing shift to the use of plastic materials so long as they remain cost competitive (frame and upholstery) and Canadian companies could be active in this area.

1E. Carpet, mats

There are Canadian suppliers of carpet and their product is generally used by the domestic vehicle builders. Suppliers have changed, some disappeared and others appeared. Much of the raw material is of US origin which reduces profitability of Canadian manufacture.

Growth opportunities have been identified in throw mats and luggage compartment mats but the greater availability in the USA of reclaimed material seems to provide them with an advantage. There is added growth potential on fibrous foam mats, with corrosion inhibiting adhesive and used to reduce noise.

1F. Windows, frames, operating mechanisms

Adequate production capacity seems to exist for the Canadian supply of required glass, considering that vehicle companies do not want to single source. Thinner glass will be used, will require different handling techniques, and is currently under development in Canada. The subsequent move could be to plastic or a flexible glass with plastic insert (already developed in Europe) where the insert is conductive to provide de-frost capability. That development is not proceeding in Canada.

Frames and operating mechanisms are produced in Canada but there is room for increased participation. The probability of a change to plastic material must be continually monitored to ensure that maximum Canadian involvement results.

1G. Restraint systems

Capability and capacity on active lap and shoulder belts seems to be quite adequate and will soon be increased by the establishment of a fourth production facility. It is all foreign owned and rationalization tends to dictate the operations which remain in Canada.

All have a capability on passive systems in preparation for their mandated introduction and little change in production location is envisaged. Being a highly sensitive safety item, the product is quite labour intensive in nature.

An air bag development did occur in Canada but as a system it would no longer be suitable. The fabric development was, however, quite advanced and could offer potential supply to the US system producers.

1H. Ornamentation, emblems, mouldings

There is a mix here of Canadian and US produced items, the latter where the duplication of tooling cannot be justified. They are not 'large ticket' items but opportunity is believed to exist in vinyl decals, tape stripes, woodgrain panels, etc.

1J. Ventilation, air-conditioning

Some limited level of involvement exists on controls, coils, etc. but it is quite minimal. No system capability exists and none is under development.

Vehicle builders have indicated an interest in many components if they were available from Canada. They include compressor parts, valves, hoses, clutches, condensors, dampers, accumulators (dryers - receivers) etc., mainly close tolerance items. Defogger units and aluminum tube assemblies also offer good potential.

1K. Windshield wiper/washer system

There is some Canadian production of wiper motors, wiper blades and arms but no capability to produce the windshield wiper system. This, then, rates as an area with good potential for growth.

The A.D. Little report identified an advanced wiper/washer system as an opportunity for Canada but that will require some special effort to build on the current limited component basis.

1L. Mirrors, visors

Light truck mirrors are produced in Canada but there is no producer of the high-volume automobile mirror. The Litte study sees plastic mirrors as a good opportunity for Canada. A company has considered such a product for at least 8 years but has made no formal move to develop the end item.

Visors are a mixture of domestically produced and imported items. There is Canadian production and potential for growth in most of the regularly used materials.

1M. Roof vinyl, skylight

Headliners (some laminated) are produced and used in Canada, some bought out and others produced in-house. Little sees a development opportunity for a new type of single piece, snap-in headliner.

Roof vinyl is produced in Canada and supplied to the vehicle companies. There is limited Canadian involvement in skylights.

1N. Cabs

Not applicable here.

SECTION 2 - FRAME

Smaller automobiles have already moved from a body/frame construction to a unitized construction in which the former chassis or frame is eliminated. A partial or mini-frame is used to support the engine.

Similar changes will follow with compact and intermediate automobiles and eventually probably even to the luxury types. The rate of planned change has been indicated by the motor companies. The requirement, then, for full frames is declining and the replacement partial frames will not require the same total facility.

Since frame plants, captive and otherwise, purchased significant volumes of new, sophisticated equipment in 1976 and 1977 for the downsizing at that time, there is now a surplus of good, large press capacity. The motor companies can be expected to ensure full utilization of captive plants as a priority so the opportunities for outside suppliers do not look too encouraging.

Some motor company engineers believe that body and frame construction will return, in the interest of comfort and of noise reduction, but it is more likely that improved design of the unitized body will take care of these factors. So increased frame business is most unlikely and we will have the problem of alternate utilization of frame plants as their current business disappears.

Light trucks and jeep type vehicles will probably continue to use a frame for some time yet but, with surplus production capacity, there will obviously be strong competition for this business.

There may be some move to aluminum frames on light trucks but at the expense of steel and the total requirement will not change significantly. Similar equipment can produce frames in either material.

The potential, then, for growth in frame business is decidedly negative and producers are working hard at diversification into other components or products.

SECTION 3 - FRONT AXLE/SUSPENSION

3A. Front axle

The accelerated FWD application is creating some fairly significant changes here.

The forged type front axle beam remains on some of the vans and light trucks but the forgings are imported. There is presently no Canadian capability for forgings of this type.

Automobiles have moved to independent suspension, made up of combinations of stamped, cast, forged and machined components, some of which are available from Canadian sources. Many of the parts are imported, from captive and non-captive facilities, and there is room for increased Canadian participation.

3B. Front springs, attachments, bump stops

For both leaf and coil there is Canadian capability with some fairly modern equipment, especially on coils. Leaf spring capacities have already been reduced and the move to strut type suspension will increase this move. The Canadian plants, especially the major ones, are mainly owned by subsidiaries of US multinationals. There is little evidence of any growth potential but increased coil capability will be required as a substitute for leaf springs.

Attachments, bump stops, etc. are available from Canadian sources and, in fact, are typical of the type of small, less-critical component which most readily finds its way to domestic plants.

The A.D. Little study sees elimination of all leaf springs by 1985 and their replacement by hollow steel tubing springs. There is no indication, at present, that a Canadian company is pursuing such a development so they will likely rely on technology transfer from a foreign supplier.

3C. Front shock absorbers

Good capability exists for the production of conventional telescoping tube shock absorbers and this is expected to remain in place. The present plants are still heavily oriented to the aftermarket on telescoping units but have been in and out of OEM as the market fluctuated.

Canadian plants are moving to strut production with capacity increase to meet future requirements. There is good growth potential and the producers seem to have taken the appropriate action to capture a fair share of it. With foreign ownership, in each case, there will always be product rationalization which will mean that some sizes will not be available from Canadian plants.

The Little report identifies a need to develop a strut of heavier capacity, a market which is being watched closely. It is more of an engineering function of up-scaling rather than new development. Little also report a need to develop a load-levelling shock absorber for 1985. This has been examined and discussed with one of the producers, over the recent 5-6 years, and should continue to be followed up. It would represent a significant research and development effort.

3D. Front final drive, differential, axle shafts

With the move to FWD, the motor companies are looking to Canada for some new components. Some major in-house capability is being established and components being sourced. In other cases, the major units are being produced outside Canada with opportunity for component supply, especially on the US produced assemblies. Casings, covers, shafts and miscellaneous items are produced in Canada but with opportunities in excess of capacity. The vehicle companies are actively seeking these new components which do offer good potential for Canadian participation.

There is still a world shortage of capacity to produce CV joints but this is gradually being overcome. Canada has no base on which to build and they will probably continue to be imported. European producers, especially GKN, have taken advantage of this opportunity and have moved into the USA on a large scale.

The total absence of independent gear cutting capability and capacity in Canada reduces the potential on this and other items.

3E. Wheel bearings, hubs, seals

Some sizes of wheel bearings are produced in Canada; rationalization precludes the manufacture of other sizes. Sizes up to and including light truck can be produced in high volumes with some of the components being imported. The growth potential here is not great and the technology is very high with resulting capital intensity.

A.D. Little report identified the GM type, lubricated for life, sealed ball bearing as an opportunity for Canada but there is no current indication that it is being actively pursued.

Some hubs are produced in-house, others are purchased from independents, chiefly in the USA. Seals are available from domestic sources but there is scope for increased involvement.

3F. Air suspension

Other than some air-ride shock absorbers, air type suspension parts have not been identified as Canadian produced.

3G. Front stabilizer

There is some Canadian component production. Being a safety related item of fairly high technology, production is generally in-house or by a large multi-national. There is room for growth in the manufacture of this item.

A.D. Little identified a Canadian opportunity for hollow bar to replace solid bar, probably because they were made aware of just such a development being contemplated.

Miscellaneous

A.D. Little commented on a component identified as front suspension, where they indicate that McPherson strut will replace the double A-arm presently in common use. As with the stabilizers above, we do have some production at present. Perhaps the message here is that the double A-arm component producers should be monitoring the coming obsolescense.

SECTION 4 - REAR AXLE/SUSPENSION

4A. Rear axle assembly

GM has the only axle assembly plant, where they have extensive gear cutting equipment.

The rear axle is disappearing from passenger cars but will remain with vans and light trucks. There is some limited Canadian component involvement in this rear axle assembly, generally the add-on items, and certainly scope for growth if the appropriate facilities were in place. The new type axle on automobiles contains a high proportion of stamped parts and there is some involvement there and room for growth.

Spindles, hubs and drums are of Canadian origin but there is still ample room for increased involvement.

4B. Propellor shaft, universal joints

Canadian capability is limited to one company producing units across the board from passenger cars, through light trucks to heavy vehicles. Even in the USA, the number of manufacturers is very small and they have developed a special place through a sound reputation.

With the elimination of the propellor shaft on the FWD vehicles, the prospect of growth here does not look encouraging. Present capacity is adequate for the light truck requirement.

The Little report sees a Canadian opportunity for low cost, high quality constant velocity joints. There was no indication of how such capability will develop from the present ability to produce only the Hooke's type joint.

4C. Differential

Since the demise of Canadian Acme Screw and Gear there is no Canadian production of these units except in one of the captive plants. This is specialized production and it is only likely to grow in Canada if a foreign source decides to locate and produce here. However, this and all other gear type components represent a growth area which is badly needed in Canada.

The A.D. Little report identifies an opportunity for Canadian manufacture as the ring and pinion is replaced (1985) by helical cut spur gears in cast or forged steel (transverse FWD). At present there is no non-captive facility capable of handling this.

4D. Axle shafts

There is both captive and non-captive capability to produce axle shafts, the former for passenger cars and the latter for trucks. As the requirement reduces through shift to FWD, the opportunities are reduced and the current capacity may well be adequate. Capital investment on these items is too high to justify undue risk.

4E. Torque tubes, struts, rods

The materials are all available from Canadian supply and there are several producers of the finished components. There is room for growth but the safety aspect demands high technology with sound experience.

4F. Rear springs, attachments, bump stops

The situation is generally the same as at 3B, front springs.

A.D. Little anticipate that the current leaf and coil springs will be replaced by hollow torsion bar or coil by 1985. They see it as a good opportunity for Canada even though there is no identified early development action taking place. Unless the foreign parents of the present Canadian producers see fit to place such new developments in Canada, this is one are where obsolescence could be quite rapid.

4G. Rear shock absorbers

The comments at 3C, front shock absorbers, have some relevance here.

There is surplus shock absorber capacity in the world at present and the Canadian plants have generally concentrated on the aftermarket. There is some shift from conventional to strut, from in-house to outside suplier but with strong competition, including high quality, off-shore products.

There is spare capacity in Canada at present but some limited involvement in new developments which could take up the slack.

4H. Suspensions

Not really applicable, this relates more to the heavy truck section.

4I. Stabilizers

See the comment at 3G, front stabilizer, it is quite pertinent here too.

SECTION 5 - BRAKES

5A. Front brakes, hubs, drums, discs

The approach here varies with the different motor companies. It goes from integrated, in-house production, through Canadian supply by US multi-nationals to the import of parts from the USA. There is no well-documented record of the supply of the various components but first impression is that Canada has a fair share of this business.

We have been quite active in the supply of asbestos based linings and materials but appear to have played no part in the development and application of materials to replace asbestos. As a consequence, the brake friction material related companies do face obsolescence in the future.

5B. Rear brakes, hubs, drums, discs

Generally as at 5A above.

5C. Service brake pedal and connections

There is sound Canadian involvement here, even extending to total corporate supply in one case. Some is in-house, some is from independents, and the total involvement is quite good. This is fairly standard technology and there is a number of Canadian producers with capability.

