

7 TRANSPORTATION

SUPPORTING SERVICES FOR GOVERNMENT

REPORT 7: TRANSPORTATION

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THE ROYAL COMMISSION ON GOVERNMENT ORGANIZATION

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A number of submissions bearing on this topic were received from individuals and organizations: these have been carefully considered and are noted in our final report.

Your Commissioners, in acknowledging the assistance and advice received from the above-named persons, dissociate them from any of the findings and conclusions contained in this report; for these, your Commissioners assume full responsibility.

1

INTRODUCTION

For the Government of Canada, as for the public it serves, transportation is a major element in the cost of living—and of doing business. Every activity of government contributes to this cost: the administration of public affairs from coast to coast and from the southern border to the Arctic, the representation of Canadian interests throughout the world, the movement of large military forces throughout Canada and abroad, and the acquisition and distribution of supplies for the civil and military services.

Transportation costs incurred in providing for the direct needs of the public service are not fully revealed in the accounts. For example, shipping costs frequently are included in the purchase price of goods, and costs incurred in the operation of transportation services ignore, in most cases, the capital investment. However, it may be safely assumed that in 1961:

- More than \$17 million was paid to commercial carriers for transporting public employees (this includes the Armed Forces) from one place to another.
- Over \$5 million was paid directly to public employees for use of their automobiles in performing public functions.
- An estimated \$12 million was spent for the movement of the household effects of public servants transferred from one post to another.
- Almost \$12 million was paid to the commercial carriers for freight, express and cartage, as such, and

- Payments to suppliers included an element for shipping costs estimated at between \$20 million and \$25 million.
- About \$4 million was spent transporting government departments' mail by land, sea and air.
- The bill for chartering aircraft exceeded \$5 million, and almost \$3 million was paid for the charter of ships.
- The operation and maintenance of vehicles by the civil departments and agencies cost over \$6 million.
- The cost of operating and maintaining vehicles for the general administrative needs of the Armed Forces approximated \$4 million.
- Ships of the civil departments and agencies cost over \$30 million to operate and maintain.
- Aircraft of the civil departments cost almost \$4 million to operate and maintain, and the Air Transport Command of the Royal Canadian Air Force more than \$17 million exclusive of personnel costs.

What would normally be the provision for depreciation cannot be calculated with any degree of precision. It is known, however, that the investment at cost in watercraft alone is approximately \$150 million; that the capital cost of civilian vehicles (cars, trucks, etc.) is about \$20 million with another \$12-\$15 million invested in the administrative vehicles of the Armed Services (not directly supporting their operational forces); that the aircraft of civil departments and agencies originally cost more than \$8 million—and those of Air Transport Command many times that amount. Annual depreciation charges exceed \$25 million if applied on a conservative life expectancy of twenty years for ships, ten for aircraft and five for vehicles.

Thus, the total identifiable burden borne by the federal government for the purchase of transportation services and for the operation and maintenance of its own vehicles, ships and aircraft (excluding the ships and aircraft of the Royal Canadian Navy, the training and fighting aircraft and the vessels of the Royal Canadian Air Force and the aircraft and operational vehicles of the Army) is estimated at \$160 million annually. If other relevant costs were included, the yearly total would approach \$200 million.

As in the other studies of this Commission, the practices of public undertakings of a commercial type were excluded from this inquiry into the management of transportation services. Also excluded were the very extensive transportation services rendered by federal departments and agencies to the

general public. The magnitude of these public undertakings, which have played so prominent a part in the creation, the growth and the prosperity of the country, can be expressed only in billions of dollars—greatly overshadowing the cost of meeting the administrative needs of the federal government. It is perhaps for this reason that the latter needs and the methods by which they are met have received little attention in the past, despite their mounting cost.

The activities of the government in meeting its transportation needs fall into two broad categories: its purchase of services and its operation of facilities. Each category, in turn, involves a number of separate elements with distinctive problems: the movement of supplies, of people and of their household effects in the first case; the operation of vehicles, of aircraft and of vessels in the second. But the two categories cannot be studied in isolation from each other; they meet and merge in the shadowland of choice between purchase of services and operation of facilities, between charter and ownership. Such, then, are the factors that have dictated the plan of this inquiry and the arrangement of this report.

2

FREIGHT, EXPRESS AND CARTAGE

During the fiscal year 1960-61, the cost of moving the supplies and equipment of the federal government by commercial carriers is estimated to have been approximately \$35 million. This sum comprises two elements. First, freight, express and cartage services purchased directly by departments and agencies are recorded in the published accounts for the year in the amount of \$11.6 million; this does not include expenditures by a wide range of Crown corporations. The other—and larger—element consists of shipping costs paid by suppliers and included in the price charged to government for its goods. Such costs are not generally segregated in the invoices received from suppliers, except under contracts involving the reimbursement of actual costs, and cannot be identified in the accounts of the government. However, on the basis of industrial experience, it is estimated that this freight component of government purchases is \$20-\$25 million annually.

DIRECT PURCHASES OF SERVICES

Of the \$11.6 million paid directly to commercial carriers for freight, express and cartage in 1960-61, over \$6.5 million was spent by the Department of National Defence and the balance by the civil departments. Among the latter, only the Department of Transport recorded payments in excess of one million dollars: its bill for the year was \$1.4 million. The Department of Northern Affairs and National Resources spent almost \$900,000; and all others, with two exceptions, spent less than \$250,000. Thus, for most departments and agencies, payments under this heading were a relatively small item of expense.

Existing Arrangements

This pattern of expenditures takes on significance in light of the fact that responsibility for the purchase of these transportation services rests wholly with the individual departments. Because of their relatively limited volume of shipments, most departments do not employ specialists in freight and traffic management. Frequently the work is assigned to junior clerical staff, and throughout the departments there is little knowledge of modern traffic management methods. Personnel are competent in particular aspects of the work, but little effort is made to develop technical skills and apply the best commercial practices.

No attempt has been made within the public service to compile data on the volume and categories of shipments, shipping and receiving points, the routes and modes of transportation chosen, and the related costs. The general assumption appears to be that whatever is administratively simple is best; few, if any, departments and agencies analyze their freight traffic to determine whether savings might result through the adoption of more sophisticated methods.

The one exception is the Department of National Defence. Because of the volume of its shipments, this Department has felt a greater need for systematic traffic management. In addition, because of the vital importance of reliable and orderly transportation in wartime, the Armed Forces devote serious attention to the movement of men and materiel. As a result, the Department of National Defence has made substantial progress in controlling freight costs. A civilian traffic expert is employed to help in developing good traffic management procedures and under the auspices of a Tri-Service Movements Committee, a manual of movements has been developed to standardize and improve procedures for the purchase of transportation services. While these steps indicate that the Department of National Defence has displayed more initiative and skill than other departments, traffic management, nevertheless, has lagged behind commercial practice, largely (and perhaps necessarily) because military needs have outweighed cost considerations and because the existing civilian expertise in the Department of National Defence is used in an essentially advisory capacity.

Commercial Traffic Management

Recent developments in commercial traffic management reflect the virtual disappearance of the monopoly once enjoyed by railroads and the new opportunities for shippers to exercise greater control over transportation costs by exploiting the growing competition among rail, road, air and, more recently,

pipeline carriers. To secure the benefits of this new competitive situation, commercial shippers have evolved new techniques of traffic management, and in recent years have made major improvements.

Current traffic management practice starts with a thorough analysis of the main factors influencing costs: on the one hand, classes of commodity, volumes, traffic patterns and other factors relevant to the needs of the shipper; on the other, the services offered by various modes of transportation and the charges associated with each. Knowledge of these factors is a prerequisite to traffic management, the goal of which is to ensure the use of the most economical means of carriage and to eliminate, where possible, the use of premium or high-cost transportation.

In the development of traffic management, a number of techniques have emerged. Routing of shipments is controlled, both by the evolution of principles and through the preparation of specific routing guides appropriate to the kinds, volumes and pattern of traffic. Procedures for shipment are standardized. And the greatest economies are obtained through the negotiation of rates and the consolidation of traffic.

The recent rapid development of competing methods of transportation has created a bargaining position for shippers of which they make increasing use. To illustrate:—although the general level of freight rates increased by 138 per cent between 1948 and 1961, the revenues of the railways, for each ton-mile of traffic, increased by only 55 per cent. The difference reflects the need of the railways to adapt to meet the competition of other modes, and the ability of shippers to negotiate special rates for their traffic. In return for favourable rates, shippers have offered an agreed percentage of their traffic, and the assurance that shipments would be of such a size or character as to reduce the carrier's handling costs.

Volume of shipments is of two-fold importance in traffic management. First, the ability to assure a carrier a substantial continuing volume of traffic permits the negotiation of favourable agreed charges. In addition, the tariffs of all common carriers provide substantial reductions for volume in individual shipments; carload and truckload shipments are the lowest cost transportation available for other than bulk commodities. Even short of full carloads or truckloads, preferred rates are available for shipments in large lot quantities. And the key to volume is consolidation of traffic.

Commercial organizations have recognized the value of consolidation to the point even of setting aside their habitual rivalries to pool their traffic. In Toronto and Montreal, for example, strongly competitive retail organizations band together to consolidate shipments from suppliers to their stores. The basic procedure for such consolidation is simple: all shipments originating

within the defined area, whether from suppliers or warehouse, and destined for defined points or beyond, are delivered to a central shipping location; the originator indicates when the goods are required at destination and the limits of time and cost within which shipping arrangements may be varied. A central traffic organization selects the routing which best meets the need and makes up carloads or truckloads for the various destinations or, where less than carload shipments must be made, selects the method of shipment best suited to the particular tonnage. In addition, the central traffic organization keeps participating shippers informed of alternative modes and routes and the relevant costs so that the latter can time shipments to secure the most economic rates.

Even without the benefit of negotiated special rates, the savings to be gained from consolidation of shipments and proper routing control are readily demonstrable. Not only are less-than-carload and less-than-truckload shipments charged higher rates than carload or truckload lots, they are also subject to minimum charges, generally the rate for one hundred pounds. Thus, the shipping cost of a forty-pound item includes, in effect, a charge for sixty pounds of "air", representing wasted transportation dollars. These minimum freight charges also reinforce the tendency for small shipments to be made by premium methods, such as express. With very little consolidation of traffic, coupled with better control of routing, the added cost of these premium services can be eliminated.

Similar benefits can be found at another level—in the consolidation of express shipments. For example, express shipments of less than five pounds from Toronto to Vancouver incur a minimum charge of \$1.16. Thus, a one-pound parcel is charged at the equivalent of \$116 a hundred-weight while an actual hundred-weight costs only \$15.95.

Knowledge of these rate differentials, and of the techniques for using the various modes to the greatest advantage, is the stock-in-trade of contemporary traffic management.

Traffic Management in the Federal Government

Little traffic management on the commercial pattern exists in the departments of government. Commercial practice requires the compilation and analysis of traffic statistics: this essential is lacking in the public service. In consequence, departments have little way of knowing how efficiently their shipments are being handled, or what opportunities there may be for savings and improvements in service. Even in the Department of National Defence, where sizeable

traffic organizations exist, little is done to compile traffic data in a form which would permit useful analyses to be made.

The government may lack the freedom of action enjoyed by private shippers in the negotiation of rates. A large private undertaking can exploit its bargaining position to the full and may, in fact, succeed in negotiating rates which include less than a proportionate share of the general overhead costs of the carrier. It is able to do so because of its ability to offer the carrier, in return, a firm commitment of the bulk—from 75 to 100 per cent—of its total traffic. For the government—whose volume of traffic is equalled by few commercial shippers—such arrangements would be difficult, if not impossible.

However, the experience of the Department of National Defence suggests that some reduction of costs are possible. By agreement between the Armed Forces and the carriers, special classes of rates have been established for the shipment of military stores. The primary object is to simplify the calculation and verification of charges for shipments made up of miscellaneous commodities to which, otherwise, a variety of rates would apply. The military stores rates provide a ceiling on freight charges, while leaving the Armed Forces free to ship at the standard rates whenever these are lower than the special rates. The resulting savings are not inconsequential.

The potential source of major savings lies in the consolidation of traffic into carload and truckload shipments. To illustrate: the military stores rate for less-than-carload shipments from Montreal to Winnipeg is \$4.89 a hundred-weight, but the carload rate is only \$3.10; to Vancouver the two rates are \$9.74 and \$6.25. Thus, consolidation of shipments into carloads yields savings in freight charges of about 35 per cent.

Several obstacles to the consolidation of government traffic must be overcome before any substantial economies can be achieved in this manner, particularly among the civil departments and agencies. Because of the relatively small volume of traffic generated by individual departments, it would be necessary to create a central traffic management organization responsible for the movement of all departmental shipments which lend themselves to consolidation. In addition, the dispersion of government operations throughout the country gives rise to exceptionally complex patterns of traffic. Any attempt at consolidation must, of necessity, be highly selective, concentrating on those shipping and receiving points and traffic routes where the volume is heaviest. At present, consolidation would be further impeded, even in major centres like Montreal and Toronto, by the lack of any integrated supply organization and central warehousing facilities. Under these circumstances, the costs of collecting, sorting and manifesting at shipping centres, of sorting, delivering or re-shipping at distribution points, and of accounting and billing

might outweigh potential savings in the cost of carriage.

For military traffic a large measure of consolidation has already been achieved. In 1960-61, for example, about 20 per cent of the tonnage shipped from the three main R.C.A.F. depots went in carload and truckload lots; for the four main naval depots, the proportion was almost 30 per cent, and a further 12 per cent was shipped by "piggyback" trailers; the three principal ordnance depots of the Army, shipping principally to regional and other large stores, moved about 80 per cent of their traffic by carload, truckload, pool car and truck, or "piggyback" trailer. (The differences among the Services are not necessarily a reflection of their traffic management skills, but result rather from their different supply systems.)

Any substantial further consolidation of military traffic could only be effected on a tri-service basis, and at this level the difficulties to be overcome closely resemble those affecting the traffic of civil departments. Consolidation of traffic from Montreal, for example, must reckon with the fact that the principal supply depots of the three Services are widely dispersed. Consequently, any attempt at general tri-service consolidation of traffic would interpose several additional steps in the already complex supply systems of the three Services. The alternative would be a substantial measure of integration of the three supply systems.

Thus, for both civil and military departments, the rationalization of traffic management must be related to the possibility of combining supply systems. Moreover, whether central traffic management is possible or desirable cannot be decided solely on the basis of the level of direct purchases by the government of freight, express and cartage services. As has been noted, the larger element in the government's total bill for shipments by common carriers is buried in payments to suppliers, as a result of the general policy of buying f.o.b. destination. These relationships between transportation and other aspects of supply will be examined in the next section.

One inescapable conclusion emerges: data on government shipments must be developed systematically to permit the assessment of existing procedure and of the net savings to be gained through the adoption of central traffic management. What must be determined is not merely the total volume of government traffic, but how much of this total lends itself to central management by virtue of potential savings that outweigh the costs of operating a central traffic organization.

We therefore recommend that: Data on government shipments be developed systematically with a view to ascertaining the possible economies to be gained through central traffic management.

TRANSPORTATION AND SUPPLY

In the year 1960-61, the federal government spent over \$550 million for supplies and equipment of all kinds, civil and military. Of this amount, almost \$70 million went towards the purchase of ships and aircraft, the delivery of which involved no freight charges; in addition, \$120 million represented purchases by local offices, largely from suppliers in their immediate vicinity and involved, generally, only local trucking. The remaining purchases, amounting to about \$360 million, generally required shipment by common carrier, with the exception of some of the vehicles purchased, which were delivered under their own power. Based on industrial experience, it is estimated that between five and seven per cent of the purchase price of these supplies represented delivery costs—roughly \$20 million to \$25 million. Of this amount, almost ninety per cent related to equipment and supplies purchased by the Department of Defence Production.

Increasingly, the practice of large commercial and industrial firms is to subject the delivery of their purchases to the control of their own traffic management groups. From experience they have found that savings are achieved by consolidating this incoming traffic and contracting directly with the carriers for its movement under agreed charges. In contrast to commercial practice, government normally places full responsibility for shipment on the supplier; it therefore becomes an element of cost to the latter, to be included in the purchase price charged to the government. The present policy became entrenched several decades ago, but circumstances have since changed radically. With growing competition among different modes of transportation, rate structures have become more complex and flexible, and shipping charges, to a far greater extent than before, a controllable element of cost. In response to this change, there have been rapid developments within industry in techniques of traffic management, coupled with much greater awareness of the relationship of transportation to purchasing and materials management. In effect, these developments have been ignored by the government in its own purchasing.

Even the slight element of control originally afforded by the existing purchasing policy has disappeared. With the increasing substitution of firm price for cost-reimbursement contracts, purchasing departments no longer receive detailed statements of their suppliers' costs to the same extent as previously and are consequently less able to judge whether shipment has been made by "the most economical and expeditious means". In fact, even where the cost data are received, this assessment can no longer be made with the same assurance as before; the greater complexity and flexibility of the

current rate structure, and the widespread adoption of agreed charges, have eliminated the relatively simple criteria by which freight charges could be measured two decades ago. Effective scrutiny of these costs today would require the existence, within each purchasing organization, of expert traffic advisers. Any case for the use of a government traffic organization must rest on incontrovertible evidence of significant potential savings. Such evidence is not now available. There is, however, a compelling case for getting the facts about the hidden freight bill. It has already been concluded that data should be obtained on the character and costs of the government's own shipments of goods as a basis for assessing the net savings available through central traffic management. The same information is needed in respect of shipments prepaid by the government's suppliers.

The analysis of traffic and the assessment of potential savings should concentrate first on the traffic generated by the central purchasing department. For this purpose, it will be necessary to create a traffic advisory group within the central purchasing and supply organization proposed in your Commissioners' report on *Purchasing and Supply*. Its task will be to make an appraisal of traffic patterns and develop cost data on a selective but ever-widening basis, for major shipping points and traffic routes. The advisory group should also evaluate the traffic pattern of other departments. Should these analyses disclose significant potential savings, the traffic advisory group could become the nucleus of a traffic organization, fully integrated into the central purchasing and supply department. But until such a development proved warranted, the advisory group should remain small, its primary task being to plan and direct the necessary studies.

Quite apart from the need to establish whether central traffic control is desirable, there is a need for such a traffic advisory group within the government. Among the tasks it could perform are:

- Drafting standards and procedures for the guidance of traffic management throughout all civil departments and agencies.
- Serving as a source of expert advice for traffic personnel throughout the government.
- Negotiating special rates with the carriers for government shipments, comparable to the military stores rates now available to the Armed Forces.
- Assisting in the training and development of traffic personnel throughout the government.
- Furnishing advice to the Treasury Board on traffic management matters (including the formulation of standards).

We therefore recommend that: A Traffic Advisory Group be established within the Department of Purchasing and Supply, to compile data on the movement of supplies and equipment to or within the federal government, and assess the utility of central management for this traffic (excluding movements within the military supply system); to negotiate with carriers to obtain suitable rates for government traffic not entitled to the military stores rates; and to advise the civil departments and the Treasury Board on traffic matters.

The task of traffic management, and the role of the Traffic Advisory Group, or of the traffic adviser in the Department of National Defence, must be adjusted to any changes in the supply systems within which they operate. Closer integration of supply for the three Armed Forces, changes in the location or function of depots and warehouses, either military or civilian, the adoption of central purchasing and supply for materials in common use, or changes in methods of inventory control which affect the frequency and scale of purchases and shipments—all these and other elements of the supply system must be taken into account in determining the most suitable approach to traffic management. In short, policies and practices in this area cannot be permitted to become static.

REVIEW OF CHARGES

Commercial traffic management places heavy emphasis on the audit of freight bills to detect unreasonable or incorrect charges, and as a check on routing control. The scrutiny of these accounts in federal departments is generally more extensive than industrial practice, but is far less effectual.

Because of limited volume, most departments are unable to develop and maintain audit staffs possessing the knowledge of routes, procedures and rates needed for this work. Only among organizations having relatively heavy traffic, such as the Department of National Defence, is there an awareness of the objectives and practices appropriate to the review of freight charges, and even here the level of skills falls short of the best industrial standards.

Your Commissioners, in the report on *Financial Management*, recommend that departments be made directly responsible for all financial transactions and the accounting related thereto. When this is done, their accounting and audit procedures will serve two management needs: first, measure the effec-

tiveness of departmental traffic procedures and, second, develop analyses of traffic data which will disclose the area where improvements may be effected. A problem may arise in departments where the volume of traffic will not justify expert staffing for this purpose; but there are various sources to which they can turn. Resort can be had to commercial consulting services which undertake specialized freight auditing for industry. Even larger departments might profitably employ these commercial specialists from time to time to test the adequacy of their own procedures.

A major defect in existing review procedures is their excessive cost, relative to the accounts reviewed. By commercial standards, an expenditure on review amounting to two per cent of expenditure for freight is considered reasonable. By contrast, using the Department of National Defence to illustrate because it maintains data, it costs about \$900,000 annually in salaries alone to review freight accounts amounting to less than \$7 million; thus, the proportion of audit cost to accounts exceeds thirteen per cent, involving excess costs of more than \$750,000 by industrial standards.

There is consequently a need for improved methods of review, and especially for the use of sampling techniques by which the intensity of audit can be graduated according to the amount of probable error. Industry has learned that review becomes uneconomic for accounts below a certain limit, varying from \$2 to \$10, depending on the nature of the business. Above this limit, sampling methods can be used, in conjunction with more intensive checks where chronic errors are discovered, until the point is reached at which comprehensive review becomes automatic. Adoption of such techniques has been recommended, in a more general context, in the report on *Paperwork and Systems Management*.

3

TRAVEL AND REMOVAL

TRAVEL

Government payments to common carriers for the transportation of public servants by rail, air, bus and ship in 1960-61 is estimated at \$17 million, of which \$5 million was incurred for the travel of the Armed Forces. In addition, more than \$5 million was paid in mileage allowances to public servants using their own automobiles.

Travel Services

Arrangements for the purchase of transportation vary widely. Some departments, notably External Affairs, Trade and Commerce and Veterans Affairs, maintain staff groups to arrange reservations for air, rail or steamship travel and hotels, and to buy and distribute tickets. This service is especially useful for overseas travel or domestic trips with complicated itineraries. In other departments, each employee makes his own arrangements, but may be helped by central administrative personnel. In the Armed Forces, transportation is controlled, for the most part, by routing and transport officers.

In 1955, the Organization and Methods Service of the Civil Service Commission investigated the possibility of establishing a central travel service and concluded that the advantages would be outweighed by the cost. Your Commissioners concur in their findings. Travel in Canada and the United States, which accounts for by far the greater part of the requirement, can be arranged with little difficulty and at the least possible cost by the officer himself or by his immediate staff.

Overseas travel—and movements of household effects—for the civil departments and agencies would be better served by a single organization. Such an agency might be established in the Department of External Affairs provided it is staffed by specialists, and the present departmental practice of assigning foreign service personnel on a short rotational basis abandoned. An alternative is to place this function in the hands of a commercial travel service with international connections—this course was adopted by the United Nations organization after unsatisfactory experience in operating a travel service with its own staff.

Your Commissioners have concluded that the existing arrangements for the movement of military personnel should continue.

Rates

Some public employees are entitled to travel on railway passes but most members of the civil departments travel at the normal rates charged to the public. However, the *Railway Act* provides that “members of the Armed Forces, and all policemen, constables or others travelling in Her Majesty’s service shall, when required by the Minister or Deputy Minister of National Defence or any person having the superintendence and command of any police force, be carried by the railways on such terms and conditions and under such regulations as the Governor in Council makes.” By virtue of this provision, special rates, significantly lower than those charged to the general public, have been negotiated for the classes named in the Act. In addition, the Armed Forces obtain ocean passages at 15 per cent discount in season, and 30 per cent in the off season.

Your Commissioners are informed that the railway companies have expressed a willingness to negotiate agreed charges for all government passenger traffic, both civil and military. The interest of both the government and the carriers might be equally well served by the negotiation of rates applicable to travel of all public servants on duty without any commitment of traffic.

We therefore recommend that:

- 1 Consideration be given to negotiating for fixed rates for the travel of military and civil personnel in the public service.
- 2 Either the travel section within the Department of External Affairs be reorganized to serve as a central agency for arranging overseas travel for all members of the public service or a travel agency be retained to provide this service.

Control and Review of Travel Expense Claims

The travelling public servant must conform to detailed rules which leave little discretionary power to even the most senior officers of departments other than to determine whether or not a trip should be made. Review procedures are detailed to the point of absurdity, for Treasury Board rules are expanded and refined by the Comptroller of the Treasury's Office to an extravagant degree.

In the Department of National Defence alone, about 400 man-years are devoted annually by Treasury personnel to the review of travel claims, at an estimated cost, for salaries alone, of \$1.6 million. In many instances, throughout the public service, payments are held up and massive correspondence entered into for very trivial reasons, yielding no significant reduction in expense.

