

1948
NEW ZEALAND

REPORT
of the
United Kingdom
Civil Aviation Mission
1948

Presented to both Houses of the General Assembly by Leave

CONTENTS

	Page
PERSONNEL AND TERMS OF REFERENCE	3
INTRODUCTION	4
PART I—GOVERNMENTAL ORGANISATION FOR THE ADMINISTRATION OF CIVIL AVIATION	
CHAPTER 1—MAJOR DEPARTMENTAL ORGANISATION	7
Relationship with Royal New Zealand Air Force	8
Ministry of Transport	8
Status of the Civil Aviation Directorate—relationship to Air Department ..	9
Relationship of Air Department with national operating organisations ..	13
Relationship with Prime Minister's Department	14
Crown Law Office	14
Relationship with other technical departments—Meteorology and Works ..	14
CHAPTER 2—INTERNAL ORGANISATION OF THE CIVIL AVIATION DIRECTORATE ..	16
Boards and committees	21
International representation	23
CHAPTER 3—STAFF OF THE CIVIL AVIATION DIRECTORATE	24
Director General of Civil Aviation	24
Deputy Directors General and Directors	25
Recruitment and conditions of service of technical personnel	26
Civil engineering staff	28
PART II—MEASURES FOR THE EFFICIENT, SAFE, AND ECONOMIC OPERATION OF AIRCRAFT	
CHAPTER 4—PLANNING OF AIR SERVICES AND AIR ROUTES	29
Air service planning	31
Aerodrome construction programme	32
Radio and meteorological services and air traffic control	32
Principles governing planning	32
CHAPTER 5—ORGANISATION OF AIR SERVICES	33
International air services	33
Internal air services	37
CHAPTER 6—STUDY OF AIR TRANSPORT OPERATING RESULTS	39
CHAPTER 7—AIR ROUTE ORGANISATION	39
Air traffic control	39
Search and rescue	40
Aeronautical radio communications and aids to navigation	41
CHAPTER 8—REGULATION OF CIVIL AVIATION	42
Defects in procedure	42
Regulations appropriate to national operator	44
Application of regulations to Government personnel and aircraft	44
Consultative machinery	45
CHAPTER 9—AIR SERVICE CERTIFICATE AND AIR SERVICE CERTIFICATE RATING	46
Air Service Certificate	46
Air Service Certificate rating	47
CHAPTER 10—CERTIFICATES OF AIRWORTHINESS AND THE NEW ZEALAND CIVIL AIRWORTHINESS REQUIREMENTS	50
CHAPTER 11—CONDITIONS GOVERNING THE IMPORT OF AIRCRAFT: TYPE RECORD AND AEROPLANE FLIGHT MANUAL	53
CHAPTER 12—AIR SERVICE LICENCE	57
CHAPTER 13—INVESTIGATION OF ACCIDENTS	57

CONTENTS—continued

	PAGE
CHAPTER 14—TRAINING	60
Air traffic controllers (Government service)	61
Radio operators and technicians (Government service)	61
Aeronautical engineering personnel (Government service)	62
Pilots (non-Government service)	62
Engineers and mechanics (non-Government service)	63
Aeradio operators and technicians (non-Government service)	64
CHAPTER 15—FLYING CLUBS	64

PART III—I.C.A.O. STANDARDS

CHAPTER 16—PRESENT STATUS OF I.C.A.O. STANDARDS AND RECOMMENDED PRACTICES	69
CHAPTER 17—I.C.A.O. DRAFT STANDARDS GOVERNING AIRCRAFT PERFORMANCE	72
Application of United Kingdom draft regulations to the Tasman service	75

PART IV—AERODROME STANDARDS AND ECONOMIC PRINCIPLES

CHAPTER 18—I.C.A.O. AERODROME STANDARDS AND THEIR APPLICATION	77
CHAPTER 19—INTERNATIONAL AIRPORTS	82
Auckland	83
Ohakea—alternate international aerodrome	85
Wellington	85
Christchurch	86
Water aerodromes	88
CHAPTER 20—INTERNAL AERODROMES	89
Rongotai	89
Paraparaumu	91
Palmerston North	91
Hastings and Napier	92
Dunedin (Taieri)	93
Otago Harbour	94
Central Otago	94
Invercargill	95
CHAPTER 21—AERODROME EQUIPMENT—FIRE AND CRASH	95
CHAPTER 22—AERODROME ECONOMICS AND MANAGEMENT	97
State and local responsibility	97
Aerodrome management	100
Aerodrome revenue and charges	100
Aerodrome licensing	104

APPENDICES

A—LIST OF PLACES VISITED AND INSPECTED	107
B—AUTHORITIES WITH WHOM DISCUSSIONS HAVE BEEN HELD	110
C—CIVIL AVIATION BRANCH—PLAN SHOWING PRINCIPAL OFFICERS AT HEAD OFFICE	113
D—RECOMMENDED ORGANISATION OF THE CIVIL AVIATION DIRECTORATE	114
E—DISTRIBUTION OF DUTIES, CIVIL AVIATION DIRECTORATE	115
F—EXAMPLES OF TRENDS OBSERVED IN REGULATION OF CIVIL AVIATION	118
G—EXTRACT FROM UNITED KINGDOM DRAFT REGULATIONS GOVERNING AIRCRAFT PERFORMANCE	122
H—AIRCRAFT DATA FOR AERODROME CLASSIFICATION	126
I—INTERNATIONAL AIRPORT AT AUCKLAND	129
J—VIEWS OF HAREWOOD OVERSEAS AIR TERMINAL COMMITTEE	132

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS	133
--	-----

PERSONNEL AND TERMS OF REFERENCE

OF THE UNITED KINGDOM CIVIL AVIATION MISSION LED BY
SIR FREDERICK TYMMS, K.C.I.E., M.C., F.R.Ae.S., INVITED
BY THE NEW ZEALAND GOVERNMENT TO ADVISE THEM
UPON CIVIL AVIATION IN NEW ZEALAND

Sir FREDERICK TYMMS, K.C.I.E., M.C., F.R.Ae.S., United Kingdom
Representative, International Civil Aviation Organisation (Montreal).

Mr. K. T. SPENCER, M.C., A.M.I.C.E., F.R.Ae.S., B.Sc., A.C.G.I., Deputy
Director, Aircraft Research and Development, Ministry of Supply
(London).

Mr. G. J. WARCUP, Deputy Director, Aerodromes Division, Ministry of
Civil Aviation (London).

Official Secretary

Squadron Leader M. B. FURLONG, Royal New Zealand Air Force.

To investigate and advise the Hon. Mr. Jones, Minister in Charge of
the Air Department :—

Whether any change should be made, and if so what, in the organ-
isation, administration, and control of civil aviation in New Zealand,
including in particular—

- (A) The organisation of the Civil Aviation Branch of the Air Depart-
ment and related services for the efficient discharge of the
responsibilities of Government in relation to civil aviation :
- (B) The technical and administrative measures necessary to provide
for the efficient, safe, and economic operation of civil aircraft
and air services, including, *inter alia*, the principles and
procedure governing the issue of Air Service Certificates :
- (C) The interpretation and application of I.C.A.O. proposals for
International Standards and Recommended Practices having
an immediate and important bearing on New Zealand civil
aviation operations :
- (D) The standards required of aerodromes in New Zealand for the
operation of internal and international civil air services, and the
economic principles governing the provision of aerodromes
and air route organisation.

And, generally, upon matters incidental to the purposes of the
Mission.

(Sgd.) F. JONES.

Office of the Minister in Charge of Air Department,
Parliament House,
Wellington, 3rd September, 1948.

UNITED KINGDOM CIVIL AVIATION MISSION

To the Hon. the Minister in Charge of Air Department,
Wellington.

SIR,—

We have the honour to present the report of the United Kingdom Civil Aviation Mission which was invited by the New Zealand Government to advise on certain matters concerning civil aviation.

The Mission arrived in Auckland on 24th August and in Wellington on 26th August.

The terms of reference, which are reproduced on page 3, were the subject of discussion between Ministers, Departments, and the Mission, before they were finalised and issued to the Mission by the Hon. the Minister in Charge of Air Department on 3rd September. This discussion was aimed at ensuring that the scope of the terms of reference was clearly understood. It was evident that the terms of reference could be interpreted as requiring a completely detailed and exhaustive examination and report on every aspect of civil aviation organisation in New Zealand. It was made clear that the principal purpose of the Mission was to advise on the over-all organisation and principles which should govern the administration of civil aviation, with such particular attention to specific problems as might appear to be justified by the investigations of the Mission.

Under the second paragraph of the terms of reference the Mission was not expected to advise, for example, on the types of aircraft which should be operated by the New Zealand National Airways Corporation or Tasman Empire Airways, Limited, on the specific air services which they should operate, or the detailed organisation necessary for their programme of operations. An investigation and report of such a nature could not have been accomplished in the brief time during which the Mission was expected to be in New Zealand, and it has not been attempted.

It was confirmed by discussion with the Minister in Charge of Air Department that, in spite of the fact that the Mission had been set up as a result of certain allegations regarding governmental control of civil aviation, the Mission would not act in any sense as a court of inquiry, taking formal evidence and otherwise proceeding in accordance with court practice. The Mission was not constituted in such a way as to be competent to carry out such an inquiry, and the field covered by its terms of reference was far too wide to lend itself to an inquiry of this nature. Consequently, this Report does not record the evidence on which any

conclusions have been reached by the Mission. It is confined to giving the best advice of which the Mission is capable on the matters referred to it, on the basis of the evidence which we have been able to collect.

We should not like it to be inferred from our criticisms of some features in New Zealand civil aviation that these features are unique to this country. Far from this, it is often because we in our respective spheres have shared responsibility for practices open to the very same criticisms that we are now quick to detect them here. In respect of the control and development of civil aviation in its early stages, New Zealand is, in our opinion, less vulnerable to criticism than were other countries, of which we have experience, at a comparable stage in their history.

We would also emphasise that in no country, nor in I.C.A.O. itself, has a complete solution to all the complex problems of adjusting the regulation of civil aviation to the modern development of aeronautics been reached, and the efforts which have been made in this connection in New Zealand are deserving of praise. As for practical achievements, New Zealand's record in civil aviation, having regard to her small population and relatively late start, is second to none.

The Mission has been given every assistance by Government to facilitate its work, and furnished with information by the operators, flying clubs, local authorities, and officers of Government—in particular, the officers of the Air Department and the Director of Civil Aviation and his staff. We are indebted to the Chief of Air Staff and officers of the Royal New Zealand Air Force who have given us advice and information and afforded facilities for our air travel. At every centre we have visited we have been privileged to meet the leading citizens and representatives of business, who have devoted much of their valuable time to meetings and inspections in order to acquaint us with the aspects of the aviation problem which concerned them. We wish to acknowledge with gratitude this ready assistance and the hospitality which everywhere has been extended to us.

We attach as Appendices A and B statements recording the places visited in New Zealand and the authorities and officials whom we have consulted and who have supplied information.

We gratefully acknowledge the services of the staff placed at our disposal by the New Zealand Government. We cannot praise too highly the services of Squadron Leader M. B. Furlong, R.N.Z.A.F., who was posted as Official Secretary to the Mission. He not only handled all office and travel arrangements unfailingly, but also his knowledge of New Zealand and its problems and personalities and his wisdom and judgment were of the greatest value both in our investigations and in compiling our Report. Among the secretarial staff who have all given efficient and

willing service, we wish to mention Mr. Walter S. Saville, whose single-minded devotion to duty without regard to hours of work or holidays and whose skill in recording involved technical discussions and in writing English have been invaluable to us. Miss B. J. Kitchingman, who was assigned for regular duty with the Mission, is a skilled stenographer who has also given us loyal and valuable service.

We have the honour to be, Sir,

Your obedient servants,

F. TYMMS.

K. T. SPENCER.

G. J. WARCUP.

Wellington, 4th November, 1948.

A summary of conclusions and recommendations is given on pages 133 to 144.

PART I

GOVERNMENTAL ORGANISATION FOR THE ADMINISTRATION OF CIVIL AVIATION

“(A) *The organisation of the Civil Aviation Branch of the Air Department and related services for the efficient discharge of the responsibilities of Government in relation to civil aviation.*”

THE Mission came to the early conclusion that the difficulties which have arisen in the administration of civil aviation, to some of which its attention was called, were the result rather of a lack of definition of the several responsibilities of the departments and authorities concerned than of fundamental defects in the organisation itself. Nevertheless, the organisation is in our opinion susceptible of improvement in detail. We would like to make it clear at the outset that we have endeavoured not to concern ourselves with personalities, and especially in proposing a particular form of organisation we have regarded it as an abstract problem, divorced from the personalities of the present officers.

CHAPTER 1—MAJOR DEPARTMENTAL ORGANISATION

1. In the light of criticisms which have been made from time to time, and having studied the sundry reports and recommendations which have been made concerning the post-war organisation of civil aviation in New Zealand, including in particular the report made in March, 1946, by the present Chief of the Air Staff (Air Vice-Marshal A. de T. Nevill), the Mission considered whether any change in the major departmental organisation of Government was necessary in regard to civil aviation. In the opinion of the Mission, the development and administration of civil aviation in New Zealand do not constitute a problem of sufficient magnitude to justify their allocation to a separate Minister of Civil Aviation as his sole responsibility. An examination of the portfolios held by the fourteen existing Ministers is sufficient for conviction on this point.

2. Nor does the Mission consider that it is necessary at this stage that civil aviation should be the responsibility of a separate department of State. We understand that there are at present some forty-six separate departments of State allocated to the fourteen Ministers. We have been informed that efforts are being directed towards amalgamation and the reduction of the number. It is undoubtedly true that the importance attached by Government to a particular activity of the State and the attention which it receives from Government and the public can be emphasised and increased by making that activity the sole function of a Minister and of a separate department, but the present

lack of clarity in regard to the functions and responsibilities of the several departments of State, branches of the Air Department, and other authorities concerned can be removed without taking a step which is not justified by the present relative importance of civil aviation.

Relationship with Royal New Zealand Air Force

3. It has been suggested that the interests of the development and administration of civil aviation have suffered by its association in the Government structure with the Royal New Zealand Air Force and its subservience to the Air Department, which in some quarters has been regarded as primarily concerned with the Air Force. We have seen references to the Air Secretary as the head of the Air Force, a misconception which we believe to have some bearing on the civil aviation problem. We are satisfied that civil aviation has not in any way suffered from its association with the Royal New Zealand Air Force, either in the form of interference or subordination of its interests—this in spite of the fact that the present Chief of the Air Staff, who has contributed so greatly to the formulation of sound principles and the establishment of the present organisation of civil aviation in New Zealand, might have been led by his personal interest to exercise an undue measure of control over civil aviation activities. On the contrary, we believe that civil aviation in New Zealand has received invaluable help in its development from the Royal New Zealand Air Force, not least in the building-up of civil aviation organisations to serve both Air Force and civil requirements, wherever such joint organisation was practicable. Such extensive and valuable assistance by the Air Force, which is both desirable and necessary, could equally have been achieved, and we believe would have been achieved, even if civil aviation had been the responsibility of a department of State other than the Air Department and of a Minister other than the Minister of Defence. Nevertheless, it is important to make clear our view that the present association of civil aviation with the Department responsible for the Air Force has not been detrimental to civil aviation.

Ministry of Transport

4. We understand that recommendations have in the past been made that a Ministry of Transport should be established and that it should embrace all forms of transport—namely, rail, road, sea, and air. If and when it should be decided to establish such a Department (Ministry), it would be logical that civil aviation should become the responsibility of that department and of the Minister of Transport, but the advantages of co-ordination of different forms of transport which might be expected to ensue might conceivably be counteracted by the suppression of one form of transport in the interests of others ; this could arise if the department

were not carefully planned and maintained in balance. The advantages of co-ordination of different forms of transport can in present conditions, we believe, be equally achieved by interdepartmental co-ordination, if necessary assisted by standing committees. The co-ordination of air with surface transport would represent a comparatively minor part of the activities of the Civil Aviation Directorate or of the corresponding departments controlling surface transport, while the need for co-ordination between the Air Force and civil aviation is a constant day-to-day problem.

Status of the Civil Aviation Directorate—relationship to Air Department

5. There appears to be no other department of State in the present structure of Government with which civil aviation has a peculiar affinity, and it is our recommendation that it should remain the responsibility of the Air Department. At the same time, it appears desirable that the Civil Aviation Branch should have a more independent existence and a greater measure of autonomy than it has at present. The Civil Aviation Act, 1948 (section 11), establishes the post of Director of Civil Aviation, the holder of which "shall be an officer of the Air Department." The Act prescribes that he "shall have such special duties and functions as may be conferred on him by regulations under this Act." The Civil Aviation Branch is a branch of the Air Department. We are unable to trace that the duties and functions of the Director of Civil Aviation have been clearly laid down, even in broad general terms, and the regulations made under the Act in fact confer powers on the Minister and not on the Director of Civil Aviation. Apart from the desirability or otherwise of defining the duties and responsibilities of the Director of Civil Aviation, the deduction is that the Director of Civil Aviation has at present no separate existence and no separate responsibilities from those of the Air Department. The Air Secretary is established in a position with reference to civil aviation which is different entirely from that he occupies in relation to the Air Force. While it is difficult to avoid the conclusion that the Air Secretary is the head of the Department administering civil aviation, he is certainly not the head of the Air Force. The Air Force Act, 1937, prescribes (sections 11 and 12) that the Air Secretary, who shall be a member of the Air Board, "shall have such duties and functions in relation to the Air Force as the Board may from time to time determine, or as may be from time to time prescribed." The Board is "charged with the administration of the Air Force." By virtue of section 4 of the Air Department Act, 1937, the powers of the Air Secretary in relation to the Air Force are specifically restricted to those conferred on him pursuant to the Air Force Act, 1937. It is clear that the Air Secretary in relation to the Air Force has certain administrative responsibilities and constitutes a necessary link in the co-ordinating machinery of Government. In

respect of civil aviation it is suggested that the Air Secretary should have a similar function, leaving to the Director of Civil Aviation functions and responsibilities as clearly established as those of the Chief of the Air Staff in relation to the Air Force.

6. To develop such an organisation it may be necessary to depart somewhat from precedent in the New Zealand Government organisation. If a Secretary of Government, being the head of a department of Government, had clearly defined powers, responsibilities, and functions (and we understand that no authoritative statement has ever been made on this subject), there would be nothing anomalous or impracticable in his exercising those functions on behalf of Government in respect of a number of activities, each the responsibility of a separate office, with a large degree of autonomy and headed by a director or other officer with defined powers and duties.

7. We recommend that the Civil Aviation Branch should cease to be a branch of the Air Department. To avoid confusion in the use of the word "department," it could be called a "directorate," and it is proposed to refer to it as such in this report. In suggesting this separation and the definition of the relationship between the Air Secretary and the Air Department on the one hand and the Director of Civil Aviation and the Civil Aviation Directorate on the other hand, we have considered the organisation in the United Kingdom and other Dominions. We do not think that the organisation of the United Kingdom Government provides a parallel.

8. The Government of India organisation, with its small number of departments of Government, each with its group of satellite departments, directorates, or attached offices, provides a parallel which New Zealand might, with considerable advantage, adopt, at least so far as civil aviation is concerned. Civil aviation in India was the responsibility of the Minister of Communications and the Communications Department, whose permanent head was a Secretary to Government (the Communications Secretary). The Secretary was assisted by Deputy Secretaries, Under-Secretaries, and a secretarial staff. The officers of the department were empowered, in varying degree, to express the decisions of Government, and were charged with the responsibility of co-ordinating the activities of the department with Government policy, including financial and general administration policy and rules. The Communications Department was responsible for the activities of three attached departments or directorates, each having a separate corporate existence, each headed by a Director General, each having complete technical autonomy and a large prescribed measure of administrative and financial autonomy, and each having responsibility to Government through the Communications Department for the administration of

their departments and the execution of Government policy. Correspondence was conducted on a formal or an informal basis as necessary, to ensure that the major decisions of Government were properly authenticated. The attached departments and directorates were—

The Director General of Posts and Telegraphs (called a department because of its magnitude and importance) :

The Director General of Civil Aviation (called a directorate) :

The Director General of Observatories (mainly Meteorological), (called a directorate).

9. In recommending the adoption of a similar organisation in New Zealand in so far as civil aviation is concerned, we have in mind that, while the size and population of the two countries are not comparable, the state of development of industry and of aviation and the task of building up civil aviation after the war are closely comparable. Moreover, the problem of administration in India has always been one of using to the utmost advantage a comparatively small number of highly-trained administrators and technicians, and New Zealand has, for different reasons, a similar problem.

10. The powers, duties, and responsibilities of the Air Secretary and the Air Department in relation to civil aviation, we suggest, should comprise the following :—

- (a) To act as the co-ordinating authority between Government, including all other departments of Government, and the Civil Aviation Directorate.
- (b) To maintain under continuous review civil aviation administrative and development policy and its co-ordination with the overall policy of Government and the financial and other resources of Government.
- (c) To act as the responsible accounting authority for the Budget of the Civil Aviation Directorate ; to review Budget Estimates and Appropriation Accounts.
- (d) To exercise the responsibility of the permanent head of a department under the Public Service Regulations for measures of efficiency, economy, and discipline.
- (e) To conduct correspondence in the name of Government.