5D. Parking brake mechanisms

Again there is a mix of in-house manufacture and supply by independents. The latter are mainly US located. Cable is available from Canadian supply but there is still room for growth in the present total participation.

5E. Cylinders, hoses, lines, etc.

Once again a mix of in-house, independent and import. Cylinders are in-house in one case, bought out in others, with the in-house being both US and Canada. So there is room for growth in this product.

Hoses and lines are produced in Canada and there has been recent capacity additions on solid lines. On brake hoses, there is potential for growth in supply to Canadian and US assembly plants.

The A.D. Little report identifies a Canadian opportunity in the development of low-cost, non-corroding lines. Such a development is already in progress. There is, however, development of non-corrosive, silicone fluids which may well supersede the current ideas.

5F. Power braking equipment, air compressors

Since the Bendix plant closed in Canada, there is no involvement in the power braking systems. It is imported from the USA, from in-house and independent sources.

5G. General

From the above, it can be seen that there is quite a mix of supply. The vehicle companies and A.D. Little identify opportunities for Canadian involvement in the skid control systems, with low cost, intelligent speed and load sensing systems. At present there is no record of any company being engaged on such work.

SECTION 6 - ENGINE

Most of the engine production is carried on by in-house facilities. Some components are produced by independents with final assembly in-house. The move to 4 cylinder units will be at the expense of 6 and 8 cylinder. Canadian production is currently 8 cylinder with some limited plans to move down to 6 cylinder. In the long term, then, Canada could run the risk of having obsolete 6 and 8 cylinder engine capacity.

6A. Block, crankcase, liners

Block and crankcase are currently captive to in-house facilities. These may be switched to aluminum and there could be an opportunity, at that time, for Canadian production. This will depend upon the policy of the motor companies and the ability of Canada to establish the appropriate facilities.

The Little report also indicates potential for Canada in 2 areas:

(1) Aluminum block with steel or cast iron liners, by 1985.

(2) Cylinder liners, centrifugally cast in iron.

6B. Cylinder head

These have generally been cast and machined in captive plants and that remains the case on the current engines built in Canada. There is a move to aluminum, starting with 4 cylinder engines and some participation by Canadian companies. The motor companies have identified this component as being of high potential for Canada; a start has been made in that direction and the rate of growth will be directly related to the establishment of suitable facilities.

The Little report suggest that an opportunity exists for Canada on aluminum cylinder heads with valve seat inserts of phosphor bronze, iron, steel or powdered metal.

6C. Crankshaft

Since these went mainly to castings, there is virtually no Canadian involvement, except in the motor company captive facilities. There is no reason to expect any change to that situation.

On the low volume items which remain as forgings, there is independent Canadian capability, but no record of any involvement. Crankshaft dampers for automobile engines are produced in high volume in independent facilities. Capability exists for the machining of the military jeep crankshafts.

6D. Flywheel

Whether stamped or cast, they are presently produced in-house with some of the stamped ones being of Canadian origin. The starter ring is not currently produced in Canada and there have been several opportunities to become involved in that item.

Production of the flywheel and the flywheel housing have been offered, by motor companies, as a good potential area for Canada.

6E. Con-rods, pistons, pins, rings

There is some Canadian in-house production of con-rods and caps and the balance is imported. The independent forge shops no longer have this business, except on limited applications. The switch to 4 cylinder engines has had its effect on this item, and there is obviously no growth here.

Pistons are produced in-house by GM but the remainder are imported. Being an aluminum casting we should be able to develop a competitive position, but there has really been no effort made in that direction. A.D. Little see the present piston being fitted with nickel inserts for diesel application and offer it as a good opportunity for Canada.

Piston pins are usually cold forged and we have only limited production capability and capacity in this respect. It is a capital intensive business with very high volumes required to justify the equipment costs.

OEM piston rings are no longer produced in Canada, the last producer ceased production in 1980. The smaller engines resulted in a decline in requirement and in this case the Canadian subsidiary closed and the business was transferred to the US parent. There remains a limited production capability on aftermarket rings but it is not the kind of base on which to develop OEM supply.

6F. Oil pans

Since these are stampings (or they are drawn), they are classified accordingly and the statistics do not provide a ready picture of Canadian involvement. There are several domestic companies capable of producing these components and it is assumed that some such production takes place. GM produce them in-house in Canada.

Until a sub-sector profile is completed on stampings (or even oil pans) we cannot easily identify our position.

A.D. Little indicate that there will be a change by 1985 to double-wall stamped steel (for noise reduction), or to stamped and moulded plastic, and that these represent opportunities for Canadian suppliers. Truck builders have already moved in this direction, with insulated oil pans. Similar comment would apply to engine rocker covers.

6G. Oil pump, drive, tank, filters, coolers

GM produces oil pumps in Canada, others purchase them in the USA. Some pump components are supplied by independents.

Filters are almost entirely purchased in the US for OEM application, the motor companies generally see Canadian filter capability geared to the aftermarket. This would seem to be an area of potential growth in the OEM.

Engine oil coolers have not been fitted as standard equipment on automobiles to date but A.D. Little see them being required as engines run hotter. We have the capability to develop and produce them but as yet we have no indication that the engine builders are out looking for them.

6H. Cooling fan, clutch and drive

Drives are apparently all imported and that represents a logical growth area for a fan supplier. They consist of electric drive in some instances and can incorporate a clutch. Drive belts and kits have also been offered as good potential.

Fans are produced in Canada, in metal and plastic and this is an area where the domestic supplier has kept out front in technology. They are well aware of future trends and are reacting accordingly; in fact the approach taken here through early liaison with motor company development staffs could be a lesson to others.

A.D. Little suggest opportunities exist for Canada in 2 areas:

(1) Moulded rigid plastic fan by 1985.

(2) Electric drive by 1985, as replacement for belt and pulleys.

6J. Water pump, coolant, thermostat

Pumps are cast and assembled in Canada by GM. They will go to aluminum in due course and every effort should be made to retain them in Canada.

The pumps fitted by other builders are imported, except for some minor components. Ford identify a need for impellers to be supplied to their US assembly plant.

Thermostats are produced in Canada but the high volume OEMs buy them in the US, indicating a growth area where we already have a capability.

Anti-freeze is readily available from domestic chemical companies.

6K. Manifolds and heat control

Manifolds were traditionally produced in-house of grey iron but that is changing. Intake manifolds are going to aluminum castings or perhaps even to a steel fabrication. Exhaust manifold could remain in grey iron or be fabricated from a stainless steel such as the 409 variety. Canada has a start on both manifolds in these new materials but seems to lack an organized approach to absorb the growth which is available.

A.D. Little identified opportunities in both types of manifold:

Intake - to go to aluminum or stamped steel.
Exhaust - to go to stamped steel or bent tubing.

Heat controls may take a variety of forms such as the manifold and carburetor types and this product would warrant some detailed examination in order to determine the action required for sustained growth. There is Canadian supply at present and it is by a company which has a record of staying out front technologically.

6L. Turbochargers

There is no Canadian production of the turbochargers but a very limited involvement in some small components. There is also capability and experience in the production of the volute castings but no participation at present.

The A.D. Little report identified Canadian opportunity as follows:

(1) Conventional turbocharger production by 1985.

(2) Variable geometry units (with ceramic components) by 1990.

(3) Stainless steel tubing for turbochargers.

(4) Replacement seals and wheels for auto turbochargers.

These Little observations seem over-optimistic under present circumstances unless a technology transfer from outside the country can be effected. None of these four developments is proceeding now, and it is difficult to identify potential participants.

6M. Air cleaner

There is only limited Canadian involvement in OEM production. Most of them are brought from the US where they are manufactured, some in-house and some by independents.

A Canadian facility exists to produce the stamped casing which is then married up with a Canadian element and used in limited application for OEM passenger cars. This might well be an area with good growth potential.

These units are likely to change to plastic or aluminum in the 1985 time frame, and could present sound opportunities for Canada if the appropriate development is put into effect in the near future.

6N. Throttle, controls

There is a mix, some in-house, some independent, both US and Canada. Throttle is often part of carburetor which is covered at 8C.

The control linkages, rods, etc. are produced in Canada by several companies and there is more business available if it is pursued aggressively. Accelerator cables are offered as good potential, with fairly low technology and requiring minimal capital investment.

The Little report indicates that Canada should be able to participate in a diesel cruise control to hold speed constant on downhill.

6O. Camshaft, drive, lifters, valves, springs, rocker arms

Camshafts are no longer produced in Canada, they are generally from captive plants, all in the USA. Little report a Canadian opportunity, in the 1990 time frame, for an elective, variable valve timing device for camshaft application.

The driving gears (or sprockets and chains) are not currently produced in Canada except for a timing chain facility of a US multi-national. Anything to do with gears, Canada is not very strong. A.D. Little record an opportunity to manufacture toothed belt which they believe will replace the gears and silent chains by the 1985 model.

Push rods are Canadian in many instances; hydraulic tappets are usually imported. A.D. Little believe that Canada has an opportunity on future generation tappets, in ceramic material, by the 1990 model year. They repeated the ceramic potential in several areas and perhaps their plant visits gave them some insight in Canadian capabilities over and above those known to the writer.

Spring capability and production in Canada is quite good and requires no comment.

Valve production in Canada is limited to a subsidiary of a U.S. multi-national but the volumes there are very high. The manufacturing techniques and the production equipment are very special and involve high technologies which preclude entry into the business by any but the large organizations with background in that product.

Some rocker arms are in-house production, others are by independents. The motor companies generally identify a shortage in Canada of the high-precision, high-volume type facility which could produce this and similar components.

6P. Accessory drives

There is a good pulley production capability and a considerable involvement in supply. Prices are said to be high but that probably reflects the very high quality of the product.

There are 2 belt manufacturers and both supply some part of the requirement. Duty on belt component materials has been cited as a factor in reducing Canadian competitiveness, against a finished item which enters duty free. There is room here for greater domestic production.

6Q. Miscellaneous

A.D. Little identified other opportunities as follows:

HVAC controls - non vacuum controls for diesel engines.
Knock sensors - to replace spark plug activated sensor.
Programmable EGR for diesels - no current equivalent.
Air mass flow sensor - improved accuracy for fuel metering.

SECTION 7 - TRANSMISSION/CLUTCH

7A. External controls

Canadian capability and supply on shift levers is quite good. Other minor components and sub-components are also supplied.

7B. Casing, housing

There is some Canadian involvement here, by independents, but the opportunities far exceed the matching capacity. So, at present, most units are imported from captive or independent suppliers. Some new suppliers have been identified but this will continue to be a growth area, especially where aluminum die castings are involved.

7C. Shifting, clutch, mechanism

There is Canadian production of some shifting mechanism parts (levers, etc.) but other components also offer growth.

There has been no OEM clutch manufacture for about 20 years and it has not really been regarded as a growth item for N. America where automatics are so popular. However, vehicle companies now identify the clutch disc and plate assembly as a suitable item for Canada as the use of manual transmissions increases. Transmission and clutch shift cables also seem to have potential. Selector assemblies are also seen as suited to Canada. The vinyl dipped rubber boot or gaiter on the transmission offers yet another component opportunity.

7D. Gears, gear sets

Other than an in-house transmission plant of one of the vehicle companies, there is no Canadian capability for high volume gear component production.

This is a good growth area but the capital investment requirements and the demanding technology have scared off any potential participants. The technology develops over a long period of time and there is currently no suitable starting base in Canada. Knowing of Canada's absence of this capability, several off-shore companies have looked at the possibility of facility establishment but none has chosen to move in.

7E. Valves, pumps, controls

This is quite high technology and Canadian participation is limited to some minor component suppliers - screw machine type products. The main items are either from captive plants in the US or from the long-standing proprietary manufacturers who would be almost impossible to displace.

7F. Transmission oil coolers

This is one area where Canada has excellent capability and capacity, in a subsidiary of a US owned multi-national. There is also US located captive plant production. Once the auto business picks up again, there is good growth potential with fairly modest capital outlay.

Supply of transmission fluid is another area with growth possibility.