Your Commissioners have already recommended, in their report on *Financial Management*, that responsibility be placed on departments for certifying to the Comptroller of the Treasury that expenditures will be lawful charges and funds are available, and that the responsibility of the Comptroller be limited to ensuring that departmental officers providing this certificate are properly authorized. It is again emphasized here that, subject to the right of the Treasury Board to prescribe general standards and the right of the Auditor General to scrutinize all financial control procedures and audit any transactions, the control of expenditures such as those incurred for travel is properly a responsibility of departmental management.

MOVEMENT OF HOUSEHOLD EFFECTS

The annual cost of moving (and storing) the furniture and effects of public servants transferred from one post to another is estimated at almost \$12 million. Eighty per cent of this, about \$9.5 million, is accounted for by the Armed Forces. Another \$400,000 represents the annual cost of removals for members of the foreign services of the Departments of External Affairs and Trade and Commerce.

Regulations require employees about to be transferred to another post to arrange for the movement of their household goods by obtaining estimates, from two or more carriers, of the probable cost of shipping their household effects, such estimates to be based on the rate per hundred pounds or per cubic foot.

In applying these regulations, departments differ widely in their practices. In some, the employee is told what movers are to be considered. In others, the effective choice is made by the employee. The Armed Forces have devised

the most detailed instructions: lists of satisfactory movers for each location are maintained and the serviceman is asked to state a preference. Three sealed tenders are obtained, and the mover preferred by the serviceman is engaged if there is no lower bid, or if the serviceman is willing to pay any cost in excess of the lowest bid.

Most long distance movers apply the standard tariff devised by the Canadian Warehousemen's Association; consequently, in most cases, the quoted rates per hundred pounds are uniform. Generally speaking, competition is based on service rather than price. Moreover, quotations submitted by movers are estimates only; billings for both packing and carriage are based on the work actually done. A low estimate may therefore give no assurance of a low price.

The Armed Forces, by developing a detailed specification for packing, with a standard packing rate based on weight, have succeeded in eliminating, to a significant extent, one of the most uncertain elements in moving costs. Consequently, the offer of a lower moving rate per hundred pounds can normally be treated as a genuinely lower bid for this job. In addition, the maintenance of lists of movers considered by all three Services to be satisfactory offers some assurance that at least minimum standards of service will be received.

For the civilian departments and agencies, it would be advantageous to adopt packing specifications comparable to those of the Armed Forces and to secure the packing rate based on weight which is applied to the movement of servicemen's effects. Competitive bids would then take on more meaning, and selection of the mover could be made in the same manner as in the Forces.

The cumbersome and costly procedures for the review of charges, to which freight movements and travel claims are subject, apply equally to the movement of household effects. In some departments it was found that, on average, direct clerical time costing over \$100 was devoted to checking a removal claim.

We therefore recommend that: Regulations covering travel arrangements for public servants be revised and simplified in order to reduce present costly checking procedures to reasonable proportions.

4

THE OPERATION OF VEHICLES

In 1960, civilian departments and agencies owned and operated more than 8,300 general purpose passenger vehicles and trucks. The Armed Forces had over 5,800 similar vehicles, bringing the total holdings of the federal government to about 14,150. This does not include either special purpose civilian vehicles, such as warehouse and farm tractors, and engineering equipment, or the operational vehicles of the Armed Forces.

Each year, these vehicles are driven about 150,000,000 miles, the equivalent of 6,000 trips around the world. Costs of garaging, supervision and depreciation were available in only fragmentary form, but apparently total at least \$15 million annually. In addition, full-time drivers are employed for most vehicles of the Armed Forces and for a number of those of the civil departments, at an annual cost in excess of \$20 million. Thus, the total cost of the vehicles fleets of the federal government, excluding special purpose equipment, is around \$50 million a year.

Among the civilian departments, three organizations operate almost sixty per cent of all vehicles: the Department of Agriculture with 1,700, of which almost half are trucks; the Royal Canadian Mounted Police with 1,600, of which over 85 per cent are passenger cars and station wagons; and the Department of Transport with 1,500, of which about one-third are passenger vehicles. At the other extreme, the Departments of Defence Production and Labour have only one automobile each, and the Department of Justice manages without any. In the Armed Forces, the Army is by far the largest operator, accounting for about 3,500; the Air Force has slightly less than half as many, and the Navy, about 600.

CONTROL OF VEHICLE OPERATIONS

The general supervision of civilian vehicles is vested in the Government Motor Vehicle Committee, a body of officials created in 1936 to assist the Treasury Board in controlling the purchase, hire, operation, maintenance, and replacement or disposal of motor vehicles, and the granting of mileage allowances for the operation of employees' vehicles on government business in their area headquarters. The Committee's one active role involves the examination of applications for the purchase of all new vehicles, either as additions to or replacements within departmental fleets.

Apart from this check on purchases, civil departments and agencies generally act independently in the management of their vehicle operations. Although Treasury Board regulations require the maintenance by all departments of standard records of vehicle operations and the submission to the Motor Vehicle Committee of periodic reports, there is, in fact, little uniformity in the bases on which records are compiled, and the Committee can make little use of the reports as instruments of control.

Each of the Armed Forces enjoys similar freedom in the management of its vehicles. In recent years, however, the Tri-Service Vehicle Committee, composed of officers representing each of the Services, has succeeded in achieving some measure of standardization in specifications, operating and maintenance instructions, and records.

PURCHASE AND REPLACEMENT

The controlling authority over purchase and replacement is the Treasury Board, and policy is defined in its regulations. The machinery for applying that policy is provided by the Motor Vehicle Committee—with, of course, a reserve power remaining in the hands of the Board itself.

Regulations prescribe that automotive vehicles must have Canadian or Commonwealth content at least equal to that required for customs duty drawback; passenger cars, which must be of the standard coupe or coach type, are to be bought only where the prospective mileage will be at least 6,000 annually for three years or more, and they are to be driven at least 60,000 miles before being replaced. In addition, the Board has restricted the accessories which may be ordered for government vehicles.

All purchases, whether of replacement or additional vehicles, must have prior approval by the Motor Vehicle Committee but, if the Committee rejects an application, the department concerned may appeal to the Treasury Board.

This approach to the central control of vehicle purchases grossly oversimplifies the factors to be weighed in deciding on acquisition or replacement.

The requirement that each new vehicle be justified individually, in terms of its prospective use, is virtually meaningless if the vehicle concerned, as is usually the case, will be operated as one unit in a general purpose fleet. The requirement of 60,000 miles of use before replacement is undoubtedly more often inappropriate than not. Many factors must be considered in deciding when to replace a vehicle, of which mileage is only one. Age must also be taken into account: long before reaching the stipulated mileage, passenger cars and light trucks with low annual usage will lose heavily in resale value and may become very costly to maintain through body corrosion or general fatigue of their lightly-built working parts. Operating conditions are equally important: some vehicles are driven exclusively on first-class highways, others on very rough roads. Vehicles which, like those used on police duty by the R.C.M.P., have high annual mileages and consequently low depreciation costs per mile, may warrant annual replacement in order to avoid heavy maintenance charges. Obviously, all these factors must be considered in determining the most economic point for replacement of a vehicle.

Your Commissioners have emphasized, especially in the volume entitled "Management of the Public Service", that there is an overriding interest, properly vested in the Treasury Board, in the maintenance of standards throughout the government. The Board is properly concerned with the performance of departments, including the efficacy of departmental procedures for determining operating requirements and controlling the use of resources. But meticulous and inflexible regulations, interpreted and applied by central organizations, are self-defeating. Subject to any general policies laid down by the Board, decisions with respect to replacement of vehicles can best be made by departmental management.

THE USE OF VEHICLES

The annual mileage of cars and trucks ranges from a few hundred (in exceptional cases) to 30,000 or more at the other extreme. Automobiles used for police duties by the R.C.M.P. average about 25,000 miles annually, but the general purpose trucks of the Force average just half this mileage. Vehicles of the Geological Survey Branch of the Department of Mines and Technical Surveys average only 6,400 miles a year, largely because many vehicles are laid up during the winter.

In some instances, special requirements explain low utilization. For example, at Bedford the Navy has a number of diesel trucks with mileages averaging less than 5,000, but safety considerations require the use of such expensive vehicles for transporting ammunition. Again, vehicles may have

to be provided in isolated locations, especially in the North, although the annual usage may be relatively slight.

One frequent cause of under-employment is a fragmenting of control. The attitude of many organizations is summed up by an observation of one department that cars and trucks are only tools needed by the men in the field to do their work. This attitude has much in its favour, and an overriding concern with getting on with the job is the mark of a healthy organization. But enthusiasm must be tempered by a proper regard to cost, and a willingness to accept reasonable controls. It is the task of departmental management to strike the proper balance; the point at which it is to be found will vary from one organization to another, and within a department according to the role which vehicles are expected to play.

The foregoing considerations are particularly appropriate to the question of "pooling" *versus* "allocation" of vehicles. Against the understandable desire of operating groups and field officers to have full control over their own vehicles, must be set the almost certain increase in cost (or decrease in utilization) which results from fragmented control and supervision. Pooling of vehicles should be the general aim, and every assignment to a specific use must justify itself.

Pooling can be attempted on two bases: first, within a department or agency and second, within a locality. Under existing conditions, with control of vehicle operations entirely in the hands of the individual departments, only the first alternative has been tried.

Pooling of vehicles is most extensive in the Armed Forces. Apart from staff cars assigned for the personal use of senior officers, virtually all vehicles are operated in transport pools. Among civilian departments and agencies, allocation of vehicles to specific duties is a more common practice. This is obviously necessary for officers whose duties involve extensive field travel—inspectors and the like—but is less clearly justified for purely local use by individual branches or divisions of an organization. At National Research Council laboratories, for example, certain vehicles are allotted to engineering departments, with a complete severance from the control of those operating the rest of the fleet. In particular cases, especially at regional centres, geographic dispersion of the activities of a department may make this fragmentation of control unavoidable, but wherever activities are concentrated, pooling of the vehicles of a department should be the normal rule.

Interdepartmental pooling within particular localities is virtually unknown in the federal government. The most obvious locality in which such an arrangement might be considered is the Ottawa-Hull area. A study made in 1955 by the Organization and Methods Branch of the Civil Service Commission indicated that a regular inter-building mail and messenger service in Ottawa,

operated by the Ottawa Post Office, could yield savings of at least \$12,000 annually. This is a conservative estimate. Centralization of general utility vehicles is also possible, with further savings to be gained. However, the planning needed to create this messenger vehicle pool was not undertaken. Your Commissioners are of the view that this proposal should be proceeded with, because of the immediate savings and in order to gain experience in the formation and operation of an interdepartmental pooling practice which might be extended to other services and localities.

- We therefore recommend that:*
- 1 Plans be developed for the creation of local messenger and trucking services in Ottawa for common use by all departments and agencies.
 - 2 The Treasury Board initiate studies of the feasibility of similar local transport pools in other major centres.
 - 3 Pooled service be provided on a cost-recovery basis.

One further question relative to the use of vehicles remains to be examined: what are the legitimate uses for which government vehicles should be employed? Regulations explicitly prohibit the use of all government vehicles for personal purposes, except with specific authorization by the Treasury Board. The rule is sound; but should exceptions require Treasury Board authorization? More appropriately the role of the Board might be to prescribe the general rules, with their application left to departmental authorities.

Where passenger cars are public property, a problem is the establishing of a dividing line where official need merges into official perquisite. This is a far more sensitive matter in government than in private enterprise. Moreover, thirty years ago the decision was taken to dispose of all limousines provided for the convenience of cabinet ministers and the deputy heads of departments, and this decision, confirmed by Parliament, has never been varied.

World War II needs resulted in many automobiles being acquired for military and civil officials in the Department of National Defence. Currently, there are approximately 1,350 passenger cars and station wagons in use by the Forces with, almost invariably, a driver assigned. It has been estimated that, with driver, operating cost is in the nature of 39 cents a mile. There is, therefore, both a significant cost factor and an inconsistency between civil and military practices, this being particularly noticeable in the upper echelons of the public service.

We therefore recommend that: A review be made of Armed Forces' policies and practices respecting the use of passenger vehicles to the end that there be consistency throughout the public service.

OWNERSHIP OR HIRE

As an alternative to government ownership, your Commissioners have considered the possibility of rental from commercial leasing concerns. It is concluded, however, that such arrangements offer no likelihood of savings. The experience of two federal organizations which now rent limited numbers of automobiles—the Canadian Broadcasting Corporation, and the Standards Branch of the Department of Trade and Commerce—discloses that annual rental charges are more than double the depreciation costs on Crown-owned vehicles; the tasks of managing, operating and maintaining remain unchanged, whether vehicles are owned or leased. Consequently, rental of automobiles should be resorted to only to meet temporary or emergency needs.

In certain agencies, such as the Department of Public Printing and Stationery, pick-up trucks are used with a full-time staff of drivers, for the sole purpose of providing a delivery service. Taking account of overhead, depreciation, driver costs and all other expenses, a more economical service could be obtained by hiring commercial cartage companies. Such companies can normally make greater and more economical use of equipment and staff.

Official Use of Employees' Vehicles

A further alternative to government ownership is the use by public servants of their own automobiles for official duties, with suitable compensation. The use of private cars for occasional travel on official business is governed (in detail) by the Government Travel Regulations. Regular use of employees' vehicles on public business in the headquarters area must be sanctioned by the Motor Vehicle Committee.

Full control of this practice, like the control of purchasing, should revert to departments, the concern of Treasury Board and the Motor Vehicle Committee being limited to the formulation of general policy and standards. Under the latter heading, two main questions arise: first, under what circumstances is the practice desirable or permissible and, second, what rate of compensation should be granted?

On the first point, policy must be sufficiently flexible to allow departments to adapt their arrangements to local conditions. The degree of isolation of the post will be of relevance, and whether or not the department is operating

vehicles of its own in the same locality. Usage must also be considered; beyond certain limits (say, in most cases, 10,000 miles annually) purchase by the department may be more economical.

The government does not insure its own vehicles and does not require its employees to insure their cars when using them on government business. There is provision, however, to assist the employee whose car is insured at the higher rates for business use.

The application of allowances throughout the country ignores certain marked differentials in operating costs. The experience of the R.C.M.P. in operating its own automobiles discloses that running and maintenance costs, although reasonably uniform in the more settled parts of the country, are 2.1 cents a mile higher in Newfoundland than in Ontario, and 2.3 cents a mile higher in the Northwest Territories. In fairness to employees, these differentials should be recognized, and mileage allowances should be adjusted accordingly.

MAINTENANCE AND REPAIR

Unco-ordinated departmental control has produced the greatest conceivable variety of standards and practices in the repair and maintenance of vehicles throughout the government. In part, this is an inevitable consequence of the geographic dispersion of operations and the widely varying roles of vehicles in the many different activities of government. In part, however, it reflects a failure to develop appropriate and consistent standards of maintenance.

Each department decides whether to prepare a manual of maintenance, and what to put in it. A review of forms relating to garage maintenance and repairs, the issue of supplies and parts, and general inspection show neither uniformity nor consistency. Some departments have a preventive maintenance programme; others do not. Lubricating programmes vary from oil changes and greasing every 500 miles, in the Department of Public Printing and Stationery, to 1,000 mile changes in most civil departments, and a formula in the Army requiring changes only every 5,000 miles, with chassis lubrication every 1,000 miles; the Air Force requires oil changes and greasing, in automobiles and light trucks, for every 100 gallons of gasoline consumed.

The Armed Forces generally, and the Army in particular, show a much greater concern with vehicle maintenance than do civilian organizations; among the latter, the R.C.M.P. has the most highly developed maintenance programme. Army instructions for the operation and care of vehicles are voluminous and are so prepared that the raw recruit can readily discover what he is expected to do with a vehicle in any situation. A programme of periodic inspections is carried out, with systematic running maintenance and detailed

seasonal servicing. The R.C.A.F. has conducted an intensive examination of the operation and care of automotive equipment; and has prepared comprehensive instructions to improve control. The written instructions of the Royal Canadian Navy, by comparison with the other services, are relatively sketchy, although more detailed manuals are being prepared; however, the investigation indicates that naval maintenance standards are high.

The proportion of work done in government garages and repair establishments varies widely. Because of the dispersion of operations, many vehicles cannot conveniently be maintained in government shops. Among civilian departments, about two-thirds of all vehicles are repaired by commercial firms. The following figures are significant because they include more than fifty per cent of the vehicles in civilian departments:

Table 1—VEHICLE REPAIRS AND OVERHAUL IN NON-GOVERNMENT SHOPS

<i>Department</i>	<i>Vehicles (Approximate)</i>	<i>Work Done by Commercial Shops</i>
Agriculture	1,700	75%
R.C.M.P.	1,600	65%
Transport	1,500	45%
Northern Affairs	950	25%

Other organizations, having smaller fleets, contract out by far the greater part of their work: the Department of Mines and Technical Surveys, for example, with about 300 vehicles, places ninety per cent of its work with commercial firms.

Stated generally, your Commissioners consider the use of commercial repair facilities the more economical—for reasons set out in the report on *The "Make or Buy" Problem*. The maintenance and repair of certain military vehicles, for example, is undertaken by means of annual contracts placed with the major manufacturers, under which repairs are made at dealers' garages. Commanders of Service units may select an approved dealer conveniently situated to carry out any necessary repairs. Charges for labour are based on prevailing rates; parts are provided at favourable discounts under master contracts entered into annually with manufacturers; the invoicing under these arrangements is done by the manufacturer. The master contracts for the supply of parts also apply to parts needed for repairs made in the workshops of the Armed Forces.

Among civilian departments, repair contracts with commercial garages are generally governed by the contract regulations, requiring the calling of competitive tenders and acceptance, as a normal rule, of the lowest bid. This procedure is clearly inferior to the arrangement under which repair services and

parts are purchased for the Armed Forces.

There are circumstances in which the government must establish its own garage and repair facilities: in northern locations, for example, or where for other reasons no other facilities are available. Where such conditions prevail more consideration should be given to integrating such facilities, with a view to sharing them wherever possible. This move would be facilitated by, but need not be conditional upon, the development of common maintenance standards for all government vehicles. In the absence of a common-service local transport agency, however, allocation of responsibility for the operation of shared facilities would have to vary from one locality to another, and must be decided in the light of local circumstances.

Government workshops tend to be over-equipped and over-staffed. A typical commercial transport company was found to have a repair staff in the ratio of one man to every twelve vehicles in the fleet. Government workshops, on the other hand, are generally staffed at about twice this scale. For example, the workshops of both the National Research Council and Atomic Energy of Canada Limited handle less than six vehicles per man, and the mileage of these vehicles is relatively low. The same is true in the Armed Forces. The Royal Canadian Army Service Corps workshops, for example, which handle only servicing and lighter repairs, show a ratio of slightly over five vehicles per man; high levels of staffing also exist in the workshops of the Royal Canadian Electrical and Mechanical Engineers, where heavy repairs to Army vehicles are made. The standards of care, and especially of preventive maintenance, are undoubtedly high in the Army, but the cost of maintenance is excessive.

The record of vehicle maintenance and repair in the R.C.M.P. demonstrates that high standards can be reconciled with economy of effort. The vehicles of the Force have, on average, the highest annual usage of all government vehicles and standards of maintenance are also high. Yet the ratio of vehicles to staff at R.C.M.P. garages ranged from 9:1 to 12:1.

Repairs in Penal Institutions

Repair services are also provided by the federal penal institutions, partly as a means of providing vocational training for inmates. The Industries Division is now planning to provide major overhaul and repair services to government departments as part of the industrial rehabilitation programme. In fact, for some years now, a number of vehicles of the Department of Mines and Technical Surveys in the Ottawa area, which are idle in winter, have been sent to the Collin's Bay Penitentiary near Kingston for overhaul. The medium-security Leclerc Institution, near Montreal, has begun to provide some repair service

for government vehicles in that area, and penitentiary officials hope to develop this further both at Leclerc and at the corresponding Joyceville Institution near Kingston. Similar programmes may, at some future date, be attempted in western institutions.

These programmes and plans are relatively modest because the number of vehicles that can be accommodated is limited, and only major mechanical and body repairs can be undertaken. Use of these services cannot be justified on a strict calculation of cost and convenience. Vehicles to be overhauled at Joyceville or Collin's Bay, for example, must be drawn largely from the Ottawa or Toronto areas, more than 100 miles distant. Vehicles must also be taken out of service for longer periods than would be the case were the work done in local commercial garages. However, in view of the primary purpose of the programme, such considerations do not apply with the usual force. Certainly the programme lends itself well to the overhaul of seasonally-employed vehicles from points near the penal institutions and, of course, of vehicles of the institutions themselves.

The determination of charges for this service presents difficulties if departments are to pay approximately what comparable work would cost in a commercial garage. Inevitably, productivity in the penal institutions is well below that of commercial shops; labour costs are therefore billed at from 35 to 45 per cent of the standard commercial rates for mechanical repairs, and from 30 to 40 per cent of the commercial rate for body work. With experience, the pricing basis can be further refined.

RECORDS AND COST CONTROL

Despite the heavy investment in vehicles and the substantial costs of operations, few departments devote much attention to the maintenance of cost records. All civilian departments are required, by Treasury Board regulations, to complete periodic reports prescribed by the Government Motor Vehicle Committee, but few departments make any use of these records for internal control.

Properly completed, these forms could provide a valuable record of direct costs of vehicle operations, excluding driver costs, and a useful instrument of management control. In fact, their potential value has been largely vitiated by inaccuracy and inconsistency in compilation. One department shows operating costs as low as 1.6 cents a mile. Another records little cost for tire replacement on vehicles that have been driven 30,000 to 70,000 miles. Labour costs incurred in departmental garages are charged at the rate of \$3.00 an hour by the Civil Aviation Branch of the Department of Transport, at \$1.25 an hour by the R.C.M.P.; and the Department of Agriculture makes no charge.

Some departments record the gross purchase price as capital cost; others use the net figure after deducting trade-in allowance. Some departments record a storage charge for vehicles left outdoors, while others charge nothing for vehicles stored in departmental garages. Although the regulations require completion of the annual reports by June 30, three months after the year end, some departments take much longer—undoubtedly reflecting the indifference towards cost records which is all too prevalent.

Responsibility for the present state of cost records must be shared by the Treasury Board and the departments. The Board, through its regulations and the Motor Vehicle Committee, has declared itself the controlling authority, but has failed to insist that its own stated requirements for cost data are met. The departments, on the other hand, have generally failed to recognize their primary responsibility for the management of their own vehicles. There are exceptions: the R.C.M.P., for example, although some of their costing practices are questionable, have been consistent in maintaining their records, and have met the requirements of the regulations conscientiously.

Undoubtedly, the use of standard records of vehicle costs throughout the government represents a sound approach to management control. With the re-definition of Treasury Board and departmental roles proposed by your Commissioners in the volume on "Management of the Public Service", the value of such records would, in fact, be enhanced. But the Treasury Board and the departments share a responsibility for ensuring their effective use.

In contrast to most civilian departments, the cost records kept by the Armed Forces are detailed and precise. In the Army and Air Force especially, accounting procedures are prescribed in almost overwhelming detail, and target operating costs are maintained for each type of vehicle. However, the development of cost data is only a means to an end—the control of costs. An examination of Army records discloses that costs are high, not only by commercial standards but also by comparison with Air Force and Navy records. This is particularly applicable to maintenance and repair costs.

RE-DEFINITION OF FUNCTIONS

There emerges from the foregoing a re-definition of the functions of the departments and Treasury Board in the control of vehicle operations. Primary responsibility should rest on the departments, embracing the definition of needs, the application of adequate standards of use and maintenance, the development of proper records and cost control, and the training and development of qualified personnel. The Treasury Board, on the other hand, should concern itself with the formulation of standards, the assessment of departmental management

and, in addition, with the development, where appropriate, of interdepartmental vehicle pools and shared repair facilities.

In performing its task, the Board will need counsel as to the standards and practices best suited to the operating needs of the departments, as well as technical advice. A reconstituted Government Motor Vehicle Committee is therefore required. Shorn of its present task of screening purchase proposals, the Committee should concern itself with the drafting of standards governing the selection and acquisition of vehicles, operation, maintenance and repairs, contract arrangements for purchasing vehicles, parts, lubricants, repair services, etc., and the commissioning of studies of possible pooling arrangements for operation or maintenance. The Committee should be representative of the operating departments and the central purchasing department.

We therefore recommend that: A reconstituted Government Motor Vehicle Committee be established to advise the Treasury Board on standards for guiding departments in the management and maintenance of their vehicles.

5

THE OPERATION OF WATERCRAFT

Federal departments and agencies employ almost every conceivable kind of watercraft, from an aircraft carrier and icebreakers to sailing dinghies, out-board motorboats and canoes. Problems of management and operation are diverse and the observations which follow relate only to powered watercraft requiring the full-time services of specialized personnel for their operation, excluding those manned by naval personnel.