11. The functions and responsibilities of the Director of Civil Aviation should be—

- (a) To advise Government on all civil aviation matters, including its development and administration.
- (b) To formulate policies and programmes of development for consideration by Government.
- (c) To study and develop the system of regulation of civil aviation, including the preparation of draft regulations, in consultation with Air Department and the Crown Law Office.

- (d) To administer the Acts and regulations relating to civil aviation, and to exercise the powers conferred on him by the Minister for this purpose.
- (e) To be responsible to the Air Department for the preparation and administration of the Budget relating to civil aviation.
- (f) To exercise executive responsibility for the provision, operation, and maintenance of aerodromes and air route organisation, and to exercise co-ordinating responsibility for technical services rendered by other departments to civil aviation.
- (g) To exercise the responsibility to Government (through the Air Department) of the head of an attached office (a semi-autonomous department or directorate) for the efficient organisation and administration of the Civil Aviation Directorate.

12. We feel it necessary to emphasise that the Director of Civil Aviation should be the adviser of Government on civil aviation matters, and should be consulted. Civil aviation is a complex and highly technical activity, and the Director of Civil Aviation must of necessity, we think, be qualified for his task by his pre-eminence in operational experience, knowledge, and competence, acquired by the exercise of responsibility in this field. The Air Secretary, being an administrative officer of the public service, may have no such specialised qualifications. The responsibility of accepting or rejecting advice rests on Government, and the function of the Air Secretary is to review the advice tendered, from the point of view of the over-all administration of Government and Government's policy. The proper operation of this principle neither precludes direct contact between the Director of Civil Aviation and the Minister or other departments nor excludes the Air Department and the Air Secretary from their proper participation in the framing of policy.

13. The statement of the respective functions of the Air Secretary and the Director of Civil Aviation will need to be developed from time to time, and particularly maintained in conformity with the general principles applicable to all departments of Government and their relationship with any such semi-autonomous departments. We do not, however, think it necessary that all the functions of the Director of Civil Aviation should be defined in detail, except in respect of certain statutory powers and functions to which we refer later in this report (*vide* Chapter 8, paragraph 112). The smooth and efficient working of a department of Government having certain general supervisory and co-ordinating functions on behalf of Government, in relation to a specialist department or directorate responsible for the development of policy, the detailed administration, and the executive operation of the services provided by that specialist department, depends on understanding co-operation rather than a too close definition of functions and procedure.

14. We do not regard the services which are provided on a common-user basis by Air Department, such as library, registry, typing pool, and accounts section, as having more than a minor bearing on the proper relationship of the Air Department with the Civil Aviation Directorate. Economy should continue to be served by the provision of these services by the Air Department so long as efficiency and the major principles of allocation of responsibility are not thereby impaired. To the extent required to enable the Director of Civil Aviation to fulfil his responsibilities and control his organisation—for example, accounts and control of expenditure—he should have the necessary staff in his own office.

Relationship of Air Department with national operating organisations

15. The governmental organisation for the administration of civil aviation must of necessity be moulded to the policy of Government in regard to the nationalisation of air transport, in pursuance of which Government have established a single national corporation for the operation of the internal air services and certain of the external air services of the Dominion. Government also participate with other Commonwealth Governments in the ownership and operation of the air services between Australia and New Zealand and across the Pacific, for the former of which New Zealand is operationally responsible. These two operating agencies created by Government have a responsibility to Government for the development and efficient operation (technically and financially) of the air transport which the country needs. The technical control of the operations of the New Zealand National Airways Corporation and Tasman Empire Airways is dealt with later (*vide* Chapter 8, paragraph 114; Chapter 9; and Chapter 11, paragraph 162), but it should be stated here that it does not appear to the Mission desirable that the Air Secretary or any member of the Air Department or the Civil Aviation Directorate should be a member of the Board of Directors either of the Corporation or of Tasman Empire Airways, Limited. In spite of parallels in Canada and Australia, it is more customary for the Government to be represented in such organisations by a director or directors having no responsibility for the governmental administration of civil aviation, the Government directors being briefed by the department responsible. While the Director of Civil Aviation is responsible to Government for the administration of the Acts and regulations, he is responsible to Government for this activity *through* the Air Secretary, who therefore is associated with the regulation of aviation. Moreover, the Air Secretary must carry responsibility for reviewing, on behalf of Government, the projects, estimates, operations, and financial results of the company. It is difficult to reconcile these duties with those of a director of the company.

16. We have seen no evidence that this dual responsibility of the Air Secretary has in fact resulted in the one responsibility having an undue influence on the other, but it is clearly possible that by inadvertence

it may do so, and we recommend that the Air Secretary should cease to be a member of the Board of Directors of Tasman Empire Airways, Limited.

Relationship with Prime Minister's Department

17. At this point it is necessary to refer to the functions and responsibilities of the Prime Minister's Department and its relationship with the Air Department and the Director of Civil Aviation. We observe that this department has in the past taken the lead in a number of matters concerning civil aviation, particularly those having a bearing on international relationships and arrangements with other Governments of the Commonwealth, to an extent greater than is usual in other Governments with which we are familiar. The Prime Minister's Department must exercise its proper responsibility for co-ordinating, and when necessary handling, international negotiations, but it is important to realise that civil aviation policy involves practical and technical problems and is reflected in the organisation of civil aviation. Policy must be related to practical possibilities and its effect on the New Zealand organisation for the development and operation of air transport and other aviation activities. There is some evidence that the Air Department and the Director of Civil Aviation have not exercised their full responsibility in this regard. No doubt this has arisen from the weakness of the civil aviation organisation in its embryonic stage. While recognising that important policy issues must sometimes originate from the head of the Government, in civil aviation as in other matters, we wish to emphasise that the Air Department and the Director of Civil Aviation should be associated with the consideration of these policy issues at the earliest stage, and should take the responsibility for advising Government on their practical effects before the policy is determined.

Crown Law Office

18. We observe that there has not invariably been adequate consultation with the legal officers of Government in the framing of statutory regulations or directions or other pronouncements purporting to have legal effect. In view of what is said in Part II of this Report (*vide* Chapter 8, paragraph 113), we recommend that the responsibility of the Crown Law Office should be more fully exercised in framing the law governing civil aviation.

Relationship with other technical departments—Meteorology and Works

19. Before dealing with the detailed organisation of the Civil Aviation Directorate it is necessary to refer to other departments or branches of departments which perform services for civil aviation, and

which thereby constitute one of the component parts of the Government organisation for the administration of civil aviation. The relationship with these, being mainly of a technical character, presents a somewhat different problem from that of the relationship with other departments of State.

20. The meteorological services for both civil aviation and the Royal New Zealand Air Force are provided by the Meteorological branch of the Air Department, under the Director of Meteorological Services. This arrangement is usual, and calls for no major change. It is recognised universally to be essential that the Meteorological department or office should have a separate entity because of the specialised nature of its work and because of its responsibilities in relation to a large number of activities and organisations. It is common practice to associate the Meteorological office with the department responsible for civil aviation and the Air Force, under the banner of the major department of State responsible for one of these organisations, because the major demand for meteorological services in these modern days is for the service of aviation. We would only suggest that, if Government see fit to adopt our suggestion that the Directorate of Civil Aviation should be given semi-autonomous status attached to the Air Department, it may be found desirable to take similar action in regard to what is now the Meteorological branch of the Air Department.

21. The administration of civil aviation involves increasingly large civil engineering services in the construction of aerodromes and buildings. We foresee that this activity will grow in magnitude and importance with the increasingly direct responsibility of Government for the construction and maintenance of aerodromes which was assumed during the war and which will continue to grow if New Zealand aviation is to have the aerodromes it needs. In some countries where the programme of aerodrome construction and maintenance has reached a large scale, a separate works (or civil engineering) organisation has been established for the planning and execution of civil aviation works. This is the case in the United Kingdom, in Canada, and in India. In the United Kingdom the Civil Aviation Works Department is a detached wing of the Air Ministry Works Department. In India it is a detached wing of the Central Public Works Department. This arrangement ensures that the Works Department devotes its whole attention to civil aviation problems and works under the direct guidance of the Civil Aviation Administration, while it remains a part of the larger engineering organisation for technical engineering control and staff purposes. During the war and its aftermath, when the resources of all countries in materials and labour have to be apportioned, an over-riding control is necessary for this purpose, irrespective of the number of separate works organisations which may be established for different activities.

22. Having regard to the scale of New Zealand aerodrome construction activities, we do not think that there is any case for the establishment of a separate works organisation for civil aviation at this stage. We merely refer to the possibility of its being found necessary in the future. In the meantime, the present organisation whereby the execution of civil aviation works is entrusted to the Ministry of Works, while a civil engineer of the Ministry of Works is attached to the Director of Civil Aviation to assist in the planning of aerodromes (which is the responsibility of the Director of Civil Aviation) has precedents elsewhere and is considered to be the best arrangement.

CHAPTER 2—INTERNAL ORGANISATION OF THE CIVIL AVIATION DIRECTORATE

23. The organisation of the Civil Aviation Branch (Directorate) as it exists to-day could be improved by a more logical distribution of duties and the establishment of a clearer chain of responsibility within itself. The development and administration of civil aviation embrace many activities of widely varying nature, each of considerable importance in itself. Coupled with the fact that aviation is still in its development stage, that new problems constantly present themselves and new principles are continually being evolved, this precludes the adoption of a simple form of organisation such as may be suitable for an older-established, stabilised, and less complex activity. The organisation of the Directorate should be such as to reflect clearly the different forms of activity involved in aviation, and to lend itself to expansion by simple cellular division without re-arrangement of the major parts. The defects which we suggest should be removed are summarised in paragraphs 24 to 30.

24. A departmental organisation having at its head a director and one deputy director, while suitable for a small department of simple character, suffers from the defect either that the director and deputy director divide the duties between them, with consequent lack of unified control, or that the deputy director acts as a screening agent for the director, with consequent duplication and congestion at the level of the deputy director. A pyramidal structure should be aimed at.

25. The organisation chart of the Branch (Appendix C) depicts three Divisions—the Airways Division, the Air Navigation Division, and the Aeronautics Division, each embracing a number of Sections. None of these Divisions has an officer in charge. There is therefore no co-ordination of the work of the Sections, except at the deputy director level, and the Divisions have no factual existence. It is questionable whether the Air Navigation Division, the sections in which have been assigned some duties proper to the Airways Division, represents a clearly distinguishable major division of the functions of

the Directorate. The heads of the Divisions should be responsible to the Director, and each should be a deputy director. Officiating arrangements in the absence of the Director can be settled by seniority or otherwise.

26. An essential part of the structure of a civil aviation department where the State is the provider and operator of aerodromes is an Aerodromes and Air Routes Branch responsible for the planning, development, equipment, administration, operation, and maintenance of the aerodromes and air routes. It should be the cornerstone of the Airways Division. Under the existing distribution of duties within the Civil Aviation Branch, the various aspects of aerodrome and air route planning, administration, and control are divided between several widely removed officers. A considerable measure of improvement in working efficiency could be achieved if these responsibilities could be grouped together under one head. The important service of Air Traffic Control can, in a small organisation, be made the responsibility of the Aerodromes and Air Routes Branch, but it can with advantage, in a large organisation, be directed by a separate branch within the Airways Division.

27. The duties of the Controller of Operations and the Controller of Air Navigation, particularly the latter, do not constitute clearly separable and distinct responsibilities properly related to the duties of other sections. There is overlapping and an assignment of duties which properly belong to the Airways Division.

28. The organisation does not provide adequately for the important activity of training, with which is coupled licensing of personnel. The duties of a Training and Licensing Section are distributed between other sections, on a not clearly defined plan.

29. There is inadequate provision in the organisation for the co-ordinated direction of the functions of the Civil Aviation Directorate in regard to air transport and other commercial operations. Part of these functions are assigned to the Controller of Operations, but the Civil Aviation Directorate should be organised to deal with economic and financial analyses and studies, as well as with the regulation of air transport and other operations (*vide* Chapter 6).

30. The Director of Civil Aviation appears to have no means of exercising control over expenditure from the Budget. He should be responsible to Government, through the Air Department, not only for estimating, but for expenditure, and stores accounting. Whatever the accounting organisation of Government, it appears essential that expenditure should be recorded in the Civil Aviation Directorate, and the Director should be responsible for controlling expenditure in accordance with the Budget. Much of the correspondence of the Civil Aviation Directorate does not concern Air Department. There should

be separate files and a separate Registry. An apparent saving of staff often cloaks an inefficient organisation. A strengthening of the Administrative Section for these purposes appears to be necessary. In general, the provision for administration, in an organisation of such extent and varied and novel character as the Civil Aviation Directorate, appears inadequate. Unless the responsibility for administration is shouldered by the Director and he is given suitable staff to assist him, it does not appear reasonable to expect the efficient development of the organisation.

31. The functions of a Civil Aviation Directorate can be divided into three major Divisions of comparable importance, each comprising duties which are related by common characteristics and clearly separable from the duties of other Divisions. They are—

The Airways Division.

The Aircraft Division.

The Works (Civil Engineering) Division.

32. To these must be added an activity which is common to all—namely, administration, which is hardly of sufficient magnitude to rank as a Division.

33. The Works (Civil Engineering) Division has the function of constructing and maintaining aerodromes, buildings, and other works to the requirements of the Airways Division. In view of what has been said, this function should continue to be performed by the Ministry of Works. The number of Divisions required in the Civil Aviation Directorate in New Zealand is thereby reduced to two, while provision is made in the Airways Division for liaison with the Ministry of Works.

34. The work of each of the two Divisions should, we recommend, be divided between three Branches, while there should be a separate Administration Branch common to all :—

Airways Division—

Air Routes and Aerodromes Branch.

Telecommunications Branch.

Regulations and Information Branch.

Aircraft Division—

Aeronautical Engineering Branch.

Training and Licensing Branch.

Air Services and Operations Branch.

Administration Branch.

35. The Airways Division embraces all the ground services required for the operation of aircraft, and is responsible for liaison with the Director of Meteorological Services. In this Division, for convenience, is included the Regulations and Information Branch, which has general responsibilities.

36. The Aircraft Division embraces all those activities related to the operation of aircraft, including flying and engineering.

37. This major division of the functions of aviation administration—the operation and servicing of the aircraft on the one hand and the ground services for aircraft operation on the other—has been proved in practice ; the Ministry of Civil Aviation is in course of re-organisation on these lines. We have no hesitation in recommending it as the most efficient.

38. A chart showing the organisation of the Directorate on this plan is attached as Appendix D. Appendix E lists the principal functions of each branch.

39. Each Branch is responsible for an activity of considerable importance, and the function of the head of the Branch is to direct it. The title “Controller ” at present used is, we consider, not an apt one. Both because of the status which we recommend should be accorded to the head of the Civil Aviation Directorate and the responsibilities which he should carry, and because of the varied activities which are directed by separate branches under his control, we recommend that the head of the Civil Aviation Directorate should be designated Director General. Each head of the two Divisions should be designated Deputy Director General, while the head of each Branch should be designated Director. We do not think it necessary to go further in designating the appropriate division of Branches into sections. Such division will be necessary to a greater or lesser extent in each Branch, and normally the sections will be headed by Deputy Directors. The more detailed division of the Branches leaves room for some variation without affecting the main structure, and it can be done more efficiently with closer reference to existing conditions in New Zealand than is possible in the time available to us.

40. While Appendix E sets out the duties of each of the Branches, it is desirable to make reference here to some of special importance which require some explanation. These are dealt with in paragraphs 41 to 47.

41. The direction of Air Traffic Control, with which is associated Search and Rescue, is allocated to the Director of Air Routes and Aerodromes. There should then be a Deputy Director in charge of Air Traffic Control, but an acceptable alternative would be to constitute Air Traffic Control as a separate branch. In any case the necessity of an Air Routes and Aerodromes Branch to provide co-ordinated development and management of all aerodromes, Government or otherwise, is well proven. It is a function of the Civil Aviation organisation which can only be directed by officers with air experience. Only fortuitously can the Ministry of Works provide officers with the right experience. The function of the Civil Engineer is to co-ordinate air requirements with the engineering services.

42. A special branch to deal with Regulations and Information, experience shows to be necessary. Its activities touch on the work of all branches. Co-ordination of action on I.C.A.O. decisions and recommendations and their translation into legislation, regulations, notices to airmen, and other publications is a most important part of the function of civil aviation administration to-day. It requires a wide general knowledge of aviation and ability to translate practical issues into language. It necessitates close liaison with the legal advisers of Government. Intelligence, general publicity, and other international relationships are conveniently handled by the same branch. It is, of course, possible to separate Information and Publications from Regulations, but they are common in requiring the same wide knowledge and contact with all branches, and it is undesirable to create too many branches.

43. The Administration Branch should be responsible for budget, accounts, stores accounting, establishments, the promulgation and supervision of general government rules and procedures, records, office organisation, equipment, &c., both in the headquarters and the rapidly increasing outstations of the Directorate.

44. Training, both as a long-term and a short-term problem, is especially important. It embraces the work of flying clubs, training by operating companies, special schools which are likely to be necessary for the production of specialised personnel of all kinds essential to the growth of civil aviation, and correlation of training with aeronautical education in the Universities and elsewhere. With it is associated the establishment of the standards necessary for licensed and unlicensed specialist personnel and their examination. Experience shows that this can be more efficiently handled by a special branch, rather than by the dispersal of the activity over a number of different sections allocated to different officers, as at present.

45. The duties of the Controller of Air Navigation under these proposals are distributed between the Director of Training and the Director of Regulations and Information.

46. The Air Services and Operations Branch embraces the duties now allocated to the Controller of Operations, so far as they may be retained, as well as the duties of the Economic Research and Intelligence Section. It has been emphasised above that the Civil Aviation Directorate should be organised to deal not only with technical problems in the operation of air transport but economic analyses and studies (*vide* paragraph 29). This Branch should also be responsible for the development of other commercial activities—*e.g.*, air survey, crop dusting, forest protection, &c.

47. There is a tendency in the post-war organisation of civil aviation administrations to create special branches to deal with Planning and Air Safety. In our view, neither is justified. A Planning Branch can only accomplish its task by covering the activities of all the other branches, without their special knowledge of the problems involved. It introduces overlapping and division of responsibilities. Planning is the responsibility of each Branch, and its co-ordination and direction the responsibility of the Deputy Directors General and the Director General. *Ad hoc* committees can sometimes assist. Within each Branch there may be a necessity to detail an officer to deal with planning problems at certain times. It may be noted that the Planning Department in the United Kingdom Ministry of Civil Aviation has recently been abolished. Air safety, as a distinct activity, appears to us to rest on a misconception. The whole of the activities of a civil aviation administration are concerned with air safety. What is needed is a systematic co-ordination of the activities of all branches, and this is necessary for nearly every phase of the work.

Boards and committees

48. From time to time proposals are pressed for the formation of boards and committees with executive or advisory powers to aid in the development and administration of civil aviation. In general we think that a multiplicity of standing boards and committees tends to clog the machinery of administration. They create a great deal of work, which in itself necessitates additional staff, and they are rarely composed of the people who have executive responsibility. We offer below comments on some of these. In general, we think that the establishment of *ad hoc* committees for the consideration of specific problems where it is necessary to co-ordinate the requirements and views of the responsible authorities, official and otherwise, is more conducive to quick and satisfactory results.

49. *Civil Aviation Board*.—A civil aviation board is usually advocated for the purpose of formulating policy and in some cases of making policy decisions. So far as such board is composed of persons having no responsibility for the administration or operation of civil aviation, we do not think it serves any useful purpose. Commerce, industry, and local authorities have other ways in which they can put forward their views. A board composed of representatives of the departments concerned with different aspects of aviation problems and of the operators does not relieve the departments and others of the work involved in formulating policy on development and administration, and the essential

co-ordination can be achieved by the normal process of departmental consultation and *ad hoc* meetings to consider specific subjects. We do not recommend the establishment of a civil aviation board.

50. *Air Safety Board*.—Following a practice which has been developed in the Air Forces, the establishment of an air safety board for civil aviation has been advocated. We believe that this is based on a misconception of the true nature of the problem, and the establishment of such a board is liable to lead to confusion of responsibility. The whole of the administration of civil aviation is concerned with air safety and the bulk of the time and work of each branch of any civil aviation department is devoted to this end. A proper organisation of the departmental structure and a clearly established chain of responsibility for co-ordination at different levels is more effective than any air safety board, which at the best can only concentrate on a small selection of the problems. The institution of measures to eliminate defects which have been revealed by accident investigation which is sometimes undertaken by such boards is the responsibility of the branches concerned, and can equally be achieved by proper co-ordination of their work.