SECTION 8(A) - FUEL SUPPLY

8A. Tanks

There was good involvement at one time in this item but it has now mostly disappeared from Canada. Much of the requirement is now supplied from captive facilities in the USA. There is some limited production of tank components, mainly in unassembled halves which do not offer much employment.

Considering that shipment involves high cube at low weight, there should be significant advantage for domestic producers to supply the Canadian assembly plants. The material availability in Canada is one problem.

A.D. Little believe that the material will make a major shift to moulded plastics by 1985 but there is little evidence of Canadian companies being engaged in such development.

Gas tank caps have been suggested, by the vehicle builders, as being a suitable product for domestic manufacture.

8B. Fuel lines, pipes, filters

Fuel lines and the raw material involved are fairly well covered in Canada, but too much is still bought outside the country.

On filters, Canadian emphasis is on aftermarket with much of the OEM being imported. This, then, is an area of potential growth.

8C. Carburetors, pumps, choke, injectors

There is some production of fuel pumps and carburetor parts but not in proportion to usage. Pumps are mainly from in-house facilities, US and Canada, with the balance from large, world-renowned suppliers of foreign origin. It is high technology business.

Fuel injection on gasoline engines falls in this component category but there is no involvement and no capability in Canada at present.

A.D. Little see the fuel pump going electric - a system which has been common in Europe for over 50 years. They also see plastic carburetor, electronically controlled and in that particular item there has been a proposed Canadian design. Developments since the writing of the Little report seem to favour the disappearance of the carburetor and replacement by indirect fuel injection.

Choke housings and fuel pump eccentrics have been specifically identified as offering good potential for production in Canada.

With the increasing use of diesel engines, there is a comparable growth in the application of appropriate fuel pumps and injection equipment. None of this is made in Canada nor is there any indication of anyone proposing to enter the market. A.D. Little record it as an opportunity for Canadian manufacture, presumably under license from someone like Bosch or CAV. They see Canadian potential in the manufacture of electromagnetic injectors for diesels and also in a linear displacement actuator for diesels. Both will be required by 1985 with the linear displacement actuator moving on to an electromechanical fuel injector by 1990.

Generally speaking, there has been very little Canadian involvement in this 8C item, limited to the production to drawing of some minor components.

SECTION 8(B) - EXHAUST SYSTEM

8D. Exhaust pipe, tail pipe, hangers, brackets

All of the major US manufacturers have subsidiaries in Canada and on the face of it, we appear to have our share of the production aspect. Some of the materials used (409 stainless, aluminized steel, etc.) are not produced here which removes the content value and also the advantage of the lower values of the Canadian dollar and domestic steel.

There is special technology involved in working with the current and future materials but much of it is now well known to Canadian companies. There is no up-to-date record of this sub-sector of our industry and it would be a worthwhile exercise to examine it and chart its future. It might well show a need to upgrade the production equipment and methods in some instances.

Vehicle companies see this as a growth area for Canada especially in fabricated piping of large I.D. and also on clamps and 'U' bolts.

8E. Muffler

This is similar to 8D above but with a much reduced Canadian involvement. Many are imported from the USA, from both captive and independent suppliers. It is low margin business which relies on high volumes and the resulting scale economies, so it demands full automation.

There is room for greater production in Canada and it is under continual examination by the leading participants.

8F. Catalytic converter

At the outset of converter requirement, a Crown assisted development took place but it was not taken to the production stage. There is now no catalytic converter manufacturer in Canada, only some modest involvement in the supply of certain components (casings, brackets, etc.). These latter items involve low technologies such as stamping, presswork, etc.

Without a full examination of the market and the current supply situation, it would be difficult to determine what role exists for Canada. One of the vehicle companies sees it as good potential for Canada and A.D. Little agreed with that, especially if some action is taken before anticipated 1985 design and material changes. They also expect further major design changes by 1990 and 2000.

8G. Emission controls

This covers a very broad and changing spectrum. Canada has quite a presence through a US owned multi-national which has maintained a pre-eminent position with extensive research and development efforts.

There is potential for much greater activity, including the supply of the products to the foreign vehicle companies who ship automobiles to North America. We should not allow the success of the one company to cause us to overlook the many other areas of growth which exist in this type of componentry.

SECTION 9 - STEERING

9A. Gear, column, lock

There is no Canadian company producing the steeing gear and only a very limited involvement in some of the minor components. Most of the gear is supplied from captive US facilities. It is high technology business and there is no apparent reason to have duplicate facility in Canada.

One of the motor companies identifies power and manual rack and pinion gear as having good potential here but that may simply be because no such product exists at present. They also identify column shafts as being equally suited here. The base from which to begin seems to be lacking and some foreign involvement would likely be imperative.

A.D. Little recorded good opportunity with the move from recirculating ball type to rack and pinion but the development of the latter, and its production seem to be already very mature.

9B. Steering wheel

The 2 domestic producers are subsidiaries of US companies, perform little or no development here but provide CVA. There is some product rationalization within these corporations, who allocate the particular products on good, sound, business grounds.

The down-sized vehicles offer growth opportunities involving new technologies and there is some planned Canadian involvement. There is potential off-shore business and still some domestic assembly requirements to be captured.

9C. Linkages, arms, ball joints, tie rods, etc.

There is one major producer of these items but with a heavy bias to aftermarket. Further, they are oriented to the rear wheel drive vehicles. There is no component development, simply make to drawing type operations in high volume. There are recognized leaders in this field producing parts in the US and there is really no compelling reason to establish in Canada. They are safety related items which demand the closest control.

Motor companies identify potential here on ball joints, sockets, upper arms and shafts as well as track bar assemblies.

The CV type ball joints of the front wheel drive vehicles will have an increasing requirement. They demand high technology which we do not possess and where such companies as GKN have an enormous lead. A.D. Little identified it as an opportunity for Canada but that might have been a little over-optimistic. GKN looked at Canada as a potential production location but then chose US sites where greater incentives were offered.

9D. Power units

These units are not produced in Canada. They are quite specialized and we have so far taken no steps to develop a capability. There is potential for the supply of hoses and fluid.

The Little report sees a requirement for a power steering oil cooler to offset the elevated under-hood temperatures. This could be developed by a Canadian based company once the requirement is firm.

SECTION 10 - WHEELS AND TIRES

10A. Wheels

In conventional steel wheels, Canada has good capability, in plants operated by subsidiaries of US multi-nationals. The plants were established at the time of the Auto Pact and now begin to require major investment in modern, automated equipment. US plants are of similar vintage so the competition there has no advantage. Subject to availability due to rationalization, Canadian vehicle plants use domestic wheels, for automobiles and light duty trucks.

A.D. Little see the current stamped, rolled wheels being replaced by lightweight units by 1985 but there is no development here in that direction. There is no move, either, to aluminum or plastic.

On aluminum wheels, there is no Canadian OEM capability and only modest involvement in aftermarket, specialty and performance types. Volume opportunities have been examined in the past but failure to capitalize on them allowed the UK producer (GKN) to move in and establish production in the USA. Cast aluminum wheels have been offered, by one of the car companies, as having good potential.

Similarly, it has been indicated by a vehicle company that wheel weights should offer an opportunity for Canada.

The future of this component seems quite difficult to predict at the moment and Canadian producers seem to be sticking to the belief that the current materials will remain. It is an area where it seems most important to stay close to the advanced engineering groups of the motor companies in order to be prepared to react to any planned changes.

10B. Tires

There have been numerous, detailed profiles on this sub-sector and so little detail will be included here. It is quite a complex industry which does not lend itself to description in generalities. There is capability to provide all domestic OEM tires but many are still imported, on a duty drawback basis.

One of the vehicle companies identifies the space saver tire and canister as having high potential for Canada. A.D. Little offer the run-flat tire by 1990 and the mini-spare by 1985.

SECTION 11 - CHASSIS SHEET METAL (PLASTIC)

11A. Fenders, front and rear

These are 100% in-house production and until recently have also been 100% US manufacture. Some items are now being produced in Canada but this practice will likely have limited application. In any case, the decision rests with the motor company, presumably for CVA, and will not be influenced by outside factors.

11B. Running board

Not generally applicable to OEM. There is some aftermarket production.

11C. Hood

Generally as at 11A above. Motor companies believe that hood insulators and release cables could be produced competitively in Canada.

11D. Miscellaneous sheet parts

This covers the numerous small stamped parts which have generally been suited to Canadian production. They involve minimum cost in machinery and are not technologically demanding. They can be handled in many of the smaller shops throughout North America and tend to be highly competitive and capable of transfer from one supplier to another.

A move to plastic has to be anticipated and this trend requires careful attention to ensure optimum Canadian involvement.

SECTION 12 - ELECTRICAL/INSTRUMENTS

There is very incomplete data available on this sub-sector and a complete profile is badly needed. The data below is the best currently available and it could be updated once a profile has been prepared.

12A. Battery and leads

There appears to be good and adequate battery manufacturing capability, all in foreign owned companies, including a captive plant of one of the vehicle builders. There has been a shift of manufacturers in recent years, some have left and new ones have been established.

Battery cables are mainly imported and so this must represent an area of growth potential, through the replacement of imports.

12B. Battery box

In metal or plastic, these are readily available from Canada. They are typical of the low-cost, low technology item which most readily finds its way to local production.

12C. Front lamps, turn signals

There is a mix of captive, domestic independent and foreign supply here. There is some involvement in bulbs, sealed beams, headlamp casings, etc. but it is not up to the Canadian assembly requirement and many items are imported.

A.D. Little identify 2 significant opportunities for Canadian manufacture:

Headlamps - halogen or quartz/iodine bulbs with plastic lenses by 1985.

Fog lamps - new requirement, not presently offered as an OEM standard.

Motor companies have confirmed a need for production here of quartz-halogen type lamps.

12D. Rear lamps

Much of the manufacturing capability is in captive plants located in the USA so there is considerable import here. Bulbs are of Canadian production.

A.D. Little record an opportunity for manufacture of a new light by 1985 with red light for active braking and amber light for engine braking.

12E. Horn

There is currently no Canadian production of any kind and this must rank as a good area for growth. The #1 US producer has a Canadian plant but so far has not produced horns here.

An air horn requirement has been identified by one of the vehicle companies.

12F. Wiring, fuses, switches, bulbs

This area deserves closer examination and more adequate documentation to determine the appropriate action required to improve Canadian involvement.

Wiring has traditionally been produced both at Canadian captive and independent plants. Some of the latter have disappeared now and the former will probably be contracted out in the near future. It is labour intensive business which was attracted to Canada before wage parity reduced competitiveness. There is opportunity for increased production but it must be approached carefully to ensure that it can remain profitable. The material is readily available in Canada. One of the motor companies suggests high energy wiring as good potential; the A.D. Little report sees a switch to copper foil for wiring by 1990. Fiber optics was not mentioned but would surely deserve attention.

Canadian production on fuses and switches could be increased and some of the specifically identified areas are ignition lock-sets, circuit breakers, capacitors, solenoids (such as seat latch, carburetor, etc.), and switches for headlamps, windshield wipers, courtesy lights, turn signals, etc. The A.D. Little report suggests an opportunity will exist for 1985 and onwards on solid state relays and solenoids with lower EMI characteristics.

Bulbs are available, in volume, from domestic suppliers and are generally being used.

12G. Alternator/generator

GM have Canadian in-house production capability, the balance are from the US, some in-house and others by independents.

12H. Starter motor/solenoid

As at 12G above. Starter end plates have been suggested as a component suitable for Canadian production.

12J. Ignition, distributor, coil, regulator

The move to electronic controlled ignition is continuing to change requirements and there is presently no record of Canadian involvement. First impression is that the majority of the items is imported.

Motor companies suggest opportunities exist in spark delay valves, distributors, and governor and distributor gears. Little identified a requirement, by 1990, for electrical switching (as opposed to mechanical) of the spark distribution. This is a European development by Citroen.

12K. Spark plugs

GM have in-house production in Canada and the majority of the balance of Canadian requirement is supplied through imports. Some low volume OEM requirement is filled by the one domestic producer, who normally concentrates on aftermarket business. This is a very competitive product area where highly efficient plants exist in foreign countries. The chances of displacing the imports are not good. The CVA on plugs is also quite minimal.