Within this group of vessels, two classes can be identified: first, larger sea-going vessels, manned for 24-hour watchkeeping; second, non-watchkeeping craft with only limited sea-going capabilities, which usually seek shelter and tie up overnight. The first group includes icebreakers, supply ships and large research and patrol craft. The second group comprises small patrol vessels, tugs, launches for personnel transportation, work boats and other small craft engaged in day-to-day duties.

In 1960, the civilian departments and agencies operated 63 watchkeeping vessels, and nearly four hundred of the smaller craft. In addition, the Royal Canadian Navy operated ten watchkeeping and 150 smaller auxiliary vessels, manned by civilian crews; five of the larger ships were engaged in scientific research, the rest providing a variety of services in direct support of naval fighting ships.

These 600 vessels represent a capital investment, at original cost, of some \$150 million; their replacement today, from Canadian yards, would cost in excess of \$450 million. Direct annual operating costs exceed \$30 million, and total annual charges, including depreciation and overhead, approach \$50 mil-

lion. Operation of the vessels requires over 3,600 officers and seamen, including some seasonally employed.

DISTRIBUTION AND FUNCTIONS

In 1960, as shown in Table 2, thirteen departments or agencies of the federal government operated these vessels.

Table 2—VESSELS—CIVILIAN MANNED

	Watchkeeping	Other	Total	Annual Direct Costs	Operating Personnel
				(\$ million)	
Royal Canadian Navy	10	150	160	3.7	600
Department of Transport	47	106	153	18.0	1500
Department of Mines and Technical Surveys	7	51	58	2.0	370
Department of Fisheries	4	74	78	2.0	350
R.C.M.P.	4	28	32	1.5	273
Fisheries Research Board	1	17	18	.6	77
Public Works* .....	....	86	86	2.7	400
National Harbours Board .....	....	7	7	.2	45
St. Lawrence Seaway Authority .....	....	7	7	.2	12
National Revenue (C & E) .....	....	3	3	†	7
Citizenship & Immigration .....	....	5	5	†	5
National Health & Welfare .....	....	2	2	†	4
Northern Affairs and National Resources .....	....	2	2	†	4
	73	538	611	30.9	3647
	73	538	611	30.9	3647

*Most DPW waterborne operations are essentially engineering tasks, especially dredging, and boat operators cannot be clearly distinguished from engineering personnel, nor can costs be segregated; consequently the figures given here are somewhat arbitrary estimates.

†Less than \$100,000.

ROYAL CANADIAN NAVY—CIVILIAN AUXILIARIES. A substantial number of auxiliary vessels are employed at the principal naval bases: over 100 in Halifax and about half as many in Esquimalt. The subsidiary base and dockyard at Sydney, Nova Scotia, has several small tugs and lighters for moving and servicing naval vessels. Except for ten larger craft, all are essentially harbour craft: fireboats, tugs, lighters, and passenger launches. Of the ten larger

watchkeeping craft, five are stores supply and maintenance vessels for fighting ships, and the remaining five are used solely for scientific research to meet defence requirements.

DEPARTMENT OF TRANSPORT—MARINE SERVICES. Among the civilian departments and agencies, the Department of Transport is by far the largest operator of ships, with almost 80 per cent of the watchkeeping vessels, 70 per cent of the annual direct costs, and over 50 per cent of the specialized personnel. It is responsible for all those waterborne functions of the federal government not specifically assigned elsewhere, and participates, in varying degrees, in much of the work of other departments and agencies. Generally, it has primary responsibility for all forms of aid to navigation—other than hydrographic surveying and charting—including ice-breaking, buoy and lighthouse supply, maintenance of navigational aids, the provision of weatherships, and the direction of search and rescue operations. In addition, it maintains ship channels in the St. Lawrence and Saguenay Rivers, performs some oceanographic and ice research duties, and provides supply services to the North. As a result of a recent decision to build eight safety-patrol vessels, the Marine Operations Branch is being recast as a coast guard service, with enlarged responsibilities for search and rescue and for general patrol, and the enforcement of marine regulations.

At the time of the inquiry, the fleet of the Department included ten heavy icebreakers, eight light icebreakers and buoy supply vessels, four survey vessels for ship channel maintenance, three weatherships, three lightships, a hydrographic and meteorology vessel in the Great Lakes, a supply vessel and over 110 tugs, landing craft, self-propelled barges, pilot boats, shore-based life boats, and other workboats.

DEPARTMENT OF MINES AND TECHNICAL SURVEYS—HYDROGRAPHIC SERVICE. This Department has primary responsibility for hydrography and oceanography, embracing the measurement and description of seas, rivers, lakes and other waters, and the determination of tides and currents. To carry out these tasks, the Hydrographic Service owns and operates seven ships ranging in size from 109 to 3,500 gross tons—with additional larger vessels now being built or planned; to these are attached twenty-four launches for working close inshore, and another twenty-seven launches are used on inland and coastal waters.

DEPARTMENT OF FISHERIES—CONSERVATION AND DEVELOPMENT SERVICE. The Fisheries Department patrols over 200,000 square miles of Atlantic and Pacific coastal and offshore waters. For this task, the Conservation and

Development Service uses a fleet of 78 vessels, four of which are deep-water ships.

FISHERIES RESEARCH BOARD. This semi-autonomous agency associated with the Department of Fisheries operates eighteen vessels in support of four marine biology stations and an Arctic research unit. Apart from a 167-foot trawler-type research vessel built in 1959, these are shore-based craft.

ROYAL CANADIAN MOUNTED POLICE—MARINE DIVISION. The R.C.M.P. operates a fleet of thirty-two vessels, four of watchkeeping category, for patrol and law enforcement tasks. In addition, it performs marine search and rescue functions.

OTHER. The Department of Public Works owns and operates 29 dredges, 30 tugs, and 27 workboats, together with scows, barges and miscellaneous craft needed for its dredging tasks. Some other departments have small craft, principally tugs and launches, for transporting their own personnel and equipment in and around harbours and docks, and for the administration of Indian and Eskimo affairs.

CONTROL AND UTILIZATION

It will be observed that the waterborne operations of most departments are specialized and, as a consequence, each department or agency has almost unqualified control over the use of its own watercraft. The Treasury Board exercises control over additions to and replacements within departmental fleets, regulates the method and terms of employment of seamen, and establishes rates of pay. But departmental control of the use of ships in support of approved programmes is unrestricted. Only for marine search and rescue operations which, by Cabinet direction, have been placed under the control of the Department of Transport, is there any significant exception to this rule.

Control by the individual departments tends to accentuate the specialization of waterborne operations. Each department seeks to acquire vessels designed specifically to meet its own particular requirements and all the equipment needed for its own purposes; consequently the utilization rates of many ships are low.

Utilization

Among the smaller vessels many operations are seasonal, and movement to ice-free locations for the winter months is not practical because of cost and lack of alternative employment. In several instances, however, low utilization rates raise doubts about the need for special craft.

One such instance concerns two launches operated by the Quarantine Services of the Department of National Health and Welfare, to transport medical authorities to and from ships in Halifax Harbour. One of these launches is already considered by the Department as surplus, while operating costs of the other, which is used only about fifty times a year, are \$15,000 annually. This service could be provided by the pilot boats or by the use of water taxis. Similarly, the Department of National Revenue operates three vessels at Saint John, N.B., St. John's, Newfoundland, and Sydney, Nova Scotia, to carry Customs and Excise officers to ships at anchor. This need could be met in the same manner as that of the Quarantine Service. Such action would save as much as \$50,000 annually, and would take the two departments out of watercraft operations.

We therefore recommend that: The Departments of National Revenue and of National Health and Welfare dispose of their harbour launches.

Watchkeeping vessels operating in open waters should not be out of service, by commercial standards, more than about ten per cent of the year; an economic utilization rate would thus be 325 days or more each year.

Usage of many government vessels falls far short of this ideal. This is particularly true of those ships operated for a single task which is seasonal. For example, because nautical surveying can only be carried out during good weather, the seven ships of the Hydrographic Service operate on an annual programme of about seven months; during the remaining five months, the vessels are de-commissioned, seamen and deck labourers are laid off, and senior officers are retained at reduced rates as watchmen and to undertake running repairs and inventories preparatory to the annual overhaul. Actual usage is only 45 per cent of the potential.

Out-of-pocket operating costs for these seven vessels amounted to \$1,409,543 during 1960-61, and capital costs raise the annual charges to over \$2 million—nearly \$2,300 for each day of actual use. By commercial standards this is an exorbitant cost for vessels of this type.

The rates of usage of watchkeeping vessels in other departments are somewhat better, but still far from ideal. The 47 ships of the Department of Transport fleet were in commission for about 86 per cent of the year, but time spent in undergoing repairs, refits and alterations, and time lost in weekend tie-ups brought the utilization rate down to about 60 per cent of potential. The Department is undertaking a detailed survey of its operating requirements and equipment and is also planning a major replacement and expansion programme.

But utilization cannot be judged only by days in operation; the duties performed must also be assessed. In many cases, these duties represent decisions of policy taken by the government and so cannot be judged on grounds of economy only; certainly this applies to activities like scientific research, ice-breaking, and the patrol activities of the R.C.M.P. and the Department of Fisheries. However, where watercraft are used simply to transport personnel or supplies, the costs, relative to other possible modes of transportation, are of significance. This is particularly applicable to the supply tasks of the Department of Transport.

Examination of supply trips chosen at random indicates that savings can be made in this regard. To illustrate, the supply and maintenance vessel *Sir William Alexander* was found to have made a supply voyage which, with loading time, took ten days to deliver less than thirty tons of cargo at twenty-one ports of call. With daily operating costs of \$2,500, including capital charges and a five per cent allowance for overhead, it cost over \$800 a ton to deliver the cargo.

The improved access to coastal points overland or by helicopter, permits radical changes in supply arrangements. The Department of Transport now has one helicopter in service on the Pacific Coast and plans to acquire another.

We therefore recommend that: The Department of Transport accelerate its plans for revised methods of supply to coastal stations.

Ownership or Charter

Four government organizations currently charter commercial ships: the Department of Transport for northern supply services to the Eastern Arctic (\$2.4 million in 1960-61); Department of Fisheries to satisfy peak seasonal demands for patrols (\$123,000); Department of Mines and Technical Surveys for hydrographic surveys (\$281,000); and Fisheries Research Board for field operations (\$102,000).

The Department of Transport follows an interesting practice of contracting with private shipping companies to build vessels suitable for northern supply service. The Department is using three such vessels, under contracts extending for a term of years and guaranteeing not less than ninety days charter service annually. During the balance of the year the owners are free to use the ships commercially.

The Department of Fisheries and Fisheries Research Board charter large numbers of vessels annually, but only of very limited size. In 1960, a total of 165 vessels were engaged for periods ranging from several days to six months. For the greater part, these were fishing boats obtained locally by fisheries pro-

tection officers and scientists to supplement their permanent facilities during the peak season. However, commercial interests are not generally interested in chartering during the season when the returns to be expected from fishing operations are greatest, but a good balance has been struck between ownership and charter.

For a number of years, the Canadian Hydrographic Service has chartered several small vessels to supplement its own equipment. However, this Service has embarked on a major programme for the expansion of its own fleet, and the use of chartered ships will be for marginal requirements in the future.

In the course of the inquiry, several opportunities for achieving economies by greater use of commercial services were observed, involving in each case the use of smaller craft in major harbour areas. For example, the *Sir Hugh Allen*, operated by the National Harbours Board in Montreal, has become excessively costly in relation to the services it provides; in view of the extensive commercial services available in the port area, replacement is unnecessary. It was also noted that there is inconsistency in the provision of pilot boats. Government-owned craft are necessary at pilot stations such as Anse-aux-Basque, at the mouth of the St. Lawrence River, where commercial harbour services do not exist. Where pilot services are associated with harbours, commercial services have been used satisfactorily for transporting pilots at Three Rivers, Port Weller, Sarnia and Vancouver. On the other hand, the Department has operated its own pilot boats at Halifax, Sydney, Saint John and St. John's, where commercial facilities are available. Moreover, the Department tends to acquire elaborate craft; the two new replacement pilot boats acquired in 1961 cost more than \$200,000 each.

It is the view of your Commissioners that charter should be resorted to wherever possible, and that private operators should be encouraged to acquire multipurpose vessels capable of meeting government needs. Operating departments have an understandable preference for special purpose ships, subject at all times to their own control. But the steeply rising cost of new ships and of manning justify such action only where there is full economic utilization. Narrow specialization in design and use must therefore be avoided, even at the price of some loss in efficiency for a specific task.

Re-allocation of Functions

In any search for improved utilization and reduced costs, the first avenue to be explored is the possible integration of functions as a means of reducing the existing specialization of operations. In its most extreme form, this would involve the concentration in a single department or agency of all activities requir-

ing the use of watercraft. This cannot be seriously proposed; hydrography, ice-breaking, fisheries protection and dredging clearly have little in common with each other.

Integration of functions may, however, be considered on a narrower basis, to combine activities having generally common characteristics. It is noted, for example, that three organizations are currently engaged in hydrographic and oceanographic work: the Department of Mines and Technical Surveys, the Department of National Defence, and the Department of Transport. The work performed by the Department of Transport is, however, of relatively minor significance, and any proposal to merge the operations of the Hydrographic Service with the oceanography carried out by naval auxiliary vessels presents the question of the relationship between work conducted for defence purposes and civilian research. The need for co-ordination of oceanographic activities has been partly recognized in the formation of the Canadian Committee on Oceanography, representing all the departments involved.

A promising field for integration is developing in marine patrol and law enforcement activities. At present both the Department of Fisheries and the Royal Canadian Mounted Police operate patrol vessels for law enforcement. The Fisheries vessels, however, also perform duties relating to the study and management of the fisheries. A third agency has now entered the field with the establishment by the Department of Transport of a coast guard service. The overlap and duplication which will result cannot be justified on any grounds and your Commissioners can see no reasonable alternative to assigning the patrol and enforcement task to a single agency. While the non-police functions of the Department of Fisheries may require the employment of some vessels by that Department, the logical development of the coast guard concept requires the grouping in a single force of the whole of the police function. The R.C.M.P. operation is a highly effective one, well staffed, well disciplined and characterized by high morale. The attainment of comparable standard must be an objective of the coast guard service if it is to assume responsibility for this function in place of the R.C.M.P.

We therefore recommend that: The development of patrol cutter operations by the Coast Guard Service, and the continuing operations of the Department of Fisheries patrol vessels and the R.C.M.P. Marine Division should proceed only on the assumption that the latter services will be absorbed by the former to the degree that this can be done without serious injury to efficiency and morale.

OPERATING METHODS AND STANDARDS

Regardless of the tasks for which they are employed, the operation of all vessels involves common problems of manning, supply, maintenance and accounting. However, except for Treasury Board regulations governing employment practices, pay and certain other aspects of personnel management, these matters are left almost entirely within the control of the various operating departments and agencies. As a result, little uniformity exists.

Management

Organization and procedures for the management of watercraft range all the way from a highly specialized and centralized system in the Department of Transport to almost complete devolution of control to operators in departments with limited holdings.

Until 1960, vessel management and control in the Department of Transport was vested primarily in the Department's marine agents, of whom there are eleven. This decentralized control proved too restrictive, and operations, since 1960, have been directed by the Operations Branch of the Marine Service. The marine agencies continue to serve as operating bases, and marine agents are responsible for the manning, accounting, husbanding and efficient technical operation of the vessels in their charge. But the Operations Branch, in addition to controlling the allocation of ships to various functions and among the agencies, has developed Marine Service Orders regulating in detail almost every facet of the operations. Control of vessels not being used for specific agency work may revert to the Branch headquarters—for northern supply tasks, for example—or may be assigned to other operating centres such as the Marine Search and Rescue co-ordinators or the Ice Information Centre. The new arrangements have not yet been adequately tested and no general judgment can be passed; however, specific weaknesses were observed in particular aspects of management, which will be noted below under the appropriate headings.

No other civil department has gone as far as the Department of Transport in developing a specialized vessel management organization. Among the major operators, the Fisheries Research Board maintains the most decentralized system, with management left almost entirely to the master of each vessel, who reports to the senior scientists at the research station to which the vessel is attached. Management of onshore supporting activities also rests with the master, working through the administrative officer of his station.

The Department of Fisheries, the Hydrographic Service and the R.C.M.P. follow middle courses. In the Department of Fisheries, for example, control of all vessels is assigned initially to the four area directors (Maritime, New-

foundland, Central and Pacific) who delegate responsibility to the area heads of the Protection Branch and their marine supervisors. The larger vessels remain under the operational control of the area organization, together with the manning, husbanding and maintenance of all vessels. Operational control of smaller craft, however, is further delegated to local supervisors in the districts and sub-districts. The functions of departmental headquarters are thus restricted to general policy, control of new construction and major refits, and other matters requiring Treasury Board approval or involving the use of headquarters purchasing facilities.

The practice in the Hydrographic Service is somewhat similar, except that maintenance and refits are supervised by technical officers at Ottawa. One management practice peculiar to this agency must be commented on: the designation of the senior surveyor on each vessel as the "officer in charge". This means that the senior scientist is responsible not only for the direction of hydrographic activities but also for the management of the vessel. This runs counter to general marine practice. Apart from the general question of safety it is to be noted that, under present arrangements, a disproportionate amount of the hydrographer's time may be required for the supervision of ship operations at the expense of his scientific duties.

Patrol cutters of the R.C.M.P. are based at naval dockyards in Halifax and Esquimalt, with general management centred at the Halifax base. The Ottawa superintendent of the Marine Division and his engineer superintendent are concerned with policy and technical supervision, but operational control rests with the superintendents of the land divisions to which the vessels are attached. Husbanding and maintenance are directed by the senior Marine Division offices in Halifax and Esquimalt, following naval standards and drawing on the facilities of the naval dockyards.

Operational control of the naval auxiliary craft is exercised by the Queen's Harbour Master, a permanent naval officer, and the management of these vessels follows naval procedures and employs naval facilities.

Manning

Each civilian vessel of the federal government has a crew establishment approved by the Treasury Board. In addition, departments with larger fleets, such as the Department of Transport, carry permanent relief establishments.

All shipboard personnel, other than those of the R.C.M.P., are employed at ministerial discretion—the *Civil Service Act* has always specifically exempted such personnel. Initial employment can take place at any rank or class, and district personnel officers sometimes apply to local branches of the National

Employment Service for suitable staff. Existing practices tend to limit the source of trained personnel, particularly for officers with certificates of competency.

Recruiting is hampered by the lack of career opportunities. Under present circumstances, there is little or no incentive for a young man to join as a deck-hand with a view to pursuing seafaring as a career. He must serve at least thirty months sea time in initial on-the-job training before sitting for his first examination for an officer's certificate of competency—and then must qualify himself at his own expense and in his own time. Conditions are even more onerous for engineers, although the skills thus acquired have a much broader application in employment ashore.

There is thus little attraction for good recruits. At present, the average academic standing of entrants is about grade eight. At this level, the knowledge of mathematics is inadequate for training as either deck or engineer officers. With the expansion of waterborne operations of the government, the need for better qualified recruits and improved technical training is becoming acute. A survey of the future requirements of the Department of Transport alone discloses that, by 1965, over 175 additional certificated officers will be needed. The Department is considering the establishment of training schools for both deck and engineer personnel.

Career opportunities are also curtailed by the fragmentation of watercraft operations among departments. Under present arrangements many competent seamen are not eligible when new and better opportunities occur in departments other than their own. Departments having specialized marine operations contend that they require seafarers who have been trained to carry out the specific departmental tasks. This is supportable where limitations in the vessel's complement require hybrid crew members: part seaman, part specialist. Nonetheless, the safe and efficient operation of a vessel requires the services of skilled seamen, and on the larger watchkeeping vessels, seamanship becomes almost the sole test of fitness.

It is the view of your Commissioners that the efficiency of watercraft operations would be improved by establishing a career service for government seafarers, embracing at least all watchkeeping vessels, with professional methods and standards of recruitment, employment and training, and equal opportunities for advancement.

Husbanding

Husbanding refers to the housekeeping tasks involved in vessel operations, including catering, methods of acquiring consumable stores and conducting running maintenance. As in other aspects of government vessel operation, there

are differences in practice among departments, each having evolved procedures which it considers best suited to its particular needs.

In the naval auxiliary service and R.C.M.P., naval standards are followed and naval facilities employed. Among other civilian fleets, husbanding is generally decentralized, with standards, procedures and the acquisition of supplies left largely to the masters and the shore establishments under which they operate. As a result, there is little uniformity, and maintenance standards could, in many cases, be improved, particularly on vessels not under the control of professional seafarers.

The major exception to the rule of decentralized control is to be found in the Department of Transport. In this case, maintenance standards are prescribed and supervised by the central organization. Catering practices are supervised by departmental catering officers and the area's shore-steward. Chief stewards and senior cooks are given training, where possible, at naval catering schools. Consumable stores for other ship departments (deck and engine room) are purchased in bulk by departmental headquarters, on the basis of requisitions prepared annually by ships officers. This highly centralized purchasing results in delays and the accumulation of excessive inventories.

With each agency husbanding its own ships independently of all others (with the exception of the R.C.M.P.) costly duplication of docks and storerooms has been inevitable. In Victoria, for example, the regional Hydrographic Service base and the Department of Transport marine agency occupy separate buildings on a common dock, and both departments plan the expansion and renewal of these duplicate facilities, at substantial cost. Similarly, in Halifax, the Department of Transport is planning a major wharf expansion programme at the marine agency, although only a few miles away the Hydrographic Service is building extensive docks and shore installations for the husbanding of its vessels and equipment. The R.C.M.P. may soon be forced to acquire new facilities because of increasing naval needs at Halifax. Integration of shore establishments is overdue, and continuation of the present policy is pyramiding the already excessive husbanding costs. In Halifax, all civilian departments could be accommodated in the new facilities now under construction for the Hydrographic Service.

Repairs and Refits

The cost of repairs and refits is an important element in the cost of ship operations. Repairs comprise work which is urgently needed to keep a vessel in service; refits are planned overhauls, carried out annually as a general rule, and

are usually preceded by the preparation of a defect list by the master and chief engineer, in consultation with the marine supervisor, which serves as the basis of a specification for contracting.

Efficiency and economy in refits depend, in the first place, on the care with which specifications are prepared. Once a refit contract has been awarded, the cost of supplementary repairs (the need for which becomes evident only after a vessel is dry-docked or machinery is opened up for inspection) is hard to control. Bidders for refit work may therefore be tempted to pare their prices on the specified work in the expectation of recouping on supplementary repairs.

Given adequate specifications, proper control of repairs and refits requires effective contracting methods and competent technical supervision of the work. In addition, account must be taken of the secondary (but not insignificant) costs: distance from base to refit yard, costs of maintaining crews away from their home base, and time lost through unnecessary delays in returning the vessel to service.

Departmental practices in repairs and refits vary widely. Vessels of the R.C.M.P. and naval auxiliaries are looked after in naval repair establishments; when the latter are unable to do the work, it is put out to contract by the Shipbuilding Branch of the Department of Defence Production, and supervised by the Navy. Repairs and refits of Department of Transport vessels are the responsibility of its Shipbuilding Branch. The Department of Fisheries, the Fisheries Research Board and the Hydrographic Service rely for technical advice on the Board of Steamship Inspection; the first two also obtain help from the Shipbuilding Branch of the Department of Transport in the preparation of specifications; but specifications for the refit of hydrographic ships are prepared by their own staffs. All these departments and agencies place and supervise their own contracts.

Control over the time lost in refits is generally weak. Although tenders for government refit and repair contracts state the estimated time required for the work, these estimates are not enforced, and vessels are generally out of service for much longer periods. Refits of larger ships of the Marine Services in 1961 took as long as 90 days, with 50 days or more not uncommon. The refit of the *Sir Walter E. Foster*, for example, was estimated by the contractors to require 28 days, but actually took 50 days; moreover, although the *Foster* is based in Saint John, the contracts were awarded to Halifax firms which entailed a further loss of four days steaming between base and yards. There is insufficient recognition of the cost to the government of prolonged losses of service; stricter control of time spent in refit is needed.

Except in the Department of Transport, supervision of shipyard contracts for repairs and refits is generally left to the responsible ships officer. In the Depart-

ment of Transport, although the Operations Branch includes an engineer-superintendent with a technical staff, the Shipbuilding Branch is responsible for the repairs. The Shipbuilding and Operations Branches co-operate but the denial of responsibility to the latter, especially to the ships officers to whom the standard of repair work is of special importance, is unsound. Moreover, the excessive centralization of management in the Marine Services includes repair and refit responsibilities which might more effectively be left with the field organization.