51. *Air Registration Board*.—The establishment of an air registration board in New Zealand has been advocated as a panacea for certain ills in the administration which have been pointed out. The recommendation has been based on the parallel of the Air Registration Board in the United Kingdom. In the first place, it is necessary to note that the United Kingdom Air Registration Board is concerned in only a limited part of the field of regulation of civil aviation. It is concerned only with recommendations to the Minister for the grant of certificates of airworthiness to prototype and subsequent aircraft manufactured in the United Kingdom, validation of the certificates of airworthiness of imported aircraft, supervision of the airworthiness of United Kingdom aircraft in operation, renewal of certificates of airworthiness, and the examination and supervision of engineering personnel who are required to be licensed. A very large part of the field of regulation is still the direct responsibility of the Ministry of Civil Aviation. The Air Registration Board is composed of representatives of aircraft manufacturers, aircraft operators, and aircraft insurers. The aircraft manufacturing industry does not exist in New Zealand, while there are virtually only two substantial operators of aircraft, both State organisations. The supervision of airworthiness of aircraft and of engineering personnel can with greater ease be carried out by the staff of the Civil Aviation Directorate in New Zealand. We do not think there is a case for the establishment of an air registration board.

52. *Advisory Committee on Air Regulations.*—In Part II of this Report (*vide* chapter 8, paragraphs 115 to 119), we point to the need for more deliberate consideration of the regulations to be applied to civil aviation and recommend the establishment of an advisory committee for this purpose, composed of representatives of the Director General of Civil Aviation, the operators (including the flying clubs), the pilots, and others professionally or technically concerned.

International representation

53. We believe that there is substantial benefit to be achieved by the closest possible link up with the International Civil Aviation Organisation (I.C.A.O.) and with certain Commonwealth countries, particularly the United Kingdom and Australia. Reference is invited to Part III of this Report in this connection. There would be advantage to New Zealand if a civil aviation officer of suitable standing and ability to deal with a variety of technical subjects were posted to Canada to take part in the deliberations of the Air Navigation Committee of I.C.A.O., to represent the New Zealand view, and to keep the Director General of Civil Aviation informed with regard to all developments and progress. While this would be his main activity, he could also attend meetings of the Air Transport Committee of I.C.A.O. and perform some of the functions of a Civil Air Attaché or liaison officer in securing technical and other information from the United States and Canada. We regard it as important, however, that he should have a specific task, and not the somewhat loose functions of a Civil Air Attaché at large.

54. We also consider that a similar officer posted to London with the specific responsibility of collaborating in the formulation of regulations to give effect to I.C.A.O. decisions, and in the revision of regulations generally to keep them in line with the rapidly changing technique of aviation, would be of mutual benefit to New Zealand and to the United Kingdom. The scientific and technical establishments which are required to perform this task, and which exist in the United Kingdom, are beyond the capacity of most countries of the world to provide. It appears to us that the only way in which these tasks can be adequately dealt with in the smaller countries is by collaboration with those countries who have the means at their disposal. We are confident that the United Kingdom Government would gladly co-operate with New Zealand in this respect.

55. We emphasise that the value to be attained from such arrangements as we have here proposed depends entirely on the officers being given specific tasks and responsibilities, and not a roving commission. We realise that it may be difficult to find or spare the personnel, but we commend the proposal to Government for consideration when it is practicable.

CHAPTER 3.—STAFF OF THE CIVIL AVIATION DIRECTORATE

Director General of Civil Aviation

56. What has been said with regard to the status and the duties and responsibilities of the Director of Civil Aviation indicates the high level of technical experience and competence, as well as administrative ability and judgment, which is required in this post. It is essential, in our view, that Government should be free in making appointments to this post to select the best possible candidate without regard to questions of seniority. It is desirable that in the course of time a cadre of civil aviation technicians and administrators should be built up, in order to provide prospective careers for new entrants and to make the best use of special experience and technique, some of which can only be obtained in the administration of civil aviation. It is not reasonable to expect that such a cadre of civil aviation administrators and technicians can be established virtually within a period of a year or two from the creation of the Civil Aviation Branch. We do not consider that the application of seniority rules as an important consideration in the selection for the post of Director General of Civil Aviation can ever ensure an appropriate appointment. Still less can it do so in the formative stage. We recommend that the post of Director General of Civil Aviation should be excluded from the provisions of the Public Service Act. We do not thereby imply any reflection on the ability of the Public Service Commission, which would be presumptuous and is not the point at issue. We believe that the Public Service Commission can give valuable assistance in making a selection for this post, but the application of all the Public Service Regulations, including particularly the procedure for appeals, in an appointment of this kind is inimical to the best interests of civil aviation and of the country.

57. We have considered the standard of remuneration at present established for the post of Director of Civil Aviation, in relation to the scale of remuneration for comparable posts in other Dominions and in relation to the standards of remuneration prevailing in New Zealand. While scales of remuneration for the lower grades of staff and employment in New Zealand are high, we find ourselves in some difficulty in view of the prevailing small range in scales of remuneration between the lowest and the highest paid workers, notwithstanding the long and expensive education, specialised training, accumulation of experience and special ability which are required in the higher ranks of administration, professions, and management. In spite of the statements which have been made that the salaries offered to technicians in the civil aviation administration (and incidentally in the operating organisations) are inadequate to attract suitably qualified men, it is difficult to advise the establishment of a scale of remuneration for the Director General of Civil Aviation, and in consequence other principal officers of the administration, greatly in

excess of that paid to heads of departments and of other organisations in Government service. Nevertheless, we draw attention to the salaries paid to the Director General of Civil Aviation (or equivalent post) in one or two other administrations. The salary of the Director General of Civil Aviation in India in the post-war period was £3,150 per annum. A similar salary was paid to the Indian successor of the then Director General. The new Dominion of Pakistan appointed a Director General of Civil Aviation on a comparable scale of salary. We understand that the Australian Government recently revised the salary of the Director General of Civil Aviation and established a scale of £2,250-£2,750 per annum. At the same time, the salary attached to the equivalent post in Canada is of the order of £2,000 per annum, while in the United States no civil servant is paid more than 10,000 dollars (£2,500) a year. We should find it easier to reconcile the present scales of remuneration with these comparisons if the cost of living in New Zealand was comparably lower, but with such opportunities as we have had to observe, we do not find it so.

58. Taking all these conflicting factors into consideration, and having regard to the status of the post of Director General of Civil Aviation which we recommend, and the imperative necessity of obtaining the best service in a post dealing with an activity of such dynamic and changing character as civil aviation, we believe that it would be justifiable to establish for this post a salary in the £1,500 to £2,000 bracket. The precise fixation of the salary is a matter which needs careful consideration in relation to economic, social, and other conditions bearing on this post and other comparable posts in the Government administration, which we do not feel that we are competent to undertake.

Deputy Directors General and Directors

59. What has been said with regard to the post of Director General applies in lesser degree to all the senior posts in the organisation which we have recommended. Excepting the post of Director of Administration, the experience for which can as well be obtained within the public service and the civil aviation administration as elsewhere, we consider that all these posts should, for reasons similar to those we have set out above, be excluded from the scope of the Public Service Regulations concerning appeals. This would be in line with the recommendation of the Public Service Commission in their thirty-sixth Report dated 9th August, 1948.

60. We consider also that, with the raising of the scale of remuneration of the Director General of Civil Aviation, the scales for these posts should be proportionately raised. This will leave room for the offer of higher salaries in some of the lower posts where the peculiar specialised experience and qualifications required can only be attained by initial education, special training, and a long period of practical work. In

line with the recommendations of the Commission of Inquiry into the Sandringham flying-boat (ZK-AME) incident, we believe that the successful development, operation, and administration of civil aviation make it necessary to recruit the best men available in the key posts, and that existing salary scales make this difficult.

Recruitment and conditions of service of technical personnel

61. The problem of staffing a technical or scientific department or a technical service entails certain peculiar problems, which it is now widely recognised, must be met by special measures.

62. The Civil Aviation Directorate cannot be expected to work efficiently unless a substantial proportion of the technical staff, juniors and seniors alike, have a wider and more up-to-date experience of aeronautics than can be obtained within a Government office in New Zealand. Even if some of the staff are recruited with such wider experience, the usefulness of such experience will decrease year by year with the progress of aviation. There must be a continual renewal of the corpus of experience within the Civil Aviation Directorate if they are to match up to their responsibilities.

63. This could best be achieved by enabling and encouraging interchange of staff between the Civil Aviation Directorate, the New Zealand airlines, and the several bodies concerned with aeronautics within the British Commonwealth, such as, for example, the United Kingdom Ministries of Civil Aviation and Supply and the Air Registration Board.

64. This principle is already recognised in other branches of the New Zealand public service. There is provision for interchange of staff between the R.N.Z.A.F. and the R.A.F. ; the newly constituted Defence Science Corps provides for its officers gaining experience wherever, within the British Commonwealth, the particular experience needed can best be obtained ; and it is understood that arrangements have recently been made for certain officers of the Department of Scientific and Industrial Research in the United Kingdom to be seconded to the Department of Scientific and Industrial Research in New Zealand, and *vice versa*. The principle is recognised within the Scientific Civil Service of the United Kingdom, the terms of service of which are specially devised to encourage a free interchange of personnel with Universities. The Air Registration Board has similar terms of service, and for similar reasons. In the re-organisation of the Ministry of Civil Aviation which is now being effected, consequent on a recent investigation, the principle of interchange of technical officers between the Ministry, the Corporations operating air transport, aircraft manufacturing firms and others, has been accepted.

65. One of the difficulties in implementing this principle is the treatment of superannuation rights. The staff of the Civil Aviation Directorate are members of the New Zealand Civil Service. As such they pay contributions towards a pension, but on leaving the Service prior to their qualification for a pension, they retain only their own contributions. While it would effect no immediate change, it is recommended that the Government should investigate the possibility of establishing for technical and scientific officers, in conjunction with Universities, the Corporation and other employers, a superannuation scheme on the lines of the Federated Superannuation Scheme for Universities (F.S.S.U.) of the United Kingdom. This scheme has been adopted in respect of the scientific staff of the British Civil Service (*vide* Command Paper 6679, "The Scientific Civil Service," published by H.M.S.O.). Under the F.S.S.U. an officer takes out an endowment policy with a commercial insurance company. The premiums on the policy are paid partly by the officer and partly by his employer. On change of employment, the policy remains the property of the employee, and the new employer, if within the scheme, accepts responsibility for the employer's share of the contributions.

66. Apart from facilitating change of employment in order to broaden the experience at the disposal, not only of the Civil Aviation Directorate, but of the Corporations, it is considered desirable that there should be arrangements for the secondment of officers to and from the Civil Aviation Directorate, both with the operating Corporations in New Zealand, and as between New Zealand and other countries in the Commonwealth. Such secondment should be of sufficiently long term to enable the officer concerned to obtain real experience and to give real service. There is a danger in short-term secondment of neither of these objects being achieved.

67. It goes without saying that while there are benefits to be derived from flexibility in the use of technical and scientific personnel by such interchanges as we have suggested, there are graver dangers if the principle is carried too far, and stability and continuity are thereby lost.

68. While there should be salaries and conditions of employment which will be attractive to the right men, it is also important to avoid placing artificial obstacles in the way of the selection of the right men. We have been informed by a number of authorities that there is less difficulty in retaining the services of scientific and technical personnel against the competition from other employers in New Zealand than against the competition of more attractive and remunerative employment outside New Zealand. We are informed that New Zealand University graduates who go abroad to complete their technical or scientific education, and who take up employment in the United Kingdom or elsewhere, frequently decide not to return to New Zealand, and it is

common knowledge that there are numbers of New Zealand engineers and scientists employed in the United Kingdom and elsewhere in the Dominions. This is to the advantage of the United Kingdom and the other Dominions, but it is necessary to ensure that New Zealand can secure and retain the services of the technical personnel which she needs, and that New Zealand technical personnel whose early career has been abroad are not discouraged from giving New Zealand the benefit of the experience thereby gained by the terms of appointment and the salaries of vacancies in New Zealand. We have noted in this connection the recommendation of the Public Service Commission in their thirty-sixth annual report, that legislation should be amended to diminish the present weighting of the scales in favour of officers already employed in the Public Service, and consider that the Civil Aviation Directorate would benefit by this reform.

Civil engineering staff

69. Although not directly the responsibility of the Civil Aviation Directorate, the development of civil aviation depends on there being an adequate staff of civil and electrical engineers available in the Ministry of Works to carry out the programme of surveys, construction, and maintenance which is involved. We understand that the allocation of the available staff of the Ministry of Works for aviation works compares unfavourably with the allocation for other classes of work such as hydro-electric and housing, even after allowing for the priority which is accorded to these works. Moreover, we understand that there is an over-all shortage of qualified engineers in the Ministry of Works, and indeed we are told that the proportion of qualified engineers to the population in New Zealand is low in comparison with other countries. It appears that there is a training problem, which no doubt is receiving attention in the proper quarter. We must, however, call attention to the fact that the progress of civil aviation is conditioned by the provision of aerodromes and other air route organisation involving such works. There is evidence that in many respects operations have progressed as far as the available ground services justify, and the consequence of a retarded construction programme will be increasingly felt in the operation of the air services.

PART II

MEASURES FOR THE EFFICIENT, SAFE, AND ECONOMIC OPERATION OF AIRCRAFT

“(B) *The technical and administrative measures necessary to provide for the efficient, safe, and economic operation of civil aircraft and air services, including, inter alia, the principles and procedure governing the issue of air service certificates.*”

We interpret our terms of reference so far as administrative measures are concerned to be mainly concerned with the administration of the Air Navigation Act and other Acts and Regulations—that is, broadly, the governmental regulation of civil aviation.

So far as technical measures are concerned, we interpret this as referring mainly to technical measures for the regulation of aviation, and in any case not to go beyond certain major technical problems. It is, we believe, entirely understood that an investigation in detail of all the technical problems involved in the regulation of aviation and the operation of air transport and other services by aircraft in New Zealand would not be possible, and we have no reason to believe that any such inquiry or advice is necessary. In selecting the factors with which we should deal, we have therefore, as we think we were intended to do, exercised our own judgment of their relevance and importance.

CHAPTER 4—PLANNING OF AIR SERVICES AND AIR ROUTES

70. It appears that there is as yet no completely co-ordinated plan of development of civil aviation in New Zealand, and in consequence the efforts of individual officers, branches, and other organisations are only partially co-ordinated and sometimes mutually conflicting. There appears to be some evidence of insufficient co-ordination of the plans for inaugurating air services and the corresponding plans for equipping air routes. We note that efforts have been made at planning programmes affecting some parts of the organisation for civil aviation, but these do not appear sufficiently linked up. The very changed circumstances with which civil aviation administrators and operators were faced after the war, in every country in the world, involved far more development work of every kind than could possibly be accomplished, except spread over a long period of phased development. In consequence, the need for a co-ordinated plan relating all phases of development was imperative. From the orgy of post-war planning which broke out about 1944, few countries have succeeded in producing such a master plan, but, to the extent that it has been achieved, it has had the

effect of stabilising detailed planning and implementation and avoiding wasted effort due to concentration on non-essentials and mutually conflicting activities.

71. In spite of planning which has been undertaken by departments and committees, we see evidence of some of these faults in New Zealand, and, while fully conscious that nowhere have they been avoided, we think it right to point out some of the principles which govern successful planning and make suggestions with regard to the methods by which it can be carried out. Since the bulk of civil aviation development, and certainly the vital heart of it, is and must continue to be organised air transport, planning must start with the need of the country for air transport—that is, with the air services, internal and international, to be operated. In effect, everything else follows from this in the sequence :—

- (a) Air services—internal and international.
- (b) Aerodrome and air route construction and equipment.
- (c) Aeronautical radio communications and navigation aids.
- (d) Meteorological services.
- (e) Air traffic control services.

There is little priority as between (c), (d), and (e), but the order of (a), (b), and the remainder is fundamental.

72. In Part I of this Report (paragraph 48) we have made certain comments on the usefulness of standing committees, whether for planning or for co-ordination of the administration or operation of civil aviation. Government have appointed an Aerodromes Committee, whose function is “to report on the number and location of aerodromes necessary for civil aviation and the work required to bring existing aerodromes up to a satisfactory standard for internal air services.” The committee is composed of a number of high-ranking officers of Government (both civil and service) and of the National Airways Corporation. We have been privileged to meet the committee and to study the minutes of the meetings of the committee. We observe that the committee is called on at its meetings to deal with a considerable volume of current problems arising at aerodromes, which in our view are the business of the departments concerned. We were informed that, while the committee required to know National Airways’ programme for the development of air services, as a basis for the committee’s work, it had not yet been fully informed on this. The impression we got is that the committee has been given a task which is in the second phase of planning, while the first phase, which is undoubtedly the responsibility of Government, has not been undertaken by Government and is not sufficiently worked out to enable the committee to make progress. Secondly, we feel that the time of a number of important officers is being wasted in discussion of matters of detail, which should be disposed of in the ordinary course

of the work of the department responsible. Moreover, even so far as the real planning work of the committee is concerned, a number of the members are brought into the discussions at a stage at which they cannot contribute effectively.

73. We note that within the Civil Aviation Branch a Radio Navigational Aids Committee has been set up, consisting of officers of the Civil Aviation Branch, but that a representative of the National Airways Corporation is invited to attend. The purpose of this committee is to make recommendations for the development of radio navigational aids, but it has been charged with examining the anticipated extension of air services and aerodromes, and its functions have been extended to cover air traffic control. There is undoubtedly a need for a radio communications and navigational aids committee, on which the operators as well as the Telecommunications Branch should be represented; but this is an example of planning in reverse. The Telecommunications Branch of the Civil Aviation Directorate and the committee concerned should work within the limits of a plan of air service development and aerodrome construction, handed down from the head of the Department or any committees of wider scope concerned.

74. In Part I of this Report (paragraph 47) we have stated our view that planning is not a task for special detached officers or committees. Planning involves a very great deal of detailed investigation, which can only be done by the staff of the departments and the operating agencies concerned. Proper planning flows from a right structure in the organisation of a department and co-ordination by the officers concerned at different levels. It requires a proper appreciation of the different phases of planning and of the authorities who are concerned or who can contribute at each stage. Thirdly, it requires review at different levels at different stages of the planning to ensure that all factors bearing on the plan and all interests affected have been considered. The place of committees, which we suggest should be *ad hoc* and not standing committees, is to review the proposals emerging from the detailed work performed in the departments and operating agencies. The committees themselves cannot greatly assist until that work has been done. Hence we make the following suggestions to ensure orderly and therefore efficient planning.

Air service planning

75. The planning of the air services of a country must be based on economic studies of the movements of traffic and the potential demand for transport in relation to the convenience, speed, and economy of surface and air transport. While the Corporation and Tasman Empire Airways have been established for the purpose of providing the internal and external air transport of New Zealand, the approval of the

plan to which they work is the responsibility of Government. It would be so even if nationalisation were not the policy. Government need to review these matters in consultation with the operators, and it is within the proper functions of the Civil Aviation Directorate to carry out this review for Government. In the organisation of the Directorate we have proposed the establishment of an Air Services and Operations Branch for this purpose.

76. In this initial stage of developing a plan for the establishment of air services it is not necessary to associate all the branches and departments who will be concerned in its further development and implementation. The plan should be prepared by the Director of Civil Aviation in consultation with the operators, for submission to Government, and it should be moulded in subsequent stages to the other practical factors which will govern its implementation.

Aerodrome construction programme

77. The operating organisations, having concurrently with the first stage planned their aircraft provisioning and servicing organisation, the aerodrome construction and development programme can then be attacked on the sure basis of an air transport plan which has taken into account the priority of air transport needs. The preparation of the aerodrome plan involves primarily the Civil Aviation Directorate and the Ministry of Works. Co-ordination with the plans of the Air Force and with the needs of the Corporation can be best achieved by *ad hoc* consultation. The work involves primarily planning and siting from the operational point of view and then more detailed planning in its operational and engineering aspects. A great amount of detailed work in the two departments primarily concerned is involved before the plan and preliminary estimates of cost can be formulated, ready for consideration by Government, through the medium of a committee or otherwise.

Radio and meteorological services and air traffic control

78. On the basis of the air service and the aerodrome plans as they take shape, the plans for the provision, including construction, of the radio and meteorological and air traffic control services should be worked out by the branches concerned, in consultation as necessary with the operators.

Principles governing planning

79. It is the responsibility of the Director of Civil Aviation to phase this planning work in order that each part of it will be based on the over-all plan and will be put in hand at the appropriate stage of

development of the over-all plan. It is, moreover, the responsibility of the Director of Civil Aviation to present to Government at appropriate stages the plans as they emerge and as they are modified by the problems of implementation of each separate part, together with estimates of the cost involved in each phase of the development proposed. On such basis Government can consider the over-all effects on policy and resources and the extent to which the plans can be implemented. In this, *ad hoc* committees representing all the departments and interests concerned can perform a useful and maybe necessary advisory function. Unless the responsibility for production of plans and co-ordinating them at every stage is firmly placed on the officer responsible for the development of civil aviation, the time of such committees must be largely wasted.