12L. Electrical convenience and miscellaneous items

There is no detailed record available and it must await completion of the planned sub-sector profile. Vehicle company has indicated requirements on lamp assemblies for interior, courtesy, cargo, license plate and engine component and all within Canadian manufacturing capability.

12M. Radio, tape deck

The 2 major vehicle producers, GM and Ford, have Canadian manufacturing facilities, one will likely be replaced by import in the near future. Chrysler have a captive US plant and supply to AMC also. This is a product which is increasingly being moved to the Far East, either for total assembly or the components.

The antennae requirement could be supplied from Canadian plants.

12N. Instrument panel

The main support panels seem to be mostly of US origin but in many instances they are matched up with a Canadian produced pad. There is opportunity for increased stamping activity on the support and for any plastic involvement as the switch from metal continues. Clusters are produced in Canada but there is room for some growth. This component involves metal and plastic parts.

A.D. Little see the instrument panel changing to a moulded plastic filled with wood flour (like the FIAT unit) by 1985 but there is so much change in material development that this needs continual watch to keep abreast of requirements.

12O. Instruments

There is no Canadian production of instruments but speedo face panels are printed. The motor companies also believe that printed circuits and flexible display tubes are good potential.

In the A.D. Little report, the following areas were offered as suited to Canada:

(1) Thinner section gauges (instruments) as panel area real estate becomes more critical.

(2) Advanced display components, liquid crystal and light emitting diodes.

(3) Speedometer drive - switch to electronic speedometers from present cable and gears.

With no base from which to start, the development of this product area will naturally be difficult and might proceed most effectively through technology transfer or the establishment of a facility by a foreign owned manufacturer of long standing.

12P. Electronic equipment, sensors

This seems to be a sub-sector with enormous potential in the immediate future, but at present there is no documented detail on where we stand in Canada. It deserves some priority attention, the opportunities are current.

Motor companies see opportunities in flexible printed circuits, transistors of all types, electronic control units, etc. The A.D. Little report listed 2 others:

(1) Linearized air/fuel ratio sensors - required by 1985 for stable closed loop control during non-stochiometric operation.

(2) Electronic engine sensors - OEM and aftermarket.

SECTION 13 - RADIATOR, GRILLE, ETC.

13A. Radiators

Peak production in Canada by the 3 producers (1 captive, 2 independent) has reached about 2 million units/year against a domestic assembly requirement of about half that figure. The balance, of course, is exported to US plants.

This is fairly high technology, changing quite considerably at present with downsizing and weight reduction. Radiators were originally produced in-house but some of the motor companies have released the production, in part or in total, to independents. It is a high energy use product using materials available in Canada so it has some attraction here.

The Little report anticipates a move to aluminum core with plastic tank. Canada has a state of the art aluminum radiator ready for volume application.

13B. Grille, deflectors, shutters

A number of domestic companies presently produce grilles and deflectors in metal or in plastic. There seems to be an acceleration in the switch to plastic but motor companies still identify a need for aluminum grilles. The finishing methods (plating) there are critical. They also see air-foils, spoilers and deflectors as suited to Canadian production.

This is very much a potential growth area.

13C. Surge tank

These are now generally blow-moulded in a plastic material and there is excellent Canadian capability and participation. It involves high tooling and equipment costs for a relatively low-priced end product, so requires very high volumes to be profitable.

Motor companies have identified opportunities for growth here and the Canadian parts companies in this field seem to be approaching it quite aggressively.

13D. Heaters

The radiator manufacturers generally produce heater components, too, so there is good Canadian capability on the built-in heater, particularly on the cores.

For block heaters and in-car heaters of the portable type, good production capability exists in Canada with sound growth potential. They are not normally fitted as OEM items but are suitable for sale to off-shore vehicle producers for incorporation into automobiles destined for North America.

SECTION 14 - BUMPERS

14A. Bumpers

This has been a changing item in recent years and the future designs still look quite unpredictable.

Since the closing of Houdaille, there is no Canadian production on passenger car bumpers. There is some US in-house capability with the balance from independents. Light truck bumpers are produced in Canada with good growth potential available.

The Little report identified a shift to moulded plastic by 1985 but there is currently no evidence of any Canadian company working on it. If that prediction is accurate, light trucks alone will have metal bumpers, and we have capability there.

Production in Canada does not match consumption on auto and truck bumpers so there is room for growth. It does not involve much assembly labour and is quite capital intensive. The future of the component will remain changeable for some time yet and it requires continuous monitoring in order to keep current and ensure maximum participation.

14B. Bumper accessories

These include brackets, guards, hardware, inserts, special trim, etc. There is Canadian capability and acceptable participation, such products seem to have attracted interest, probably because of the reduced capital investment and limited technologies involved.

14C. Bumper energy absorbers

There is presently no Canadian involvement and no indication of any interest in moving into this product field. A capability exists from a development in the early 1970's. Limited production took place but volume orders were lost due to under capitalization of the production facility.

This should represent a most natural extension of a shock absorber facility but it would be necessary to determine the present foreign production capacities available before embarking upon re-establishment in Canada. It could be a growth area and so deserves to be monitored.

SECTION 15 - MISCELLANEOUS

15A. Gaskets, seals, packings

There is some Canadian involvement in all these components but room for increased activity. We have declining production as new technologies and products have emerged and we have not kept up with them. The A.D. Little report identified Canadian opportunity by 1985 in silicone RTV or an aerobic to replace the mainly paper/fibre gaskets.

The motor companies offer the following for Canadian participation with good prospects:

- Lip seals
- Weatherstrip
- Moulded 'O' rings
- Plugs
- Axle pinion seals
- Wheel bearing seals
- Power steering seals - pump shaft
- Ball joint dust seals
- Water pump seals
- Crankshaft seals

15B. Cables, hoses

There seems to be an acceptable level of participation here at present but room for continued modest growth. Specific components identified as offering the best possibilities include:

- Silicone hoses
- Oil cooler hoses
- Power steering hoses
- Power brake hoses
- Air conditioner hoses
- Vacuum tubing

15C. Bushings, bearings, grommets, mounts

There is no accurate record of our involvement in these products but it does appear that we have a good portion of the business. There is always room for growth, and the vehicle companies have identified the following:

- Grommets
- Camshaft bearings
- Crankshaft bearings
- Roller and needle roller bearings
- Bushings

15D. Fasteners

This covers quite a broad product range and it is not too well documented with respect to automotive supply. Stelco appears to dominate this sub-sector with several other companies in support.

By and large the motor companies report that Canadian producers have not been aggressively seeking this business and possibly have found more profitable markets. They tend to want to pick off the good and easy items but must also be prepared to engage in some of the more difficult ones. Locknuts, screw machine parts and washers were specifically identified as good areas. In many items there is opportunity to participate in world scale activities.

15E. Springs

This is not road springs; it is the small miscellaneous spring requirement.

There is good involvement by Canadian companies and little can be offered here in the way of new potential business.

15F. Tools, equipment

This is usually limited to the wheel brace and jack. There is only one remaining Canadian jack producer who supplies 3 of the 4 major auto producers. There is a requirement for jack handles, suited to Canada, and also for manufacture of wheel braces.

15G. Miscellaneous others

There are 3 areas covered by the A.D. Little report where Canadian opportunities are documented. In each of these product areas we have sound Canadian involvement but the new developments need to be watched.

Paint - the conventional solvent base will be displaced by 1985 by a water based paint with lower baking temperature. By 2000, that in turn may give way to self-coloured plastic parts.

Oils and lubricants - conventional fossil-based to be replaced by synthetic "slippery" oils by 1985.

Fuel - There will be limited penetration of synthetic fuels by 1990 and this will become significant by 2000.

In addition, motor companies see adhesives and sealers as offering good prospects for Canada.

SECTION 16 - APPENDIX

Additional to the detail on each specific component item, sections 1-15, there are some main product and process areas which deserve comment.

16A. Plastics

In May 1980, F.T. Gerson Limited produced a report entitled "Plastics Components for Automotive Application" and that adequately documents the various opportunities of this sub-sector. A copy was made available to all the Canadian companies with appropriate capability and interest.

The motor companies have specifically offered opportunities in plated plastics (decorative and functional components), lamp parts, die-cut foam rubber and in various fiberglass mouldings.

16B. Forgings

The involvement in automotive forgings has decreased since crankshafts went to castings, smaller engines reduced the number of con-rods, etc. The remaining activity, some in-house and some in multi-nationals, is still quite substantial and there is room for growth through a well planned approach and recognition that significant capital expenditures are involved.

16C. Castings

This is one area of significant growth potential, especially in aluminum, as work continues on weight reduction. The motor companies have identified requirements on castings in iron and aluminum, both rough and machined. Some capability exists in these products but the continuing opportunities there seem to indicate that quite dramatic growth could be achieved given a systematic, planned approach. The capital investment will obviously be quite high and an assisted approach may be required.

16D. Materials

As new materials are developed and used on weight reduction, high temperature, increased durability, etc., there are some significant opportunities for Canadian supply. This will include HSLA, HSS, magnesium, aluminum, 405 and other SS, plastics, ceramics, composites, etc. It will require the co-ordination and co-operation of all the parties involved to ensure that Canada captures its share of this business.

HEAVY TRUCKS

INDEX

(with indication of growth potential)

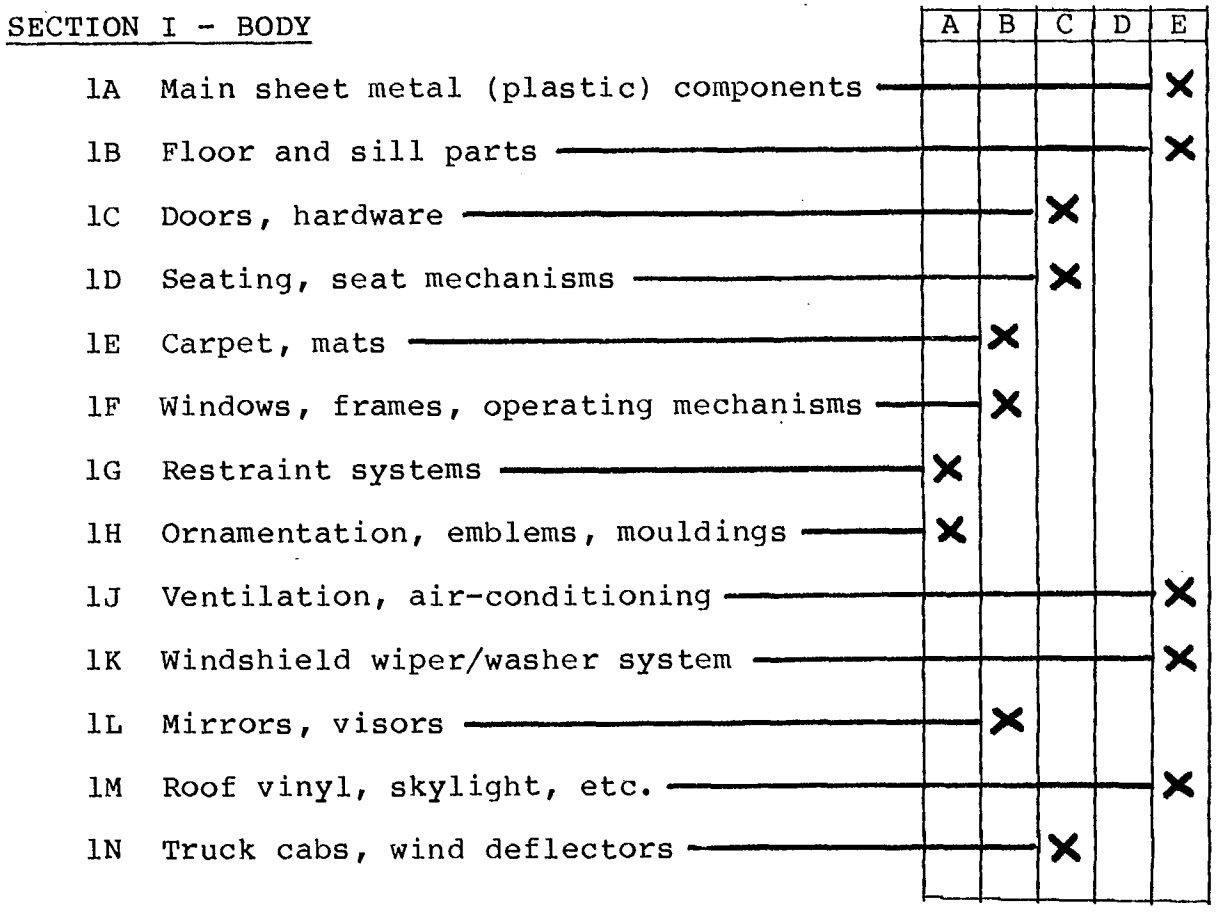
A - Growth opportunities which can be handled in existing facilities.