As in other aspects of management, better arrangements for interdepartmental co-operation in repairs and refits would yield savings. There is no clear justification for the employment of separate technical supervisory staffs in the Department of Fisheries, the Hydrographic Service and the R.C.M.P., in addition to the more than 100 technical experts employed by the Board of Steamship Inspection and the Shipbuilding Branch of the Department of Transport. It must also be noted that the Marine Services of the Department of Transport, unlike other operating agencies, use commercial surveyors to inspect and supervise their vessels rather than using its own Board of Steamship Inspection. It is contended that, as the Board is an integral part of the Marine Services, it would, in effect, be policing its own equipment. Against this must be set the unquestioned technical competence of the Board's staff, and the fact that it provides comparable services to other government departments and agencies.

Accounting and Cost Control

Operating accounts of government vessels follow the general pattern of government accounting: the same narrow concern with cash outlays, the same pre-occupation with "objects of expenditure" such as wages and supplies, and the same neglect of the accounting needs of management. Direct cash outlays are recorded for each vessel, but capital and overhead charges are ignored, and little or no attempt is made to relate costs to work performed.

As a result, departmental administrators lack financial data necessary for the evaluation of performance in the waterborne operations for which they are responsible. It is scarcely surprising that, in these circumstances, administrators show little interest in the cost records which are available to them. The most detailed and precise cost records are maintained in the Navy and the R.C.M.P. (the latter using naval accounting procedures for the greater part), and supervisory staff in these two departments give far more attention to costs. Nowhere among departments, however, is there any cost accounting related to the actual functions of vessels. In the planning and administration of

programmes requiring watercraft—scientific research, ice-breaking, aids to navigation, etc.,—costs of vessel operations are not taken into account, despite the fact that, for some programmes, these exceeded all other costs of the programme.

A fresh approach is needed. For example, a lightship has been stationed for many years off the entrance to Halifax harbour. When this vessel comes to port for repairs, refueling and servicing, the station is marked by a lighted buoy, with no apparent dissatisfaction on the part of shipping traffic. Modern electronic aids to navigation appear to have made this traditional aid to navigation unnecessary. But only if the full costs of such a service are recorded—in this case an estimated \$535 daily—and weighed against its declining utility can there be any basis for determining whether the service should be continued or at what point it should be withdrawn or modified. Thus, effective control of watercraft operations, and of the programmes dependent on them, requires adoption of the budgeting and accounting methods recommended by your Commissioners in the report on *Financial Management*.

CONSOLIDATION OF WATERCRAFT MANAGEMENT

In this analysis of government waterborne operations, certain needs have become evident:

- Greater flexibility in the use of watercraft, particularly the larger, watchkeeping vessels, in order to achieve better utilization.
- Creation of a broader career service for seamen, providing more permanent employment, greater mobility, and better use of skills, and an effective training programme.
- Professionally supervised common standards of operation, husbanding and maintenance, and amalgamation of duplicate husbanding facilities.
- More effective use of technical staffs for the superintendence and inspection of vessel maintenance and repair.
- Better cost control and cost accounting practices.

To these may be added the need for continuous assessment, at a central point, of all government watercraft needs and facilities, to ensure that a proper balance is maintained between ownership and charter, and to foster the development of multipurpose vessels.

To the extent that the various waterborne activities of government can be consolidated, most of the foregoing needs could be met. As noted earlier, how-

ever, no general consolidation of these varied operations seems practical, although the Department of Transport has a clearly established pre-eminence, with direct responsibility for all activities involving the use of watercraft except those assigned to specialized agencies, or minor activities which are incidental to the work of other departments.

Short of a merging of waterborne functions, the necessary improvements in watercraft management identified above can best be achieved by a consolidation of vessel management and supporting services, with the Marine Services of the Department of Transport as the focal point. As an initial step, the ownership, manning, husbanding and maintenance of the watchkeeping vessels of all civil departments and agencies should be transferred to the Marine Services. Ownership and management of all R.C.M.P. patrol vessels should remain with the Force until such time as the entire Marine Division and coast guard service are merged. Naval auxiliaries must, as a general rule, remain under the full control of the Royal Canadian Navy, but consideration should be given to a transfer to the Marine Services of the five oceanographic vessels which do not directly support naval operations, either in peace or war.

Initially, other departments would retain first claim on vessels they surrender, notifying the Department of Transport periodically of their requirements. Accounts must be kept in a form which will permit proper allocation of full operating costs to the user departments. At all times when these vessels are not required by their former owners, it should be the responsibility of the Marine Services to seek the fullest and most economic utilization of all craft. Future acquisitions and replacements or conversions of watchkeeping vessels should be planned and undertaken by the Department of Transport in the light of total needs.

- We therefore recommend that:*
- 1 Consideration be given to a progressive consolidation of all large vessels and husbanding facilities under the Department of Transport.
 - 2 The Marine Services of the Department of Transport extend their training programme for seamen to all marine personnel from other departments and agencies on a cost-recovery basis.
 - 3 The Department of Transport become the source of technical advice and assistance required by Treasury Board and other departments relative to new ship

construction, the formulation of government-wide standards for vessel operation and management, and conditions of service and rates of pay for seafarers in the public service

- 4 All departments and agencies concerned with the maintenance of watercraft use the technical services of the Board of Steamship Inspection, particularly in the preparation of specifications for refits and in the supervision of shipyard repairs and refits.

6

THE OPERATION OF AIRCRAFT

Aircraft are less widely dispersed among federal departments and agencies than are auto vehicles or watercraft. Among civil departments there are, in fact, only two which own and operate aircraft: the Department of Transport and the Royal Canadian Mounted Police. In 1960-61, they owned and operated sixty-nine aircraft, including helicopters. (Two of the helicopters are actually the property of the Department of Mines and Technical Surveys, for use on the Canadian Government Ship *Baffin*, but are operated and maintained by the Department of Transport.) The capital investment in these aircraft, at original cost, is \$8.5 million. Recorded annual operating costs—which do not include any capital charges, overhead, hangar space, or certain maintenance costs—amounted in 1960-61 to about \$3 million. Included in this sum are the salaries of the 230 persons employed full-time on aircraft operations.

These aircraft operations of the civilian departments are overshadowed by those of the Air Transport Command of the Royal Canadian Air Force. This organization, operating almost 200 aircraft, and controlling an additional 88 flown by auxiliary squadrons of the R.C.A.F., employed 5,900 persons in 1960-61, and recorded operating costs, excluding pay and allowances, of \$17.1 million. Personnel costs for the Command exceed this figure by almost fifty per cent. Provision of air transportation in peacetime is a subordinate function of the Air Transport Command; as an operational command of the Air Force, its primary tasks are to meet the requirements of wartime and to support missions such as those to the Gaza Strip and the Congo. Its size, structure and operating methods are governed by these primary tasks.

These three air fleets in 1960-61 logged almost 86,000 flying hours, 56,500 by Air Transport Command, 20,000 by the Department of Transport, and 9,300 by the R.C.M.P. By way of comparison, Trans-Canada Air Lines in 1961 flew a total of 177,152 hours—using, for the greater part, much larger aircraft, while the Air Transport Command recorded more flying hours on overseas operations (23,040) than did Trans-Canada (19,471).

ELDORADO AVIATION LIMITED

One other aircraft operation was examined by the Commission: that of Eldorado Aviation Limited, a subsidiary of the Crown-owned company, Eldorado Mining and Refining Limited. This agency, operating two transport aircraft and a helicopter, with a total staff of 43, provides regular air services between Edmonton and the parent company's mining operations in Northern Saskatchewan and the Northwest Territories, as well as along the water route of a sister subsidiary, Northern Transportation Company Limited, to the Arctic Coast. Operations in 1960 cost \$872,000, including depreciation charges.

This small operation is efficiently managed and provides the services needed by its parent company more economically than they could be obtained otherwise. With the suspension of exploration by the mining company, retention of the helicopter no longer appears to be justified, and a minor saving might be made by eliminating a Link training section and using commercial facilities instead. Generally, the future of Eldorado Aviation is bound up with that of Eldorado Mining and Refining, which is reviewed in our report on *The "Make or Buy" Problem*.

DEPARTMENT OF TRANSPORT

The air operations of the Department of Transport in 1960 involved the use of thirty-seven fixed-wing aircraft and seventeen helicopters (including the two helicopters on the C.G.S. *Baffin*), the exclusive employment of 170 persons, and direct expenditure of over \$2 million.

Functions and Usage

The fixed-wing aircraft are used for the calibration of airway and airport radio navigation facilities, transportation of civil aviation inspectors and other departmental personnel, practice flying by inspectors, and the transportation of ministers, visiting Heads of State and other important missions from abroad. Calibration of radio aid facilities, which is the responsibility of regional civil aviation inspectors, is carried out largely by means of seven specially-equipped

DC-3 aircraft. Civil aviation inspectors use these and other aircraft for their own transportation and for flying practice to maintain their proficiency as licensed pilots. Transportation of distinguished persons is provided by headquarters aircraft, including two Viscounts, based in Ottawa.

Usage of these aircraft in 1960-61 is indicated by the figures shown in Table 3.

Table 3—DEPARTMENT OF TRANSPORT—OPERATION OF FIXED-WING AIRCRAFT

<i>Base</i>	<i>Number In Use</i>	<i>Average Hours Flying Time (per unit)</i>	<i>Over-all Average No. Days in Use (per unit)</i>
Vancouver	3	487	143
Edmonton	4	485	136
Winnipeg	5	453	129
Toronto	4	400	122
Ottawa	12	460	122
Montreal	5	496	145
Moncton	4	426	129
	—	—	—
	37	459	126
	==	==	==

In evaluating these rates, several factors must be considered. The average annual usage, in flying hours, is undoubtedly low in comparison with commercial operations; for example, the two transport aircraft of Eldorado Aviation Limited were flown 1,283 hours and 1,810 hours in 1960-61. However, aircraft of the Department of Transport are not used for regular scheduled services but “as and when required”, which necessarily tends to reduce their flying time. Decentralization of operating control over most aircraft to the regions accentuates this tendency.

The utility of the flying actually done is difficult to assess. A significant number of hours are flown by civil aviation inspectors for the purpose of maintaining their flying proficiency and qualifying for flying allowances. Further flying time results from the centralization of repair at the Ottawa base, which is questioned below.

A reduction in the size of the fleet could be achieved through the replacement of older aircraft by newer types giving higher performance. For example, the calibration of radio aid facilities on which seven DC-3 aircraft and several regional Beechcraft are now used, could be done in less time and at lower cost by three modern aircraft operating from Moncton, Toronto and Edmonton, and flown by pilots employed solely for this work. For lack of complete cost data

on present operations, the need for such replacements cannot be measured accurately.

The fifteen helicopters owned by the Department are used primarily in conjunction with departmental icebreakers, to locate leads through icefields, to carry personnel, mail, supplies and equipment to and from the supply vessels, and to act as markers for surveyors. Because this work is seasonal, utilization rates are low, as reflected in the figures shown in Table 4 for 1960-61.

Table 4—DEPARTMENT OF TRANSPORT—OPERATION OF HELICOPTERS

<i>Base</i>	<i>Number In Use</i>	<i>Average Hours Flying Time (per unit)</i>	<i>Over-all Average No. Days in Use (per unit)</i>
Moncton	3	203	105
Ottawa	10	147	80
Vancouver	2	123	90
	—	—	—
	15	155	86
	==	==	==

Here again, lack of adequate data makes it impossible to measure operating costs, but it is unlikely that operations at these rates of usage are economic. As was noted in the preceding chapter on "The Operation of Watercraft", helicopters are being acquired to replace vessels in the supply of isolated marine services.

Control and Management

Responsibility for the control of departmental aircraft rests with the Controller of Civil Aviation. Under his direction, day-to-day operation and maintenance are the concern of the Superintendent of Flight Operations, who directs headquarters flying and maintenance and supervises operations at the six regional bases, where more direct control is exercised by the regional superintendents.

Although most flying of fixed-wing aircraft is done by civil aviation inspectors, the Department employs thirty-two professional pilots; eight fly headquarters aircraft, and the other twenty-four are helicopter pilots who also fly headquarters aircraft when not performing duties with the icebreakers. Besides flying duties, the pilots are used in the formulation of new civil aviation procedures and participate in accident investigations.

The Department employs 124 persons in the maintenance of its aircraft. Of these about 90 are experienced aircraft maintenance engineers. In addition to the servicing and running maintenance of aircraft and helicopters, this group

also includes, in Ottawa, an overhaul section to make engine changes, periodic air frame checks and major overhaul. During 1960-61 this headquarters group carried out fourteen major air frame overhauls and sixty engine changes on fixed-wing aircraft as well as engine changes and air frame overhauls on almost every helicopter owned by the Department.

The centralization of overhaul in the headquarters facilities of the Department is questioned. Aircraft must be brought considerable distances from their operating bases; other aircraft must be sent from Ottawa to the regions as temporary replacements. On the other hand, commercial overhaul facilities are available at or near all the regional bases and distribution of overhaul work among the commercial facilities would strengthen the aviation industry in Canada. It should also—although accurate cost comparisons cannot be made on the basis of existing departmental records—result in savings.

We therefore recommend that: Consideration be given to having major air frame overhaul work, currently done by Department of Transport facilities, distributed to commercial overhaul agencies.

Under present accounting practices, the operating costs of aircraft cannot be ascertained. Costs of fuel, materials and equipment are charged to the individual aircraft, but no provision is made for depreciation, overhead and hangarage. Labour and overhead costs are not charged for overhauls performed in departmental facilities; radio maintenance is provided by the Telecommunications Branch of the Department and all costs, including salaries, equipment and parts, are borne by that Branch. If management is to exercise effective control, cost accounting methods must be adopted which will provide accurate statements of the hourly operating costs for each aircraft.

ROYAL CANADIAN MOUNTED POLICE

The Air Division of the R.C.M.P. in 1960-61 operated seventeen aircraft, three of them based at Rockcliffe Airport in Ottawa, the others at thirteen bases throughout Canada. The capital cost of these aircraft was \$1.3 million, and operating costs were \$793,000. The Division employs 59 personnel.

The most important function of the Air Division is to provide transportation into hinterland areas for police investigations. Average usage in 1960-61 was 549 hours, spread over an average of 145 days in use. As in the case of the Department of Transport, the nature of the flying tasks tends to limit utilization rates. The record of the Division is generally satisfactory, with the exception of the aircraft at Frobisher which was flown only 361 hours in 1960-61—two-

thirds of this time on work for the Department of Northern Affairs and National Resources.

All air operations and maintenance are directed from divisional headquarters at Rockcliffe, flight control being exercised through Edmonton for western operations. Headquarters staff consists of twenty persons; air detachments in the field generally consist of one pilot who is a regular member of the Force, and an aircraft maintenance engineer who is a special constable. Pilots, who must first have had two years of police experience, qualify themselves initially by obtaining commercial licenses at their own expense; after appointment to the Air Division they are given extensive training in all aspects of the work. High standards of operation are maintained.

Maintenance facilities and central stores, which are provided at the R.C.M.P. Rockcliffe base, duplicate the more extensive facilities and stores of the Department of Transport at Ottawa Uplands airport. Although the transfer of the Air Division headquarters to Uplands may involve some severance from other elements of the R.C.M.P. headquarters, integration with the Department of Transport facilities would permit a reduction of personnel and stores. Headquarters pilots and maintenance personnel of the Force would also gain access to the superior training facilities of the Department.

We therefore recommend that: The Air Division headquarters of the R.C.M.P. be moved to the Department of Transport hangar at Ottawa Airport and its maintenance and stores sections be integrated with those of the Department.

THE CHARTER OF AIRCRAFT

In addition to their own flying operations, federal departments and agencies in 1960-61 chartered air services to the extent of \$5 million. The largest user was the Department of National Defence which placed contracts through the Department of Defence Production in the amount of \$2.3 million, principally on behalf of the Army Survey Establishment and the R.C.A.F. A large part of the latter requirement involved the hire by contract of crews to fly and maintain R.C.A.F.-owned helicopters used in support of the Mid-Canada Early Warning Line and Air Defence Communications System. The Department of Mines and Technical Surveys chartered aircraft and helicopters at a cost of \$1 million for the transportation and support of survey parties in Northern Canada. The Department of Transport spent over \$360,000 for the charter of aircraft for ice reconnaissance, and charter services, costing about \$200,000, were used by the Department of Northern Affairs and National Resources for forest protec-

tion, surveys and the transportation of school children. The foregoing figures do not include contracts for aerial photography by commercial firms, on which the Department of Mines and Technical Surveys spent \$1.5 million in 1960-61.

Each department independently makes charter arrangements and, although certain standard practices are prescribed by the Executive, procedures vary from one department to another. Aircraft charter negotiations require familiarity with flying operations and Air Transport Board regulations but the contracting sections are generally lacking in this expert knowledge. Consolidation of charter arrangements (apart from those required at short notice by medical and other authorities in isolated areas), using a single specialized contracting group, would produce better results.

AIR TRANSPORT COMMAND—R.C.A.F.

Major questions of government ownership *versus* use of commercial services are raised by the operations of the Air Transport Command. Special circumstances, however, make it impossible to treat these as simple "make or buy" questions.

Functions and Usage

The role of Air Transport Command is one of military operations, based on the needs to be faced by the Armed Forces at the outbreak of a general war or as a result of Canadian commitments in peacetime emergencies. In a major war, speed in moving forces to battle areas is considered to be of the utmost importance, and the "force in being" to which military strategists attach such primary importance must therefore be assured of the means of prompt deployment.

To meet these requirements, the Air Transport Command has approximately 200 aircraft, exclusive of those flown by auxiliary (part-time) squadrons. Fourteen different types are represented, ranging from long-range four-engined Yukon transports capable of carrying 135 passengers or 30,000 pounds non-stop for 4,000 miles, to single-engined Otters, able to operate for short ranges from semi-prepared short landing strips in support of army field operations. Numerically, much of the fleet consists of older aircraft, including World War II Lancasters used for Arctic reconnaissance, C-47 Dakotas, and North Stars. In recent years, however, the total capability of the Command has been greatly enhanced by the acquisition of more modern machines, including twelve Yukons, four of the capacious C-103B Hercules, ten medium range CC-109 Cosmopolitans (all these three types being powered by turbo-prop engines),

and seven twin-engined Caribou aircraft capable of operating from semi-prepared short landing strips.

The results of this modernization process can be seen from the record of recent operations shown in Table 5.

Table 5—AIR TRANSPORT COMMAND OPERATIONS

<i>Fiscal Year</i>	<i>Total Hours Flown</i>	<i>Passenger Miles</i>	<i>Freight ton/miles</i>
		('000)	('000)
1959-60	52,982	98,935	10,266
1960-61	56,518	126,925	13,076
1961-62	58,121	125,006	18,014

From this it can be seen that with a ten per cent increase in flying time over the last two years, there has been an increase in load-carrying of approximately fifty per cent. Moreover, even the 1961-62 figures do not reflect the full impact of recent re-equipment programmes. With the coming into service of the full squadron of large Yukon transports, the long-range capacity of the Command has increased sharply, and the total carrying capacity of the Command may now rival that of Trans-Canada Air Lines.

Despite the growth of Air Transport Command operations in recent years, a number of airborne activities which were begun as Air Force operations have been turned over to civil operators, including air supply for the Mid-Canada and DEW Lines, and most aerial photography and survey. As a result, civil carriers are flying some 60,000 hours annually in Canada, either in support of defence projects or on tasks which were previously undertaken by R.C.A.F. aircraft.

Because the size and composition of the Command is based primarily on the estimate of emergency needs, peacetime utilization rates cannot be judged by the standards of civil operations. Apart from such relatively minor operational tasks as air-sea rescue, Arctic reconnaissance, and the support of United Nations forces in the Middle East and Africa, the peacetime functions do not determine but on the contrary are determined by the size and capabilities of this air fleet.

In this connection, the key factor lies in the need to develop and maintain the proficiency of the Command by passenger and cargo handling on a continuing basis in peacetime. Based on experience, the R.C.A.F. have concluded that, in order to maintain a satisfactory level of skill and readiness, aircraft must be

operated in peacetime at a minimum of fifty per cent of the emergency requirement. The peacetime flying programme has therefore been devised to satisfy this need. To some extent, this has been done by modifying the logistic patterns of the Services to exploit the airlift capacity—for example, by bringing defence equipment of the forces in Europe back to Canada for repair and overhaul instead of using European facilities. Inevitably, however, the Command becomes drawn into other operations—such as the ferrying of Service personnel to and from overseas posts under peacetime policies of rotational service—for which commercial carriers would otherwise be employed.

By government policy, the transportation services of the Air Transport Command are available, as a general rule, only to the Department of National Defence. Other departments must use commercial air services, except in cases of emergency or where commercial services are not available.

Exceptions are made to this general policy in the form of both chartered or special flights and carriage of supplies or personnel of civil departments on flights that are primarily intended to meet the needs of the Services. A limited number of charter flights are made for purposes such as aerial survey and photography, transportation of medical personnel and supplies, and on behalf of provincial governments to meet emergencies usually connected with floods or forest fires. Charges are made on the basis of flying-hour costs of the aircraft plus travelling expenses of the crew. Special flights are provided without charge for members of the Royal Family, the Governor General, ministers and distinguished visitors, or for Chiefs of Staff or their civilian equivalents. It would be appropriate to adopt the practice of having the user departments reimburse the R.C.A.F. or the Department of Transport for flights of this nature. When freight and passengers are carried by regular flights, on behalf of other departments, the latter are billed at the low rate of five cents per passenger mile or one cent a mile per hundredweight of freight. Most of this traffic is carried on flights serving the North. Total operations in 1960-61 are summarized in Table 6.

From this it will be seen that domestic flights accounted for 60 per cent of the flying time but only 45 per cent of the passenger miles and 40 per cent of the ton/miles—chiefly reflecting the larger capacity of aircraft used on overseas flights. Moreover, about 40 per cent of the hours flown, over 63 per cent of the passenger miles and 55 per cent of the ton/miles are attributable to scheduled flights, the proportions being in all cases higher on overseas traffic than on domestic. With the introduction of the Yukon transports to full squadron service, it is estimated that the Command will be able to airlift forty-five per cent of all the overseas traffic of the Department of National Defence—within the utilization target of one-half the full operational capacity.

Table 6—AIR TRANSPORT COMMAND 1960-61 OPERATIONS

	<i>Domestic</i>	<i>Overseas</i>	<i>Total</i>
Hours flown:			
Scheduled	8,010	14,797	22,807
Other	25,468	8,243	33,711
Total	33,478	23,040	56,518
Passenger miles ('000):			
Scheduled	32,462	48,013	80,475
Other	25,106	21,344	46,450
Total	57,568	69,357	126,925
Ton/miles of freight ('000):			
Scheduled	1,935	5,195	7,130
Other	3,215	2,731	5,946
Total	5,150	7,926	13,076

The Basic Problem

This large and growing volume of traffic and the high incidence of scheduled flying by the Air Transport Command probably are disturbing to commercial carriers, whether their interest be air, sea or land transportation. What is fundamental is the long-term policy decisions of the Executive, and these necessitate evaluations of military and economic factors. Your Commissioners' interest is limited by the terms of reference to the ways and means utilized to assemble the data required for decision-taking.

The size of the Air Transport Command obviously involves calculations of prospective military needs, the relative priority to be assigned to them and an assessment of the degree to which emergency demands may be met by conscripting civil air transport resources—a long established practice with respect to mercantile shipping.

From the economic viewpoint, it would seem that the expansion of the Air Transport Command has, in the past, been evaluated primarily by weighing the impact on the over-all military budget of the Department of National Defence. The direct operating cost is now great, at least \$50 million annually.

Moreover, as the facilities of the Air Transport Command increase, it becomes more and more a competitor of such public owned agencies as Trans-Canada Air Lines and, to lesser degree, the Canadian National Railways. Each of these is dependent on the resources of the Consolidated Revenue Fund when a year ends with a deficit.

The diversity of the elements to be taken into calculation is such that the future of the Air Transport Command should not be regarded as something to be settled by limiting consideration to military convenience or to budgetary allocations. The existing machinery and processes to marshal the data to be weighed in arriving at decisions should be strengthened and better balanced. Military and civil experts should both make contributions.

We therefore recommend that: The Department of Transport be more closely associated with the Department of National Defence and the Royal Canadian Air Force in the formulating of policy proposal relating to military transport.

8 TELECOMMUNICATIONS

SUPPORTING SERVICES FOR GOVERNMENT

REPORT 8: TELECOMMUNICATIONS

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Frank S. B. Thompson, B.Sc., P.Eng., on loan from *Department of National Defence*, Ottawa

A number of submissions bearing on this topic were received from individuals and organizations: these have been carefully considered and are noted in our final report.

Your Commissioners, in acknowledging the assistance and advice received from the above-named persons, dissociate them from any of the findings and conclusions contained in this report; for these, your Commissioners assume full responsibility.

1

THE TELECOMMUNICATIONS FUNCTION

Canada, because of its great area and its needs for the defence of long and remote frontiers, has a vital interest in the quality of its communications. The federal administration as the regulatory authority in this field, as the largest single user, and as a substantial owner of communications plant, is concerned with the adequacy and reliability of the modern electric and electronic systems on which the nation relies.