80. In the application of these principles at this late stage in the actual development of aviation in New Zealand, it might appear that we counsel holding up further development while a plan is prepared. This, of course, would not be acceptable, nor is it necessary. Much of the required development is already clear and much has taken place. This must be worked into the master plan. The major requirements which are already defined provide a programme of work sufficient to occupy the departments and operating agencies while the planning continues, and they will absorb more than all the resources at present available.

CHAPTER 5—ORGANISATION OF AIR SERVICES

81. In offering the following comments on the needs of New Zealand for air transport services, we wish to emphasise that we have not attempted, nor would it have been possible for us to attempt, to consider and draw up a programme of what these services should be. The remarks which we have made with regard to the sequence of planning and the factors involved are sufficient to show that this could not have been done. We have, however, heard a great many views bearing on this, and we offer the following comments on certain major factors in the problem.

International air services

82. We have come to the conclusion that there are three centres in New Zealand which should be served by international air services, in which is included the trans-Tasman air service. These are Auckland, Wellington, and Christchurch. In this we merely confirm what we believe to be the view of Government and of all the authorities directly concerned. We emphasise in particular that we do not consider that the needs of New Zealand for international air services would be met by

operating such services to centrally situated localities in either the North Island or the South Island or both. The claims of sundry local authorities and local interests for such a solution, based on such factors as central geographical position or the ease of making an aerodrome of international standards, do not and cannot carry weight in a problem which is wholly a national one.

83. Certain physical factors have over-riding importance at each of the three major centres. Auckland must, by reason of its geographical position, always remain the terminal of the trans-Pacific air services, and this is reinforced by its importance as the largest industrial and commercial centre and the largest population centre in the Dominion. Since all the trans-Pacific services are at present operated by landplane, and since the present tendency of transport aircraft development is all in the direction of landplanes, it follows that Auckland must be provided with a first-class international aerodrome for landplanes. In Part IV of this Report (Chapter 19, paragraphs 259 to 264) we examine the solution of this problem. For reasons given below, Auckland must at present also be equipped for the reception of international seaplane services.

84. Wellington, as the capital city, a large industrial and commercial centre, and the largest traffic generating centre in the Dominion, should be served direct by international air services. Unfortunately, the topography of the country surrounding Wellington makes it impossible at present to provide an aerodrome of international standard for landplanes. The Wellington harbour appears, subject to investigation and trial, to be suitable for the operation of modern flying-boats. In Part IV of this Report (Chapter 19, paragraph 279) we examine this problem in more detail. It follows that international air services direct to Wellington can only be operated with flying-boats, and in view of what has been said in the preceding paragraph, these will be limited to trans-Tasman services.

85. Christchurch, as the major centre of population, industry, and commerce in the South Island, as well as by its geographical location, is a centre which should be served by international air services, though it would appear necessary to consider this only in relation to services to and from Australia and beyond. Christchurch cannot at present be served by flying-boats, and the cost of constructing a flying-boat base would, we think, not be justified by the present prospects of flying-boat development and operation. On the other hand, the Christchurch terrain is eminently suitable for the construction of a land aerodrome of international standard. We deal with this in more detail in Part IV (Chapter 19, paragraphs 269 to 276).

86. Since, of the three centres in New Zealand which should be served by international air services across the Tasman Sea, one is suitable only for flying-boats and one suitable only for landplanes, it appears

to us necessary that Government should consider the establishment of both landplane and seaplane services across the Tasman. We have been provided by Tasman Empire Airways with analyses of the problem of operation of this service with flying-boats and with available types of landplanes. While we have not attempted anything in the nature of an independent investigation, we are satisfied that the Solent flying-boats which have been ordered for the replacement of the Sandringhams will provide an eminently satisfactory service, and we think that the company have made a good case for its selection as the best solution available at present.

87. We note that Tasman Empire Airways plans for the operation of flying-boats are based on day flying only, and in the comparisons of landplanes and seaplanes which have frequently been made, the limitation of flying-boats to day flying has been emphasised as an adverse factor for the flying-boat. We are unable to appreciate the reason for this distinction. It has been said that pressurised aircraft are required for operation on the Tasman route in order to avoid the storms which are encountered, and which by day are negotiated by flying below the cloud. We observe, however, that during the past year the unpressurised DC 4 aircraft operated by Australian National Airways have operated on a regular night flying schedule. Since a new contract has recently been made with Australian National Airways for the continued operation of these aircraft on a regular night flying schedule, we assume that the difficulties referred to have not proved serious. We wish to point out that this limitation to day flying by flying-boats, which is inconsistent with the practice adopted in the operation of DC 4's across the Tasman and has not been found necessary in many years of operation elsewhere, imposes a serious adverse factor on the service, both in its utility to the travelling public and its economy.

88. In order to serve Christchurch, the company would have to acquire a certain number of landplanes either by purchase or charter. A complete changeover to landplanes at this stage would dislocate the company's organisation, which is based on Mechanics Bay, to an extent which might result in transferring the responsibility for engineering and even operation from New Zealand to Australia. The company would thereby cease to be what it is at present—namely, the medium for development of New Zealand-controlled international air transport. For the operation of landplanes to Christchurch, we recommend that arrangements should be made between Tasman Empire Airways, Limited, and the National Airways Corporation for the maintenance and overhaul of Tasman Empire Airways' landplanes in the Corporation base at Harewood. This base is well organised and capable of development to undertake this additional work. The Tasman Empire Airways landplanes could also operate alternatively to Auckland, using Whenuapai.

89. To ensure right decisions on a number of problems which now confront Tasman Empire Airways, Limited, it is necessary to look to the future. The Solents which have been ordered would normally have a life of seven years, but advances in the design of transport aircraft may force their replacement in a shorter period.

90. It is our opinion that there is grave doubt whether the Solents will be replaced by seaplanes. We base this opinion on several considerations, but one has, we think, an over-riding importance. Seaplanes are now very much in the minority in world aviation, and few new type seaplanes are now being designed and built. Experience shows that aeronautical progress in any field is roughly proportioned to the effort expended in that field. Inevitably, therefore, the rate of aeronautical progress must be much slower for seaplanes than landplanes. When, in a few years' time, the selection of the Solent replacement becomes necessary, there will be several new type landplanes in the running for every new type seaplane. In fact, according to present indications, there is doubt whether there will be a single new type seaplane available then of a size suitable for the Tasman crossing, the Saunders-Roe boat (SR 45.) being too large to share the traffic with the Christchurch landplane service, which, in our view, is necessary and inevitable. In these circumstances, it is unrealistic to plan on the off chance that a seaplane will compete successfully with its many landplane rivals when the selection of the Solent replacement becomes due.

91. We do not think it is any answer to say that a new type seaplane could be designed, built, proved, and produced in the numbers needed, by the time the Solent is due for replacement. Even were there time for this—and it would take more than five years—the large development costs would not be justified for the Tasman service alone. Only if the new seaplane type also fulfilled other needs—perhaps those of military aviation—would it be reasonable to incur those development costs. Even if there were such other needs, the necessity to design the aircraft as a compromise between the needs of the Tasman service and those of the other operator would further reduce the already small chance of its proving a successful competitor to landplanes.

92. In view of what has been said about an international aerodrome at Wellington, this does not necessarily determine the issue. The need to serve Wellington may justify the retention of seaplanes in the system of trans-Tasman operations for a longer period than would otherwise be warranted.

93. The proposed development of the Mechanics Bay seaplane base for the operation of Solents, which includes a hangar, engine repair shop, stores, hard standing and slipway, at a cost of something over £300,000 should be carefully considered in the light of the prospective

period of use. It may be that the whole of the new buildings will be fully useable for other purposes, should they no longer be required for the seaplane base, and their position in the port of Auckland suggests that this may well be so. Possible alternatives such as the continued use of Hobsonville for both airframe and engine overhaul, or the location of the engine repair shop in another locality where it may continue to be used as the engine repair base for landplanes, should be carefully considered. The decision is admittedly a difficult one in view of the probability that Whenuapai will not continue to be the international aerodrome for landplanes. We think it important that the advisability of establishing an engine repair shop in the middle of the city, as at Mechanics Bay, should be very carefully reviewed, having regard to the noise nuisance arising from the testing of engines. This nuisance factor should not be minimised.

Internal air services

94. We have been supplied by the Corporation with a great deal of well-prepared data and memoranda on the organisation and operation of their services. We have already remarked that the development which has taken place in air transport since the war has been vigorous and extensive. Detailed comment could only be based on a long study such as we have referred to above. We draw attention, however, to one or two points which it seems to us should be borne in mind in the planning of future development.

95. We suggest that the location of the Corporation's operational and base headquarters should be reviewed in the light of the changed situation which the development of Rongotai and a new international aerodrome at Auckland will produce. The base should preferably be at the hub of the air services and in the vicinity of a large centre of population. Wellington is the natural geographical hub of the internal air services of New Zealand. Palmerston North is an artificial hub, and its selection as the Corporation's permanent base will involve capital and recurring expenditure which might otherwise be avoided. If Rongotai were selected as the permanent base, this would reinforce the need for its speedy construction to the full plan.

96. Within the limits of the Government's policy of nationalisation of air transport, it seems permissible to discuss the practical effects of the application of this policy to minor air transport operations. There can be no doubt that the operation of the major air transport services of New Zealand does not provide a field for more than one air transport operator, and where there is a monopoly there is no doubt that it should be a State monopoly. The air services required to serve New Zealand, from the extreme north to the extreme south, must be co-ordinated and operated under a single control.

97. At the same time, there are advantages to be gained by the admission of independent local enterprise in such operations as "joyriding" and charter or taxi flying. The proper service of the public in these activities requires that aircraft shall be available locally at short notice, and the proper development of such services requires the attention of local management. The national operator, whose attention must be concentrated on the major air transport problems of the country, cannot give the same attention to such local operations, of an entirely different character, as an independent operator; nor would the non-scheduled operations of such independent carriers affect to any material extent the operations of the national carrier. Subject to precautions against the growth of such non-scheduled operations to an extent assuming the character of a scheduled service competing directly with the national operator, the effect of such independent operations is likely to be beneficial to the national operator in feeding traffic on to the scheduled services.

98. The provision of scope for such independent local operations has been in the past beneficial to aviation. Independent operators, as well as flying clubs, have in most countries played a substantial part in the development of civil aviation in that country, and, indeed, a significant part in the development of aircraft and aviation in its wider sense. To nationalise all air transport operations of a country, including charter or taxi flying and joyriding, involves a sterilisation of that enterprise which in the past has contributed substantially to aeronautical progress.

99. It would be incorrect to say that the whole of this activity can be looked after by flying clubs. While flying clubs can with advantage give service of this kind, it is well known that they are limited in development by the nature of their organisation and their different objectives. The flying clubs' limited power of raising capital, the form of their management (by committee), and their pre-occupation with the provision of training and private flying facilities limit the extent to which they can meet the public need for such services. We recommend, therefore, that Government give consideration to the desirability of permitting a limited degree of free development in air transport of this kind.

100. There is in some regions scope for the use of seaplanes or small amphibians, which would avoid having to construct land aerodromes, and which would serve places at which no landing ground could be constructed. We cite Central Otago as one area where air transport could be built up on this basis. There should be a National Airways scheduled air service to a central aerodrome in this region, such as Alexandra. Minor air services which are required to connect the scheduled service at Alexandra with such centres as Cromwell, Wanaka,

and Queenstown, as well as with other scattered localities around the Lakes, could be built up on a taxi or charter basis in this way. As and when greater regularity and frequency of service are required, it would be possible for the National Airways Corporation to arrange such operations by contract with the local operator. The case we have cited is illustrative only.

CHAPTER 6.—STUDY OF AIR TRANSPORT OPERATING RESULTS

101. Complementary to the planning of air services, there is a need for the systematic analysis of the economic results. The Corporation and Tasman Empire Airways, Limited, are responsible for developing air transport to meet the country's needs in their particular spheres. They report their financial and operational results to Government. In order that progress may be assessed and efficiency measured by comparison with air transport operations elsewhere, there is a need for detailed analysis of the financial and operational results and their reduction to terms which provide a simple measure of the success of the operation. This, rather than detailed supervision of the operations, which is the function of management, is in the province of the Civil Aviation Directorate. The proposed Air Services and Operations Branch should have suitable staff and should be required to prepare for Government such analyses of the air transport operations of the national operators. The systems and principles developed by the Civil Aeronautics Board of the United States of America provide an excellent guide.

CHAPTER 7.—AIR ROUTE ORGANISATION

102. We have given but superficial attention to the organisation of the air routes, but we have discussed the problems involved with those concerned and received a considerable amount of information on the subject. We wish to emphasise what we have said in connection with planning—the vital importance of keeping the ancillary organisation of the air routes abreast of and in line with the development of air services and aerodromes. By neglect of any one of the ancillary services, expenditure on aircraft, aerodromes, and the other ancillary services, may be rendered nugatory.

Air traffic control

103. We note the excellent arrangement which has been made in New Zealand whereby there is a joint Air Traffic Control service for the Air Force and civil aviation, operated by the Civil Aviation Directorate, with arrangements for Air Traffic Control personnel to be enrolled in the Territorial Air Force and to serve as Air Force personnel when posted to Air Force stations.

104. In the absence of agreed I.C.A.O. Standards and Recommended Practices on Air Traffic Control, it falls to each country to institute such systems of air traffic control as are most nearly in conformity with the measure of international agreement reached and as are most suitable for the conditions of that country. Such a system has been introduced in New Zealand, and we believe the standard of the air traffic control system to be good. Such troubles and difficulties as are experienced are natural to the formative stage of any organisation, when personnel are being recruited and trained and the stations equipped. We draw attention in Chapter 14 to the need for initial training and the maintenance of air experience by the air traffic control staff.

105. In the operation of air traffic control there is a need for close co-ordination and centralisation of the air traffic control, meteorological, and radio services. These, with the pilot-briefing organisation, should be conveniently housed together in the control building. This calls for the construction of properly planned terminal buildings at the main aerodromes.

106. Our attention has also been called to a problem of long standing which has been experienced in many countries. It is desirable that the relative responsibilities of the commander of aircraft and of the air traffic control should be as clearly defined as the problem permits. The responsibility of Air Traffic Control is to advise the pilot as necessary to secure safe operation in dangerous weather conditions, to regulate air traffic in congested areas, and to maintain contact with all aircraft in flight. The pilot is responsible for compliance with all regulations and relevant standing instructions and procedures, and with all instructions of Air Traffic Control where the safety of other aircraft is involved. Subject to compliance with these, the final responsibility for the safety of his aircraft rests upon the pilot.

Search and rescue

107. We observe that, while I.C.A.O. has not yet produced acceptable Search and Rescue Standards and Recommended Practices, New Zealand has rightly appreciated the proper principles to be applied in the development of such an organisation and system in peacetime. The initiation and co-ordination of search and rescue action has been made the prime responsibility of the air traffic control, while the Royal New Zealand Air Force provide aircraft and personnel for air search and rescue. The system is rightly based on the mobilisation of all available resources in the area concerned and the prior organisation of these local resources, including shipping, with the aid of the Police Department and the Marine Department. We are informed that no arrangements have yet been made for the use of civil aircraft for search, although the flying clubs and others, as elsewhere, have participated voluntarily. Since aircraft

available on the spot are frequently an important means of locating aircraft in distress, and since flying clubs and other owners are involved in what to them is considerable expense when such searches are undertaken, we recommend consideration of the extension of the organisation to cover search by civil aircraft and reimbursement of costs involved.

Aeronautical radio communications and aids to navigation

108. It is generally admitted that the provision of radio and landline communication and radio aids to navigation has not kept pace with the requirements of the air services and of air traffic control. This is almost universal experience, and the situation requires continuing effort to make up the deficiencies in trained personnel and equipment, as well as co-ordinated policy decisions emanating from the planning which has been advocated. Recognition of certain accepted principles would assist in implementing the programme. Aeronautical radio is a highly specialised form of radio science and practice. It needs to be handled by specialists, and the Civil Aviation Directorate should be fully organised to deal with all the technical problems, from construction to maintenance. We would advise a review of the Joint Report of the Post and Telegraph Department and Air Department on Control and Operation of Aeradio Services, dated 18th October, 1946, to ensure that there is no confusion of responsibility, and that the Civil Aviation Directorate is adequately manned and equipped to fulfill its responsibilities.

109. Of present shortcomings, it has been emphasised to us that point to point communication at present is inadequate for the proper operation of air traffic control. Instrument landing equipment is an urgent necessity at Whenuapai and the alternate international aerodrome—i.e., Ohakea—for the safe operation of the international air services. Similar instrument landing equipment will be required at certain aerodromes for the operation of internal air services.

110. It has been represented to us that the radio aids to navigation in the Tasman Sea are inadequate in the light of modern knowledge. The utility of astronomical navigation by day is limited. Although there is not universal acceptance of I.C.A.O. recommendations on systems of long-range navigational aids, we recommend that continuing attention should be given to the improvement of the long-range navigational aids in this area. The provision of one or more ocean weather ships, which has been considered at several international conferences and considered not justified for meteorological purposes alone, would be one means of providing additional aids to navigation, as well as a search and rescue unit. The provision of such ships is not the responsibility of one country alone, and we merely draw attention to the need for keeping the matter under consideration in relation to the whole problem of air navigation.

111. The correct functioning of radio aids to navigation, and therefore the safety of aircraft, depend on regular and systematic calibration. This should be the responsibility of the Civil Aviation Directorate, which should have the necessary fully equipped aircraft at its disposal. The technical personnel employed for calibration should be provided in the staff of the Civil Aviation Directorate, and the aircrews, if not so employed, should be regularly assigned for this duty.

CHAPTER 8—REGULATION OF CIVIL AVIATION

Defects in procedure

112. In considering the instruments under which civil aviation is regulated in New Zealand, we have been impressed by the vigour with which the post-war problems have been tackled and the amount of thought and work which have been devoted to them, but we observe certain trends which call for comment :—

- (a) There is a tendency to extend Government control, through the medium of Regulations, Directions, Notices to Airmen, Notices to Aircraft Owners and Engineers, Requirements, and other instructions, beyond the usual level of Government regulation of an activity. Measures which have been taken amount also to an assumption of the management of operations.
- (b) Broadly speaking, the regulation of an activity should be directed in accordance with a published code of law—that is, Regulations, Directions, &c.—issued with statutory authority. The administration of such a code inevitably involves the exercise in some degree of the technical judgment of the Government officials entrusted with it, but a code of law whose substantive content is limited to a requirement to satisfy an officer of Government conflicts with the spirit and traditions of British jurisprudence.
- (c) Regulations or rules of comparable importance have been promulgated both in Regulations issued under the Acts and in Directions issued in pursuance of the Regulations. There appears to be no advantage in maintaining two forms—*i.e.*, Regulations and Directions—for the promulgation of rules having statutory effect. Instructions on procedure need not be issued in a document having statutory effect.
- (d) There is doubt in our minds of the legal force of Directions, no provision for which is made in the Act. Infringement of a Direction appears not to be subject to penalty.
- (e) Directions have been issued to amend or repeal Air Navigation Regulations issued under the Act. There can be no doubt that these Directions are *ultra vires*.

- (f) While there may be some doubt about the legal force of some Directions, there can be no doubt that Notices to Airmen and other publications, which have likewise been used not only for the promulgation of Regulations, but ostensibly to amend Regulations issued under the Act, have no legal force.
- (g) The Air Navigation Directions which have been issued in some cases bear no evidence of having been issued by the Minister in accordance with Regulation 33 of the Air Navigation Regulations, 1933, and in some cases, it appears, have not been so issued.
- (h) Air Navigation Directions do not appear to be submitted to legal scrutiny by the Crown Law Office. In consequence, many anachronisms and inconsistencies appear.
- (i) Control of the import of aircraft for technical reasons has been effected by the use of the Import Licence Regulations, which were introduced for a different purpose—namely, economic control. It appears open to doubt whether this use of powers is a proper one, apart from the desirability or otherwise of controlling the import of aircraft as a means of regulating aviation.
- (j) The Air Navigation Regulations issued in pursuance of the Act confer on the Minister a number of functions and powers. These functions and powers are exercised by a number of different officers, although there has been no formal delegation of power. Such delegation, and equally the limitation of delegated powers, of necessity should be defined, since some must by their nature be exercised by a number of officers (*e.g.*, the issue of licences), while others equally must be retained in the hands of the Minister himself (*e.g.*, the issue of Directions).
- (k) In general, there appears a tendency to over-regulation. This has been criticised as a device whereby officials seek to protect themselves against all contingencies. The Director of Civil Aviation is not the sole authority responsible for the safety of aviation. Everyone engaged in aviation is responsible for air safety, and the regulatory system should be such as to ensure that each carries his share of responsibility.