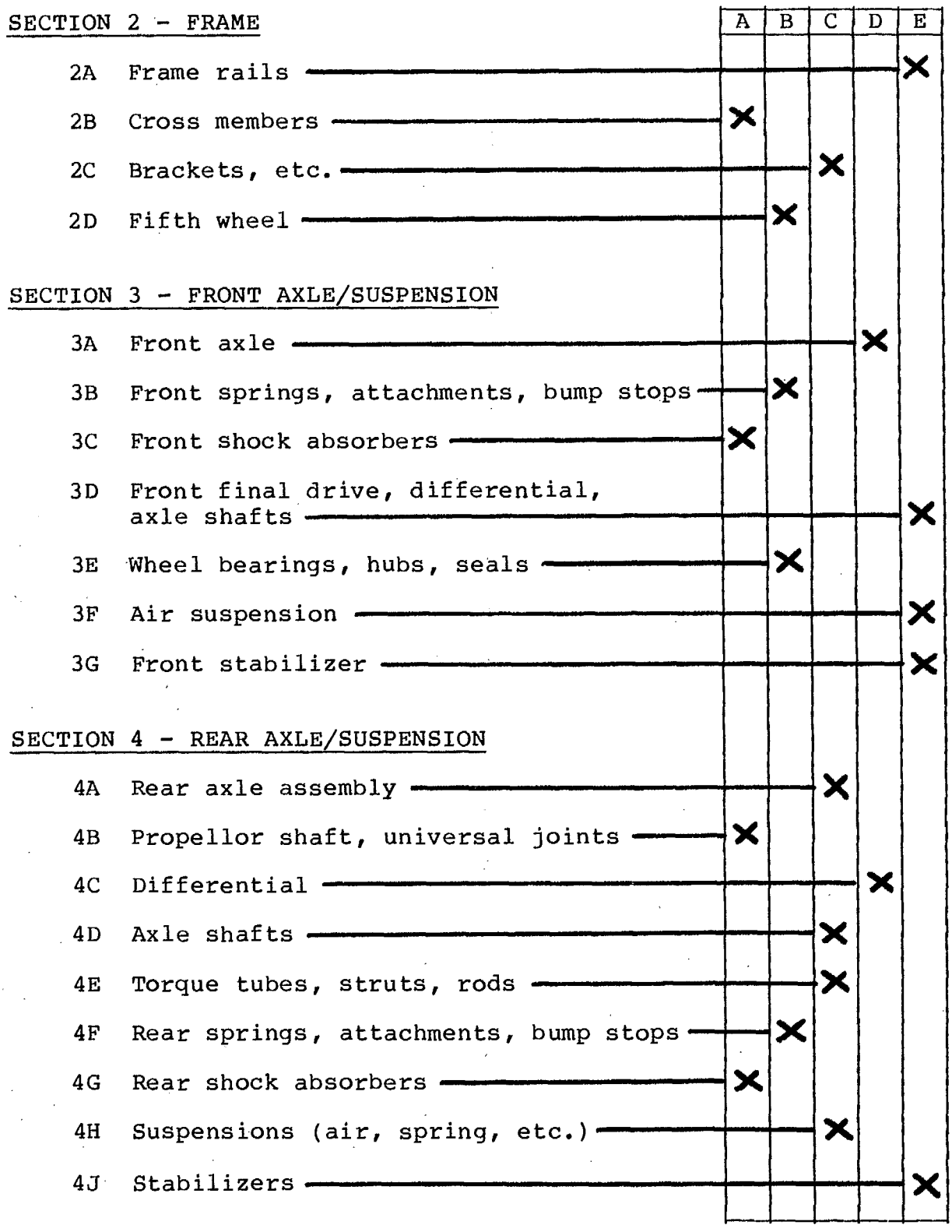
B - Canadian capability exists and identified expansion opportunities involve modest capital costs.

C - Canadian capability exists and identified expansion opportunities require major capital investment.

D - Little or no capability presently in place in Canada but development of appropriate facility is of real interest and importance.

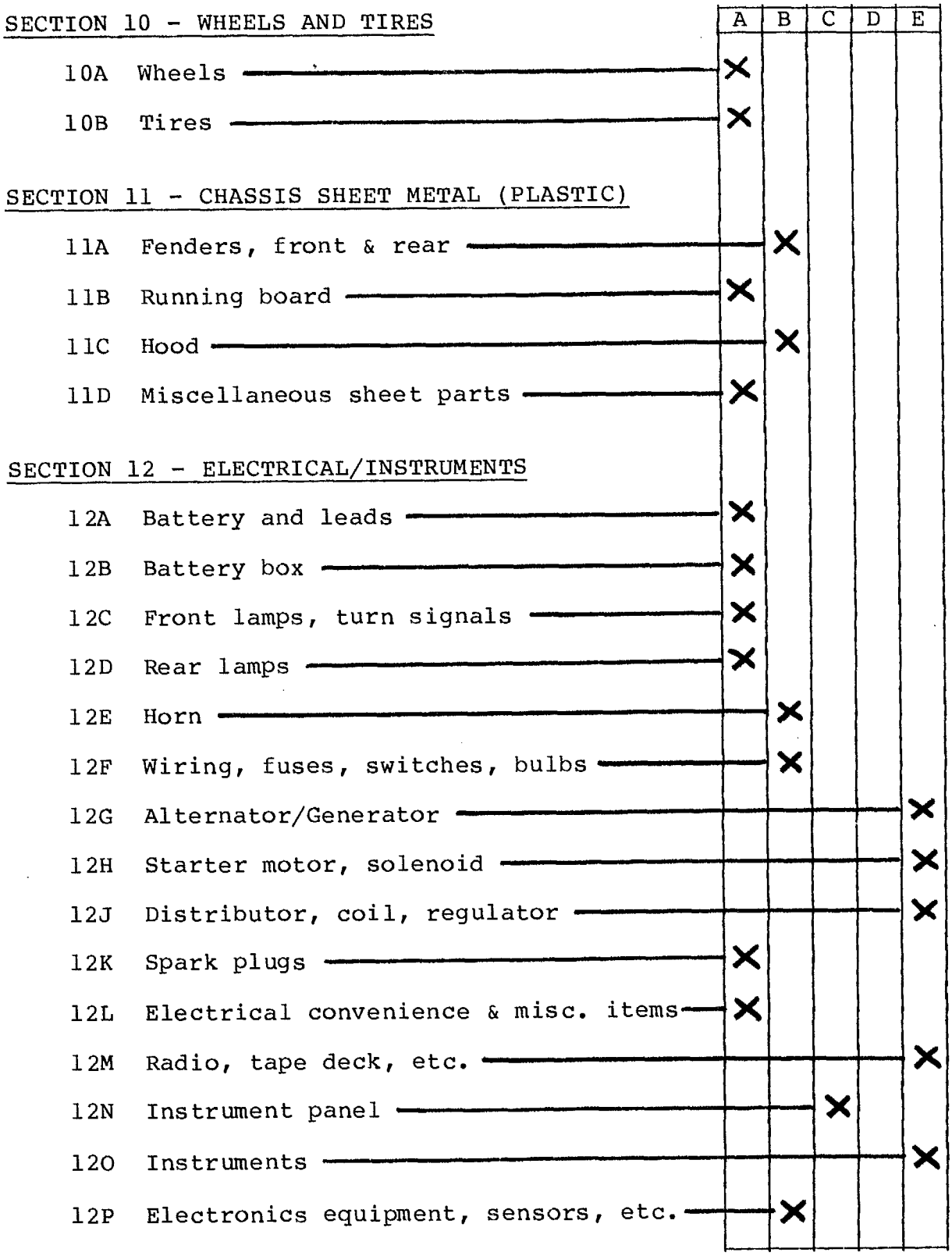
E - Canadian involvement appears unlikely.




SECTION 2 - FRAME
A
B
C
D
E
2A Frame rails
2B Cross members
2C Brackets, etc.
2D Fifth wheel
SECTION 3 - FRONT AXLE/SUSPENSION
3A Front axle
3B Front springs, attachments, bump stops
3C Front shock absorbers
3D Front final drive, differential, axle shafts
3E Wheel bearings, hubs, seals
3F Air suspension
3G Front stabilizer
SECTION 4 - REAR AXLE/SUSPENSION
4A Rear axle assembly
4B Propellor shaft, universal joints
4C Differential
4D Axle shafts
4E Torque tubes, struts, rods
4F Rear springs, attachments, bump stops
4G Rear shock absorbers
4H Suspensions (air, spring, etc.)
4J Stabilizers

	A	B	C	D	E
SECTION 5 - BRAKES					
5A Front brakes, hubs, drums			X		
5B Rear brakes, hubs, drums			X		
5C Service brake pedal & connections		X			
5D Parking brake mechanism					X
5E Master cylinder, wheel cylinders, hoses, (lines, etc.)		X			
5F Power braking equipment, air compressors					X
SECTION 6 - ENGINE					
6A Block, crankcase, cylinder liners				X	
6B Cylinder head				X	
6C Crankshaft					X
6D Flywheel					X
6E Con-rods, pistons, pins, rings				X	
6F Oil pans		X			
6G Oil pump, drive, tank, filters, coolers, distribution			X		
6H Cooling fan, clutch and drive					X
6J Water pump, coolant, thermostat					X
6K Manifolds and heat control				X	
6L Turbochargers				X	
6M Air cleaner			X		
6N Throttle, controls		X			
6O Camshaft, drive, lifters, valves, springs, rocker arms, etc.			X		
6P Accessory drives, pulleys, belts		X			

	A	B	C	D	E
SECTION 7 - TRANSMISSION/CLUTCH					
7A External controls		X			
7B Casing, housing					X
7C Shifting, clutch, mechanisms					X
7D Gears, gear sets				X	
7E Valves, pumps, controls					X
7F Transmission oil coolers	X				
SECTION 8(a) - FUEL SUPPLY					
8A Tank	X				
8B Fuel lines, pipes, filters			X		
8C Carburetor, pump, choke, injectors					X
SECTION 8(b) - EXHAUST SYSTEM					
8D Exhaust pipe, tail pipe, hangers, brackets	X				
8E Muffler				X	
8F Catalytic converter					X
8G Emission controls					X
SECTION 9 - STEERING					
9A Gear and column (with supports), lock					X
9B Steering wheel	X				
9C Linkages, arms, ball joints, knuckles, tie-rods, etc.		X			
9D Power units					X


SECTION 10 - WHEELS AND TIRES
A
B
C
D
E
10A Wheels
10B Tires
SECTION 11 - CHASSIS SHEET METAL (PLASTIC)
11A Fenders, front & rear
11B Running board
11C Hood
11D Miscellaneous sheet parts
SECTION 12 - ELECTRICAL/INSTRUMENTS
12A Battery and leads
12B Battery box
12C Front lamps, turn signals
12D Rear lamps
12E Horn
12F Wiring, fuses, switches, bulbs
12G Alternator/Generator
12H Starter motor, solenoid
12J Distributor, coil, regulator
12K Spark plugs
12L Electrical convenience & misc. items
12M Radio, tape deck, etc.
12N Instrument panel
12O Instruments
12P Electronics equipment, sensors, etc.

SECTION 13 - RADIATOR, GRILLE, ETC.	A	B	C	D	E
13A Radiators, including mountings & misc. parts	X				
13B Grille, deflectors, shutters			X		
13C Surge tank	X				
13D Heaters	X				
SECTION 14 - BUMPERS					
14A Bumpers			X		
14B Bumper accessories	X				
14C Bumper energy absorbers					X
SECTION 15 - MISCELLANEOUS PARTS					
15A Gaskets, seals, packings	X				
15B Cables, hoses	X				
15C Bushings, bearings, grommets, mounts		X			
15D Fasteners	X				
15E Springs	X				
15F Tools, equipment			X		
15G Miscellaneous, others					

SECTION 1 - BODY

1A Main sheet metal (plastic) components

These parts are not generally applicable to heavy trucks.