SCOPE OF THE INQUIRY

Your Commissioners' study of telecommunications as one of the major supporting services of federal activity has encompassed a review of current procedures and policies and of the economy and efficiency with which the needs of government are met. As in other inquiries of the Commission, operations of public undertakings of a commercial type have been excluded, notably the Canadian National Railways and Trans-Canada Air Lines. The two large publicly-owned common carriers, Canadian National Telegraphs and Canadian Overseas Telecommunication Corporation, were consulted in the course of the study, as were the major privately-owned systems, but their operations were not examined.

Subject to these exclusions, in 1961 the Government of Canada owned telecommunications facilities costing \$178 million and its annual expenditures for operation, maintenance and staff training exceeded \$116 million.

Much of this outlay, \$147 million of the capital investment and \$65 million

of annual operating expense, relates to the operational requirements, as distinct from the administrative needs, of the Armed Forces. These purely military telecommunications, designed to meet the stringent and rapidly changing demands of modern warfare, can only be judged on military grounds. Consequently, no attempt has been made to assess their management or effectiveness. Some operational systems, however,—especially the large networks used in continental air defence—have an impact on the general development of Canadian telecommunications resources and may therefore be relevant to the peaceful needs of the federal government and the country at large. This aspect has received consideration by your Commissioners.

THE SCALE OF ADMINISTRATIVE COMMUNICATIONS

In general, then, attention is directed to the telecommunications employed by the federal departments and agencies (with the exceptions noted) for its own administrative purposes, including the general administration of the Armed Forces. These comprise the large transmission systems of the Department of Transport for its meteorological, air traffic control and marine services; the military teletype networks spanning Canada, and their extensions to the United States, Europe and Australasia; the radio network of the R.C.M.P.; and the general administrative telecommunications used in government operations both within Canada and throughout the world.

A wide variety of systems and services is employed in meeting the administrative communications needs of the federal government:

- Telephones and inter-office communications.
- Telegraph and cable services, including private wire teletype, Telex (a commercial teletype subscriber service), and data transmission systems.
- Facsimile, telephoto and similar services for the transmission of pictorial reproductions.
- Transmission circuits for radio and television programmes, including closed circuit television.
- Radio link services, including fixed links, ship-to-shore, air-ground-air, and other mobile link systems.

The annual cost of administrative telecommunications was almost \$52 million in the fiscal year ending in 1961, and the investment in telecommunications equipment, at original cost, amounted to over \$30 million. Almost half the

annual cost—\$25 million—represented payments to the communications industry for services and rentals of lines and equipment; the balance was spent principally on salaries and wages of public servants engaged in operating and maintaining the systems or involved (chiefly in the Armed Forces) in communications training.

About 5200 persons, including members of the Armed Forces, are employed full-time in the operation and maintenance of these administrative communications. Over sixty per cent are employed by the Armed Forces—about 3200, including a significant training component. About 1400 are in the Department of Transport and, of the remaining 600-odd, three-quarters are to be found in three organizations: the Royal Canadian Mounted Police, the Department of External Affairs and the Canadian Broadcasting Corporation. With few exceptions, other departments and agencies rely almost entirely on the facilities and personnel of the commercial carriers.

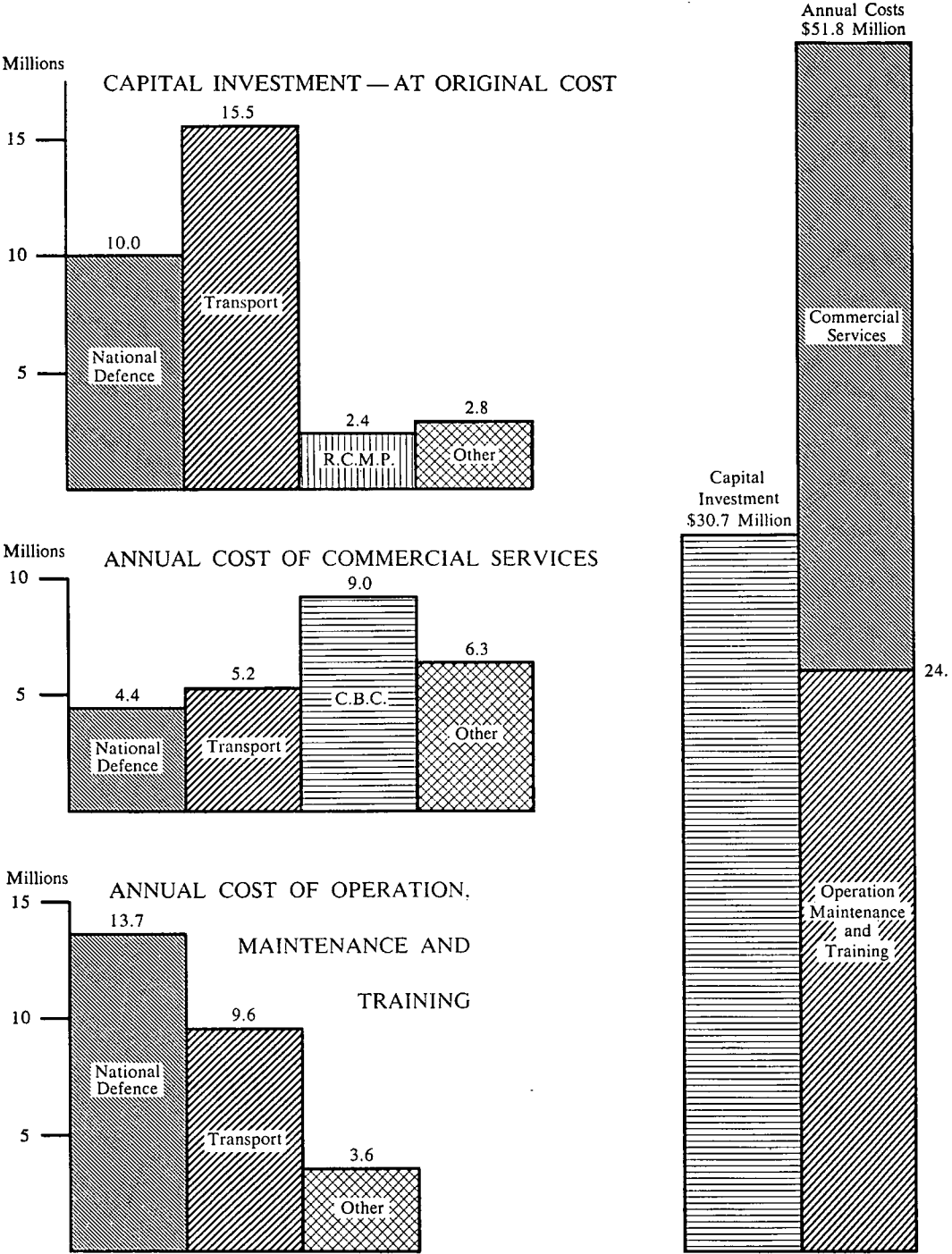
Considerable diversity is found in the methods adopted by individual departments to obtain the communication services they require. The needs of many offices of the government differ in no way from those of the general public, and are met simply by employing commercial telephone and telegraph service. On the other hand, special operating needs of a number of departments call for systems that are essentially unrelated to the telecommunications available commercially, which must therefore be built and operated by the government. Among the systems included in this study, four different patterns were identified:

- Using the publicly available services of the commercial carrier companies.
- Leasing facilities from commercial carriers and operating them with government personnel—where the volume of traffic is large enough or can be built up by pooling requirements.
- Owning part of the facilities (usually terminal equipment and radio support), leasing others (such as transmission lines and circuits), and operating both with government personnel.
- Owning and operating all facilities—generally radio.

Among the large air defence systems of communication a further variant is to be found: facilities owned by the government but staffed for the Armed Forces, under contract, by private firms.

The method adopted to meet any specific need has an obvious effect on both the capital outlay and the number of people needed for manning and maintenance. Thus the two departments—National Defence and Transport—that

Chart 1—GOVERNMENT OF CANADA ADMINISTRATIVE TELECOMMUNICATIONS—1961



make the greatest use of the third and fourth methods mentioned above, account for more than eighty per cent of both the capital investment and of the operating staff of the systems. On the other hand, the Canadian Broadcasting Corporation, which relies heavily on the first two methods, has no investment in communications equipment (other than its broadcasting facilities) and employs a small percentage of the total communications staff in the public service. Yet rentals paid by the C.B.C. account for forty per cent of the total payments to commercial carriers, almost as much as the combined payments of the Departments of National Defence and Transport.

OBJECTIVES OF TELECOMMUNICATIONS POLICY

In the broadest sense, communications serve as the nervous system of an organization—conveying the information to centres where it can be assembled, analyzed and made the basis of decisions, and conveying decisions to points where action must be taken. Effective communications are vital to the administration of an organization, in a sense unmatched by any other supporting service. An organization may be wasteful or niggardly in its construction, accommodation and purchasing services, or in moving its people and goods, and still be reasonably successful in carrying out its essential functions. Not so, however, the organization which cannot count on a proper flow of information and decisions.

The important tests of a telecommunications system are its speed, reliability, coverage and security. In addition, the constantly changing pattern of the user's administrative needs and even more rapid changes in technology demand a high degree of adaptability in any system.

The electrical impulse and radio wave which are the basis of telecommunications provide the ultimate in speed—186,000 miles a second. Nonetheless, the advantage of this can be all-too-easily nullified by faulty organization and clumsy administration of a communications system, or by the use of inadequate terminal and switching equipment—just as transatlantic air travel would be of little value if passengers had to proceed inland by horse and buggy. In short, a telecommunications system must be planned at each stage from the originator of a message to its ultimate recipient. Messages must reach transmitters and be delivered from receiving stations with a minimum of delay. Systems should not become so overloaded that messages must queue for hours awaiting their turn for transmittal. The number of times a message must be switched from one circuit to another and the time required for switching must be minimized.

The necessity for speed is equalled by the need for reliability. In part, this

is a matter of technical quality—of good equipment, well maintained. In part, too, it relates to the suitability of the choice of system. For transmission over long distances, land lines, cables and microwave systems are generally more reliable than radio, and among radio systems one type will be more reliable than others for a particular purpose. In some circumstances—northern communications, for example—a high degree of reliability may be excessively costly, but each sacrifice in service must be weighed carefully against the saving in cost. In other circumstances, the importance of reliability may warrant, almost regardless of cost, not only the adoption of the most reliable means of transmission, but also the provision of alternative and “back-up” circuits of radio links.

The third test of effectiveness is the completeness of the service given by a system: its ability to provide, either within itself or by connections with other systems, rapid and reliable communications meeting *all* the needs of the operation it serves. Perfection of coverage is seldom, if ever, achieved in any system. But every gap in coverage, and every closed system leading a hermit existence without outside links, should be viewed askance.

The need for security of communications is of special, though not unique, concern to government. The ideal system from this viewpoint—fully shielded and proof against tampering—is probably impractical, if not impossible to achieve. But security may be unnecessarily jeopardized by the use of inappropriate methods of transmission, especially radio systems; by inadequacies in cypher equipment; or by dependence on communications systems over which the government has little or no control and within which little heed is paid to security.

CHANGING NEEDS AND IMPROVED TECHNOLOGY

The pace of technological advance in telecommunications within the past twenty-five years has been staggering. Not only has it produced an array of new and superior systems and equipment, rendering obsolete much of the earlier plant, but the extent of improvement in the service rendered, in terms of speedier and more reliable transmission at lower cost, has in itself stimulated a broad change in the nature and volume of demand.

Under static circumstances, telecommunications might be expected to adjust themselves gradually to produce maximum effectiveness, with little or no co-ordination of planning and direction. But in today’s fluid situation, the communication services of the government must, so to speak, run in order to keep up with changing needs and techniques that will achieve reasonable efficiency and minimize chances of malfunction in emergencies.

Developments which currently impose new demands on government telecommunications include the following:

- Increasing population and the widening range of government activities, causing continuous growth of general administrative communications needs.
- Widening international involvements.
- Increasing resort to integrated and automatic data processing, requiring reliable data transmission networks.
- Accelerating development of the North, demanding increased coverage and capacity in northern networks.
- Increasing speed of aircraft, necessitating corresponding acceleration in communications for air traffic control.
- Increasing density of air traffic, requiring more complex and more extensive air traffic control systems near airports.

These new and growing demands may be met largely through continuously improving techniques of which the following are the most significant:

- Rapidly expanding commercial carrier networks, increasing in range, coverage and capacity.
- New equipment and techniques of telecommunication which enhance the speed, reliability and flexibility of services, ranging from new subscriber sets and switchboards to improved long-range radio operations.
- Prospective techniques based on earth satellites, extending the range and capacity of communications systems throughout the world.

Under these conditions of rapid change, a major user such as the government can ill afford a static or indifferent attitude towards its telecommunications systems. Planning must keep well ahead of events. The needs of future operations must be carefully assessed. The best possible advice on future techniques must be sought. Failing such an approach, the government is likely to find itself burdened with telecommunications systems which are costly anachronisms—more monumental than efficient—limiting the effectiveness of government and of its service to the public.

SERVICE AND ECONOMY

Because of the variety of equipment and methods of transmission available today, selection of the suitable telecommunications system for any particular

task is a matter of judgment. In most cases the ideal system will be priced beyond reason while the least expensive will be unacceptable on grounds of service. This element of choice or compromise enters into decisions with respect to both simple and complex communications requirements.

The need for sound judgment in this area is evident. While waste and extravagance are to be avoided, special care must be taken to guard against false economies. In the programmes most heavily dependent on telecommunications—defence and air traffic control—public safety is at stake. In other programmes, the effect of weak communications may be less drastic but not unimportant in terms of the quality of performance.

Compromise in choice of method and equipment are usually capable of assessment, in broad terms, by measuring monetary savings against sacrifices in effectiveness. But a more negative type of economy, represented by overloaded systems, understaffing, obsolete equipment, gaps in coverage, closed systems, and so forth, almost defies precise evaluation. The more obvious consequences, lost staff time for example, may be assessable but these will usually be small compared with the incalculable damage done to the quality of government operations.

There are, however, significant economies to be achieved in ways which do not diminish the effectiveness of communications—and may even enhance it. As in other activities requiring large amounts of capital, there are significant economies of scale to be achieved in communications. In general, a system which embraces a large number of users and a high volume of traffic can provide service at relatively low cost. It follows, therefore, that a primary economic aim of communications planning is to encompass as many users and obtain as much traffic as possible.

Savings of scale can be obtained not only where the government builds and operates its own systems but also where it uses the established facilities of commercial carriers. Where traffic warrants, leased lines offer important savings. Moreover, substantial economies are possible under new kinds of special rates for large-volume users of the long-distance telephone, teletype and data transmission services of the commercial carriers.

For the Government of Canada, because of the size of the country and the limited traffic generated by most programmes, the economies of scale depend largely on the development of integrated systems which serve a variety of purposes. The single-purpose system—duplicating routes and services of other systems—is probably the greatest enemy of economy.

Moreover, with proper planning designed to extend the coverage provided, the integration of communications services will not only reduce costs but also enhance the value of the system to its users. And as the economies of scale are

realized, it becomes increasingly permissible to employ more advanced—but more costly—techniques to improve speed and reliability.

NEEDS OF NATIONAL DEVELOPMENT

Finally, adaptability of systems and density of traffic—and the related economies—are most likely to be achieved, as a rule, by merging the telecommunications needs of the government with those of the general public. Consequently, in deciding on its telecommunications services the government must relate its requirements to those of the country at large.

This need is reinforced by the fact that the concern of the government with communications goes well beyond its interests as a user and operator. Under the constitution, it is responsible for the regulation of national communications in the public interest, and for defining and defending the interests of Canada in international telecommunications. More generally, it cannot ignore the social and economic importance of telecommunications in the life of the country. Consequently, in planning to meet its own communications needs, the government must consider not only the effectiveness and relative cost of alternative solutions but also their impact on the development of the general communications resources of Canada.

EXISTING CONTROL PROCEDURES

With a few exceptions to be referred to later, each department and agency of government has been left to devise its own ways of meeting its needs for telecommunications. Although some interdepartmental arrangements of a voluntary nature exist, it is generally true that the planning, provision, operation and maintenance of services and facilities are carried out independently by departments and agencies.

The only element of central control or co-ordination is that exercised by the Treasury Board and its staff. In essence, this is a control on spending, reflecting the fact that the Treasury Board is, for all practical purposes, the finance committee of the Cabinet. The principal instrument of control is the Government Contracts Regulations, prepared under the direction of the Board and sanctioned by Order in Council. These regulations, binding on all departments and the ten agencies classed as departmental corporations, prescribe the limits of departmental authority to purchase telecommunications equipment and services and require that all proposed expenditures in excess of such limits be submitted to the Treasury Board for specific approval.

Departmental authority for the purchase of communications equipment is

limited to \$15,000, or \$25,000 if competitive tenders have been obtained and the lowest tender accepted; for defence purchases, under the Defence Production Act, these limits are raised to \$25,000 and \$50,000. A variety of limits apply to departmental contracts for rentals and services, with different rules applying in Ottawa and the field. All proposals in excess of these limits must be submitted to the Treasury Board.

In the result, the authority of departments is narrowly circumscribed. While they are solely responsible for planning, as for operation and maintenance, the financial control of the Treasury Board, which exists to check extravagance, is basically a negative rather than a constructive influence on the development of their facilities.

2

GENERAL ADMINISTRATIVE

COMMUNICATIONS

The communications needs of the Government of Canada encompass the broadest range of systems, equipment and operating techniques. Many of these needs may be supplied by commercial carriers using conventional equipment, and in the view of your Commissioners the services and facilities of such carriers should be used wherever possible. Moreover, in the selection of most suitable equipment, switching arrangements and other aspects of use of conventional communications systems, the expert technical services of the commercial carriers should be fully utilized in the interests of efficiency and economy.

This chapter reviews existing arrangements for the general administrative communications of departments and agencies, which employ almost exclusively the facilities of the public carriers. More specialized systems to meet specific needs of an unusual nature are described in a subsequent chapter.

TELEPHONES

There are several important exceptions to the general lack of integration of communications operations throughout the government. In the telephone field, the Government Telephone Service Office, which forms part of the staff of the Treasury Board, operates central telephone switchboards for federal offices in Ottawa, Toronto and Edmonton. All equipment is leased and in Toronto and Edmonton is operated by civil servants, but in Ottawa operators are provided

by the Bell Telephone Company. In addition, leased circuits from Ottawa to Toronto and Montreal provide private line service available to the more senior civil servants. Costs are apportioned in Toronto and Edmonton, but in Ottawa they are absorbed by the Department of Finance; long-distance calls are charged to users.

The Government Telephone Service Office, in addition to the operating function, exercises strict control over the use of equipment and the quality of service made available within departments and agencies. Because of its origin as a check on extravagance, its principal concern has been with cost rather than quality of service. But cost has been viewed as consisting only of the charges of the telephone company; inconvenience and loss of time through inadequate service have not been taken into account.

As a result, in the offices controlled by the Telephone Service Office, existing standards of equipment and service are seriously deficient. Telephones are of the simplest possible type and no proper use has been made of the wide variety of switching, signalling and holding devices which are available to provide convenient and flexible telephone service. Telephones are often shared by a number of persons and allocation standards are based on rank and arbitrary rules, rather than an assessment of need. Instead of regarding the telephone as an efficient tool to be placed in the hands of the worker who needs it, it is still in government circles regarded somewhat as a slightly extravagant status symbol—the sort of attitude which would award the shovel to the foreman and leave the labourers to dig with their hands.

Throughout the rest of Canada, the telephone service of the federal departments and agencies is generally unco-ordinated. In some cases, this has enabled individual agencies or offices to obtain standards of service more appropriate to their needs, and to take better advantage of the facilities offered by telephone companies. Generally, however, field operations have suffered, in common with headquarters establishments, from the lack of central planning and technical advice. In addition, the lack of co-ordination in the field has caused a wasteful duplication of facilities. Within a single government building, offices of different departments, or even of different branches within a single department, may have separate switchboards, each with its own operators, unconnected except through the general telephone system. In one building, where federal offices operated thirteen separate switchboards, consolidation was achieved on the initiative of one of the departments concerned, but local initiative of this sort appears to be exceptional.

To offset the defects of these limitations of equipment and service, departments have resorted to a variety of inter-office telephone and signalling systems which provide partial remedies. In spite of this, widespread dissatisfaction with

the service exists, both within the public service and among those who do business with the government.

The operations of the Telephone Service Office in the long-distance field are limited to the private line service, Ottawa-Montreal-Toronto, previously mentioned. While economical in concept, the utilization standards may be inappropriate. Waiting times on these lines are generally so great that urgent calls are commonly placed through the long distance services of the telephone company.

Other long-distance traffic of the government throughout Canada and abroad is not centrally administered and each department is billed individually by the telephone companies. In the existing atmosphere in which telephone costs are viewed, it is not surprising that there is no present intention of permitting departments to take advantage of Direct Distance Dialling—a new time-saving service coming into general use. Without it and in the absence of co-ordination of government long-distance service, it will not be possible to benefit from the substantial rate reductions becoming available under such developments as Wide Area Telephone Service—a flat rate long-distance service for large volume users.

TELEGRAPH AND TELETYPE

Co-ordination in the planning and operation of other telecommunications services depends almost entirely on the initiative of individual departments. As a consequence, most departments rely principally on commercial telegraph or teletype service. A few departments and agencies, however, subscribe to Telex, where the volume of traffic between headquarters and field offices or among field offices is sufficient to warrant the costs of installing and operating the machines. Two of these make their Telex available to certain other departments—the Department of Public Works to Central Mortgage and Housing Corporation, and the Department of Defence Production to about fifteen other departments and agencies—and are reimbursed for this service.

The communications centre of the Department of Defence Production offers the nearest approach to a general domestic teletype service for the civilian departments and agencies. In addition to its Telex service, it has leased teletype lines between Ottawa, Toronto, Montreal and Washington, teletype circuits to the Ottawa offices of the commercial telegraph companies, and a teletype circuit to the R.C.A.F. communications unit in Ottawa, which provides access to the systems of the three Armed Forces. Messages sent by or addressed to other departments and agencies are accepted and delivered by telephone. Costs appear to be reasonable and the service acceptable to its users.

The Defence Production system is an accidental growth, based on the system developed during World War II to meet the needs of the Department of Munitions and Supply. For some purposes it may be more than adequate: the Department is considering whether the leased circuit to Toronto might not well be replaced by Telex, and the services to Montreal and Washington might also be provided more economically by using Telex and National Defence facilities. The centre is not designed to meet the total needs of the government, and, in fact, no effort has been made to determine what those needs might be or how they might best be met. If this were done, the existing message centre would undoubtedly require reorganization and re-equipping to meet the need.

A basic weakness of existing systems, including some special purpose systems, is that they have developed almost solely in response to the needs of headquarters areas. As matters now stand, field offices enjoy teletype service to their headquarters and among themselves, only where the volume of traffic generated within the individual department or agency will support such an arrangement. While most field establishments of the federal public service use commercial telegraph service, at standard rates, the R.C.M.P. provides Telex service between headquarters and thirty-one of its field offices; the Unemployment Insurance Commission in 1961 installed Telex for thirty of its regional offices, with links to the local teletype networks embracing its seven Montreal and four Toronto offices; and the Armed Forces provide teletype service to their establishments throughout the country. In fact, however, the effectiveness and economy of telecommunications service in the field can only be improved if greater attention is given to the field organization of federal departments generally, including the provision of other services for which they have common needs.

CONCLUSIONS

Unfortunately, the present approach to general administrative telecommunications fails to recognize their role and importance in public administration. It appears to assume, quite wrongly, that by exercising a veto power over contract proposals, central authority can curb extravagance and ensure that services are economical. It fails to recognize that integration of telephone service in the headquarters area, undertaken as a measure of cost-control, has not succeeded in providing adequate standards of service for the conduct of the nation's business. Finally, it overlooks completely the opportunities for improved service and actual savings in pooling and integrating telephone and wire services throughout the field organization. This approach is damaging to the public purse and to the efficiency of federal administration alike.

To overcome these deficiencies, your Commissioners believe that a single co-ordinating agency must be created with responsibility to assist departments in achieving suitable standards of communications performance, eliminating duplication of facilities and initiating such integration and pooling of services as will promote the realization of the important economies which are possible. In view of the fact that in this area of general administrative communications, the needed facilities are all available from commercial carriers, the proposed agency should not require engineering or design staff but, rather, should look to the carriers for advice and guidance on all technical aspects.