113. In Appendix F are cited cases from current documents to illustrate the trends referred to above. These are illustrative only, and in no way represent an exhaustive examination of the sundry regulations and pronouncements. We have seen draft revisions of some of these documents in which these trends are very much further developed. We feel there is too much haste in the issue of regulations, and insufficient scrutiny of their over-all effect by Government. The rules and orders

which have been issued outside the statutory Air Navigation Regulations, and which have not generally been submitted to legal scrutiny, contain many far-reaching provisions. Not only is examination by the competent law officers of Government necessary to ensure their validity, but closer scrutiny by the Air Department and other departments of Government which may be involved should be given to ensure that their over-all effect is that which is desired by Government. The degree of regulation which is embodied in regulations needs to be balanced against the administrative staff and other machinery which is required for the implementation or supervision of the regulation. A regulatory system may either commit Government to large increases of staff or involve the waiving of the regulations because of the impracticability of complying with them.

Regulations appropriate to national operator

114. In particular, it appears necessary to consider the effect of Government's nationalisation policy on the need for particular regulation and supervision by a Government department. What may be suitable and necessary for the protection of the public in operations by commercial enterprise may be unnecessary in a nationalised service where there is virtually only one operator. Certain provisions of law, such as those relating to the licensing of personnel and the certification and supervision of airworthiness, are undoubtedly appropriate to all operations, whether conducted by Government or private enterprise, and it is appropriate that they should be the responsibility of the Civil Aviation Directorate. Beyond a certain point, however, the supervision by the Civil Aviation Directorate becomes supervision of the management and the detailed organisation of the operator, which is the business of management. Since the Corporation has been established by Government and is responsible to Government for the proper conduct of the operations entrusted to it, it is both inefficient and uneconomic to establish a department of Government to supervise them in detail. The effect of proposed regulations should be scrutinised from these points of view before they are promulgated.

Application of regulations to Government personnel and aircraft

115. We have seen proposals for regulations which would establish a licensing system for technical personnel employed by Government and which would extend some of the regulations to Air Force aircraft and personnel. We think it advisable to draw attention to the embarrassments which would ensue from such action. Statutory regulations are enforceable in a Court of law, and action of this kind could not well be taken by Government against its own employees in respect of their official duties or against Air Force personnel in respect of their duty in flying military aircraft. For example, Air Traffic

Control personnel are employed for this purpose solely by Government. Their employment should be subject to qualification maintained by departmental systems. Compliance by Air Force aircraft with rules of the air is secured by Air Force Orders and discipline, not by civil law. This principle does not apply to the rules requiring all civil aircraft to be licensed, to be certified as airworthy, and to be operated by licensed personnel.

Consultative machinery

116. We also consider it necessary that the framing of regulations should be carried out in the closest collaboration with those affected by them. Full recognition must be given to the fact that the difficult and intricate task of devising and administering aeronautical legislation can only be done satisfactorily if it is regarded as the joint responsibility of the rule-makers and those who will be bound by the rules. The Civil Aviation Directorate cannot command within itself the full range of up-to-date experience needed.

117. We recognise that consultation between the present Civil Aviation Branch and representatives of aeronautical interests is already established practice in New Zealand, but we do not think it has been used hitherto to full advantage. It is not sufficient for the Civil Aviation Directorate to send draft proposals to selected bodies for comment, nor for such comments to be followed on occasion by an *ad hoc* discussion. All aeronautical interests within New Zealand which have technical contributions to make towards the devising of aeronautical legislation must be made to feel not only that their contributions will be welcomed by the Directorate of Civil Aviation, but also that they have a duty to bring their special experience to bear upon the task of regulating New Zealand civil aviation to the common good. They can only do this if their advice and help are sought during the early formative stage, and if this is done in accordance with an established procedure.

118. We recommend the establishment of a committee—which might be called the Advisory Committee on Air Regulations—whose functions would be to advise the Director General of Civil Aviation on the formulation and revision of the Air Navigation Regulations and associated instructions. The committee should comprise representatives of the New Zealand National Airways Corporation, Tasman Empire Airways, Limited, the New Zealand Airline Pilots' Association, the Guild of Air Pilots and Air Navigators, and the Royal New Zealand Aero Club. Aircraft suppliers and repairers and representatives of licensed aircraft engineers might be co-opted when the subject particularly concerns them. There should be no representation of trade associations or trade unions as such. The committee should be confined to professional and technical men with experience of specific aspects of civil aviation.

119. The agenda and supporting papers should be circulated sufficiently in advance of each meeting to give committee members time to consult with those whom they represent. Draft regulations should be put to the committee at an early stage, before they go to the Crown Law Office. To ensure that this is done, an officer of the Civil Aviation Directorate (Regulations and Information Branch) should be appointed as secretary of the committee. In this capacity he should be servant of the committee and responsible to it. If the committee is to serve the purpose intended, if it is to help and not hinder the business of the Directorate, its members must not interpret their function as being to defend the interests they represent. They must bring to the conference table their professional and technical knowledge and that of the bodies they represent, and must strive to make their full contributions to the common goal of aeronautical progress and air safety.

120. In the succeeding pages, we deal in some detail with certain specific aspects of the regulation of aviation which have been called in question by previous inquiries or which otherwise have assumed prominence. It will be readily understood that we have not been able to review in so much detail all parts of the regulations and practices, and our report cannot therefore pretend to be comprehensive.

CHAPTER 9—AIR SERVICE CERTIFICATE AND AIR SERVICE CERTIFICATE RATING

Air Service Certificate

121. The introduction in New Zealand of the Air Service Certificate dates from 1940 when Regulation No. 7A was made. This provides that “no person shall use any aircraft or permit any aircraft to be used in the operation of a public air transport service except under the authority of and in accordance with a certificate to be known as an Air Service Certificate, issued as hereinafter provided.” At the time the intention and practice were to license selected commercial operators of air transport. Before discussing whether the concept of an Air Service Certificate is appropriate to nationalised airline operation, we wish to draw attention to some unsatisfactory features of the Regulation and of the way in which it has been interpreted.

122. One of the provisions of Regulation No. 7A states that the “applicant for an Air Service Certificate shall furnish such information in relation to the service for which the certificate is required *as the Minister may direct.*” This must be construed in conjunction with Regulation No. 33 empowering the Minister to issue directions for the purpose of supplementing or giving full effect to the provisions of the Regulations. No direction pursuant to Regulation No. 7A appears to have been issued. Instead, an application form has been prepared by the Director of Civil Aviation, who requires applicants for an Air

Service Certificate to complete the form. There is no indication that the information demanded by the form is that which the Minister has directed shall be supplied under Regulation No. 7A.

123. The form requires an immense amount of detailed information to be given, including details of operating and supervisory personnel, and an organisation chart of the supervisory personnel. The form stipulates that a draft Operations Manual covering details of operating methods, procedures, and limitations applicable to the route is to accompany and form part of the application. No other indication is given of the required contents of the Operations Manual, and we understand that such indication is customarily given piecemeal, orally and in letters, while the applicant drafts the Manual. Another provision of Regulation No. 7A states that the Air Service Certificate "may include such conditions, in addition to compliance with these regulations, as the Minister deems necessary to ensure the safe operation of the service."

124. It follows from the foregoing that the standard required of an operator to qualify for an Air Service Certificate is an undefined standard. As we understand it, in practice the definition is progressive: it develops and proliferates as the applicant strives to bring his organisation into conformity with it. This, in our opinion, is bad legislation and bad administration.

125. We understand that, with a few exceptions, public air transport is carried on in New Zealand without a current Air Service Certificate. We are informed that such operation, without compliance with Regulation No. 7A, has been authorised under Regulation No. 8. This provides that the Regulations "shall not apply to any aircraft or person to which or to whom the Minister directs that these regulations or any part thereof shall not apply." It appears that a better method of obtaining this result would have been to adjust the conditions on which the Air Service Certificate would be issued under Regulation No. 7A, to fit the circumstances of the day, since the conditions have only in small part been authoritatively published.

Air Service Certificate Rating

126. The application form for an Air Service Certificate implies that one of the conditions of the grant of such a certificate is that the operator's maintenance organisation must qualify for an Air Service Certificate Rating. The standard required of the operator to qualify for such a Rating is defined in Leaflet P. 22/3 of the New Zealand Civil Airworthiness Requirements, published under the authority of Air Navigation Directions No. 4. This standard is defined in considerable detail. One of the stipulations is that the operator must prepare a Maintenance and Overhaul Manual. In contrast to the Operations

Manual, the required contents of this Manual are particularised in detail. The Manual, and all amendments to it, have to be submitted to the Director of Civil Aviation for approval.

127. The Air Service Certificate conception originated in the United States of America as part of an air transport licensing system. Its purpose was to ensure that the selected operator on any route measured up to a general standard of organisation, thereby guaranteeing the stability of the operation, and to control the activities of a number of competing commercial airline operators. There was a clear responsibility on Government to ensure that competitive practices should not be prejudicial to safety, and the Air Service Certificate scheme is one administrative method of achieving this.

128. The Air Service Certificate scheme is not, in our experience, the only method of securing operational safety, even with commercial operators. It is, we consider, quite inappropriate to national operators. To require a national operator to submit his organisation to the detailed scrutiny and control implicit in the Air Service Certificate Scheme, is in effect to require one organ of Government to supervise the work of another organ of Government. Such a principle is, in our opinion, unsound. It suggests the absurdity that the supervising Government body should itself be supervised by a third Government body, and so on in infinite series.

129. The proper division of function between the Civil Aviation Directorate and a national operator is, in our view, as follows: The Directorate is responsible for defining, in Air Navigation Regulations, the standard of operational safety to be achieved. This standard will be, in the main, an adaptation and amplification of the I.C.A.O. Standards, or anticipations of those Standards in those cases where no I.C.A.O. Standards have yet been adopted. The Regulations will not have regard to specific routes. The operator, on his part, will be responsible for ensuring that, at all times, he conforms with these Regulations. None of his activities will be subject to any prior "approval" by the Directorate. The national operator should have, and be known by the general public to have, full responsibility for safe operation. The ultimate check that this responsibility is being satisfactorily discharged is the accident record. In the case of an accident, the operator has to convince the investigating authority, and through it the general public, that he has taken all practicable steps within the technical possibilities of the day to conform in spirit and in letter to the law of the land, as set out in the Acts of Parliament and regulations made pursuant to those Acts.

130. We therefore recommend that, as regards nationalised operators, the need to obtain from the Directorate of Civil Aviation an Air Service Certificate and an Air Service Certificate Rating for the operator's maintenance organisation should be abolished. The operator would still

need, in his own interests, to prepare and keep up to date an Operations Manual and a Maintenance and Overhaul Manual, but neither of these should need approval by the Directorate of Civil Aviation. There should instead be the closest collaboration between the national operators and the Director of Civil Aviation. The latter, as the authority responsible for the supervision of airworthiness of aircraft and the administration of other statutory regulations, is in an undisputed position to give good advice on features of the operator's organisation, bearing on compliance with the regulations ; and it may be observed that the requirements for an Air Service Certificate Rating set out in New Zealand Civil Airworthiness Requirements Leaflet P. 22/3 constitute an admirable statement of the factors on which any operator should base the engineering branch of his organisation.

131. So far as the operation of any form of public air transport, including the operations of flying clubs, by operators other than national corporations or companies may continue to be permitted, the supervision of the standard of their organisation, operational as well as engineering, by the Director of Civil Aviation is justifiable, but should be carefully adjusted to the nature of the organisation and the operation. Broadly speaking, compliance with the statutory requirements of the Air Navigation Regulations relating to personnel licensing, certification of the airworthiness of aircraft, workshop rating, use of aerodromes, &c., is adequate to ensure safety. Only in the case of an operator who is licensed to operate a scheduled air service (however minor) does the necessity of ensuring the regularity and continuity of the service justify a further degree of supervision of the organisation, on which these depend. The Air Service Certificate system is a good means of securing this end, and the Director of Civil Aviation is the proper authority for the purpose. Care should, however, be exercised that the State does not thereby take over the burden and responsibility of management of the service. The exercise of judgment as to how far Government regulation should be carried is in our opinion the key to a successful system. The conditions to be fulfilled for the grant of an Air Service Certificate should be defined in the Regulations.

132. In the case of non-scheduled air transport operations, including "taxi" flying, joy riding, and flying club operations, the element of regularity and continuity is not present and we do not think that the Air Service Certificate system is necessary. All that is necessary can be achieved by advice from the Director of Civil Aviation. In our experience such advice is never unheeded, and there are ample powers in the Civil Aviation Act and regulations to suspend any operation which appears likely to constitute a danger to the public.

CHAPTER 10—CERTIFICATES OF AIRWORTHINESS AND THE NEW ZEALAND CIVIL AIRWORTHINESS REQUIREMENTS

133. The law on this subject is contained in Regulation No. 5 of the Air Navigation Regulations, 1933, which requires that no aircraft shall fly unless it is certified as airworthy in the prescribed manner; in Schedule II of the Air Navigation Regulations, 1933, which prescribes the procedure for the validation and renewal of certificates of airworthiness; and in Air Navigation Directions No. 4, which prescribes that the design, construction, overhaul, repair, maintenance, or supply of civil aircraft shall be in accordance with conditions approved in writing by the Director of Civil Aviation, and indicates that the conditions which will guide the Director of Civil Aviation will be published in "New Zealand Civil Airworthiness Requirements" (C.A. Publication No. 1), together with any other conditions and requirements which the Director of Civil Aviation thinks fit. A number of leaflets forming part of C.A. Publication No. 1 and covering some parts of the procedure and conditions governing certification of airworthiness have been published. It may be noted that the civil airworthiness requirements of a manufacturing country, which will in future, so far as it does not do so at present, conform to the I.C.A.O. Airworthiness Standards and Recommended Practices, constitute a voluminous and very complex technical code, and the verification of compliance with this code constitutes a comparably laborious and complex problem.

134. It seems unlikely that any aircraft intended for airline or taxi service use will be designed and built in New Zealand for many years to come. A few small experimental types may be designed and made by individuals, but these are unlikely to play any significant part in New Zealand civil aviation. Hence the primary concern of the Civil Aviation Directorate is the validation of the certificates of aircraft designed and built abroad.

135. The current practice of the Civil Aviation Branch in respect of aircraft designed and constructed in any country of the British Commonwealth or in the United States of America is to validate the certificate of airworthiness without investigating the airworthiness design standard of the country of origin. In our opinion, this is the only practicable policy, and should be continued. The validation of the certificate of airworthiness of an aircraft designed and constructed in some country other than the above should be dealt with by the Civil Aviation Directorate on its merits, if and when the case arises. The chief considerations will be whether the country is an I.C.A.O. member State, and the confidence which the Civil Aviation Directorate has in the reliability of that country's airworthiness administration.

136. The possibility mentioned above that small experimental aircraft may be designed and constructed in New Zealand creates a problem that must be faced. If the Civil Aviation Directorate is to be staffed to enable it to investigate the design and test the prototype aircraft, the cost and technical effort involved will be out of all proportion to the importance to New Zealand civil aviation of the few aircraft involved; yet nothing short of a complete investigation would enable the Civil Aviation Directorate to vouch for the airworthiness of the aircraft.

137. The solution we recommend is that the designer of such an aeroplane should be given two options:—

- (a) To furnish the Civil Aviation Directorate with evidence acceptable to them that the aeroplane complies with the British civil airworthiness requirements. Such evidence might take the form of a type record certified by the Air Registration Board of the United Kingdom, it being for the designer to negotiate direct with the Air Registration Board to obtain such certification, and for him to defray all costs; or
- (b) To have a permit to fly the aeroplane himself, without a certificate of airworthiness, at such times and places as the Civil Aviation Directorate would prescribe, and conditional upon his taking out a third party insurance.

138. It may be observed here that it is not universal practice to require the certification of airworthiness of aircraft used for private flying exclusively within the State of registration. Although the majority of such aircraft are of types which have been granted a certificate of airworthiness, the private owner in countries where the law so provides is not required to submit his aircraft to inspection for the annual renewal of the certificate of airworthiness. He has the option of so doing.

139. As regards modifications to aircraft which have been issued with a certificate of airworthiness, other than modifications originating in the country of origin of the aircraft, the Civil Aviation Branch at present require details of all such modifications to be submitted to them for airworthiness approval. The investigations necessarily associated with such approval occupy time which the Branch can ill spare, and the paper work and transit delays are an exasperation to all concerned.

140. The remedy for this situation does not lie wholly, or even principally, with the Civil Aviation Branch. They are, we are assured, willing and anxious to delegate the major part of this work to firms and operators, provided those firms and operators employ, or use the services of, qualified aeronautical engineers with experience of aircraft design, flight testing, and flight test analysis. So far as our information goes, no aircraft firm or operator in New Zealand at present employs such

qualified personnel. Instead, they rely for advice and assistance, as well as for airworthiness approval, upon the technical staff of the Civil Aviation Branch.

141. In our opinion, it is not in the best interests of New Zealand civil aviation that aeronautical engineers with the qualifications mentioned should find a place only in Government service. We are particularly surprised that neither the New Zealand National Airways Corporation nor Tasman Empire Airways, Limited, have yet taken any men with these particular qualifications on to their staff.

142. Notice to Aircraft Owners and Engineers No. 5/1948 stipulates that, as from 28th October, 1948, firms with a " C " rating and operators of scheduled air services must submit, with applications for approval of modifications, a quantitative technical analysis in support of the application. We do not doubt that any firm or operator who shows by the quality and completeness of the technical analyses so submitted that they are competent in this field will be accorded a measure of design approval by the Civil Aviation Branch. Such design approval should, we recommend, ultimately extend to complete exemption from having to submit drawings and technical assessments to the Civil Aviation Branch. Instead, that Branch should accept a guarantee that the modified aircraft complies with requirements as sufficient justification for giving airworthiness approval. With the guarantee should be sent, for record purposes only, the technical assessment giving the evidence on which the applicant has based his guarantee.

143. As regards the New Zealand Civil Airworthiness Requirements, since, in practice, imported aircraft will conform only to the airworthiness code of the country of manufacture, and since the codes of different countries vary considerably in form and to some extent in substance, it is clear that it is not practicable to restate them all in the New Zealand code of civil airworthiness requirements. At present it would involve the repetition of both the British and the American codes ; at any time in the future it might involve the restatement of one or two other national codes. While reserving to New Zealand the undoubted right and duty to impose additional requirements which must be met by aircraft as a condition of issue of a New Zealand certificate of airworthiness, it appears that the only practical way to state the New Zealand code is to say that aircraft shall conform to the civil airworthiness requirements of the country of manufacture, and in addition with such special New Zealand requirements as may be promulgated in accordance with the law. The provision for this is contained in the Air Navigation Regulations, 1933, Schedule II, paragraph 3, which makes the issue of a certificate of airworthiness dependent on " minimum requirements approved by the Minister." There is no reason why the power to approve such minimum

requirements should not be delegated to the Director of Civil Aviation, but for the removal of doubt it would be preferable that this, like other delegations, should be formally made.

144. The contents of the New Zealand Civil Airworthiness Requirements (C.A. Publication No. 1), as issued up to date, in reality consist of three kinds of requirements :

- (a) Mandatory provisions which, if they are to be effective, should have the force of law. These should be issued as regulations.
- (b) Technical requirements to be satisfied as a condition of issue, validation, continuing in force, or renewal of a certificate of airworthiness. The sanction for non-compliance is failure to obtain or retain the desired certificate. These are proper to the code of New Zealand civil airworthiness requirements.
- (c) Procedural instructions intended to facilitate the process of obtaining a certificate of airworthiness (or other like qualification). These need not and should not have the force of law and should be issued in some suitable separate publication.

145. In Part I of this Report, we have referred to proposals that an air registration board should be established in New Zealand. In the light of what has been said, this may now be better understood. A large part of the work of the British Air Registration Board is the formulation of the British Civil Airworthiness Requirements and the investigation of new aircraft for the issue of certificates of airworthiness to prototype and subsequent aircraft. There being no prospect of a volume of work of this nature in New Zealand, it is not considered necessary or desirable to establish an air registration board.

CHAPTER 11—CONDITIONS GOVERNING THE IMPORT OF AIRCRAFT: TYPE RECORD AND AEROPLANE FLIGHT MANUAL

146. In the report of the Commission of inquiry into the Sandringham ZK-AME incident, reference is made to the failure of the manufacturers to produce a type record for the aircraft, and we have been informed of subsequent difficulties which have arisen in this respect. It appears desirable, therefore, to elucidate the principles and practice governing this matter.

147. Type records were introduced in the United Kingdom in 1928 concurrently with the introduction of an "approved firms" scheme for aircraft design and prototype construction. In the United Kingdom an approved firm guarantees that its aircraft have been designed and constructed in compliance with the appropriate airworthiness requirements. Attached to this guarantee is a summary of the evidence on which compliance with the requirements is based. This summary is the "type record."

148. Details of the stipulated contents of modern type records are given in British Civil Airworthiness Requirements, Sub-section A. 9. One of the items stipulated is a report on all flying trials made by the applicant's personnel in connection with airworthiness approval.