1B Floor and sill parts

As at 1A above, these components are not applicable to heavy trucks or are covered elsewhere (e.g. cab).

1C Doors, hardware

Doors are mainly produced in the USA (Japan in case of Hino), in many instances at in-house facilities. Some truck builders bring the doors in complete with hardware, others fit Canadian produced hardware. There is no standard pattern with this component. There is potential for some increased Canadian participation but the longer runs in the US result in a more competitive situation there.

1D Seating, seat mechanisms

The driver's seat is generally of US origin, either as a frame to be upholstered in Canada or in the complete state. They are normally the air ride type by such renowned manufacturers as Bostrom, National and Anchorlok. One Bostrom model, the Viking, is licensed for Canadian production but it has found limited use.

The passenger seat is more commonly of Canadian production, both frame and the finishing, especially in the upholstery.

There is scope for increased Canadian involvement and the vehicle builders are continuously working on this.

1E Carpet, mats

Canadian involvement has steadily declined until now most of the carpet which is used is of US origin. Some vehicle builders show local supply but it is believed to be mainly of US manufacture. The raw material for the carpets is invariably produced in the US, making manufacture there more economical. This, then does not look like a good growth area.

Rubber mats are available from Canadian producers but there is a mix of supply, some Canadian and some US. Presumably, price and rationalization are factors.

1F Windows, frames, operating mechanisms

There is adequate Canadian capability for all of this to be produced here but volumes and tooling costs may be the influencing factor. Most of the windshields are supplied by Duplate; other glass is by such companies as Excel (Canada or US). Growth potential exists through supply to the US assembly plants.

Mechanisms and frames are mainly of US origin, the volumes would not likely justify duplication of the tooling required.

1G Restraint systems

The low volumes make this business more appropriate to an aftermarket producer of specials. Many of the builders, then, purchase seat belts from Indiana Mills in the US; others buy them from Canadian A.S.E. who seem capable of reacting to the low and medium volume requirements.

1H Ornamentation, emblems, mouldings

This is quite varied and difficult to fully identify. There is some very limited Canadian involvement but most items are brought in from the USA (again, Japan for Hino). Once tooled up in the USA, it is relatively simple to extend the production run to include Canada and so eliminate the added tooling costs.

The dollar value here is relatively small and the effect on CVA would be minimal. However, there is growth potential and the Canadian production capability exists.

1J Ventilation, air-conditioning

There is minimal Canadian production of this item and no compelling reason to duplicate the US facilities.

The 1979 Little report identifies 'Reefer' refrigeration power plants (10-15 HP diesel engines) as a good opportunity for Canada but there was no indication of a base on which to build.

1K Windshield wiper/washer system

Almost without exception, the 2 top US suppliers, Trico and Sprague, are fitted. They have been the standard of the industry over a long period and it is difficult to picture them being displaced by Canadian product. There is some fairly limited application of Canadian produced wiper arms and blades.

1L Mirrors, visors

The mirror business is split between US and Canadian supply with Canadian being the lesser of the two. There is growing acceptance of the Canadian product and every indication that it could now be accepted for corporate supply in some cases.

Visors are both inside and outside. They are both suitable for manufacture in Canada and in many instances are purchased locally, some in metal, others in plastic material.

1M Roof vinyl, skylight, etc.

Not generally applicable to truck components.

1N Truck cabs, wind deflectors

The cabs are produced by various means. They can be US corporate assembled, produced in-house in Canada, assembled here from US stampings, imported complete from Japan (Hino), and so on. In most instances, they remain near 100% metal and there is scope for increased Canadian manufacture but the vehicle builders have not had much success in creating a Canadian supplier involvement. The same applies to the sleeper cab, a fairly low-volume item which is suited to local production.

As cab material shifts to plastic (FRP or some alternate) there will again be quite a mix of Canadian and US supply. Canadian companies have not been too aggressive here and the alternate seems to be for the vehicle builder to acquire its own supplier.

Cab interiors are generally finished by local suppliers.

Deflectors are not normally fitted at the assembly plant but the necessary attachments may be provided. These are normally local supply.

SECTION 2 - FRAME

2A Frame rails

These are generally of high grade alloy steel in heat treated condition with some specials in aluminum. There are 3 main suppliers in the USA, the production is quite capital intensive and Canadian volumes do not presently appear to warrant an additional supplier. One low volume builder produces rigid frames in-house (from structural sections) and another imports assembled frames from Japan.

The frame rails are normally supplied in a partly drilled state and the balance of the holes is drilled, as required, at the assembly plant. The Canadian content, then, is very limited.

Any gradual switch to aluminum rails, for weight saving, will not necessarily offer any different volumes but will rather reduce the total volumes in any one material.

The Little Report identifies frame rails as an opportunity area for Canada. However, considerable effort has been expended over the past 5-6 years in trying to justify a Canadian facility, so far with no success.

2B Cross members

These components are normally of Canadian origin, except where an assembled frame is imported. In the production of cross members there is quite a mix of in-house and local manufacture, the product is suited to production by the medium and small fabricators who are found in most areas.

2C Brackets, etc.

There is quite a variety of types from steel fabrications through castings in steel, iron or aluminum and to forged aluminum.

Fabricated brackets are generally produced in-house by the assembly plant or are obtainable locally. On castings, the vehicle companies have, in most instances, shown an ability to develop suitable Canadian suppliers except where they own their own foundry (in the US). Aluminum forgings are from the USA; there is no Canadian capability.

While there is obviously real potential at the higher volume US assembly plants, these markets have not been penetrated to any extent by the Canadian suppliers. A fully integrated operation, casting and machining, with modern production equipment would likely be a requirement to assure competitiveness.

2D Fifth wheel

It is not common practice for the vehicle builder to fit the fifth wheel, that is normally the dealer responsibility. Some are fitted, however, under special circumstances and the business seems to be shared between the 2 major Canadian producers, Holland and Fontaine. This offers a choice between cast and fabricated units.

SECTION 3 - FRONT AXLE, SUSPENSION

3A Front axle

Rockwell and Eaton are the main suppliers. Several of the truck companies have identified this as a component that they would like to purchase in Canada, presumably for the CVA it would contribute. At present, we do not have suitable forge capabilities and even should we establish them, the tooling costs are high and duplication would be uneconomical.

The best that we can hope for here is the add-on items such as brackets, etc.

3B Front springs

There is quite a mix of suppliers. Some are bought in Japan, Mexico and the USA but a good proportion is of Canadian manufacture.

Good capability exists on conventional springs and that on taper leaf is growing, though not in Canadian-owned facilities. There is requirement in excess of domestic production capability which indicates potential for growth.

The A.D. Little study identified a Canadian opportunity for entry into the development of carbon fiber springs by 1990 but there has been no evidence of any company working towards this end. The cost effectiveness would likely be questionable.

3C Front shock absorbers

There is adequate capability and capacity in Canada to supply all the Canadian-based truck builders. Both Canadian companies have developed expertise in the larger-sizes of shock absorber and could increase output with minimum investment. Delco is still a preferred unit in some cases and Monroe supply some units of US origin. All of these imports could be replaced by acceptable domestic units.

3D Front final drive

With the exception of a very limited volume of 6x6 vehicles, this item is not applicable to the heavy truck section. The few that are used are of US origin and duplication of capability could not be justified.

3E Wheel bearings, hubs, seals

Most bearings are presently by Timken, with the balance from Japan. The Timken units are a mix of US and Canadian origin, depending on size and type.

Hubs are generally imported from the US where the higher volumes provide the economies of scale.

Two Canadian based companies provide seals, with a mix of Canadian and US origin. There is room for growth here.

3F Air suspension

At present there is not widespread use of air suspension and where required it is of US origin, some proprietary to the truck builder.

3G Front stabilizer

Not applicable.

SECTION 4 - REAR AXLE, SUSPENSION

4A Rear axle assembly

A truck axle capability has been established in Canada using a pressed and welded type casing. The higher volume truck builders are using the unit; the low volume producers appear to have stayed, for the present, with the traditional Eaton and Rockwell units from the USA. This Canadian axle uses imported gear components but the balance of the assembly such as casing, shafts, carriers, attaching bracketry, etc. is produced and assembled in Canada.

There is room for considerable growth here, to provide CVA, but that growth will likely take place in the one producer. It is difficult to see a second manufacturer setting up in the near future.

The A.D. Little report shows 2 growth opportunities on axles:

a) A tag axle. This requires examination because there have been tag axles used for a long time, to help meet restricted loading requirements, and so it is not really a growth idea.

b) Non-driven rear axle. Again, this requires careful consideration. Non-driven rear usually signifies front wheel drive, which would be quite a departure for heavy trucks.

4B Propellor shaft, universal joints

Other than the very large units, these are generally available from a sole source in Canada plus a limited level of in-house production. We have virtually all the business that can be economically justified. The volumes in the very large units do not warrant tooling duplication.

By 1990, A.D. Little see a move to reinforced composites with significant potential for Canada. At present, any development in this direction is being carried on outside Canada. However, the current Canadian producer has ready access to the parent research results and has a history of keeping abreast of new technologies.

4C Differential

There is no Canadian gear cutting capability suited to truck components so much of the differential is imported. It comes in as part of a complete US built axle or is imported (in parts or as an assembly) for incorporation into domestically produced axles. This is high technology and while there is room for growth, there seems little reason to anticipate much change to the present position.

4D Axle shafts

These are forged in Canada for the Canadian built rear axles and some limited supply for US assembly. The finish machining capabilities are also limited and provide room for growth.

The traditional axle suppliers, Eaton and Rockwell have US sources of shafts and it would be quite difficult to displace that business.

4E Torque tubes, struts, rods

There is some in-house production, a very limited amount of local purchase, and the greater part from US sources. Increased Canadian participation is possible but it will not be easy to win since the components are generally safety related and some fairly long-standing supply arrangements are currently in effect.

4F Rear springs, attachments, bump stops

The comment at para 3B, Front springs, is generally equally applicable here. Some local supply of the bump stops, attachments, etc. does occur.

4G Rear shock absorbers

The comment given at 3C, Front shock absorbers, will be appropriate here, too.

4H Suspensions (air, spring, etc.)

The preponderance here is for the application of Hendrickson units which have dominated the market over a long period of time. Their Canadian content appears to have declined and so the recapture of the former levels

of CVA do represent a logical growth area. Ownership, personnel and product changes have occurred at Hendrickson and it may be in order to examine their present and future intentions with a view to optimizing Canadian content.

Several of the truck companies produce their own proprietary suspension units, especially the air-ride types, and these are used in Canadian-built vehicles as required.

4J Stabilizers

Information on this component is quite limited since the application is not widespread. There are no identified Canadian suppliers.

SECTION 5 - BRAKES

This is a complex component area and the detail is not too clear regarding supply. Main system producers are in the US but some component production activity is located in Canada. There is considerable diversity in approach by the different truck builders, there is no common pattern to record.

5A Front brakes, hubs, drums

There are some well-known names involved, such as Gunnite, Firestone, Bendix, Rockwell, Eaton etc. and the safety aspect is of paramount importance. Some have Canadian subsidiaries producing components, they buy from other suppliers in both Canada and the US and, above all, they have their own US based plants. On top of that, some truck producers have in-house capability to produce components. Canadian involvement has reduced in recent years but the right climate could well see some of it return.

Hubs are produced both in Canada and the US, the majority in the latter. Again, there is in-house production by truck companies with the appropriate facilities. There is considerable Canadian involvement in the casting and machining of brake spiders.

Drums, of truck sizes, are mainly of US origin and the required economies of scale dictate that such a situation will likely continue.

The A.D. Little report offered 3 specific growth areas for Canadian participation:

1. Move from drums to higher capacity discs by 1985. We presently have no involvement in such discs.

2. Anti-skid system to be legislated by 1985. The US producers have been developing these systems for several years and Canada will probably be shut out except for any sourcing decisions to put some components here.