It must be emphasized that the creation of this common service agency will not relieve the user departments of their primary responsibility for the adequacy and efficient use of their administrative telecommunications. This is an inseparable part of their general responsibility for the successful management of the programmes which those communications support. The user department must define its needs for supporting services. The co-ordinating agency can indicate the alternative services available to meet these needs, and the cost of each, but only the user department can weigh service against cost and determine where the balance should be struck between the two. In addition, it remains part of the task of departmental management to ensure that telecommunications are used sensibly and efficiently—that the more costly modes are not used extravagantly, that a proper scale of priorities is applied and that satisfactory standards of message writing are observed. Departments may look to the co-ordinating agency for guidance on such matters, but cannot evade the responsibility. To bring these responsibilities home to the departments—and to ensure that the full cost of departmental programmes is disclosed—the cost of common service telecommunications must be allocated, as accurately as may be practical, among the users.

Because of the flexibility inherent in commercial services, the proposed agency need not have direct operating responsibility for all elements of the common service systems—the existing Telex services of the U.I.C. and R.C.M.P., for example, need not be affected—but its planning of country-wide telecommunications services must take account of all such special arrangements. Subject to over-all budgetary authority, it should be responsible for all negotiations with carriers, including the leasing of circuits (and its costs should be apportioned among the user departments and agencies in an equitable manner).

The success of the proposed agency's operations is not to be judged by monetary standards alone, nor should it be regarded, as has been the Telephone Service Office which it will absorb, as having as its main purpose the control of costs. The needs of individual users should be sympathetically and expertly

considered and the primary objective of the agency should be the provision of standards of service appropriate to the need.

The general telephone, teletype and data transmission needs of departmental field offices across Canada require planning and co-ordination on two levels: national and local. For this reason, the agency responsible for the general administration of such services must itself have an extensive field organization and a knowledge, in considerable detail, of the distribution of the offices of the federal public service throughout the country. Among the existing departments of government, the one best able to assume responsibility for the planning and administration of these general services is the Department of Public Works, both because of the extent of its field organization and because of the natural relationship between such telecommunication services and the planning and administration of accommodation for the field establishments of the government.

- We therefore recommend that:*
- 1 An Administrative Telecommunications Agency be established in the Department of Public Works to co-ordinate the needs of departments and agencies for general administrative communication; to provide proper systems for telephone, telegraph and teletype transmission of government messages through arrangements with commercial carriers and to make the same available to departments throughout Canada on an individual or collective basis, as may be appropriate.
 - 2 The costs of such services be apportioned among the departments and agencies on an equitable basis.

3

SPECIAL COMMUNICATIONS

NEEDS AND SYSTEMS

DEPARTMENT OF TRANSPORT

Among the civilian departments and agencies of the federal government, the Department of Transport makes by far the greatest use of specialized telecommunications. Throughout Canada it operates extensive networks to carry the heavy teletype, telephone and facsimile traffic essential to its civil aviation, marine and meteorological services. Together with its general administrative telecommunications, these systems represent a capital investment in equipment (at cost) of about \$15.5 million, and give rise to annual operating and maintenance charges of about \$14.8 million (including the Department's share of the cost of the Ottawa telephone service).

The principal systems operated by the Department of Transport include the following:

- *Air Operations Fixed Network:* A country-wide system of teletype and radio, linking all Canadian establishments concerned with the controlling of aircraft. These include: the Ottawa and regional headquarters of the Department, Air Traffic Control Centres, civil and some military airports, radio ranges, and over thirty departmental radio stations mainly in the North. Branches of the network extend to Iceland, Greenland, Ireland, the United Kingdom and a number of points in the United States. A general purpose system, it carries domestic aviation communications such as flight plans, notices to airmen and technicians, aircraft messages, and private traffic for commercial airlines and private aircraft operators on a cost-recovery basis; it handles international airways traffic, to meet Canada's commit-

ment to the International Civil Aviation Organization; and it also serves the needs of departmental administration. (see Appendix 1)

- *Air Traffic Control Interphone:* A telephone network linking air traffic control positions (control towers, R.C.A.F. operations centres, etc.) to provide a fast exchange of domestic flight information. Associated with it is an Air Movement Information Service, essentially a parallel system to keep R.C.A.F. and U.S.A.F. air defence centres advised of the movement of civilian aircraft. (see Appendix 2)
- *Air-Ground-Air Systems:* Three systems for communication between aircraft and ground control points. One system, using remote controlled transmitters linked by landlines to the regional air traffic control centres, enables the latter to control flying on the main airways. A second system, based on control towers, radio ranges and departure and arrival control centres, provides for the control of aircraft in the vicinity of airports. The third system provides at selected locations throughout the country long-range communications with aircraft and is available to airlines for general information and passenger traffic.
- *Meteorological Systems:* For the rapid gathering and dissemination of information about weather conditions. Included are a teletype system linking major meteorological centres with connections to the United Kingdom and United States, a broader network feeding into the major centres, and a facsimile system for transmitting weather maps by landlines and radio from the central forecasting and mapping office to major departmental stations throughout the country. (see Appendices 3 and 4)
- *Marine Systems:* A variety of systems providing teletype, telephone and radio services throughout the country for departmental marine stations on the coasts and Great Lakes, and for ships and private agencies concerned with shipping. (see Appendix 5)

In addition, the Department of Transport operates about fifty large vessels and over forty aircraft (including helicopters) with a wide range of communications equipment.

These systems are managed by the Telecommunications and Electronics Branch of the Department of Transport. As a consequence of this centralization under the Assistant Deputy Minister for Air Services, the various needs of the Department are being met with little or no duplication of effort and facilities are integrated where circumstances permit. The Air Operations Fixed Network, for example, is used in greater or lesser degree by all branches of

the Department and its radio facilities, especially in the North, are used to extend the coverage of the Meteorological Systems. Some marine traffic is also carried on this network and other marine needs are met through long-distance Air-Ground-Air radio centres in the North.

Co-ordination of these systems with those of the Armed Forces is also reasonably good. The Air Operations Fixed Network, Air Traffic Control Interphone and Meteorological Systems reach R.C.A.F. airfields. The meteorological circuit on the transatlantic cable to the United Kingdom is available to the R.C.A.F. during four half-hour periods daily. The paralleling of the Air Traffic Control Interphone and Air Movements Information Service, appearances to the contrary, involves no unnecessary duplication: the former system is too heavily loaded to carry the traffic of the latter, and speed is essential in meeting both needs—for flight safety in the first case and for rapid identification of aircraft in the Air Defence Systems in the other. A slight duplication of shore-to-ship facilities exists between the Department and the Royal Canadian Navy, reflecting their respective peacetime and wartime responsibilities, but, to a significant extent, R.C.N. facilities are used by the civilian agency.

The centralization of management of these varied systems in a single Branch has had the further advantage that technical aspects of departmental communications, as a general rule, receive adequate attention. Message format and procedures have been well standardized and conform, where appropriate, to commercial, military and international procedures. Operating and maintenance standards are high.

In the organization of the Telecommunications and Electronics Branch the work seems overly fragmented among staff groups at headquarters and similar staffs found in each of the six regional headquarters which carry the day-to-day burden of operations. This results in some overstaffing, and excessive absorption of technical personnel in co-ordinating and administrative work.

The most serious criticism, however, relates to forward planning and modernization. Although the systems are generally adequate to current needs, much of the equipment is old, in some instances obsolete, and some circuitry is primitive. The Telecommunications Branch relies heavily on other branches of the Department for the definition of future needs and it is clear that both these and the technology of communications are changing rapidly. For the air traffic control and meteorological services, present systems seem certain to be superseded in the near future by radically different techniques, involving a high degree of automation based on computers and requiring new kinds of networks for data transmission. The coverage provided by existing facilities has been rendered inadequate by the changing patterns and increasing speed and density of air traffic. Because the Air Traffic Control Interphone system,

for example, is limited to the areas served by commercial carriers, there are serious gaps in the coverage provided, particularly in the North. For the same reason, there are wide gaps in direct radio communication between regional air traffic controllers and aircraft in flight, which are increasingly serious in areas of high traffic density, such as the air space between Goose Bay and Seven Islands.

Departmental officers are generally aware of these weaknesses but remedies are slow in coming. This is partly due to organizational weaknesses of the Branch, but the greater cause seems to be the financial procedures of the government. Forward planning in the past has been inhibited by the government's general practice of considering financial plans on only a year-to-year basis. However, there are signs of growing interest in longer-range planning and it is to be hoped that more serious efforts will be made by the Department to forecast future needs and develop better plans for modernization—as the Meteorological Branch in particular is now trying to do.

In several important respects, the policies of this Department facilitate the development and adaptation of telecommunications systems as a whole. Although it has a sizeable investment in equipment—especially radio facilities—it relies heavily on circuits and equipment leased from the commercial carriers and actively encourages the latter to extend their systems into new areas of the country. As such extensions occur, the department is able to improve its services, both by extending the coverage and by replacing radio links with more reliable methods of transmission based on leased facilities.

DEPARTMENT OF NATIONAL DEFENCE

Within the Armed Forces, each of the three Services is responsible for the planning, provision and control of its own telecommunications. Because of the crucial importance of good communications to the operational tasks of the services, this policy is understandable, even though not altogether commendable. As a consequence, there has been relatively little integration of systems developed by the three Services to meet common or related needs, in particular, administrative communications.

At one time an integrated system was tried. In 1950, a Tri-Service joint relay system was organized, with each Service participating to operate one or more relay centres. In 1955, however, as a result of the inability of the three Services to work on this basis, the arrangement was abandoned and each Service established its own network. The weakness of this Tri-Service attempt lay in the lack of a single controlling authority, necessitating “troika” rule with all its disadvantages.

Since 1955, integration of the Armed Forces' requirements and technical programmes has depended on the largely ineffective machinery of a Tri-Service committee—the Joint Telecommunications Committee, with nine sub-committees. Each Service is required to refer its plans and technical programmes to the Committee only when it considers them susceptible of integration; and since the committee is composed entirely of representatives of the three Services, it possesses a traditional inherent bias against integration.

The principal communications systems used for general administration, carrying operational traffic as well, are the teletype networks operated by each of the three Armed Services. Each has a country-wide network, with overseas extensions by radio. All networks are based on the same technique of collecting traffic from a number of tributaries in manually operated relay centres, the latter being connected by leased lines, backed up in each case by radio facilities. Connections between the systems permit interchange of traffic.

The Strategic Communications System of the Royal Canadian Navy (*see* Appendix 6) extends from New Zealand across Canada to the United Kingdom, with major relay centres in Halifax, Ottawa and Esquimalt and a minor relay centre in Hamilton. The system links all Naval establishments, with branches to the United States Navy, Canadian Army, Royal Canadian Air Force and Department of Transport, and shore stations for communication with ships.

The Canadian Army Signal System (*see* Appendix 7) extends across Canada with a radio extension to the United Kingdom and branch networks in Europe. Following the designation of the Signal Corps to develop and operate a country-wide emergency communications system joining federal and provincial emergency government headquarters, it was decided to modify the present signal system for this purpose.

The Main Communications Relay Network of the Royal Canadian Air Force (*see* Appendix 8) provides a third country-wide teletype system with connections to the United States and Europe, as well as a terminal station in Australia. A European extension is provided by the communications system of the Air Division, a mixed system of leased land lines and R.C.A.F.-owned microwave relays.

The Navy system handles about one million messages annually at a cost of \$2.5 million, employing a staff of almost 600 of whom about half are civilian. The Army system, with 1.4 million messages a year, costs about \$6 million and employs almost 1400 of whom about twenty per cent are civilian. The main Air Force system, with 2.5 million messages a year, costs about \$5 million annually and employs about 1000 servicemen and very few civilians. Generally, it appears that the R.C.N. and R.C.A.F. are anxious to operate

their systems with a minimum of operating and maintenance costs, while the staffing of the Army system is governed to a greater extent by calculations of the wartime need for trained and experienced operators.

Among the three Services, there are two quite different attitudes towards the provision of telecommunications, especially those needed for administrative purposes. In the Army, there is evidence of a general preference for ownership of facilities, including telephone equipment, and for operation and maintenance by service personnel or civilian employees. Within the Air Force, on the other hand, telephone facilities are more commonly leased and commercial firms play a more prominent part in staffing and maintaining the systems; the prevailing view has been that the Service should concern itself primarily with the provision of operational telecommunications and should, as far as possible, not become involved in the ownership and maintenance of administrative systems, particularly general telephone service. The attitude of the Navy appears to be less clearly defined, falling somewhere between the two. These differences in approach seem to be largely a reflection of the attitudes of senior officers directing telecommunications operations in recent years in the three Services, but it may be significant that the communications elements of the Navy and Air Force are not as sharply differentiated within their Services as their more autonomous counterpart in the Army—the Royal Canadian Army Signal Corps.

No examination has been made of message content in these systems, nor of the extent of their use for operational purposes. It is to be noted, however, that traffic at present levels represents a daily average of over 13,000 messages throughout the year. In view of operation at near capacity of present facilities, there is particular need for officers in each Service to ensure that their volume is adequately controlled.

Because of the importance attached to communications by all the Services, and their ability to carry large technical staffs, the equipment employed in their systems is generally of good quality—although not as modern and sophisticated as some of their purely operational facilities—and the standards of operation and maintenance are very high. There are, however, certain shortcomings, the more important of which are attributable to the low degree of Tri-Service integration.

Each of the three systems suffers from a weakness in the handling of messages between message centres and the originators or recipients of messages. These tail-ends of the communications process are usually provided for by ordinary mail services—through central registries—introducing delays far in excess of those due to deficiencies in the system itself.

In the transatlantic extensions of the three systems the radio links now

employed have relatively low reliability—especially for the Army and Air Force systems. Circuits on the transatlantic cables, which might be economical if traffic were built up sufficiently by pooling, would improve such services substantially.

The total cost of the three systems operating independently is disproportionate to their combined traffic load. At the same time, the manually-operated relay centres of all three systems are operating near capacity, and each of the Services recognizes a need for automation in order to improve speed, capacity and flexibility. But if automation is introduced without integration, costs will become notably excessive. In recognition of this, the R.C.N. and R.C.A.F. are considering an amalgamated automatic centre in Halifax. However, the Army is proceeding independently in the re-engineering and expansion of its system to provide emergency government communications, with partial automation.

This situation is to be deplored on both technical and economic grounds. The ideal would seem to be a single system with jointly used automatic centres, tributaries operated by each Service individually, common use of overseas extensions, and a general plan which provides enough alternative routing facilities for both peacetime and emergency needs. Such a system could also be planned with the capacity and flexibility needed to handle a sizeable volume of civilian government traffic.

In addition to these main teletype systems with their overseas extensions, and the associated systems serving the Army Brigade and Air Division in Europe, all three Services have general requirements for telecommunications—especially telephone service—which are comparable to those of the civilian departments. Naval, military and air force establishments have their own central exchanges, connected with the local commercial telephone system, and in Ottawa the headquarters of the Department of National Defence and the Armed Forces are included in the central service administered by the Telephone Service Office. In general, telephone service for administrative purposes in the Armed Forces is subject to the same kind of cost-control as is experienced by civilian departments, with much the same effect.

We therefore recommend that: 1 The teletype relay networks of the three Armed Services be integrated into a single automatic system, sharing such facilities as may be appropriate with the civilian teletype services of the recommended Administrative Telecommunications Agency and the overseas services of the Department of External Affairs.

- 2 To the extent that administrative telecommunications facilities and service in Canada are required by the Department of National Defence and the Armed Services, beyond those provided by their special systems, such services be made available to them and managed by the Administrative Telecommunications Agency.

AIR DEFENCE COMMUNICATIONS SYSTEMS

Although operational telecommunications of the Armed Forces were excluded from this inquiry, a partial exception was made for the air defence communications of the Royal Canadian Air Force. Unlike other operational communications of the Services, the air defence systems involve extensive static networks suited to general telephone, teletype and data transmission, operating over large areas of Canada. Consequently, their relationship to the general telecommunication resources of the country, and certain other aspects of their administration, were considered relevant.

Two systems are of particular interest (*see* Appendix 9):

- The Mid-Canada (early warning) Line, which crosses Canada at about the fifty-fifth parallel of latitude.
- Adcom (Air Defence Communications), a microwave system originally built to link a number of the heavy radar stations in the Canadian air defence system with Air Defence Command at St. Hubert, Quebec, but now re-engineered to serve SAGE (semi-automatic ground environment), which forms part of the North American air defence system.

The Mid-Canada Line was designed, of course, as a detection system, and the communications function is subordinate to this primary task. Of the total cost of the Line, amounting to about \$240 million, less than \$20 million was spent for communications equipment.

The Line contains eight main stations and a large number of unmanned intermediate stations operated by remote control. Microwave communications are provided throughout the length of the Line, with southward connections to the populated areas of the country from the main stations. Traffic to and from the Line is carried through these links, of which one is owned by the R.C.A.F., one by the United States Air Force and the others by commercial carriers. There is little through traffic across the Line.

Geographically, the Mid-Canada Line is well located to serve as a lateral bypass route for communications, far removed from all populated areas. Sufficient access from the south is available through the rearward links from the main stations. However, the Line was planned essentially to meet air defence requirements as a detection system and provision was not made for any volume of transcontinental traffic, although this could have been done at little extra cost. Alternatively, segments of the Line might have been engineered to meet general telecommunications needs of certain remote settlements, providing them with valuable links to the commercial systems in the more settled areas. Only defence needs were considered in the planning process, with little or no thought of incorporating greater communications capacity for other purposes.

Within the limits of its capacity, however, the Mid-Canada Line does serve some purposes beyond its defence role. Its radio facilities are used extensively by civilian aircraft not only for identification purposes but also as navigation aids and in cases of distress. The Line now carries some teletype traffic for the Army and the possibility of accommodating commercial traffic in the James Bay area is being considered.

The modification of the Line to carry heavy through traffic would be costly and may not be practicable. Certainly, if the present plans of the telegraph companies for a transcontinental microwave system are carried out, the only possible justification for the development of the Mid-Canada Line for general communications would be its value as a bypass in an emergency.

Despite what appear to be its limited prospects as a communications system, there is need for a fuller assessment of its potential, in relation to requirements, not only of the Armed Forces but of civilian departments and the general public as well. A study should be undertaken immediately of the communications purposes which the Mid-Canada Line might serve, incidental to its primary air defence role. But in the course of such a study, account must be taken of the possible residual value of the Line, in whole or in part, for telecommunications, in the event that its utility for defence should disappear.

The 1400-mile Adcom system runs through territory in Ontario and Quebec that is served, for the greater part, by commercial carriers. Despite this fact, the system, representing a capital investment of about \$20 million, is owned in its entirety by the Crown. All other carrier facilities and most telephone equipment in the rest of the continental air defence system in Canada—of which Adcom now forms a part—have been leased from commercial companies.

In its original design (now referred to as Adcom I), the system was a relatively inexpensive way of providing communications within a major part of

the Canadian air defence scheme. At that time—1951—it was decided to buy the system rather than lease from the commercial carriers, since suitable commercial lines did not exist.

However, the development of SAGE six years later rendered the Adcom I concept obsolete and called for the development of a much more complex and advanced system of air defence communications. It was decided to re-engineer the Adcom system to form part of the new network, although it was far from ideally suited to the new purpose and its modification was expensive—costing about \$15 million. There emerged a highly complicated network, with a multiplicity of cross-connections between commercial facilities and the modified Adcom II system. Commercial carriers have been highly critical of the development of Adcom, on the grounds that it has impeded their efforts to create a more widespread, diversified and dense network of general purpose telecommunications throughout the area affected.

Two arguments have been advanced in support of the decision to construct Adcom. First, it was estimated that leasing costs for comparable commercial facilities would be about \$5 million annually; against this, the annual maintenance costs for the system are little more than \$500,000. The difference should effect recovery of capital cost in about five years. Second, it was argued that Crown-ownership gives the R.C.A.F. necessary experience in the operation of microwave communications.

Both contentions, however, can be challenged. With respect to costs, it is unreasonable to suppose that the R.C.A.F.—proficient as they undoubtedly are in communications—can run a system of this kind more efficiently than specialized commercial companies. At standard commercial rates, leasing costs for the system might approach the estimate on which the comparison of costs was based. But it can be questioned whether such a rate structure would be appropriate in these circumstances.

In this connection, our inquiries have revealed that, in fact, the government may be paying excessive rentals for its leased facilities in the rest of the SAGE system. The Canadian practice has been to pay standard rates for these circuits, but comparable facilities in the United States air defence sectors are leased on multiple circuit rates which are significantly lower. If similar rates were negotiated in Canada, and such possibility should be explored, the argument for Crown-ownership of Adcom on grounds of cost might prove invalid.

The contention that ownership by the Crown is necessary to the development of skills in the R.C.A.F. is no less questionable. First, it runs counter to the general policy of the three Services that static communications systems should, where possible, be leased from commercial companies. While the

R.C.A.F. must be competent in the operation of mobile microwave systems, this scarcely requires experience with large-scale fixed systems like Adcom. Finally, it must be noted that the actual maintenance of the system seems likely to be placed in the hands of civilian contractors, as is done in the Mid-Canada Line, and should this happen, the utility of the system as a source of experience will largely vanish.

Against these arguments must be set the serious loss of flexibility involved in creating a major static system designed solely to meet defence needs which are changing rapidly. Greater involvement of the commercial carriers in the planning and development of such systems as Adcom, coupled with leasing arrangements, would almost certainly facilitate subsequent adjustments to meet changing needs.

The general conclusion to be drawn from the Mid-Canada Line and Adcom systems is that the planning of large-scale static communications for defence purposes has taken inadequate account of broader considerations of public need. Critical defence requirements cannot, of course, be seriously compromised, but the planning should be undertaken in such a way that the other relevant factors are recognized and systems are planned for the greatest practical benefit of the country.

We therefore recommend that: A special study be undertaken to assess the potential value of the Mid-Canada Line for general telecommunication purposes, and to consider the future ownership and role of the Adcom facilities.

ROYAL CANADIAN MOUNTED POLICE

The special needs of the Royal Canadian Mounted Police are met by a variety of systems. Operational control of field activities is provided at the local level by the installation of very high frequency (VHF) mobile radio in eight hundred vehicles, ships and aircraft of the Force, and at some three hundred detachments, giving radio coverage throughout those habitable parts of Canada where the Force provides police services. This VHF system is designed primarily for local control by detachments, but when fully developed will provide, in effect, a radio-telephone net encompassing all but the northern subdivisions of the Force.

Above the detachment level, in addition to normal commercial telephone service, two principal means of telecommunication are used—Telex and high frequency (HF) radio for voice and code transmission.

The Telex service is installed in most divisions and sub-division headquarters at points where Telex exchanges are available. Its primary purpose is to provide communications within the divisions (between divisional headquarters and sub-divisions), reflecting the fact that the operations of the Force are largely decentralized to the division level. An installation at R.C.M.P. headquarters in Ottawa permits the use of Telex also for the general control of the Force.

The HF radio network (*see* Appendix 10) serves a dual purpose. First, it provides a supporting system to the Telex service, embracing headquarters, divisional centres and most sub-divisions. Second, it is the primary means of communication for the four sub-divisions in the North and their detachments, the coastal detachments, and the R.C.M.P. ships and aircraft.

The importance of adequate communications for police administration is recognized in the Force. Systems are generally well managed and operated at a high level of efficiency. There is also a lively, perhaps excessive, concern with economy and the coverage and reliability of the radio service may as a result be unduly limited. The systems are being extended and improved according to carefully developed plans, but standards adopted—for example, the relatively low power of the HF transmitters—may fall short of the needs of the job to be done, especially in the North. The pace of development generally has been limited by a low and apparently unvarying ceiling placed on annual capital expenditures. Numbers employed in planning and operating having been austere, but adequate.

In planning these systems, the sole concern has been for the needs of the Force itself and the facilities are used almost exclusively for its own purposes, except in the North. The requirements of police action, both in normal times and in the event of an emergency, appear to justify the maintenance of such special systems, but to the extent that the general administrative telecommunications of the federal government are improved, their relevance to R.C.M.P. needs should be assessed. Similarly, requirements of the Force which cannot, by themselves, be met economically—such as the need for facsimile transmission services—should be taken into account in measuring total government requirements as a basis for any development programmes.

CANADIAN BROADCASTING CORPORATION

As noted earlier, the Canadian Broadcasting Corporation makes extensive use of commercial telecommunications facilities in its operations, chiefly for the transmission of radio and television programmes throughout its networks. It is the general policy of the Corporation to rely for all its telecommunications,

other than the actual broadcasting, on commercial carriers and to limit its own activities to planning, leasing, and technical supervision of the services.

In most cases circuits are rented for eight or sixteen hours daily, under long-term contracts (five or ten years). When inviting tenders, the Corporation specifies the coverage and quality of circuits needed, but does not concern itself with how or by what facilities the service is to be supplied. Carriers are therefore able to integrate services rendered to the C.B.C. with other services. Tenders are usually called two years in advance, in order to permit successful bidders to construct any facilities that may be necessary.

In all aspects of this operation—planning, procurement, utilization and quality control—a consistently high level of efficiency was found. Adequate planning and control have ensured virtually full utilization. Circuits are obtained at economical rates, in most cases lower than those set by the United States Federal Communications Commission for the transmission circuits of the American networks. It would appear that the telecommunications policies of the Corporation and competent management of this function have contributed to the strengthening of commercial telecommunication across the country.