149. The New Zealand civil aviation administration will need a copy of the type record only when it is called upon to give airworthiness approval to a design modification initiated in New Zealand to a United Kingdom aircraft on the New Zealand register. Without the type record, it is often impossible to make a reliable assessment of the effect of a design modification on safety. Design modifications introduced in and approved by the country of origin of the aeroplane—both optional modifications and modifications deemed essential for safety—can be dealt with by the Civil Aviation Directorate without their needing to refer to the type record.

150. It follows that the onus of ensuring that the Civil Aviation Directorate has the type record should rest on the owner of the aircraft. It is he who will initiate design modifications, and hence it will be for him to furnish to the Director of Civil Aviation whatever evidence he requires to enable him to assess the airworthiness of the modification. An essential part of this evidence will usually be the type record. In such cases the Director of Civil Aviation would be justified in withholding airworthiness approval until the aircraft owner had obtained and passed to him a copy of the type record approved by the competent authority of the country of origin.

151. The proposals for Airworthiness Standards formulated in 1947 by the Airworthiness Division of I.C.A.O. stipulate that an "aeroplane flight manual shall be furnished with each aeroplane" (I.C.A.O. Document 3031, AIR/181, paragraph 9.3). In this manual has to be included the verified performance capabilities of the aeroplane—for example, its take-off and landing characteristics, its rates of climb, and how these characteristics and rates vary with aircraft weight, climatic conditions, and with the failure of any one engine. The manual must include also additional items of information having a direct and important bearing on the safe operation of the aeroplane. The information given in the manual is essential to enable the aeroplane to be operated in conformity with the safety standards proposed by the I.C.A.O. Operations Division (I.C.A.O. Document 3030, OPS/145, Part III, Section 3, Chapter 2).

152. The provision of an aeroplane flight manual is being made mandatory in the United Kingdom, in advance of the formal adoption by the I.C.A.O. Council of the Airworthiness Division's proposals, for prototype aeroplanes issued with certificates of airworthiness after 1st January, 1949, and to all series aeroplanes of such prototypes. It will also be made mandatory to certain other aeroplanes if, in the opinion

of the Air Registration Board, a substantial contribution could thereby be made towards the operational safety of such aeroplanes (see British Civil Airworthiness Requirements, subsection A. 33, Issue 1).

153. This aeroplane flight manual will customarily be issued concurrently with the certificate of airworthiness and the approval of the manual by the Air Registration Board is a necessary condition of the issue of a certificate of airworthiness.

154. It is to be noted that the manual will contain a great deal more information about the performance characteristics than the type record. The latter contains only a report on all flying trials made by the constructor's personnel in connection with airworthiness approval. The manual will contain the performance characteristics summarised above, and these may be based on flying trials additional to those included in the type record.

155. The Civil Aeronautics Administration in the United States customarily provides with United States aircraft information equivalent to that which is to be provided by the United Kingdom in the aeroplane flight manual.

156. It follows from the above that the appropriate New Zealand authority—the purchaser, and maybe, if public funds are required for the purchase, the Civil Aviation Directorate—will need the aeroplane flight manual. This should be stipulated as one of the conditions of purchase in all future New Zealand contracts. Such stipulation is at present necessary because, as mentioned above, the United Kingdom is not making the flight manual a necessary adjunct of the certificate of airworthiness for prototypes certified prior to 1st January, 1949. It must be remembered that the manual will not be available before the aeroplane has been built, tested, and issued with a certificate of airworthiness. If information is needed in New Zealand at an earlier date than this, such information should be stipulated as one of the conditions of purchase. Normally such advance information will not be authenticated by the competent airworthiness authority of the country of origin.

157. It is stipulated in Leaflet P. 8 of the New Zealand Civil Airworthiness Requirements that no aircraft shall be imported into New Zealand unless a type record has been lodged with and approved by the Director of Civil Aviation. This was stipulated before the Air Registration Board had issued Subsection A. 33 of the British Civil Airworthiness Requirements announcing the introduction of aeroplane flight manuals.

158. As explained above, the need now is for an aeroplane flight manual rather than a type record, but it will not always be available when the aeroplane is ordered. We understand that the Director of Civil Aviation contemplates amending Leaflet P. 8.

159. The linking in this way of a rule as to the provision of type records or aeroplane flight manuals with import license is, we suggest, open to objection. The considerations governing the initial introduction of an import license system were, we expect, of a different kind from those governing the provision of an aeroplane flight manual. It is undesirable, and possibly *ultra vires* the Act, to use legislation introduced for one purpose for a quite different purpose.

160. Again, the inclusion of a provision of this kind in Leaflet P. 8 of the New Zealand Civil Airworthiness Requirements does not give it the force of law, though opinions to the contrary have been expressed. The New Zealand Civil Airworthiness Requirements were introduced by an Air Navigation Direction (AND-4) which states :—

In determining the conditions on which his approval (*i.e.*, the Director of Civil Aviation's approval of the conditions upon which civil aircraft are "supplied") is to be granted, the Controller of Civil Aviation shall have regard to, *but shall not be bound by*, the conditions and requirements set forth in the official publication styled "New Zealand Civil Airworthiness Requirements" (C.A. Publication No. 1), and he may specify any other conditions and requirements which he thinks fit.

161. The appropriate method of ensuring that the aeroplane flight manual is furnished in respect of aircraft imported into New Zealand is, as indicated above, to make its supply one of the conditions of the contract of purchase.

162. Aircraft purchased by Government or a national operator call for different treatment from those purchased by commercial companies, flying clubs, or private owners. In the first case Government have direct control over the decision to purchase particular aircraft. In exercising this control, Government may decide to consult the Director of Civil Aviation, but in doing so the question at issue is not one of the regulation of civil aviation, the responsibility for which is delegated to the Director of Civil Aviation, but one of a major financial transaction of Government. If Government should decide that the proposals of the national operator are not acceptable, they can be vetoed directly. It is unnecessary to use the roundabout procedure in which the Director of Civil Aviation advises the Controller of Imports not to issue an import license for aircraft which Government have decided not to purchase. The procedure is clearly undesirable in the case where Government have decided to purchase the aircraft, which they would presumably do only after taking full advice.

163. In the case of non-government purchase of aircraft, the control in question is an economic control for the preservation of currency and not one of the regulation of civil aviation. It is right and proper that the Director of Civil Aviation should be asked to advise whether the import of a particular aircraft is necessary or whether the purpose of the purchaser could be as well served by the purchase or use of aircraft not involving adverse effects on the exchange. In considering the problem, the Director of Civil Aviation must needs assess the aircraft

it is proposed to purchase in comparison with other aircraft available from other sources. The type record (or flight manual), which may be required for other purposes in the operation and maintenance of aircraft, cannot be demanded for this purpose by the exercise of the Director of Civil Aviation's regulatory powers any more than can the type records (or flight manuals) of all the other aircraft with which it is desired to make comparison.

CHAPTER 12.—AIR SERVICE LICENCE

164. There is no need to license the operations of a national operator. Provided that the field of activity of independent operators is carefully defined, there would appear to be no real need for a licensing system. The licensing system was designed for, and is appropriately applied to, scheduled air transport operation. Neither the necessity for avoiding duplication of operations nor the necessity for ensuring continuity of service, as a State responsibility, obtains in the case of non-scheduled operations. All such operations are subject to the Civil Aviation Act and Regulations—that is to say, the provisions of the coded law governing safety, and this normally should be sufficient to secure the safety of the public.

165. Should such independent operation be permitted, it may on occasions be of advantage to the country to use an independent operator for the operation of a scheduled service of local character, for short or long term, as a feeder of the national airways system. This may well be found desirable in the growing stage of the New Zealand National Airways Corporation, while their resources in aircraft and personnel are inadequate to meet all local demands. Such operations should be controlled by the equivalent of a licensing system, and it would be appropriate that it should be left to the control of the National Airways Corporation to arrange by contract. Moreover, as stated earlier, the operation of scheduled services is properly controlled technically by the air service certificate system. Any operator with whom the National Airways Corporation may make a contract for the operation of such a minor scheduled service should therefore be required to obtain an Air Service Certificate from the Director of Civil Aviation, in accordance with the Air Navigation Regulations.

CHAPTER 13—INVESTIGATION OF ACCIDENTS

166. The investigation of accidents to aircraft and the application of the findings are, as Government have recognised, among the more important functions in the regulation of civil aviation. Accidents in New Zealand are investigated under the provisions of the Air Navigation Regulations, 1933, by an Inspector of Accidents, who is a member of the staff of the Air Department, but is outside the Civil Aviation Branch

and independent of the Director of Civil Aviation. We have been informed of difficulties which have arisen, not only in formal Boards or Commissions of inquiry which have been appointed under the Regulations, but also in the preliminary investigation of accidents by the Inspector, in determining the proper functions of the Inspector of Accidents and those of the Director of Civil Aviation. There appears to us to have been a lack of co-operation, which would have eliminated some of these difficulties.

167. We understand that revised draft regulations governing the investigation of accidents are now under consideration, and we think it desirable to state certain principles which experience has shown should be applied in this matter.

168. In the interests of air safety, it is necessary to record and, in appropriate cases, investigate, not only "accidents" but also "incidents." The term "accidents" is used to indicate important happenings involving death of or injury to personnel, substantial structural damage, fires in the air, and the like; the term "incidents" is used to include all events other than "accidents," the recording and possibly the investigation of which provide the essential background for safety regulation and the provision of aviation facilities. In what follows, these two terms are used only in these special senses.

169. There should be a legal obligation to report accidents; there should be no legal obligation to report incidents; instead, the need for reporting incidents in the long-term as well as the short-term interests of air safety should be brought home to all concerned through such media as Notices to Airmen and Notices to Aircraft Owners and Engineers. In our experience, the voluntary reporting of incidents achieves the end in view, and any attempt to impose a legal obligation, even if that were possible, would not be worth while.

170. It follows that the term "accident" must be defined in the Regulations with legal precision. This is a straight-forward problem of drafting, though careful judgment is needed to draw the best dividing line between accidents and incidents.

171. By contrast, it is neither possible nor desirable to define "incident" with legal precision. The need here is for a widespread realisation of the purpose served by the reporting of incidents. This will be far more effective than any academic definition.

172. The first essential in respect of major accidents is to safeguard the wreckage. Successful investigation usually depends on prompt action to record and preserve the oral and material evidence. Responsibility for this must rest, not only on the Inspector of Accidents, but also on other official personnel who will often be in a better position than the Inspector to take immediate action. Personnel likely to be in this position are the police, the Royal New Zealand Air Force, and officers

of the Civil Aviation Directorate. All these should have standing instructions to safeguard the wreckage and record the statements of witnesses, pending the arrival of the Inspector of Accidents or his representative. Thereafter the Inspector of Accidents must be in complete control.

173. An immediate decision is then needed whether the Inspector of Accidents is to investigate the accident or not, and in either event whether a Board of Inquiry is to be set up under the Air Navigation Regulations. It is for the Inspector of Accidents to make this decision or to obtain the Minister's decision, as may be appropriate.

174. When the Inspector of Accidents makes the investigation, the conduct of the inquiry must be wholly under his control, and his report must be made to the Minister. Nevertheless, he should make full use of the staff of the Civil Aviation Directorate. They, by their special knowledge and experience, will usually have a valuable contribution to make. The fact that they may in some cases be interested parties, in that defects in the services provided by, or supervised by, the Directorate may have contributed to the accident, should not stand in the way of the Inspector's making full use of them in the investigation.

175. It is the duty of the Inspector of Accidents to associate the Director of Civil Aviation with the inquiry, at least to the extent necessary to enable the Director to take such immediate action, as, for example, issuing amending regulations, enforcing aircraft design changes, improving the air route organisation, or other action appropriate to the circumstances of the case, as the Director may consider necessary or expedient. Such action is wholly the Director's responsibility, and must not be allowed to prejudice in any way the findings of the Inspector.

176. We do not recommend that the Director of Civil Aviation should carry out an independent investigation of an accident which is being investigated by the Inspector of Accidents. It would, in fact, be impossible for him to do so in many cases, since the material evidence can only be under the control of one person.

177. The Inspector of Accidents should have the usual statutory powers to require the attendance of persons, the giving of evidence, and the production of documents. We note that he is not given these powers under the 1933 Regulations. The Director of Civil Aviation should have no such powers.

178. When the Inspector of Accidents decides not to investigate any accident, he must immediately inform the Director of Civil Aviation. In such cases the latter should then carry out whatever investigation seems to him necessary or expedient. Following the preceding recommendation, the Director will not have statutory powers; hence the Inspector should take his decision whether or not to investigate an accident in consultation with the Director.

179. When a Board of Inquiry is set up to investigate an accident, it is the duty of the Inspector of Accidents and of the Director of Civil Aviation to assist the Board in whatever manner the Board may deem appropriate.

180. As regards the many happenings to aircraft which are embraced within the term "incident," the Director of Civil Aviation should be receiving a continuous stream of information from a variety of sources such as his own surveyors, air traffic controllers, the national and other operators, flying clubs, and licensed personnel. He must record and collate this information, and analyse it from time to time to disclose trends and other significant features. The Inspector of Accidents may on occasion find a clue to the cause of an accident in the record of incidents. To maintain and stimulate widespread interest in the reporting of incidents, the Director should from time to time give some publicity to valuable contributions to air safety resulting from this work. It is, however, essential that this publicity should not extend to disclosing, except when strictly necessary in the interests of safety, information that responsible interests might reasonably consider had been given in confidence.

CHAPTER 14.—TRAINING

181. The administration and operation of civil aviation depend on the supply of adequate numbers of trained personnel in many widely varying specialist categories. The position at present is that New Zealand is depending on war-trained personnel released from the Royal New Zealand Air Force, and the country is well situated in this respect. The conversion training to civil methods and civil standards is, however, a present problem, and the whole training problem will assume increasing proportions and importance as the war-trained reserves are used up and demand increases.

182. In the first part of this Report (paragraphs 34, 39, 44), we have advised the establishment of a post of Director of Training and Licensing in the Civil Aviation Directorate to bring under one head the duties and responsibilities in this connection, which are at present dispersed between a number of officers.

183. We have noted that training schools and courses of training have been established or are proposed to be established to deal with some of the technical personnel required both by the Director of Civil Aviation and the air transport operators. We have not made a study of this problem in detail and do not propose to do more than urge the importance of this aspect of civil aviation organisation, both as concerns the short-term arrangements now in existence or planned, and more especially the long-term planning problem. We offer a few comments on those aspects of

the problem with which we have come in contact and on which we have been given information and received representations. The principal classes of technical personnel for whom training schemes are required are dealt with below :—

Air traffic controllers (Government service)

184. We are informed that sanction has been given for the establishment of an air traffic control school, which it is hoped may be established within six months. Difficulties are being experienced in regard to premises, equipment, and more particularly the recruitment of a sufficiently qualified and experienced chief instructor at the salary offered. Air traffic controllers should be recruited from men with aircrew experience, preferably pilots and navigators, but special training in air traffic control duties is and always will be an essential. We consider it desirable that the school should be established as soon as possible.

185. Not only is initial training of air traffic controllers necessary, but their appreciation of the air traffic control problem as it presents itself to the pilot must be continually refreshed. Recurring air experience and the closest association throughout with the problems of the aircrews are important. Experienced aircrew personnel might, by arrangement with the operators, be associated from time to time with the air traffic control personnel on duty, particularly in difficult weather conditions. The need for this airman's view of the air traffic control problem has been urged on us by representatives of the pilots. It is a universal problem, to which we think it is important to draw attention, but not as any criticism of current practice. We think that the New Zealand standard of air traffic control is good.

Radio operators and technicians (Government service)

186. We understand that training schemes for professional engineers, technicians, and operators in the civil aviation telecommunications organisation are now in various stages of implementation. The recruitment of these personnel from the Universities and technical schools, and their special training in civil aviation schools and the Royal New Zealand Air Force Electrical and Wireless School, as at present arranged or contemplated, appear adequate. The training of this class of personnel, depending mainly on normal educational institutions and ground training, does not present the same problem as the training of air traffic control personnel, in which air experience is an essential element for complete success. Nevertheless, the importance of proper specialised training to the high standard required for aeronautical communications and aeronautical radio aids to navigation must be emphasised.

Aeronautical engineering personnel (Government service)

187. The problem of staffing the aeronautical engineering branch of the Civil Aviation Directorate is less one of *ad hoc* training than of recruiting experienced engineers, including both academically qualified and workshop-trained men. For inspection duties, the emphasis is on workshop training, combined with technical education. For airworthiness and other investigations, the need is for University-trained men, who, however, should have some workshop experience and must have practical experience. There is no scheme of training which will produce the staff of this Branch of the Directorate. One of the few channels through which they can come is employment by the national operators, and we draw attention to our observations on the training of engineers for that purpose.

Pilots (non-Government service)

188. The New Zealand National Airways Corporation have established a school for the conversion training of pilots, who up to date have been almost entirely recruited from the ranks of ex-Air Force pilots. Pilots in service are also given refresher and conversion training from time to time. The training scheme appears to be well conceived and adequate for present purposes.

189. Tasman Empire Airways, we understand, have not found it necessary to go so far as National Airways in the establishment of an initial conversion training school. Pilots are given conversion training on the present type of flying-boat for the purpose of endorsement of their B licences, and subsequently receive periodic Link trainer and other ground instruction and checks. There is a difference in practice between the Corporation and Tasman Empire Airways in the subsequent training of co-pilots. Having initially qualified for the endorsement of his B licence with respect to a particular type of aircraft, the National Airways pilot is given frequent opportunities on service flights to handle the aircraft, thereby maintaining and increasing his experience. Tasman Empire Airways co-pilots, on the other hand, have little or no opportunity to maintain their experience by handling the aircraft on service flights. It is in our experience usual for co-pilots, having initially qualified for the endorsement of their licences on a type of aircraft, to have their experience maintained and developed by handling the aircraft under the supervision of the captain while on service flights. We recommend that consideration should be given to the adoption of this practice. Alternatively, special training flying must be provided so that co-pilots may be competent to carry their full responsibility as members of the aircrew.

190. As a long-term problem it is necessary to look to the initial source of supply of pilots for employment in the airlines, and we note that arrangements are under consideration for the release of short-term service pilots from the Royal New Zealand Air Force for employment by the New Zealand National Airways Corporation after three years' service. In the normal development of civil aviation, however, there must be more than one avenue of employment and therefore other demands for pilots. Subsequently we refer to the contribution which the flying clubs are able to make in the selection and initial training of pilots for this purpose. The prospective air transport pilot has a long road to travel between his initial flight and his employment, even as a co-pilot. Few, if any, could afford to pay for all the air experience required, even if it were practicable to make it available in the form of training. The maximum development of charter or taxi flying and other commercial operations which employ pilots at an earlier stage of their experience than the airlines, to which we have referred elsewhere, has an important bearing on the production of airline pilots.

Engineers and mechanics (non-Government service)

191. We understand that neither the Corporation nor Tasman Empire Airways have yet found it necessary to establish a special training scheme for engineers and mechanics, but the Corporation have drawn up proposals for progressive training. No doubt at present the requirements of the operators can be met by ex-Royal New Zealand Air Force personnel, but the time will come when this source of supply will dry up, and consideration needs to be given to the future. Without doubt, the production of experienced mechanics and licensed aircraft engineers requires systematic training, as well as workshop experience. The normal apprenticeship scheme does not provide all that is needed. The problem is, or will become, a national one, and may involve the establishment of a special school of training whose curricula will be designed to follow on those of the ordinary technical schools and lead to further practical training in the operators' workshops.

192. A large air transport operating organisation, however, requires, as the Sandringham Commission of Inquiry on the (ZK-AME) incident have pointed out, more than technical school and workshop trained men. A certain number of professionally qualified aeronautical engineers is needed in a balanced organisation, and, as we have said, the Government supervisory aeronautical engineering staff should in part be drawn from this source. It is desirable, therefore, to look to the source of supply and training for these professional engineers. We note that the engineering colleges of New Zealand University are already in touch with the Royal New Zealand Air Force and the national operators on this, but we think that the collaboration could with advantage be still

closer. We advocate arrangements whereby Royal New Zealand Air Force engineering officers and officers of the engineering staffs of the national operators would give courses of lectures at the engineering colleges ; also that the Royal New Zealand Air Force and the national operators should make a practice of offering vacation courses in practical engineering to selected undergraduates.

193. We note the remarks in paragraph 6.74 of the Commission's report regarding the bearing of the Engineers Registration Acts on the professional status of aeronautical engineers. We have not had time to inform ourselves on this, but we are emphatically of opinion that the status of aeronautical engineers should in no respects be lower than that accorded to other engineers under these Acts.

Aeradio operators and technicians (non-Government service)

194. The problem is akin to, if not identical with, the training of personnel for the civil aviation aeronautical radio service. We are without information as to the plans of the Corporation and Tasman Empire Airways. Since the problem is a common one, we recommend that consideration should be given to the establishment of common training arrangements for radio personnel for Government and the operators.

195. In passing, we note the admirable training programme for traffic staff established by the New Zealand National Airways Corporation, though we are not directly concerned with this activity.