3. Pedestrian/cyclist under-ride guard. This has existed in Europe for some time, but there is no record of any Canadian interest or know-how at present.

5B Rear brakes, hubs, drums

Generally similar to 5A above.

5C Service brake pedal and connections

Again, there is quite a mix here with some components produced in-house, others bought out in both the USA and Canada. There appears to be room for Canadian growth but it would not be high dollar value items.

5D Parking brake mechanism

These are mainly US produced, some in-house by the truck companies, including proprietary types. Volumes would probably preclude any need for a duplication of capability.

5E Master & wheel cylinders, hoses, lines, etc.

The master and wheel cylinders are US produced; a capability does not currently exist in Canada. There are rebuilders who might well form a basis on which to build an OEM involvement.

A limited number of air reservoirs are manufactured here but there is room for considerable growth in that area.

Hoses, lines and the required fittings are generally available from Canadian sources. They are normally subsidiaries of US companies and the origin of manufacture is not readily apparent.

5F Power braking equipment, air compressors

These items are almost entirely of US origin (Japan in the case of Hino). They are high technology items, US developed, and where there is no justification for facility duplication.

Air compressors were manufactured in Canada at one point but that was transferred to the USA. There has been indication that it could be returned if the right incentives were available.

5G General

There is no real clear picture of the Canadian involvement in this product and it may well justify some special effort to document the current position in order to provide a guide regarding the future potential.

SECTION 6 - ENGINE

Other than the developing KHD diesel engine, there is really no Canadian builder of large truck engines. The main suppliers are Cummins, Detroit Diesel and Caterpillar, generally in that order. Ford, GMC, Mack, International, etc. all have in-house production but they are geared to volumes which would preclude the introduction of special, low volume requirements in a facility in Canada.

There is some component involvement, covered briefly below.

6A Block, crankcase, liners

Blocks are currently produced in the USA (Japan for Hino) for most of the requirements. The balance is from offshore plants of the same companies. There is a Canadian company with production capability on large blocks but it has operated as a captive facility and requires some modernization now to be competitive. Cummins have looked at Canada as a source of supply to the US and UK and to replace some Japanese product but did not choose to establish here.

Cast crankcases have been produced in Canada for GMC and Deutz, the latter on limited run basis. The capability does exist, then, but it has not shown signs of growth. The capital equipment requirement is quite high relative to the volumes available and domestic companies have not been able to justify the risk associated with such investment. This is, however, a component area worthy of continued effort.

Cummins sought liners in Canada in 1978 but had no success. There is no obvious reason why these parts should not be manufactured in Canada, but we have no history of production such that a customer would have confidence in the quality which the product demands. As with the crankcase, it deserves on-going attention if we want the business in Canada.

There are iron foundries ceasing production of passenger car engines while truck engine producers have been seeking suppliers of their larger castings. It could be possible to find an iron foundry, even of a captive type, which might conveniently be turned over to truck engine parts rather than to close up.

6B Cylinder heads

The situation is quite comparable to that on blocks and so we have virtually no involvement. Cummins and KHD have both sought these parts in Canada but with no success to date.

6C Crankshafts

There is currently no Canadian capability to forge units of this size and weight and no facility to finish machine imported forgings. The capital intensity of the business would make it quite difficult to justify the establishment of production in Canada.

6D Flywheel

There is no Canadian production facility for either the flywheel or the ring. The latter has been studied, in response to a Cummins request but the outcome was totally negative.

6E Con-rods, pistons, pins, rings

Con-rods of this larger size are produced in Canada in the forged state, in limited volumes, but none is finish machined. A capability to supply finish machined sets could enhance the potential for increased sales.

Generally speaking, large pistons are not being produced in Canada. A start has been made on the machining of them (imported) but in quite low volumes. A.D. Little report a good Canadian opportunity for large pistons with first cast nickel inserts and then later with ceramic inserts. To date there is no indication of any company working on such components.

Pins of this size are not produced in Canada and the volumes involved would not seem to justify double sourcing, USA and Canada.

There is no manufacture of OEM piston rings in Canada and several potential customers have looked at the possibility of developing a source, without success. On this item, A.D. Little identify a Canadian opportunity on ceramic rings by 1985 but, at present, no one is working towards that end.

6F Oil pans

Most are produced in the US (Japan for Hino) especially on the larger engines. There is Canadian capability, some modest involvement and it does seem to be a good growth area. Large machines are involved in the manufacture but these are now available at several plants.

6G Oil pump, drive, tank, filters, coolers, distribution

On pumps and drive, Canadian participation is limited to the supply of some minor components, with total volume of low value.

Except for the in-house production on low volumes, tanks, reservoirs, etc. are imported. These could be produced in Canada if the volumes warrant.

Filters of the type and size used on heavy trucks are generally supplied from the USA, Canadian requirements do not seem to warrant the duplication of an existing North America capability.

Oil coolers for this type of vehicle are available from a Canadian source which was established in 1970 and has since grown steadily. There is potential for growth and it is being followed up.

There is Canadian involvement in the machining of filter and cooler housings.

6H Cooling fan, clutch and drive

At the lower end of this size of vehicle there is Canadian product available, especially on fans. The larger fans are usually supplied by Schwitzer, Horton or other US companies.

The type of fan clutch used on heavy vehicles is not presently produced in Canada. US companies such as Schwitzer, Horton, etc. have spent many years on research to reach their current position in the industry. We have done none so we have no background and the potential is not apparent. The A.D. Little report sees 2 opportunities for Canada - conventional fan clutches and viscous fan drives. These appear to be in conflict with each other but perhaps Little see them as complementary,

the one on medium trucks and the other on heavier. We have automobile fan clutch experience to start from, but that area of activity will likely provide a full-time challenge to the developer without looking to trucks.

6J Water pump, coolant, thermostat

Canadian production of water pumps for OEM application is non-existent. There are several rebuilders but no new manufacturers, except in minor components. There is also some involvement in the machining of pump casings for the engine builders.

The anti-freeze additive of the coolant is readily available from Canadian sources.

Truck type thermostats are not presently produced in Canada.

6K Manifolds and heat control

Truck engine manifolds are not produced in Canada but demands are readily available if a competitive facility were established. Cummins, Detroit Diesel, Mack, Caterpillar and KHD have all looked for these parts here but without positive result. They are cast in iron or aluminum and Canadian facilities for their production do exist. A more detailed examination of the product, potential etc., would help to determine the action required.

6L Turbochargers

The A.D. Little study reported this as a good opportunity for Canada.

It is a high technology product where there is obviously growth potential but Canadian involvement is limited to some minor components. We have a company with experience in casting the vortex and they could be encouraged back into that business given the right set of conditions.

Cummins made a detailed examination of Canada as a production site in 1979 when their UK plant reached capacity but we did not put in the right kind of effort and they chose to locate in the Southern USA instead. These products will only come to Canada if we create the right environment.

6M Air cleaner

Donaldson and Farr in the US have most of this business; they have developed a special capability over many years. At the smaller end of the scale, there is some application of Canadian produced filters. Farr have a Canadian plant which supplies the extra large units and there is room for growth there, if the product range could be extended.

This is a technology which should prove to be well within Canadian capability and increased participation should readily be achievable.

6N Throttle, controls

There is little on record relating to this product but it does appear that much of the product is of local manufacture, either in-house or sub-contracted to local shops.

6O Camshaft, drive, lifters, valves, springs, rocker arms

These items are all produced in the US (Japan for Hino) with some very minor exceptions. They are almost all within Canadian capability if the appropriate steps were to be taken. In some areas, we have previously made them but have now lost the business.

Other than captive engine plants, there is no production of camshafts and their drive in the finished state and only limited involvement in the forgings and castings. It is high technology and demands significant investment.

Some gear blanks and a few gears are produced for the drive system but the volumes are low. Cummins have tried Canada for these on previous occasions.

Valves and lifters are produced in Canada and some are supplied to US engine builders. There is no documented record of this level of involvement. Tappet rollers have been sought in Canada but with no success.

Rocker arms are produced in Canada, in rather low volumes and more business is available. This may need a close examination of existing capabilities and then the development of some new sources, instead of reliance on a handful of 'old faithfuls'.

6P Accessory drives

Currently, there is no record of Canadian capabilities and involvement.

A.D. Little identify opportunities at:

Constant speed accessory drive - new item
Variable speed drive for air pumps - by 1985

6. Miscellaneous

The following additional engine opportunities were listed by A.D. Little:

Gasoline engine to be replaced by diesel in medium trucks.
Bottoming cycle heat recovery - a US DOE experiment.
Electronic engine controls - Federal regulations.
Engine speed governor system - compensation, full load control.
Exhaust gas temperature sensing - best fuel consumption.

SECTION 7 - TRANSMISSION/CLUTCH

7A External controls

Canadian manufacture is limited to some quite nominal production of components for the low volume assemblers.

7B Casing, housing

Involvement here is quite minimal, being limited to some minor components.

7C Shifting, clutch, mechanism

No such units are manufactured in Canada.

7D Gears, gear sets

These are the high technology items which are retained in-house or they are provided by the US multi-nationals who have a long history of investment in R&D and in capital equipment. There is almost complete absence of Canadian participation.

7E Valves, pumps, controls

Again there is no real Canadian involvement except perhaps in some minor components. The complete transmission assemblies contain very high quality components by long standing suppliers and there is not much chance of their displacement by Canadian-made items.

7F Transmission oil coolers

This is one technology where Canada has maintained some lead, in foreign-owned subsidiaries and with Crown incentives. There is room for increased penetration of the market if the required financial investment can be justified. The total market potential requires identification and an appropriate plan formulated to capture the available business.

7. General

The A.D. Little study identifies an opportunity for Canada to participate in the switch from manual, multi-speed transmission to the stepped automatic with lock-up torque converter and subsequently to the continuously variable transmission. It is not easy to envisage how this will be effected and perhaps they misunderstood our existing capabilities. They were, however, made aware of the potential of the Kerr Train unit.

SECTION 8(a) - FUEL SUPPLY

8A Fuel tank

This is one area where good Canadian content exists. Canadian suppliers have been developed in both steel and aluminum and that, together with some in-house manufacture, takes care of the majority of the requirements.

In some instances, the Canadian sources are used by the US plants of the truck builders.

8B Fuel lines, pipes, filters

Much of this is provided as part of the engine. Remainder of the lines are generally imported from the US and assembled with fittings available from Canadian sources. A Canadian capability for the production of diesel engine tubing is being developed.

Filters are mostly of US origin. The Canadian filter manufacturers are subsidiaries of foreign parents and the low volume requirements do not justify a second production facility.

8C Carburetor, pump, choke, injectors

On diesel powered trucks, this will be the fuel pump and injection equipment. None of these is made in Canada. US companies have given consideration to production in Canada but were lured to alternate sites by investment incentives. It is high technology business where the current suppliers have a long record of R&D and manufacture. Canadian participation would need to rely on technology transfer by a foreign company.

There is some Canadian involvement in gasoline pumps and carburetors but not in the types and sizes used in heavy trucks.

SECTION 8(b) - EXHAUST SYSTEM

8D Exhaust pipe, tail pipe, hangers, brackets

Good Canadian capability has been developed in recent years and most of the supply is now domestic. Manufacturers have acquired the large pipe benders and using imported fittings they can assemble the required units. Some truck builders buy all the components and assemble in-house.

There is growing requirement for chrome finish and the Canadian capabilities could benefit from some improved quality. Some plating is done in the US, the majority now in Canada.

Hangers, brackets, etc. are normally in-house produced or they are obtained locally.

8E Muffler

Attempts have been made to develop sources in Canada but in each case the company has moved into market areas other than OEM trucks. Location and the lack of appropriate production equipment have been the main factors.

A foreign supplier is currently in the process of establishing a truck muffler plant in Canada and they could capture much of the available market if product and price are competitive. In the meantime, supply continues to be by Donaldson, Nelson, Stemco, etc. in the USA - all companies who have made significant investments in R&D over a long period of time.

8F Catalytic converter

Not currently applicable.

8G Emission controls

Some of the major components and assemblies include items relating to emission controls but there has not yet been a truck requirement comparable to that on automobiles. Hence, there are no Canadian companies in this field.