EXTERNAL TELECOMMUNICATIONS

Federal departments and agencies use a variety of telecommunications to points outside the country. Ordinary telephone and teletype services, including Telex, carry most of the general traffic. A few special arrangements exist, like the leased circuit to Washington of the Department of Defence Production, and the R.C.M.P. radio services reinforcing their Telex link to Interpol in Paris, and to Washington. The overseas extensions of the Armed Forces' main communications systems have been described earlier. However, the principal special requirement is that of the Department of External Affairs.

The communications services of External Affairs have grown rapidly since the end of World War II. From being almost completely dependent on the services of the British Foreign Office, the Department has developed its facilities to provide an integrated system, involving a small courier service and a telecommunications network. Dependence on the British services has been greatly reduced.

The departmental telecommunications services consist of leased Telex and teletype circuits, extended by commercial telegraph and backed by interconnections with the military systems. The kind of service provided to each mission abroad is dictated by traffic volume, the relative speed of alternative services, and security. Security considerations are vital in much of the traffic

and the system embraces considerable cypher equipment. For the same reason, the installation and operation of all communications equipment—including switchboards, teletype, Telex and cryptographic devices—is done by departmental personnel.

Much foreign traffic is carried by External Affairs for other government departments. This permits a higher utilization of facilities and, because Telex is paid for by blocks of time, reduces the unit costs of messages. However, no charge is made by External Affairs to other departments for this service, nor is there any guarantee that traffic will be handled with despatch; traffic is accepted or rejected at the discretion of the Department. The advantages of pooled traffic are unquestionable, but it would seem desirable that user departments be charged for the service and that a policy be established to define what traffic is acceptable.

Generally speaking, the External Affairs telecommunications service is efficiently operated. The quality of circuitry and equipment is well suited to requirements, routing and traffic control are handled effectively, staffing is economical to an extreme, and utilization rates are high.

The Department recognizes the importance of its telecommunications and is working to a long-term plan for extending its services and improving its transmission and cryptographic facilities. However, some acceleration of the programme is needed to ensure fast, dependable service. Like the R.C.M.P., the Department has worked within fairly severe budgetary limitations that have delayed the implementation of its plans. In addition, its programme has been hampered by staffing difficulties, attributable partly to the delays inherent in present recruiting methods—aggravated by the exceptional need to ensure the reliability of its staff—and partly to the special training needed for the operation of its cypher system.

We therefore recommend that: The Department of External Affairs be responsible for providing (at cost) teletype services to points outside Canada for all departments and agencies, other than those served by their own special systems.

TELECOMMUNICATIONS IN THE NORTH

The northern areas of Canada present special problems of communication because of the absence there of the postal, telegraph and telephone services available in the more populous areas. The federal government as the principal

—and in many areas the sole—public authority in the North, is particularly affected by this deficiency.

Each federal department and agency functioning in the North has had to devise ways to obtain communications facilities needed in its operations, and the absence of commercial facilities makes this a formidable task. The departments with well developed telecommunications components—the Armed Services, Department of Transport and R.C.M.P.—have individually developed systems for their own particular needs. Other departments have to improvise and, generally, rely heavily on the existing specialized systems. Rarely do a department's needs generate enough traffic to justify economically a high quality of service—hence the inadequacies already noted in the air traffic control systems and the R.C.M.P. radio network.

No department has the responsibility for measuring the government's total needs or for developing comprehensive telecommunications systems in the North. The Department of Northern Affairs and National Resources, with the broadest responsibility for northern administration, has no long-term communications policy or programme (beyond offering moral encouragement to the commercial carriers to expand their services in the North), nor has it the technical personnel to assess and plan services.

All northern posts of the Department of Northern Affairs and National Resources have access to telecommunications of some sort. The more fortunate ones—chiefly at the main points in the Yukon and the southern Mackenzie district—are served by commercial telephone; similar services are available at points on the Labrador coast and at Frobisher Bay through circuits made available to commercial carriers by the United States Air Force. Elsewhere, northern posts of the Department depend on the radio networks of the Department of Transport, the R.C.M.P., and, at some points, on those of the Hudson's Bay Company and the Roman Catholic Mission Communications System. Where none of these services is available, the Department equips its posts with small radio telephone sets, relying on the Department of Transport for their installation and maintenance—the latter often hampered by distance.

Results are far from satisfactory. Reliability is low; communication with Ottawa may involve routing through three or four separate systems, and reasonably direct inter-communication among northern posts is sometimes impossible. The dependence on a multiplicity of agencies—governmental, commercial and private—often makes privacy of communications unattainable.

The failure to integrate northern telecommunications services of the federal administration is a serious matter. Communications development in the North is particularly dependent on systematic planning and energetic direction by

the federal government. For lack of such planning and direction, the government's programmes for the development and administration of the North will suffer.

We therefore recommend that: A special study be made to assess the telecommunications needs of the North and to prepare long-term plans.

CONCLUSIONS

In the foregoing review of the special needs and systems of certain departments and agencies, your Commissioners express some specific criticism and advance several recommendations. This section contains more general observations on the special systems as a group which, apart from general administrative communications purchased from the commercial carriers, constitute the whole of government activity in this field.

The examination made of the various services disclosed strength in technical matters. Engineering, within the present limitations of policy, organization and money, has been generally competent, and in some departments outstanding; today's major systems are well-managed, with good standards of utilization, operation and maintenance. This technical competence is a valuable asset, but can produce effective and economical services only where directed and supported by appropriate policies and organized efficiently.

An examination of the system maps (Appendices 1-10) tellingly portrays the overlapping and duplication of existing telecommunications. The absence of central policy direction inhibits interdepartmental integration of requirements and pooling of services. The result is that management of telecommunications is highly decentralized, with each department and each of the Armed Services developing its own services without taking into calculation the needs and facilities of others, or the impact on the general development of Canadian telecommunication resources. This leads to duplication of facilities, absence of standardization and gives rise to problems of adjustment whenever requirements change. Departments and agencies whose needs are relatively slight face the alternative of making do with inadequate service or developing small and uneconomic systems.

This fragmentation of management among departments robs the government of economies of scale, both in the engineering of systems and in the negotiation of rates with commercial carriers. Recent experience in the leasing practices of the Canadian Broadcasting Corporation (and Trans-Canada Air Lines) and isolated instances in which competitive tenders have been

obtained for the provision of military circuits, suggest that savings can be achieved by pooling services and combining circuit requirements, and in taking advantage of rate concessions now becoming available to major customers of the common carriers.

The advantages of integration are clearly evident—on a limited scale—within the existing pattern. The ability of the Department of Transport to unify the planning and management of its various systems, and of the Department of External Affairs to pool overseas traffic of a number of departments has undoubtedly reduced costs and improved service. But these are only very partial solutions.

In the all-important matter of forward-planning, the position is particularly serious. With authority diffused, departments act independently and adopt programmes which, in total, result in undue expenditures of public moneys. Equally serious is that in the absence of a common policy, forward-planning will be on an inadequate short-term basis.

Communication services are treated for budgetary purposes as an “object of expenditure” rather than as integral elements of the various programmes they support. Funds are allocated somewhat arbitrarily and generally on a year-to-year basis, which in many cases has little relevance to the phasing of communication development needed to ensure the effectiveness of programmes. This, in turn, has discouraged long-term planning and where it has been undertaken, technical considerations have tended to be overshadowed by a presumption, based on past experience, of relatively inflexible financial limits.

Nowhere is responsibility assigned or machinery provided to relate the planning of government systems to the general development of Canadian telecommunications. Even in the settled parts of the country, the failure to draw the commercial carriers into government planning may hamper the full development of commercial services; in the less developed areas, and particularly in the North, the extension of general commercial services may be rendered virtually impossible through lack of comprehensive planning within the government and consultation with the communication industry.

In the light of these defects of policy and organization, it is scarcely surprising that, with the exception of some military systems, existing government telecommunications were generally found to be barely adequate for present needs and inadequate for the immediately foreseeable future. Although in most cases the need for expansion and modernization is recognized by the operating departments, the rate of progress is too slow. Defence communications are more satisfactory because financial limitations have been less stringent, but here the lack of unified planning and failure to take account of non-defence needs (both governmental and public) has inflated costs, curtailed

flexibility, and may delay modernization or make it excessively expensive. Given the present rate of change in requirements and technology, and the present rate of progress in government communication systems, the gap between demand and supply is bound to widen—not so much because of insufficient funds as because of the unplanned, unco-ordinated basis of spending.

4

CENTRAL DIRECTION AND CO-ORDINATION

Apart from the general administrative communications using facilities of the commercial carriers, there is no case for unified management of government telecommunications. But there is need for central policy and authority to ensure that a cohesive and economic pattern will evolve.

Telecommunications must be recognized to be, first and foremost, a supporting service essential to the conduct of operations. Consequently, the individual departments and agencies, as the active operating organizations of government, must bear the primary responsibility for determining what telecommunications are necessary to the success of their programmes, and for ensuring the effectiveness of those services. In these respects, the management of telecommunications differs in no way from that of other supporting services.

The planning, engineering, provision, operation and maintenance of telecommunication services require technical staffs which few departments can be expected to have. Consequently, most departments need a source of technical advice and assistance in such matters. To a large extent, they can look for this to the communications industry, but any large technical unit within the public service—such as that in the Department of Transport—can be of widespread value as an internal source of advice on planning and operations.

Consideration of the broader interests of the government may sometimes suggest that major requirements of some departments be merged with the lesser needs of other departments in order that improved service or lower rates may be secured by all; the management of the shared service might then be entrusted to the major user—for example, to the Department of External Affairs in

the case of overseas teletype service. Instances of this kind can only be identified if a single organization is given clear responsibility for making periodic or continuous assessments of all the telecommunication needs and services of the government, other than the purely operational military systems which involve no major static facilities.

Whatever autonomy may be granted to the departments having heavy requirements for communications, or to those given specific responsibility for the provision of common services throughout Canada or abroad, certain overriding considerations must be recognized and machinery must be provided to ensure that these considerations are given adequate weight in the planning and management of all telecommunication services of the government. First, any costly and unnecessary duplication of services must be prevented. Second, wherever possible, systems should be designed and operating procedures standardized to permit interchange of traffic, in order to secure maximum flexibility. Third, general standards of manning, operation and maintenance should prevail throughout all systems, and equipment should be standardized as far as the needs of the users permit.

In addition, there must be a central concern with the forward-planning of government telecommunication services, based, on the one hand, on forecasts of the needs of all departments, and, on the other, on a continuous appraisal of technological developments and innovations in the services offered by commercial carriers. Forward-planning on these lines can, as a by-product, provide the basis for guidance to agencies—public or private—engaged in communications research and development. It also bears a close relationship to the emergency telecommunication planning of the government and, logically, the two functions should be merged.

An important part of this central task involves the relating of government needs and services to the general development of Canadian telecommunications. This clearly requires close and continuous liaison with the communications industry—both to keep abreast of projected developments and to keep the industry informed of the plans and needs of the government—and with all authorities concerned with the economic development of the country, particularly in the less settled areas. This is the point at which the interests of the government as a user and operator must be reconciled with its more general interest, on behalf of the Canadian public, in fostering the growth of national telecommunication services.

These matters are, essentially, the collective concern of ministers but, if that concern is to be effective, responsibility must be assigned to a minister to furnish initiatives and to provide, within his department, a supporting staff possessing the necessary knowledge concerning the current state and future

prospects of all departmental and agency requirements, of the techniques available to satisfy those requirements, and of the extent and variety of Canadian telecommunications generally. The duties of this staff would include the following:

- To undertake forward-planning for the development of economical and effective facilities and services to meet the future needs of federal departments and agencies throughout Canada.
- To relate the telecommunication services and forward plans of the government to the needs and services of the community at large, and ensure that government facilities are developed, as far as circumstances permit, in ways which assist the extension and improvement of public services.
- To recommend, to the federal authorities responsible for the planning or conduct of research and development in telecommunications, such areas of inquiry as seem relevant to the future needs of the government.
- To provide technical advice to other departments and agencies and to foster the sharing of other telecommunication staffs in the public service.
- To assist the Treasury Board and its staff in the review of departmental proposals and the assessment of telecommunications management by departments.
- To provide technical advice and assistance to federal agencies having regulatory functions relating to telecommunications.
- To represent Canada at telecommunication conferences for the resolution of international problems, and negotiate international agreements on technical matters.
- To discharge the duties of the Emergency National Telecommunications Organization.

What is contemplated in the foregoing is essentially an advisory and service function, with central powers of control vested only in Cabinet and the Treasury Board. Moreover, the staff should not be confused with the operating personnel required by the Department of Transport for the special telecommunications systems within its various branches.

We therefore recommend that: 1 The Minister of Transport be given primary responsibility for the formulation of policies relating to telecommunications,

and for the co-ordination of the telecommunication services of the government.

- 2 The Minister undertake the previously-recommended studies of telecommunication facilities of the Air Defence Command and in the North, and, in the course of his enquiry, consult with the appropriate civil and military government agencies, as well as the common carriers.
- 3 The Minister be supported within his department by an organization to provide expert advice and to perform such non-operating duties as are required for the execution of the telecommunication policies of the government.

The machinery and procedures by which the federal government discharges its responsibility for the regulation of Canadian telecommunications do not come within the scope of this report. The present concern, rather, is with the planning and management of those telecommunication services needed in the course of administering the programmes of the government itself.

The regulatory functions, however, are extensive, encompassing such matters as the administration of federal and international radio and telegraph regulations and agreements, the management of the radio frequency spectrum, the definition of standards of equipment, the licensing of radio services and enforcement of laws and regulations governing their operation, and the regulation of rates charged by commercial carriers. It is evident, even from this brief listing, that these responsibilities are relevant, in various ways, to the administration of the government's own services because what it may do in the regulation of rates clearly affects it as a user of commercial services. How it manages the frequency spectrum and regulates standards of equipment affect it as an operator. The regulatory function and the management of its own services both require the services of specially qualified personnel, raising questions of the feasibility or desirability of using combined staffs for the two functions. Finally, there is a need, common to the two functions, for the evolution of basic policies and objectives defining the role of telecommunications in the

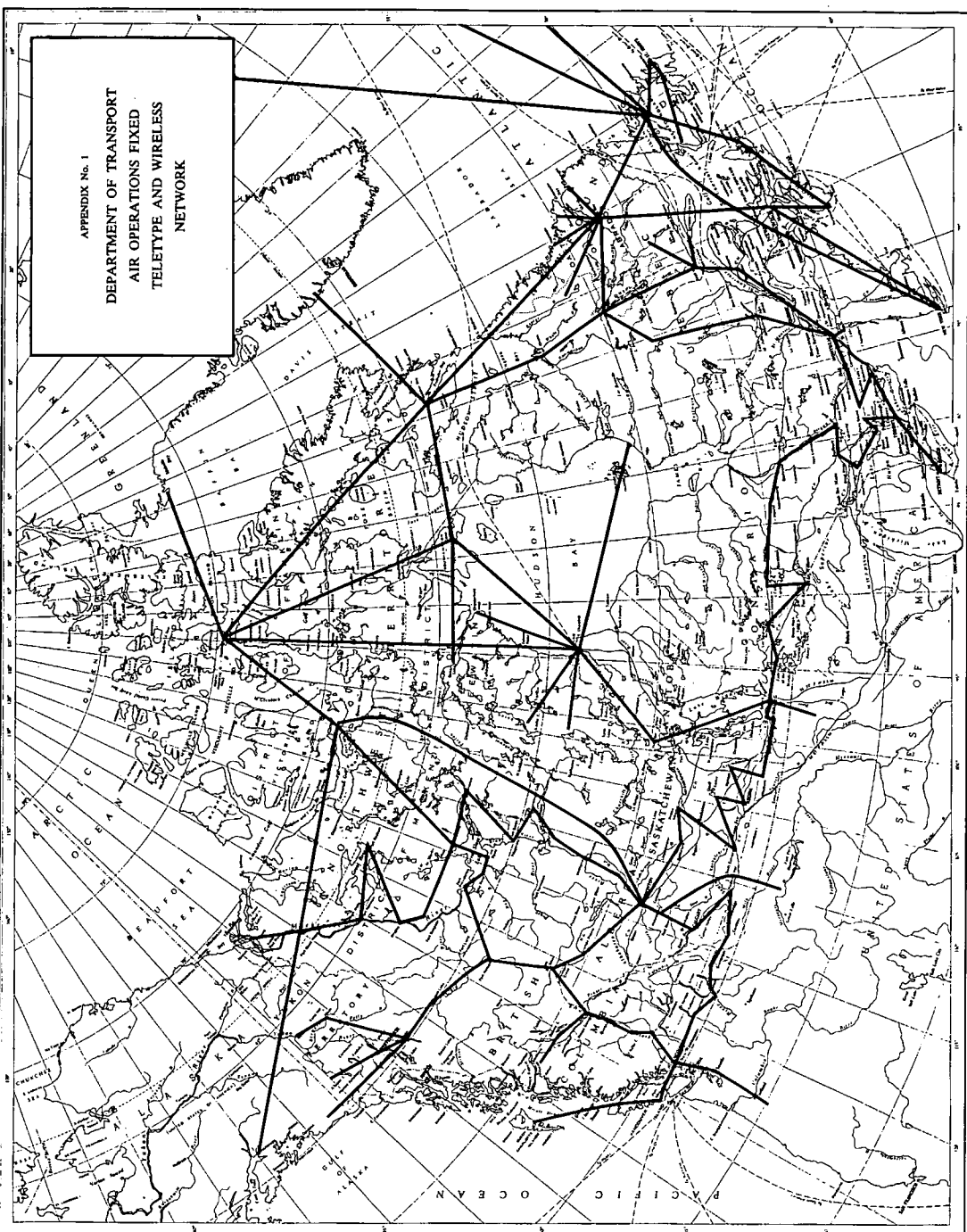
social and economic life and growth of the country. Any study of the organization and methods of operation of the federal government must obviously take these relationships into account. In particular, any duplication of the technical staffs must be avoided.

We therefore recommend that: The planning and co-ordinating organization, under the Minister of Transport, should provide all technical service required in the regulatory processes of the government.