196. We have received representations on a matter which is closely allied with training and affects the ability of the operators to secure their complement of qualified personnel, particularly engineers. Difficulty is experienced in securing licensed engineers to staff the workshops, and this in part arises from the infrequency of examinations and restrictions on the number of licence categories for which a candidate may be examined at one time. In view of the importance of the licensing system in the regulation of civil aviation operations, the Civil Aviation Directorate should be adequately staffed and organised to meet all reasonable demands for the examination of candidates, and we recommend that consideration should be given to the measures necessary to improve the situation at an early date.

CHAPTER 15.—FLYING CLUBS

197. Flying clubs have a definite and important part to play in any civil aviation training plan. We have received statements from the Royal New Zealand Aero Club and from a large number of the operating aero clubs, both in the North Island and in the South Island. We

have received copies of the representations which they have made to Government concerning their financial position and requests for Government assistance.

198. The recent war showed, in at least four countries we know of—namely, the United Kingdom, India, Canada, and New Zealand—that flying clubs are a national asset. Their contribution in the early stages of the war, in providing an immediate reserve of partially trained aircrew personnel, and in some cases throughout the war, in performing a variety of services, more than repaid the subsidies they had received. New Zealand has not lagged behind the other countries in this respect. Except in time of war, when the scale of training is enormously increased, it is our opinion that a flying club organisation provides the cheapest and most appropriate form of initial training and selection of the men who will take up aviation, whether military or civil, as a career. But the justification for giving State support rests on more than cheap training. By their nature, flying clubs are widespread throughout the country, and with comparatively little assistance are able to maintain themselves in being in a far larger number of centres than could be contemplated by any national or commercial training organisation. By their widespread activities and mobilisation of local interest, they reach many who would not otherwise come in direct contact with flying and could not hope to take an active part in it. Thus the field of recruitment is widened. Not only this, but they perform direct service to the community by the maintenance of small transport units available locally for urgent charter flights, which are frequently of a humanitarian character. Such units could not possibly be maintained on so widespread a scale by a commercial or national organisation.

199. We believe that it is in the interests of the country that the flying club movement should be preserved and given a reasonable chance to develop. The flying clubs form a focus of activity for men of public spirit, and the history of the flying clubs in every country reveals the services which they have rendered to the nation.

200. Flying clubs are suitable organisations for the initial training of pilots, but their limitations should be understood. Advanced training requires more elaborate and expensive equipment, large capital, more specialised training staff, and whole time application of the trainees. Moreover, the management of a flying club, wholly suitable as it is for the proper activities of a flying club, is not, by its nature, suitable for the management of a large business.

201. An essential condition for the continued existence of a flying club is that it shall have enough work to do to use its equipment and paid staff economically, that is, at a sufficiently high factor of utilisation

to spread the overheads. For this reason flying clubs have commonly reduced their charges for flying to a level below the cost of flying. Although this process could not be continued indefinitely, and is only temporarily maintained by inroads on capital and failure to make proper provision for fleet replacement reserves, it has proved the only way to avoid stopping flying altogether. Higher flying charges would debar most of those who now fly, and the inadequate income now earned yet bears a better relation to total costs than would be achieved by high flying charges and low flying-hours.

202. The object is to extend flying facilities to the widest possible class. It has been stated that the flying clubs serve only the richer members of society, and that they exist for the pleasure of these members. This at least is not their aim. If a flying club cannot attract sufficient support from those who are able to pay something for their flying, it would be unable to continue operation, and it would then, incidentally, not be available for the Air Training Corps training which it carries out for Government. This training is paid for at what is in effect less than cost price, since the costs include inadequate provision for reserves. In view of the Air Training Corps training scheme, which should be continued and paid for at a rate which covers the whole cost, we do not advocate differential charges as between young and old, or male and female members. The support of all is required to keep the operations on an economic basis.

203. In order to maintain the flying clubs some measure of State assistance is essential. We do not advocate a complicated system of subsidy. The costs of a flying club consist of three elements—capital costs, standing charges, and operating costs. Government have given assistance to the clubs by the gift of Tiger Moth aircraft, but the gift has involved considerable further expenditure (estimated at £300 or £400 per aircraft) from capital or from current account to recondition the aircraft and put them into service. Some of the clubs have inadequate work for these additional aircraft. The gift has therefore involved a drain on their resources, without the prospect of compensating additional earning capacity.

204. A healthy flying club must have a high ratio of operating costs to standing charges. In a small flying club it may not be possible to raise this ratio sufficiently, and the maintenance of the flying club may necessitate a fixed grant towards standing charges. A club with a larger membership, and therefore, more flying hours may have no need for a fixed subsidy, but none of the clubs is at present able to include in its standing charges adequate provision for reserves to enable it to replace its existing fleet when the aircraft becomes no longer serviceable—much less to modernise the fleet.

205. One method of assistance by Government would be to guarantee to replace, at least in part, the aircraft fleet of the flying clubs, progressively, by more modern aircraft. This would eliminate the need for large provision for reserves, and would thereby reduce fixed charges or maintain them at their present level. In fact, for the reasons which follow, we advocate that part of the assistance to flying clubs should be a capital grant and that it should be given in kind, not in cash. Few if any flying clubs are in a position to choose the best *ab initio* trainer to replace the Tiger Moth; nor is there any reason why *ab initio* training in New Zealand (both in flying clubs and in the Royal New Zealand Air Force) should, in the future any more than in the past, be given on more than one type of aircraft. There are great advantages—first cost of aircraft and spares, availability of spares, and hence maintenance costs—in having one type only. Government is clearly best able to select this type, in consultation, of course, with the flying clubs.

206. Hence we recommend that this should be done and that Government should buy sufficient of these for the Royal New Zealand Air Force and the clubs, with sufficient spares. These trainers should be made available (by gift or loan) to clubs, the number allocated being related to the amount of flying which each club is expected to perform. A proportion of the total spares bought by Government should be earmarked for the clubs and retained for resale by the agent of the aircraft manufacturer in New Zealand, at a price equal to the bulk purchase price.

207. Should a fixed annual grant be given, there appears to be no virtue in allotting it for a particular purpose among the many charges making up the standing charges—*e.g.*, pilot instructor's salary. Some flying clubs are required to pay rent for the use of the aerodrome. It is customary for the State or local authority owning an aerodrome to permit a flying club free use of the aerodrome, thus reducing the need for subsidy. It is recommended that this be done.

208. The other element in a subsidy grant is related to the work done, and therefore to the operating costs, and is customarily in the form of a grant per flying-hour, or the payment of bonus for licences issued and renewed, or a combination of both. There is no particular virtue in a grant on a flying-hour basis, but, without it, the bonuses paid on results need to be higher. In fact, the test of a flying club subsidy is whether it enables the flying clubs selected as worthy of support to cover their standing charges and operating costs, while selling flying at a rate sufficiently low to attract flying members, and to raise the flying-hours to the maximum capacity of the aircraft fleet and instructor personnel. Thus will the overall cost per flying-hour be reduced to the minimum and the commercial revenue raised to the maximum.

209. We recommend that Government should give consideration to the flying clubs' appeal for financial assistance, on the basis of the factors we have set out above. We understand that, while provision has been made in the Civil Aviation Estimates for grants to flying clubs, the Director of Civil Aviation has not hitherto been associated with the question. We consider that the Director of Civil Aviation should be responsible for all developments in civil aviation such as this, and that he should be called on to assess the short-term and long-term effects of such a subsidy scheme, and to prepare specific proposals for consideration by Government.

PART III

I.C.A.O. STANDARDS

“(C) *The interpretation and application of I.C.A.O. proposals for International Standards and Recommended Practices having an immediate and important bearing on New Zealand civil aviation operations.*”

CHAPTER 16—PRESENT STATUS OF I.C.A.O. STANDARDS AND RECOMMENDED PRACTICES

210. Our terms of reference do not call for a comprehensive examination of I.C.A.O. proposals for Standards and Recommended Practices and their application in New Zealand. Indeed, such an examination would not be practicable, since there are no less than thirteen sets of Standards in varying stages of development dealing with technical subjects, and one dealing with economic matters. These contain many thousands of provisions which have been the subject of much detailed work in I.C.A.O. conferences and national administration since the Chicago Conference in December, 1944, and are still far from settled.

211. Nevertheless, we think it useful to review the status of I.C.A.O. Standards and Recommended Practices as established by the Convention and in relation to their present stage of development, as a guide to their interpretation in New Zealand. The technical Standards and Recommended Practices are prepared under the following heads :—

PEL ..	.. Personnel Licensing.
RAC ..	.. Rules of the Air.
MET ..	.. Meteorology and Meteorological Codes.
MAP ..	.. Aeronautical Charts.
DIP ..	.. Dimensional Practices : Dimensional Units to be used in Air-Ground Communications.
AGA ..	.. Aerodromes and Ground Aids.
ATC ..	.. Air Traffic Control.
SAR ..	.. Search and Rescue.
COM ..	.. Aeronautical Telecommunication and Radio Aids to Air Navigation.
COT ..	.. Aeronautical Telecommunication and Radio Aids to Air Navigation (TECHNICAL).
REG ..	.. Aircraft Nationality and Registration Marks.
AIR ..	.. Airworthiness of Aircraft.
OPS ..	.. Operational Standards.

212. Five of these sets of standards have been adopted by the Council and designated Annexes 1 to 5 of the Convention. They have been approved by contracting States, in the sense that a majority of States have not disapproved of any of their provisions by the stipulated date under Article 90 of the Convention. They will therefore come into force, and should be implemented by contracting States, by the dates shown below :—

Annex 1 : Personnel Licensing (PEL)	..	..	1st May, 1949.
Annex 2 : Rules of the Air (RAC)	..	..	1st January, 1949
Annex 3 : Meteorological Codes (MET)	..	..	1st January, 1949.
Annex 4 : Aeronautical Charts (MAP)	..	..	1st March, 1949.
Annex 5 : Dimensional Units to be used in Air- Ground Communications (DIP)			1st January, 1949.

213. The present position of these, and of other draft Annexes which have not reached such an advanced stage, is governed by Resolution II of the Chicago Conference, dealing with the drafts of Annexes for the Convention, which states :—

in so far as the technical subcommittees have been able to agree on recommended practices, the States of the world, bearing in mind their present international obligations, are urged to accept these practices as ones toward which the national practices of the several States should be directed, as far and as rapidly as may prove practicable.

214. As regards the Annexes containing Standards and Recommended Practices which have been adopted by Council and subsequently approved by the contracting States, all contracting States are under an obligation to implement the Standards, as from the specified date, by legislative or other action, or alternatively to notify the International Civil Aviation Organisation of their inability to comply. They must then specify details of the deviations from the international standards which will exist in their aircraft or in their territory in regard to international air navigation (Article 38 of the Convention). Recommended Practices, while urged on contracting States, carry no such obligation.

215. There is a further obligation under Articles 39 and 40 of the Convention in respect of international standards governing the issue of certificates of airworthiness or personnel licences. This is that a statement of the differences between the national standards, on which the certificate or licence was issued, and the international standards shall be attached to the certificate or licence. Compliance with this provision of the Convention has been recognised to be open to objections, and consideration is being given to alternative ways in which the desired information may be provided to other contracting States. The penalty which may ensue from such deviations is that other contracting States may refuse admission to air navigation over their territory of aircraft or personnel of another State whose certificates or licences so deviate from the international standard.

216. An important exemption from the provisions of the Convention relating to airworthiness standards and related performance standards of aircraft is imposed in Article 41 of the Convention, which reads as follows :—

The provisions of this Chapter shall not apply to aircraft and aircraft equipment of types of which the prototype is submitted to the appropriate national authorities for certification prior to a date three years after the date of adoption of an international standard of airworthiness for such equipment.

While there has been disagreement respecting the meaning of this Article, and while its content is at present subject to review, it is generally held to mean that all aircraft at present in operation, together with all subsequent aircraft which may be produced of similar types, as well as all aircraft of types which are produced and certificated within three years of the date of adoption of the Airworthiness and OPS Standards by the Council of I.C.A.O., need not comply with such standards. No AIR or OPS Standards have yet been adopted by the Council, and it is uncertain when they will be, since important provisions in the present drafts are the subject of current and proposed reviews. This subject of the performance standards for aircraft is dealt with in chapter 17.

217. There is a similar provision in Article 42 giving delayed effect to the application of international standards of qualification to personnel holding licences at the date of adoption of the Standards, but this Article has not so far raised any such problem as is raised by Article 41.

218. There has been doubt and perhaps some misinterpretation in the drafting of some standards which appear to impose an obligation on contracting States to provide particular facilities for air navigation, involving perhaps considerable cost. An example is in the draft COT Standards. These prescribe that I.L.S. (radio instrument landing systems) shall be provided at every international airport. The implication of adopting any such provision as a standard would go beyond the provisions of the Convention, in that it seems to place an unqualified obligation on contracting States to provide I.L.S. at every international airport within their territories. This is inconsistent with Articles 28 and 71 of the Convention :—

Article 28

Each contracting State undertakes, *so far as it may find practicable* to :

(a) Provide, in its territory, airports, radio services, meteorological services and other air navigation facilities to facilitate international air navigation, in accordance with the standards and practices recommended or established from time to time, pursuant to this Convention.

Article 71

If a contracting State so requests, the Council may agree to provide, man, maintain, and administer any or all of the airports and other air navigation facilities, including radio and meteorological services, required in its territory for the safe, regular, efficient and economical operation of the international air services of the other contracting States, and may specify just and reasonable charges for the use of the facilities provided.

219. At most, provisions of the kind cited above can have the status of I.C.A.O. recommendations. In fostering the provision of airport and air navigation services I.C.A.O. works through a system of regional conferences, whose task it is to examine the existing facilities in a region and make recommendations as to the improvements needed, which recommendations carry great weight.

220. Apart from the performance standards of aircraft, which are dealt with at length below, there are some other matters on which I.C.A.O. in its divisional meetings and in the Air Navigation Committee has not yet reached substantial agreement. One of these subjects is Air Traffic Control, on which the RAC divisional meeting early in 1948 failed to produce agreed recommendations which could be put to the Council for adoption. The great importance of Air Traffic Control as a safety measure is universally recognised, and, pending international agreement, contracting States are faced with the necessity of instituting air traffic control systems conforming as far as possible with the international recommendations, so far as they have been agreed. We note that the New Zealand civil aviation administration has formulated and introduced such a system.

221. Search and Rescue draft Standards and Recommended Practices have been formulated by the SAR Division, but have not been found acceptable by Council. The great importance of search and rescue systems and organisation is universally recognised. These proposed SAR Standards and Recommended Practices were based primarily on the provision of special search and rescue organisations and not, as it is thought they should be, primarily on the mobilisation and direction of all available resources by the Air Traffic Control.

222. We have observed that New Zealand has in practice developed this latter system, and we are confident that the system at present in use will prove to be largely in line with the revised I.C.A.O. SAR Standards and Recommended Practices.

223. Other I.C.A.O. Standards do not call for particular comment, but aerodrome standards are dealt with in Part IV of this Report (Chapter 18).

CHAPTER 17—I.C.A.O. DRAFT STANDARDS GOVERNING AIRCRAFT PERFORMANCE

224. The AIR and OPS Divisions of I.C.A.O. have made proposals for standards governing the take-off, *en route*, and landing performance of aircraft, and for relating that performance to airfield dimensions. These draft standards have not yet been adopted by the Council of I.C.A.O., and the United Kingdom, supported by some other countries, is pressing for detailed changes in the proposals before such adoption.

Whether or not the United Kingdom view prevails no I.C.A.O. performance standards can become effective for at least three years. Even when such standards do become effective, there will continue in use a large number of non-complying aircraft. This follows from Article 41 of the Convention, which has been quoted above. During this transition period, which must last for a number of years, New Zealand and other signatories of the Final Act of the Chicago Conference have the obligation referred to in paragraph 213 in pursuance of Resolution II of the Conference.

225. It follows from the above, and from recommendations made from time to time by the Council of I.C.A.O., that while New Zealand cannot yet adopt I.C.A.O. performance standards because no such standards yet exist, nevertheless New Zealand has accepted an obligation to regulate civil aviation so as to move towards the probable future I.C.A.O. standards as far and as rapidly as practicable.

226. The proposed performance standards as drafted by the AIR and OPS Divisions during their 1947 sessions are given in the following I.C.A.O. documents :—

Doc. 3031, AIR/181—Airworthiness Division, Second Session, Final Report, Volume III.

Doc. 3030, OPS/145—Operations Division, Second Session, Final Report.

227. The most important feature of these proposed performance standards is the provision made for safe operation in the event of the failure of an engine. The aim is to ensure that passenger aeroplanes used on scheduled services shall have such performance characteristics, and shall be operated at such weights, that if an engine fails at any time during the take-off, climb, *en route* flight, or landing, the pilot will always be able to adopt one of two alternatives—either to complete the planned flight on the remaining engines, or to bring the aeroplane safely to rest at the aerodrome of departure or at some alternate aerodrome *en route*.

228. The regulatory method of achieving this aim involves two different but interrelated sets of requirements—airworthiness requirements and operations requirements.

229. The airworthiness requirements stipulate (a) certain minimum rates of climb with one engine inoperative, and (b) that the take-off, *en route*, and landing performance of the aeroplane is to be determined by the certifying authority as part of the certificate of airworthiness investigation, and that this performance is to be scheduled in an aeroplane flight manual which is linked with the certificate of airworthiness and hence has to be provided with every individual aeroplane.

230. The operations requirements stipulate that the aeroplane must be operated at such a weight that, on the evidence of the performance data scheduled in the aeroplane flight manual, it will be able to take-off from the particular aerodrome proposed, to clear all obstacles *en route*, and to land at the aerodrome of intended destination or at a planned alternate, all with prescribed margins of safety. The operations requirements further stipulate that a performance check establishing the foregoing shall be made before a flight is started, and that this check, which has to be made in a prescribed form, shall be held by the airline for six months and produced for inspection on demand.

231. While compliance with I.C.A.O. Standards is a responsibility of the State itself, and I.C.A.O. is not concerned with the internal administrative arrangements made within a State for discharging that responsibility, the I.C.A.O. proposals outlined above are not inconsistent with the following division of responsibility between the regulating authority and the airline operator. The function of the regulating authority is to issue or validate the certificate of airworthiness, to establish or accept the performance capabilities of the aeroplane scheduled in the aeroplane flight manual, to publish the pertinent aerodrome facts, and to prescribe in general terms the operational safety standards. In discharging this function the regulating authority need take no cognisance of the routes over which it is proposed to operate the aeroplane. The function of the airline operator is to check for each particular route, having regard to the data scheduled in the aeroplane flight manual, the aerodromes available, the meteorological conditions expected or forecast, and all other relevant considerations, that the aeroplane is operated so as to comply with the prescribed safety standards.

232. It is not yet practicable to implement in full the above proposals of the Airworthiness and Operations Divisions of I.C.A.O. Few aeroplanes are yet available with adequate performance capabilities, and the runway lengths available are in many cases inadequate to enable even such aeroplanes to be operated at full load. Hence the immediate problem is to devise regulations for the interim period. Such regulations must take account not only of passenger aircraft used on scheduled services, but of all other aircraft.

233. The devising of suitable regulations is a formidable task. The United Kingdom has been engaged on this task for more than two years. The text of the latest draft of the United Kingdom proposed regulations is given in Appendix G. This text is still in the formative stage.

234. It seems an unnecessary waste of effort for the New Zealand Civil Aviation Directorate to attack the difficult problem of devising performance regulations independently of the United Kingdom. Since both New Zealand and the United Kingdom are I.C.A.O. member States, each has the same task, except in so far as the legislative practices

of the two countries differ. But the common ground covers the whole of the aeronautical aspects of the problem, and if these aspects were worked out jointly by the two countries, the process of fitting the agreed solution into the legislative framework of New Zealand would present no difficulty. Hence it is recommended that New Zealand should collaborate with the United Kingdom in the finalising of the draft interim regulations reproduced in Appendix G (see paragraphs 54 and 55 in Part I).

235. It should be noted that, with one or two exceptions, the aircraft operating the international air services of the world to-day cannot comply with all the I.C.A.O. proposals for performance standards, as they exist. Because of this, the United States Civil Aeronautics Board have postponed, until 1st January, 1954, the application of the relevant United States regulations (C.A.R. 04A and 04B, on the latter of which the proposed I.C.A.O. standards were largely based), except for aircraft certificated as a basic type after 30th June, 1942. This was effected by C.A.R. Amendment 40-2, adopted on 13th February, 1948, and effective 20th March, 1948. This amendment applies to both U.S. international and U.S. internal air transport operations, and was enforced by the realisation that the regulations as they stood would put out of action the majority of aircraft now operating. Moreover, as we have stated (paragraph 216), Article 41 of the Convention as it stands precludes the obligatory international application of the I.C.A.O. Airworthiness and Performance Standards, when adopted, to aircraft of types certificated prior to or within three years after the adoption of those standards. Circumspection must therefore be exercised in applying performance standards to aircraft now operating or to be put into operation during the next few years.