The A.D. Little study reported a Canadian opportunity on electronic control smoke emission but we have no detail of what may be envisaged. It would seem probable that it would be part of the engine development, and so be difficult to locate in Canada.

SECTION 9 - STEERING

9A Gear & column

A Canadian company had license to produce Ross and Gemme but none has been produced for a long time and it has probably lapsed.

This is very high technology developed over a long period of time by specific, respected foreign companies who have become recognized world leaders. It does not lend itself to splitting off segments for Canada where there is no starting base. The best potential seems to lie with a Canadian operation of one of the recognized producers but there has been little move in that direction. Being a safety-related item, production goes only where there is known and trusted expertise.

We have capability for some specific items such as column, lock, etc. but none is presently produced in Canada for heavy truck application. These could be sold to the prime manufacturers of complete steering gear.

9B Steering wheel

We have capability on this item and some modest involvement but the majority is still produced in the USA. Canadian participation has, in fact, declined.

Domestic producers are subsidiaries of US companies and perhaps the total volumes do not warrant duplication of production facilities.

9C Linkages, arms, ball joints, tie-rods, etc.

There is some minimal involvement here by fabricators, forge and machine shops but with room for increased participation. They are safety related items where the final machine shop may have limited involvement and return yet accept all the responsibility.

9D Power units

There is currently no Canadian involvement at all on this item which is often integral to the steering. Establishment of a facility by a foreign producer has been examined but the volume requirement seemed less than adequate.

SECTION 10 - WHEELS AND TIRES

10A Wheels

There is a mix of Canadian and US supply, generally depending upon the type used.

Discs, in steel, are mainly provided by domestic plants except those exceeding 25 inches in diameter.

Cast wheels are available in Canada but the truck builders report some problems in their dealings with the supplier and so have generally opted to purchase them in the US.

Forged aluminum wheels are of US origin and it might be difficult to justify the cost of facility duplication.

Irrespective of truck wheel type, without exception the Canadian producers are subsidiaries of US companies and all development occurs there. The A.D. Little report indicates a potential for Canadian supply as aluminum wheels replace steel.

On large wheels, there is good off-highway and defence vehicle capability by a Canadian-owned company; this special product seems to offer real growth potential.

10B Tires

This has generally been treated as a separate sub-sector and has been the subject of numerous studies, so little comment will be included here.

Tires are normally supplied to customer specification with Michelin being requested above others. Problems in dealing with Michelin have forced the vehicle builders to use more Bridgestone, who seem to be challenging the lead of Michelin.

Goodyear and Firestone are used where possible, they provide Canadian content.

The A.D. Little study identified Canadian opportunities as below:

Higher load capacity to replace limited load capacity.
Increased penetration by conventional radial construction.
Quiet tread designs.

SECTION 11 - CHASSIS SHEET METAL (PLASTIC)

11A Fenders, front and rear

There is a mix of steel and FRP, with the latter now gaining in prominence.

Steel fenders are normally produced in-house. FRP are usually by independent manufacturers with some trend to integration by the truck companies. There has been some penetration of the US market by these independent FRP companies and there is potential for growth. To capitalize on this, it will be necessary to effect the transition from low to medium volume production and to establish sound transportation arrangements.

The fairly significant numbers of COE trucks reduces the fender requirements.

11B Running board

These are usually steps, including tank steps and step rings at the wheel hubs. Where fitted, they are invariably produced locally, some in-house.

11C Hood

Many vehicles are COE type and so without hood. Others have integral fenders and hood so the comment to 11A above is relevant. Where metal hoods are fitted, they are generally produced in-house; where the hood is in FRP, it is normally produced locally by a Canadian supplier.

Hood insulation tends to be imported from the US and this could be of Canadian origin.

11D Miscellaneous sheet parts

This covers a broad range of items such as engine covers, brush guards, mud flap hangers, etc. and they are usually obtained in Canada from suppliers local to the assembly plant.

SECTION 12 - ELECTRICAL/INSTRUMENTS

12A Battery & cables

There is good Canadian capability on battery manufacture and truck application is almost 100%. In some cases, corporate requirements (including US assembly plants) are supplied from Canada.

Most of the battery cables are of US origin; current environmental standards are claimed to be responsible for the exodus from Canada.

12B Battery box

For the most part these are produced in-house. Where that is not the case, then local suppliers produce them. If these shift to plastic, we must work to ensure that they remain in Canada.

12C Front lamps, turn signals

A Canadian company is a supplier in several cases, the balance is from the US. Except where special designs are employed (e.g. White marker lights), most of the units could be provided out of Canada. Price and performance must be a factor. In the US supplied items, it is believed that the source of manufacture is often Taiwan or Korea.

12D Rear lamps

Generally as at 12C above, but with a slightly higher proportion of Canadian participation. Some of the US manufacturers have established assembly facilities here.

12E Horn

There is no Canadian production. The business mainly goes to Spartan in the US. They have a subsidiary in Canada but have shown no inclination to produce horns here.

12F Wiring, fuses, switches, bulbs

Again, there is a mix here. On wiring, some vehicle manufacturers use US suppliers, some use local Canadian capability and others have in-house facilities. Most of the requirement could originate in Canada but the fluctuations in the market have driven manufacturers out.

Fuses, switches and bulbs are available from Canadian sources but the greater part is imported from the USA. They have the full range and enjoy the economies of scale.

12G Alternator/generator

Currently there is no Canadian production and they are all imported.

12H Starter motor/solenoid

100% imported at present since there is no suitable Canadian production.

12J Distributor, coil, regulator

These have relatively limited application on heavy trucks, but where they are involved, the supply is from the US.

12K Spark plugs

Most of the heavy trucks use diesel engines and so have no spark plug requirements. Where gasoline engines are used, without exception the spark plugs are imported. The engines are US built and this has some influence on sourcing.

12L Electrical convenience & miscellaneous items

There is Canadian production capability but virtually no involvement. Most of the items are of US origin, the balance from Japan or other Far East nations.

12M Radio, tape deck

These are bought in the US or Japan and in either case, production is most likely to have taken place in the Far East.

12N Instrument panel

Some are in metal, others in plastic, with almost all produced in the USA. A few FRP are Canadian and some of the metal units are padded in-house.

12O Instruments

These are usually by Stewart Warner and are produced in the USA.

12P Electronics equipment, sensors

There is no information on record to give a clear picture here, but it does appear that most of the items are imported. There are Canadian producers but the low volumes may be a problem.

The Little study identified 2 manufacturing opportunities for Canada:

Digital display and power train monitoring systems to indicate status of engine variables.
Exhaust gas temperature sensors to monitor performance of intercoolers.

SECTION 13 - RADIATOR, GRILLE, ETC.

13A Radiators (incl. mountings & misc. parts)

Varied approaches are taken here. The small, higher volume trucks use Canadian radiators, the larger units are fitted with imported radiators, some from in-house capability. A very limited number of Canadian built radiators find use in the larger vehicles and there is potential for growth if price and quality are competitive. None of the companies supplying truck radiators is Canadian owned.

Components are generally readily available in Canada on the fin and tube core section, top and bottom tanks, mountings, filler necks, caps, hoses, etc. but there is room for increased participation. Silicone components (gaskets, hoses, etc.) represent a good growth area for Canada.

13B Grille, deflectors, shutters, etc.

In many cases, the grille pattern is part of the corporate identification and the total requirement is produced in the USA. Some low volumes are produced locally (or in-house) but there is room for increased activity. Absence of acceptable plating facilities is often a major deterrent.

Deflectors are generally produced locally, either in metal or FRP.

Shutters are no longer bought from Canadian supply. There is only one producer here now manufacturing a rather expensive product oriented mainly to industrial application. The standard of the industry, Kysor, did have a manufacturing operation in Canada but subsequently consolidated the activities in the USA. Encouraging a return might be quite difficult. They have reached their present position after long involvement, extensive and continuous R&D, the supply of a top quality product and sound after-sales service. They have earned and occupy a virtual monopoly position in this product area.

13C Surge tank

In most cases, this is an integral part of the radiator. Where they are fitted as a separate item, they are of Canadian manufacture.

13D Heaters

Block heaters and demountable cab heaters are available from Canada and their utilization level is quite high.

Standard cab heaters are mainly imported from the USA with the balance produced in-house from Canadian components.

SECTION 14 - BUMPERS

14A Bumpers

There is no common pattern here. Some are imported (either from in-house or independent suppliers); others are produced in Canada (again in-house or independent supplier). Aluminum and steel bumpers are produced in Canada, in some instances for supply to both Canadian and US assembly plants for trucks and buses.

There is some growth potential here but the manufacturing standards are demanding and the capital investment significant. Plating facilities have not generally kept pace with the development of stamping capabilities.

14B Bumper accessories

This is mainly the attaching bracketry which is almost 100% Canadian. Some of it is produced in-house; some by the bumper manufacturers and the balance by local fabricators.

Winning and increasing this business requires continuous attention, it can so easily be transferred to current best cost sources, and the dollar values are not high relative to the effort involved.

14C Bumper energy absorbers

Not presently applicable to the heavy vehicles.

SECTION 15 - MISCELLANEOUS

15A Gaskets, seals, packings

Most of the gaskets are contained in the major assemblies and so they are US in origin. There is limited Canadian involvement, mostly by subsidiaries of US companies (such as Garlock). The domestic supply is declining as we do not keep up with technologies.

15B Cables, hoses

The origin of these is not too clear. The fittings are available from Canadian suppliers but they may well be manufactured in the US. Hose is produced in Canada and the silicone hose, now finding increased application, is produced in Canada.

Except where they are of a special nature, cables are available from domestic producers.

15C Bushings, bearings, grommets, etc.

Again, it is quite difficult to pin down the origins here. Some part of each type is available from Canadian manufacture but it would seem most likely that growth potential exists here. They are not big dollar items and are so easily added to the longer US runs.

15D Fasteners

There is generally excellent supply, even including the Japanese metric sizes, and most of the truck builders purchase Canadian material. Some others buy all or part of their requirements in the US and at the other end of the scale, US truck companies put total corporate requirements in Canada. The decision seems to depend on purchasing practices and types of hardware involved.

15E Springs

This is not road springs. There are several good Canadian producers and it does appear they have a fair share of the business where it has been aggressively pursued.

15F Tools, equipment

Most builders buy the wheel wrench from Docap, but it is probably of foreign manufacture.

Hydraulic jacks are generally provided but they are of Swedish, US or Japanese origin.

Canadian participation here is minimal and represents an area of growth potential.

15G Miscellaneous others

The one item to which most vehicle builders responded here was paint, since it does not have coverage elsewhere. Without exception, the North American owned truck builders use Canadian paint for their operations here.

SECTION 16 - APPENDIX

There are some products and processes which might warrant comment, in addition to that provided under the specific component groups.

16A Plastics

The application is not quite as widespread as with automobiles but an anticipated attention to weight should create a real growth pattern over the next five years. FRP has been identified at several components earlier in this document and significant opportunities exist in such material.

Trim and decorative items will increasingly turn to plastics, as will electric and electronic components. There is good Canadian capability and capacity for such production but it will require aggressive marketing.

16B Forgings

Canadian capability is limited by equipment size and due to a need to modernize. There is some involvement still in con-rods and in the miscellaneous small forged components which occur throughout a truck. There is no large forge shop with good, modern equipment seeking to win this truck business and its cyclical nature has been a major deterrent.

16C Castings

There has always been great potential here in aluminum and iron (and steel to a lesser degree) but no significant involvement by Canadian companies. The opportunities range from engine blocks through radiator tanks, chassis brackets, wheel and brake components, axle parts, housings, etc. down to small castings.

Some progress has been made in the supply of small and medium-sized castings but there remains some considerable opportunity for growth. Tooling costs and uncertainty of the market continuity seem to be the major roadblocks.

16D Raw materials

Most of the major items are US produced and the bulk of the material is purchased there. On the smaller, miscellaneous items produced in Canada, the material is generally of Canadian origin.

The major material suppliers (Stelco, Dofasco, Alcan, Dupont, Dow, etc.) are well aware of developments within the industry and have on-going development activities to meet user requirements. Some coordinating effort might be useful to provide the necessary economies of scale.