APPENDICES 1 TO 10

APPENDIX No. 1

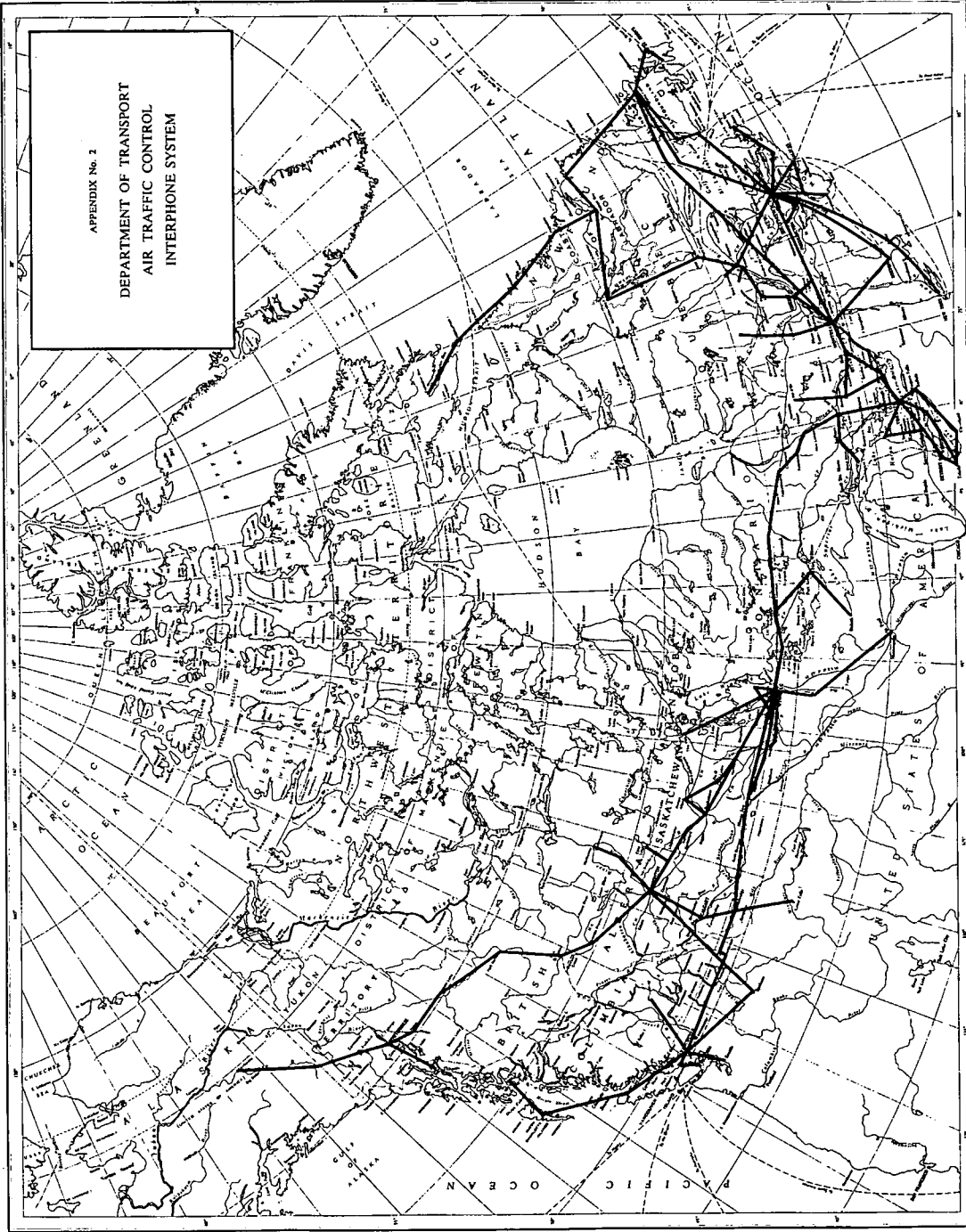
DEPARTMENT OF TRANSPORT
AIR OPERATIONS FIXED
TELETYPE AND WIRELESS
NETWORK



PRODUCED BY THE SURVEYS AND MAPPING BRANCH, OTTAWA, CANADA, 1988

APPENDIX No. 2

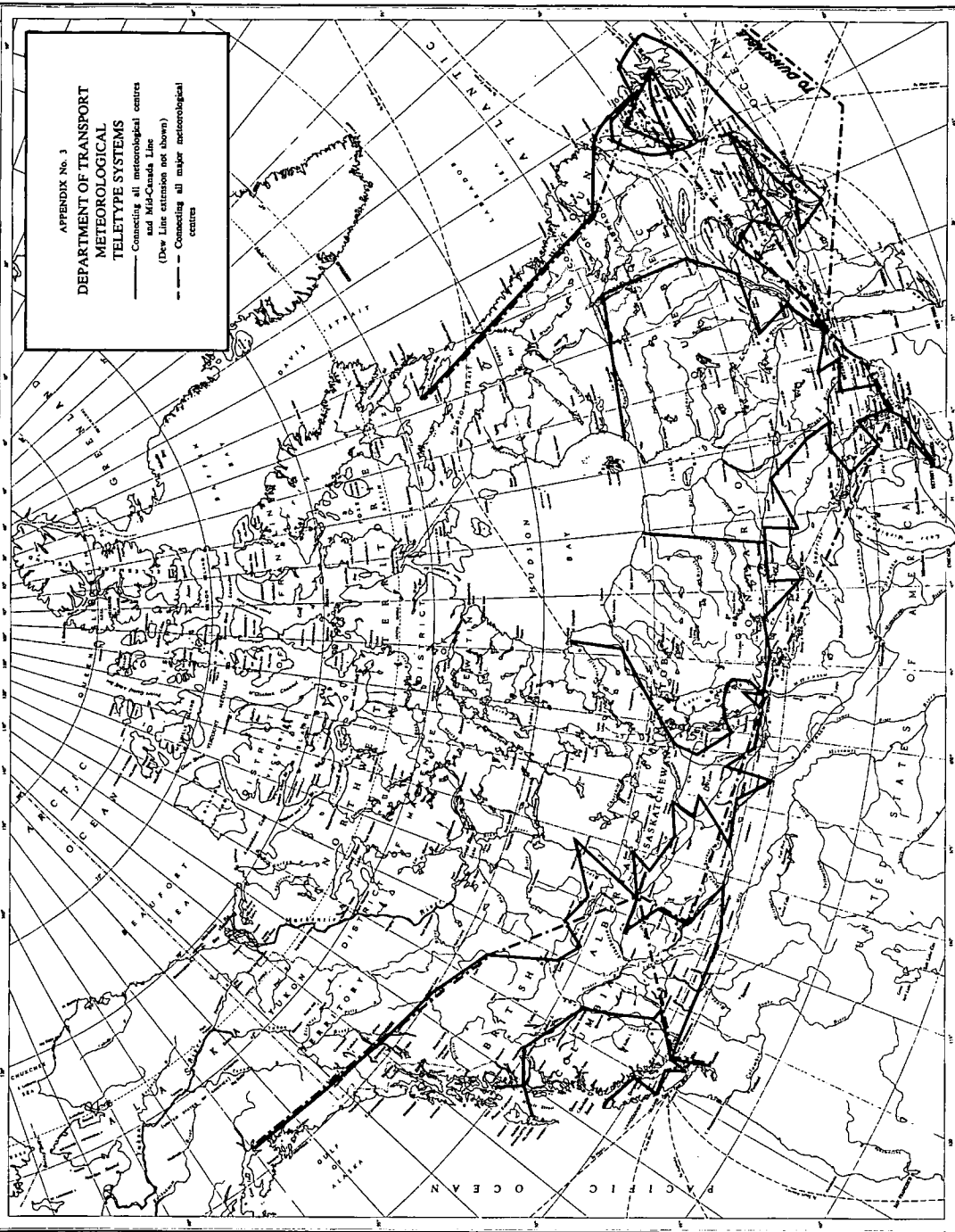
DEPARTMENT OF TRANSPORT
AIR TRAFFIC CONTROL
INTERPHONE SYSTEM



APPENDIX No. 3

DEPARTMENT OF TRANSPORT
METEOROLOGICAL
TELETYPE SYSTEMS

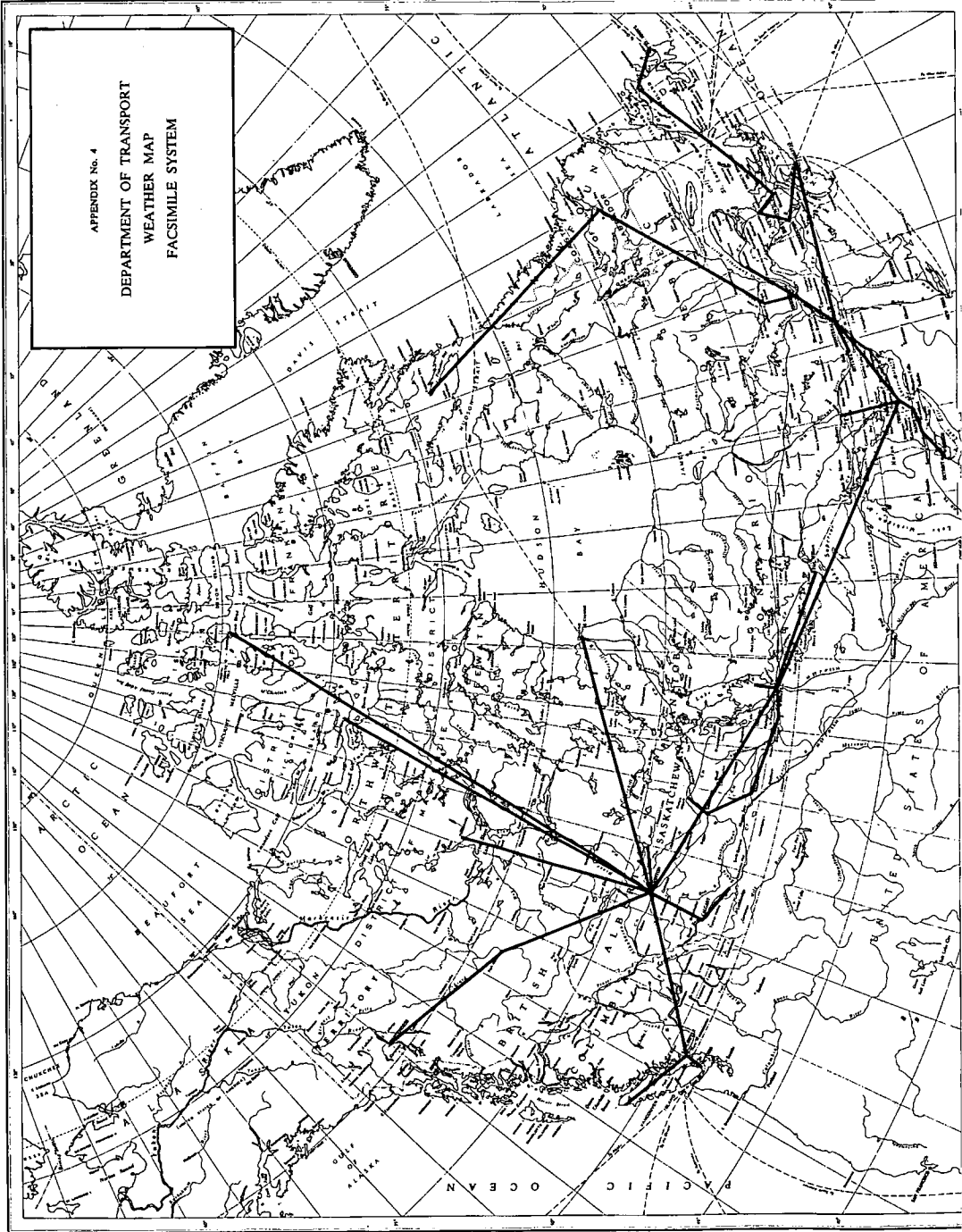
- Connecting all meteorological centres and Mid-Canada Line (Dew Line extension not shown)
- - - Connecting all major meteorological centres



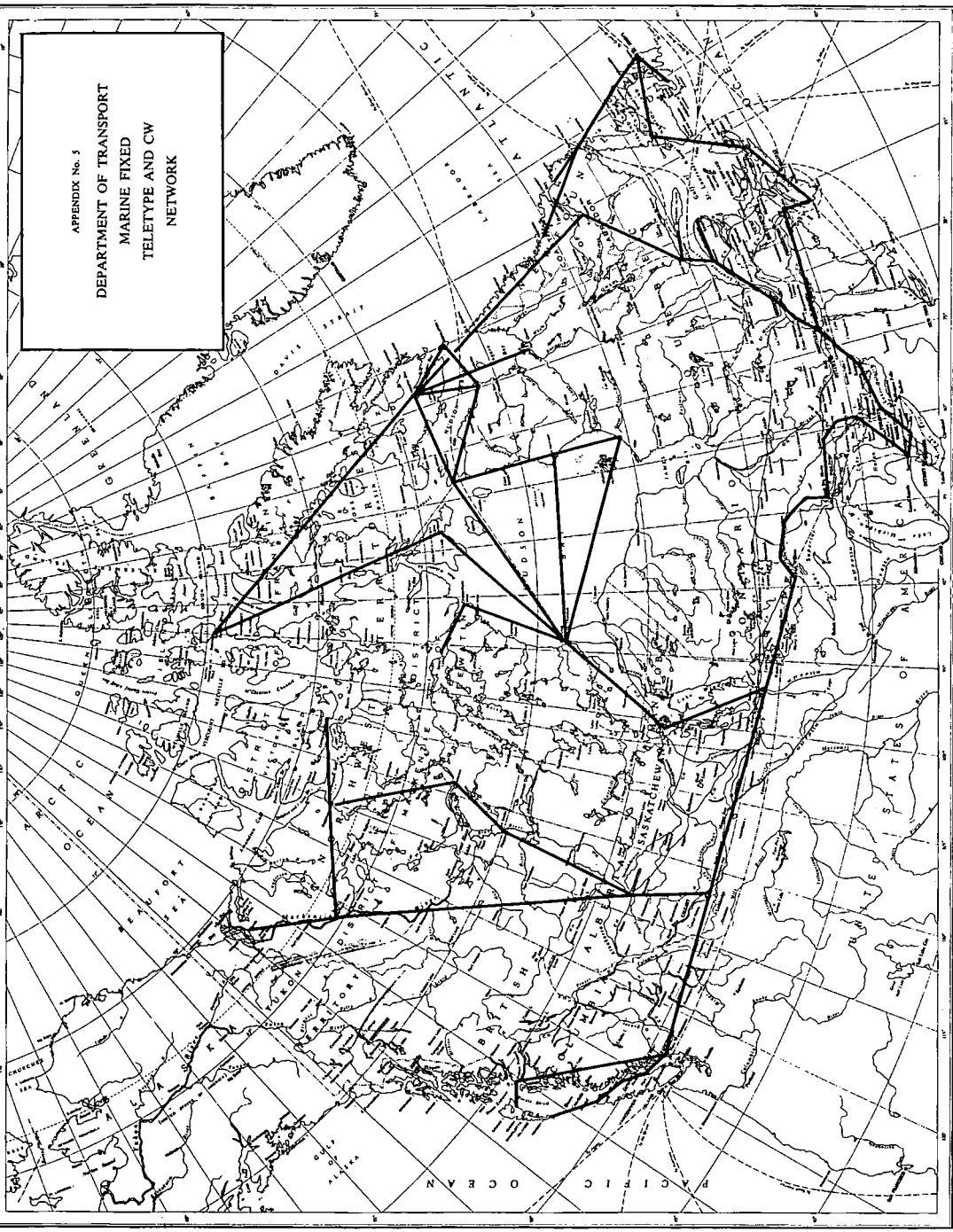
PRODUCED BY THE SURVEYS AND MAPPING BRANCH, OTTAWA, CANADA, 1961

APPENDIX No. 4

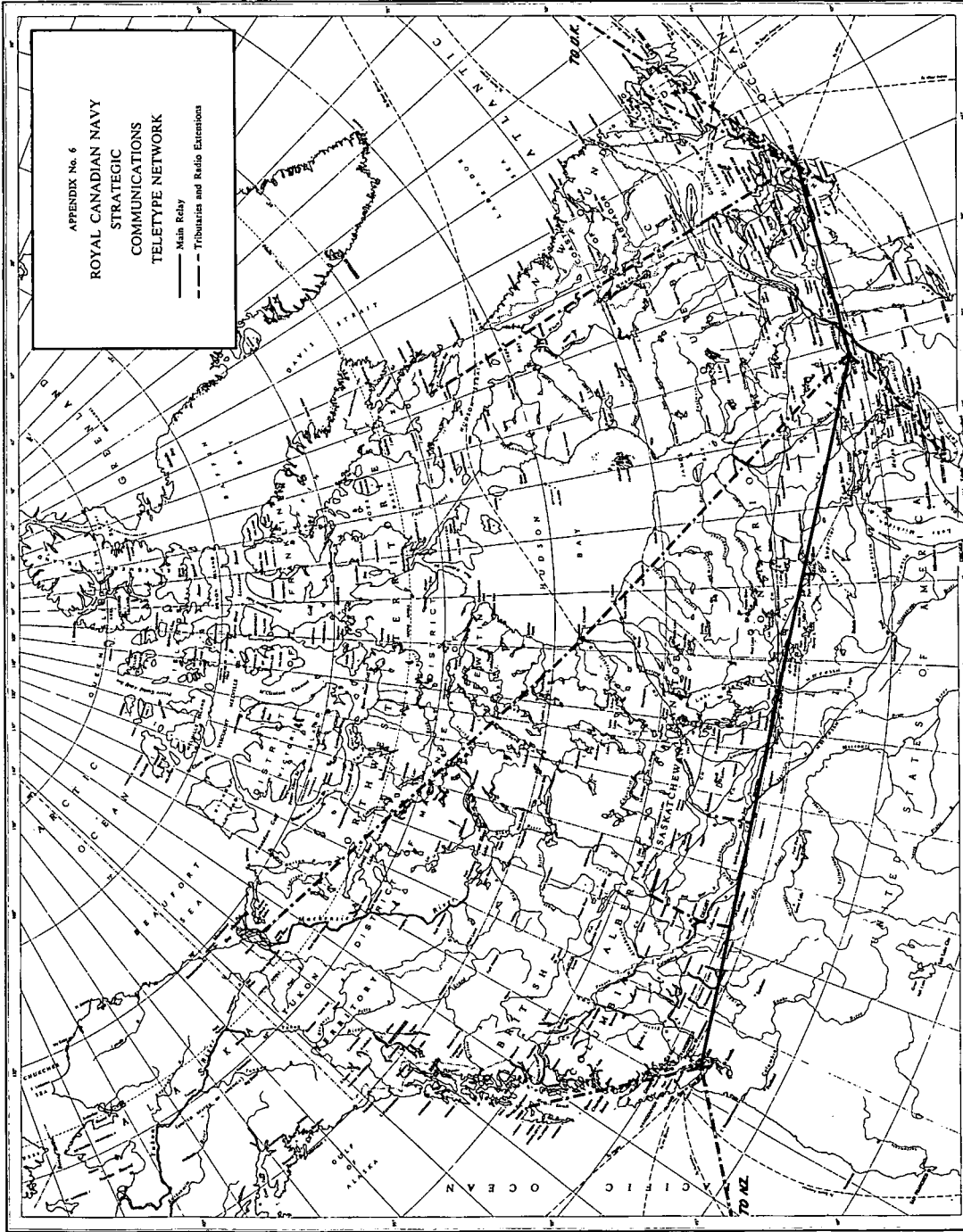
DEPARTMENT OF TRANSPORT
WEATHER MAP
FACSIMILE SYSTEM



APPENDIX No. 5
DEPARTMENT OF TRANSPORT
MARINE FIXED
TELETYPE AND CW
NETWORK



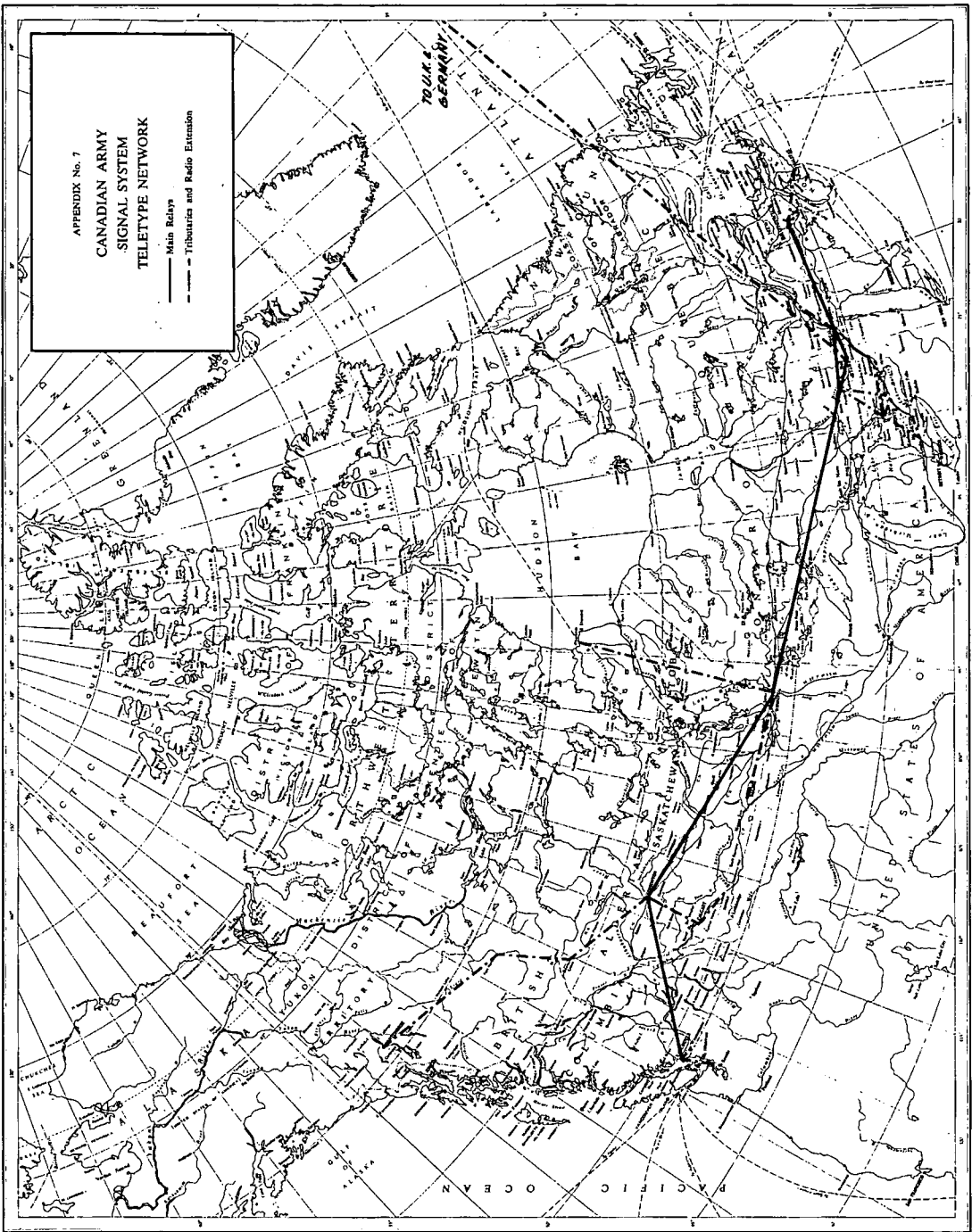
PRODUCED BY THE SURVEY AND MAPPING BRANCH, OTTAWA, CANADA, 1961



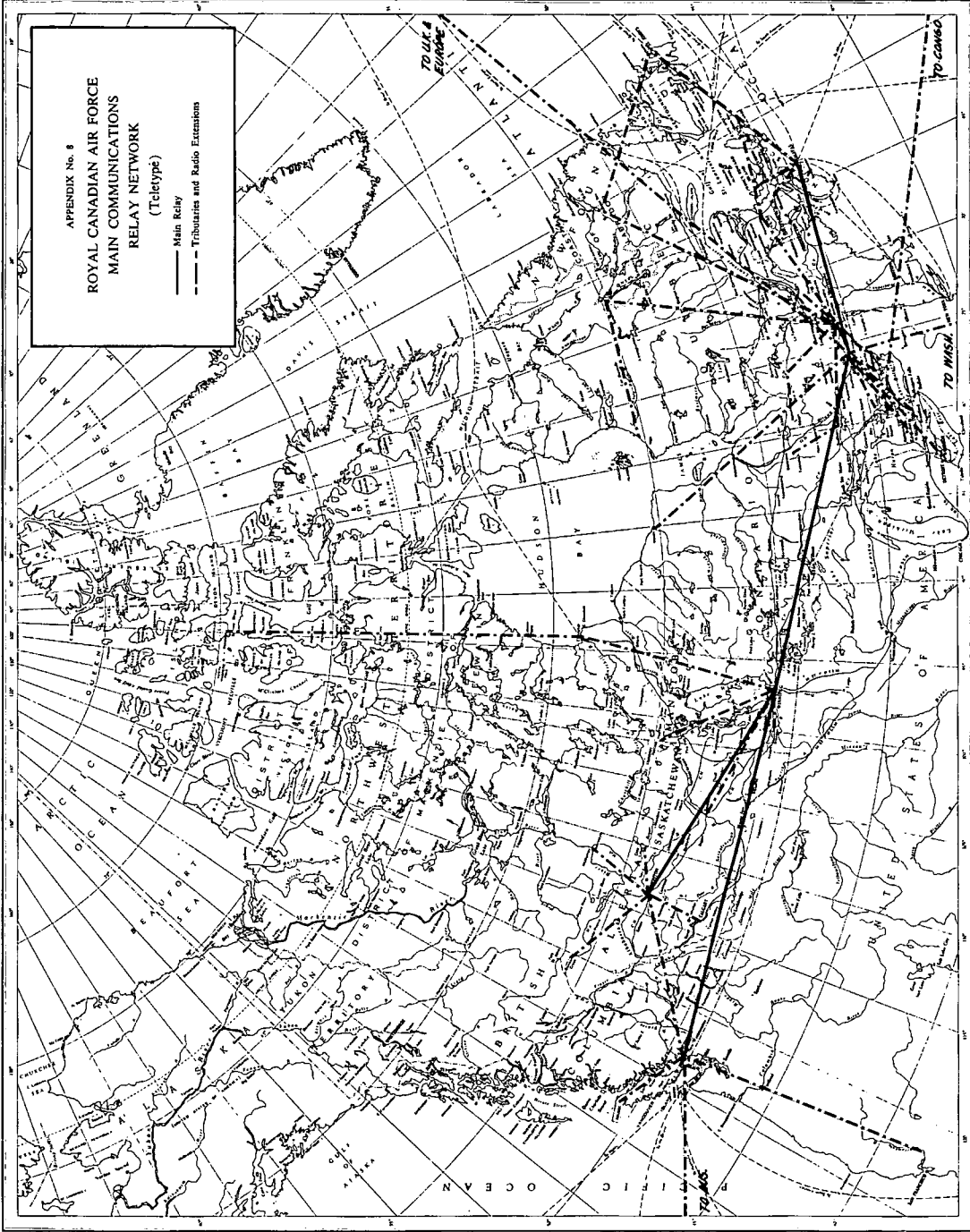
APPENDIX No. 7

CANADIAN ARMY
SIGNAL SYSTEM
TELETYPE NETWORK

— Main Relays
- - - Tributaries and Radio Extension



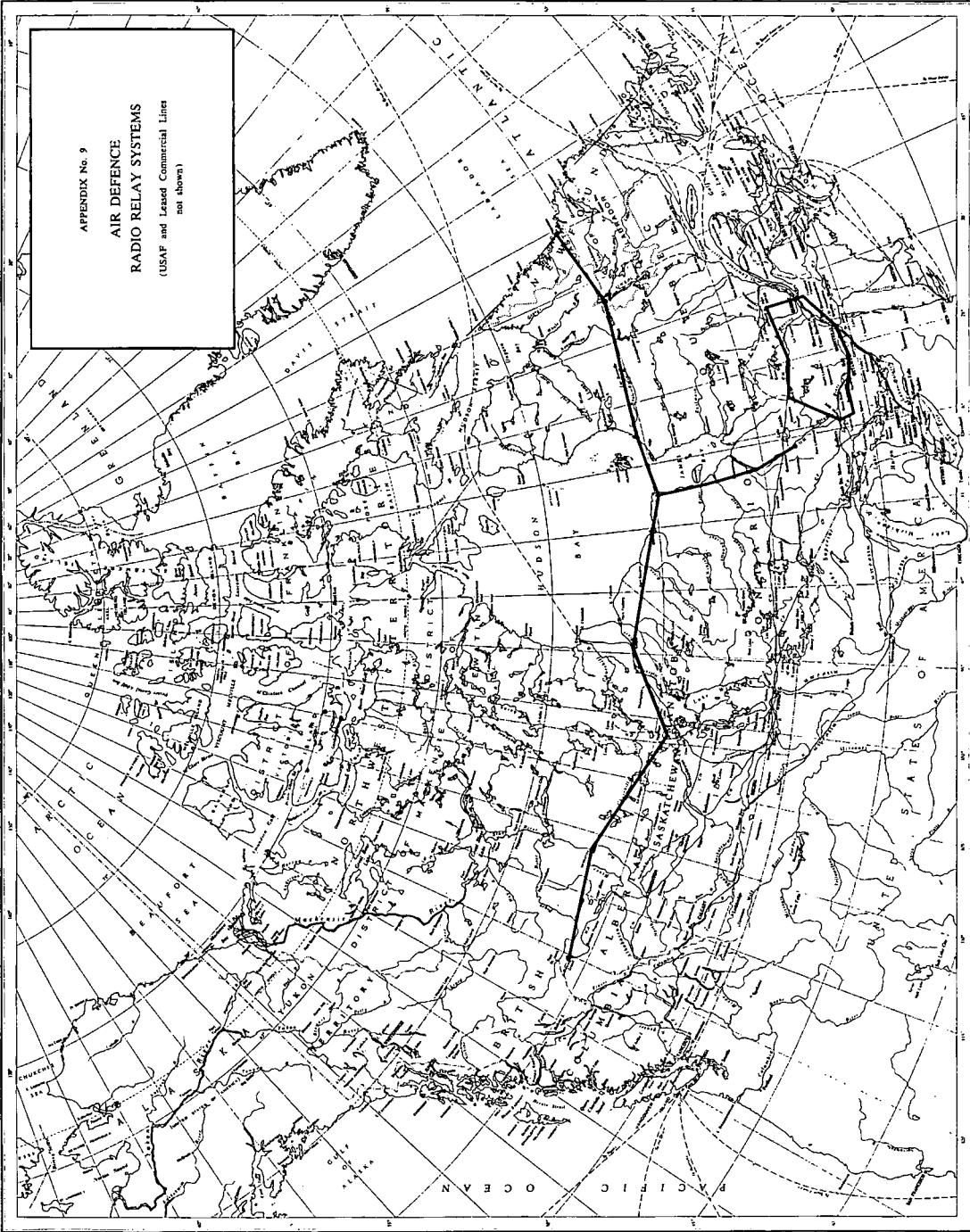
PRODUCED BY THE SURVEYS AND MAPPING BRANCH, OTTAWA, CANADA, 1961



APPENDIX No. 9

**AIR DEFENCE
RADIO RELAY SYSTEMS**

(USAF and Leased Commercial Lines
not shown)



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