Application of draft regulations in Appendix G to the Tasman service

236. Paragraph 7 (a) of Appendix G contains the provision of the proposed United Kingdom regulations which is relevant to the problem which has arisen on the Tasman service in relation to the Sandringham flying-boat. It stipulates that the aeroplane must have a rate of climb of 100 f.p.m. at 5,000 feet above sea-level, with one engine inoperative, under the atmospheric conditions expected to obtain during the flight. In fulfilling this provision it would be the responsibility of the Civil Aviation Directorate to approve the data scheduled in the aeroplane flight manual showing the relationship between all-up weight, ambient temperature and density, and rate of climb with one engine inoperative and the other engines working within their approved conditions. It would be the responsibility of the operators to prepare a performance sheet for each flight showing that, for the load carried and the conditions forecast on that flight, the prescribed conditions were complied with.

This performance sheet would not require prior approval by the Civil Aviation Directorate. The operators would have a continuing responsibility, which they could not transfer to the Civil Aviation Directorate, of proving in any disputed case that a performance sheet had been correctly prepared for the flight in question.

237. In the particular case of the Sandringham, the rates of climb stipulated by I.C.A.O., the United States, and the United Kingdom draft regulation given in Appendix G work out as follows:—

			Rate of Climb with One Engine Inoperative (Stalling Speed, 73 Knots; Weight, 60,000 lb.)
I.C.A.O. Doc. 3031, AIR/181, para 2.3.4.2.2 and U.S.A. C.A.R. 04B			282 f.p.m. at 5,000 feet <i>in the standard atmosphere.</i>
U.S.A. C.A.R. 04A	..	..	141 f.p.m. at 5,000 feet <i>in the standard atmosphere.</i>
U.K. draft regulation	..	..	100 f.p.m. at 5,000 feet <i>in the atmospheric conditions expected to obtain during the particular flight.</i>

The report of the Commission on the Sandringham (ZK-AME) incident (paragraph 6.32) records that in January, 1939, a density altitude at sea-level of 4,000 feet was recorded at Sydney, and this was accompanied by an air temperature of 45° c.* If in these atmospheric conditions the Sandringham were operated so that at 5,000 feet it had a rate of climb, with one engine inoperative, of 100 f.p.m., then in standard atmospheric conditions at 5,000 feet, the rate of climb would be 255 f.p.m. This is a close approximation to the 282 f.p.m. at 5,000 feet in the standard atmosphere stipulated in the draft I.C.A.O. standards.

238. The figures for the Solent are 382 f.p.m. required by I.C.A.O. at 5,000 feet in the standard atmosphere, corresponding to the Sandringham 282 f.p.m. The B.O.A.C. Solents, which have been tested, have a rate of climb of 400 f.p.m. The Tasman Solents, not yet tested, will have a rather better performance because of their greater horsepower and improved design, and are expected to achieve about 450 f.p.m.

* At the time of the incident on 2nd December, 1947, the air temperature at 200 feet was 15° c.—that is, the temperature of the standard atmosphere.

PART IV

AERODROME STANDARDS AND ECONOMIC PRINCIPLES

“(D) *The standards required of aerodromes in New Zealand for the operation of internal and international civil air services, and the economic principles governing the provision of aerodromes and air route organisation*”

CHAPTER 18—I.C.A.O AERODROME STANDARDS AND THEIR APPLICATION

239. There are three sets of I.C.A.O Standards which bear on the question of aerodrome dimensions—namely, AIR, OPS, and AGA. The AIR Standards prescribe a minimum rate of climb and require other elements in the performance of the aircraft to be determined and recorded in the flight manual. The OPS Standards prescribe the safety margins which should be preserved when operating *en route* and at aerodromes. They therefore provide the means whereby it may be determined whether in any particular conditions a particular aeroplane may be operated with safety over a particular route and taken off and landed at the aerodromes available. The AIR and OPS Standards relating to performance of aircraft are dealt with in more detail in Part III of this Report (Chapter 17). The AGA Standards prescribe the physical characteristics of aerodromes which will ensure safety for all aircraft of the class for which the aerodrome is intended, when operating in critical conditions. They provide a means of classifying aerodromes with reference to the length and strength of the main runway ; they prescribe means for determining the number and length of other runways ; they prescribe the treatment of obstructions on the aerodrome and in the approach and circuit areas ; and they prescribe aerodrome marking systems and procedures.

240. While the AGA Standards were drawn up with reference to the requirements of aircraft of varying characteristics, the Standards themselves do not relate the aerodrome classes to the characteristics of the aeroplanes which may safely use them, except in regard to weight of the aircraft and bearing strength of runways. No comprehensive analysis of the characteristics of existing and projected aircraft for this purpose appears to have been made. In the endeavour to assess the aerodrome requirements of New Zealand, we have collected the data which appear in Appendix H. The figures are far from complete, and their authenticity is in some cases open to doubt.

241. The information needed for the purpose of assessing the principal aerodrome dimensions is the take-off and landing performance of aircraft in terms of I.C.A.O. draft Airworthiness and Operations Standards. This comprises :—

Take-off distances—

To unstick	}	with all engines operating.
To clear 50 feet		

To unstick	}	in the I.C.A.O. "one engine inoperative" case.
To climb 50 feet		
To accelerate and stop		

Landing distance—

From 50 feet height to stop.

From touch-down to stop.

242. Extracting from the data table the take-off and landing requirements for the classes of aeroplanes likely to operate in New Zealand, the length of the main runway and hence of other runways is determined by reference to the OPS Standards. The runway should have a length not less than the maximum take-off distance required for accelerate-stop or to clear 50 feet, or two-thirds in excess of the distance required to land from 50 feet. (OPS Standards Doc. 3030, Part III, section 3, paragraphs 2.1.3 and 2.1.5.)

243. Many contemporary aircraft are operating from aerodromes whose dimensions are very considerably less than those that would be required theoretically if they were to be operated in conformity with the proposed I.C.A.O. Operational and Airworthiness Standards. For example, the Dakota can be and is being operated quite successfully from runways 3,000 to 3,500 feet long. If it were to be operated in compliance with I.C.A.O. Standards, it would require 4,860 feet for take-off, which is obviously a very much greater length of runway than is normally available to this class of aircraft.

244. It will be observed that there are wide variations in the data in Appendix H for some aeroplanes, the reason for which is explained in the appendix. These variations are an embarrassment when planning aerodromes. This difficulty will disappear in a few years' time, for, as the I.C.A.O. Airworthiness and Operational Standards come more and more into use, more aeroplanes will be provided with the aeroplane flight manual described in Chapter 11 of this Report. The airworthiness authorities of the country of origin will be responsible for deciding which of the many possible take-off measurements is to be taken as the official value, and this value will then be scheduled in the manual. Thereafter, the appropriate take-off distances will be those stated in the approved aeroplane flight manual, irrespective of whatever other measurements may have been, or may be, made.

245. I.C.A.O. AGA Standards and Recommended Practices prescribe dimensions and slopes and heights of imaginary approach and other surfaces in the vicinity of the aerodrome. These "surfaces" define the limits above which it is desirable that no obstruction should exist, and it is prescribed as a standard that if such obstructions do exist they must be marked. The prescribed surfaces in some respects vary with the class of aerodrome, and therefore with the class of aircraft for which the aerodrome class is broadly conceived to be suitable. In other respects, the surfaces prescribed are common to all classes of aerodromes. No direct reconciliation can be found for the apparent differences between the OPS and the AGA Standards, but the explanation is to be found in the different approach. The OPS Standards provide the means of determining whether an existing aerodrome is suitable for the operation of a particular aircraft. The AGA Standards prescribe the dimensions of aerodromes and objects in the vicinity which, if incorporated in the design of the aerodrome, will make it safe in critical conditions for all aeroplanes of the class for which the particular Standards were designed—in other words, they incorporate a large margin for some aircraft. Further examination of this reveals the ways which are open to New Zealand in fitting aircraft operations to the aerodromes which it is possible to construct in this country.

246. The approach surface slopes are the most important and critical in the specifications governing the surroundings of an aerodrome. The AGA Standards prescribe a slope of 1 in 50, in the most severe (instrument landing) case, from the ends of the landing strip outwards for a distance of 10,000 feet in both directions. The OPS Standards prescribe, in effect, that the aeroplane will approach at an angle not steeper than 1 in 20, and that nothing must project above that slope. For take-off, the OPS Standards only prescribe that the aeroplane must be able, with the critical engine inoperative, to clear all obstacles with a vertical margin of 50 feet. An aerodrome with an approach slope of 1 in 50 therefore provides a large margin for an aeroplane with a "one-engine-inoperative" climb angle of 1 in 20. While the AGA Standards and Recommended Practices are set out as minima, it is important to bear in mind that they are minima to cover aircraft of widely differing performance characteristics. Where, as in New Zealand, it may at some aerodromes be impossible to satisfy all the I.C.A.O. Standards, safety must be preserved by the choice of aircraft having suitable operating characteristics. In considering obstacles in the approach area, it should be noted that AGA Standards do not prohibit obstacles projecting above the approach surface, but they prescribe an obligation to mark (includes lighting) those which so project. Nothing, however, should project above the steeper slopes prescribed in the OPS Standards. At the same time, there is a great difference between an isolated obstacle in the

approach area which may be marked satisfactorily, and a range of hills which obstructs a large part of the approach area and which, even if adequately marked, would constitute a danger.

247. The circuit zone "surfaces" prescribed in the AGA Standards may be the most difficult to satisfy in full in New Zealand. In a number of places it is possible to locate an aerodrome with two diametrically opposed clear approaches fully satisfying the AGA requirements for approach areas, and where local prevailing winds are sufficiently regular in direction, these two directions of approach may be all that are required. At the same time, neighbouring hills on both sides, as in a valley site, or on one side, as at some coastal sites, may project well above the prescribed surfaces in the circuit zone. The horizontal surface, applicable to all aerodromes, at a level of 150 feet above the aerodrome reference point, and above which all obstructions should be removed or must be marked, extends to $2\frac{1}{2}$ miles in all directions; and the "conical surface," applicable to Class C international aerodromes, extends to 300 feet at three miles from the aerodrome reference point. Bearing in mind that marking is not a fully satisfactory method of dealing with anything but isolated obstructions, it is clear that the I.C.A.O. AGA Standards for circuit clearance cannot be fully met at a number of existing and projected aerodromes in New Zealand. Nevertheless, aircraft with adequate manoeuvrability can operate with safety at such aerodromes in visual flight conditions, and in some cases even in instrument flight conditions with modern instrumental aids and suitable operational procedure. Some sacrifice of regularity—that is, acceptance of a lower standard of usability of the aerodrome—may be necessary. New Zealand is not the only country where such conditions exist and where some departure from the I.C.A.O. AGA Standards as now proposed will be necessary. It appears desirable that I.C.A.O. should study the amendment of the draft Standards. We recommend that, while New Zealand aerodromes are planned to secure the nearest approach to compliance with the draft Standards, the problem of amendment should be pursued with I.C.A.O.

248. When the problem of installing instrument landing aids and prescribing instrument approach procedures is faced, it will be found that they affect areas much more extensive than those covered by the AGA approach areas, and that the procedures have to be designed for each aerodrome and for the particular type of aid installed. I.C.A.O. have not yet produced any final recommendations on standards concerning the application of instrument landing aids, it being a subject of peculiar technical difficulty on which to obtain international agreement. The Ministry of Civil Aviation in the United Kingdom, however, have given the matter considerable study and have produced a Notice to Airmen (No. 117/1948) setting out the instrument approach and holding

procedures applicable to the instrument landing aids installed at aerodromes in the United Kingdom. In doing so, they have prescribed the dimensions of the approach and overshoot areas needed for the safe operation of each individual aid.

249. As an example, in the case of S.C.S. 51, the approach section covers an area extending up to 15 nautical miles from the aerodrome, and the overshoot section extends up to seven nautical miles in the opposite direction. Operational procedures require the maintenance of certain heights above the clearance surfaces prescribed, and the existence of obstructions above the clearance surfaces has the general effect of raising the height at which the operation is performed, by the height of the obstruction above the clearance surface. This does not mean that no obstructions in these extensive areas can be accepted, but severe obstructions would necessitate a great departure from the ideal procedure, and might even render the operation impracticable. In some places, this factor, in addition to I.C.A.O. Standards, must be given consideration when planning aerodromes at which instrument approaches have to be made.

250. The installation of approach lighting and instrument landing aids necessitates construction in an area extending up to 3,000 feet from both ends of the landing strip concerned. It is not essential to clear the whole of this land, and therefore not essential to incorporate it in the aerodrome. In planning new aerodromes, however, the necessary rights to cover construction and clearance around radio aids should be secured.

251. The foregoing references to approach areas emphasise the need for aerodrome zone planning and control of the development of land within the aerodrome zone. We note that Government have powers under the Public Works Act, 1928 (sections 2 to 6), for this purpose, which it appears have not been widely exercised. We recommend the preparation of a zoning plan for all important aerodromes as the basis for action under the Public Works Act. Such zoning plans are of value, not only to aviation, but to all other national and local planning authorities.

252. It will be appreciated that any obligation to comply with I.C.A.O. AGA Standards, when they are adopted, will apply only at aerodromes open to international air navigation. Moreover, New Zealand, by reason of its geographical situation, will be concerned for this purpose only with the Standards appropriate to the larger aircraft. The significance of the Standards of lower class in relation to aerodromes for internal flying is only that they provide a convenient standard of reference. Internal aerodromes may vary from the Standards which would strictly be applicable if they came within the ambit of

I.C.A.O., but in such variation, the safety factor must be assessed and should be maintained at the same high level, perhaps by accepting a lower standard of utilisation and therefore regularity of service.

253. With the foregoing considerations in mind, and noting that there are some I.C.A.O. Standards which it will not be possible to satisfy everywhere in New Zealand, we have made an assessment of the standards to which we consider aerodromes should be constructed. We recommend that all international airports be constructed to I.C.A.O. C4 standard, except at Auckland, where provision should be made for further development. Major internal aerodromes need not comply with standards higher than I.C.A.O. Class D5, while the equivalent I.C.A.O. standard for minor aerodromes may be as low as Class G. These assessments are dealt with more fully in succeeding chapters.

CHAPTER 19—INTERNATIONAL AIRPORTS

254. To provide for the international air services by landplane and seaplane to Auckland, Wellington, and Christchurch, referred to in Part II of this Report, the international airports which we think are required in New Zealand, and the I.C.A.O. Standards which should be applied to them, are—

				Initial Standard.	Ultimate Standard.
For landplanes—					
Auckland	..	..	..	C3	B3
Christchurch	..	..	..	C4	C4
Alternate aerodrome for landplanes—					
Ohakea (RNZAF)	..	..	..	C4	C4
For seaplanes—					
Auckland	..	..	..	B2	B2
Wellington	..	..	..	B2	B2

255. The Auckland airport, as the trans-Pacific terminal, should be planned for ultimate development to I.C.A.O. Class B3. New runways should be constructed with an initial strength factor equivalent to I.C.A.O. Class 3 for economy reasons. At no other international airport, regular or alternate, is it necessary to construct runways exceeding Class C in length or Class 4 in strength. The I.C.A.O. Southern Pacific Regional Conference recommended a Class C aerodrome at Auckland. This recommendation was related to current needs.

256. A fully equipped alternate international land aerodrome is needed for both Auckland and Christchurch. They are too far apart to serve fully as alternates to each other. Ohakea is ideally situated geographically and topographically to serve as alternate for both.

Since any development work at Ohakea will benefit the Royal New Zealand Air Force, and the amount of civil use involved by its designation as an alternate is unlikely to interfere with the Air Force, no more economical solution could be found.

257. The reasons for rejecting the claims of sundry local authorities for international airports located at minor cities and towns are given in Chapter 5, paragraph 82.

258. The problems involved in providing the international airports required and the reasons for rejecting Wellington as the location of an international land aerodrome, are examined below.

Auckland

259. We have examined the Air Force aerodrome at Whenuapai and come to the conclusion that this aerodrome can never be made to comply fully with I.C.A.O. international aerodrome safety requirements, because of the hills in the immediate vicinity of the aerodrome. These hills not only constitute irremovable flightway obstructions, but also circuit obstructions, and in neither respect can the aerodrome ever be other than substandard. Moreover, it is possible to extend only one of the runways to the required length, except at prohibitive cost. These basic limitations, taken together with the fact that Whenuapai is and will continue to be required as an Air Force aerodrome and cannot accommodate both military and civil operations when they expand much above their present level, convince us that it will be necessary to construct a new international civil airport in the Auckland area.

260. The Civil Aviation Directorate and the Ministry of Works (Aerodromes Engineer) have prepared an exhaustive analysis of the physical characteristics of Whenuapai aerodrome and its possible development, and the extent to which it fails to meet I.C.A.O. proposed standards. A note on the principal limitations to its development as an international airport is given in Appendix I. In view of its present shortcomings, we agree with the Director of Civil Aviation that Whenuapai can only be safely used by international air services, subject to certain restrictions. These restrictions, we need hardly add, will bear increasingly on the efficiency and regularity of international air services as they expand, and as new types of aircraft are introduced.

261. On the practice of "joint user" of an aerodrome by Air Force and civil aviation, it should be appreciated that, while the growth in volume of total traffic would in time place a limitation on the use of the aerodrome by both, there is in fact a present limitation arising from the different nature of military and civil operations. While casual use of an Air Force aerodrome by civil aircraft or of a civil aerodrome

by military aircraft imposes no problem, in no country that we know of has it been found possible to combine a principal Air Force aerodrome with a major international airport.

262. The distance of Whenuapai from Auckland, even when new roads have been constructed, is an adverse factor resulting in continually recurring costs. Moreover, its situation north of Auckland involves the majority of internal air services in longer flying than would a more favourably situated aerodrome south of the city, and therefore adds to recurring costs. It has been calculated that these additional costs are substantial. We mention this, not as a prime factor, because such costs for a variety of reasons have to be accepted at many places in the world, but as an additional reason for an alternative solution justified for other reasons.

263. We are informed that plans for the development of Auckland city, involving harbour, railway, road, bridging, and housing projects, estimated to cost £20,000,000, have reached an advanced stage, and that construction of some parts of these projects is likely to commence in the near future. Modern city planning cannot be complete without airport planning. The site of the airport affects planning in a large area surrounding it. It needs no emphasis that the problem of the future Auckland airport should be considered in relation to these plans and the site decided now in order to ensure the best and most economical solution. Failure to do so might even make it impossible to achieve a satisfactory solution. In the light of the cost of the developments planned for the city, the expenditure of (say) three million pounds on a new international aerodrome, which will serve not only the city but the whole country, is thrown into better perspective.

264. We have made a brief inspection of two sites tentatively proposed by the Civil Aviation Directorate and the Ministry of Works which appear to offer possibilities of development of a satisfactory international airport for Auckland. Some survey work and other investigation has been carried out, and the search has been narrowed down to these two sites—one at Mangere, adjacent to the existing aerodrome, and the other at Pakuranga, approximately ten miles south-east of the city. The latter appears to have the advantage of location near to a planned main road, which will give quick access to the city, and within easy reach of a planned housing development area. The choice between these two sites can only be made on the basis of meteorological surveys to provide the essential data concerning visibility and winds, and operational and engineering surveys to determine the layout and the work involved. Meteorological surveys inevitably take time. The cost of the surveys, which may amount to a few thousand pounds, will be small compared with the total expenditure involved and the economies which can be

effected by proper planning. We recommend that these surveys should be authorised and put in hand without delay. More detailed comment on the two sites is given in Appendix I.

Ohakea—Alternate international aerodrome

265. The Royal New Zealand Air Force aerodrome has two runways of adequate length to serve as an alternate to a Class B international aerodrome. It is situated in one of the few areas in New Zealand where operations are not restricted by topography. We understand that the Air Force have no objection to its use as an international civil alternate, and its development as such will be of benefit to the Air Force. An alternate to every aerodrome served by scheduled air services is necessary, so situated that it can be used when the aerodrome of destination is closed by weather. It is more necessary for international air services operating over long stretches of water with no land *en route*, and where weather conditions at the aerodrome of destination may deteriorate after an aircraft has passed its "point of no return." It is still more necessary when the regular aerodrome of destination has physical limitations which make it more liable to be closed by weather, as at Whenuapai. In all cases the need for an alternate is greater at night when weather conditions at an aerodrome are more critical.

266. The development required at Ohakea for this purpose is approach and runway lighting and an instrument landing system. While bad weather conditions will not necessarily exist simultaneously both at Auckland and Ohakea, the possibility cannot be ignored. Both regular and alternate international aerodromes should therefore be equipped with instrument landing and with lighting systems. The need for these aids at Ohakea will therefore continue even after the development of international airports at Auckland and Christchurch, and they will remain an asset to the Air Force. They are more likely to be called into use by civil aircraft while Whenuapai is the only international aerodrome. We recommend, therefore, that these aids should be installed at Ohakea as soon as possible.

Wellington.

267. The opinion has been stated that there is no possibility of developing a safe land aerodrome for international air services at Wellington. To avoid repetition, Rongotai and Paraparaumu are examined under the head of "Internal Aerodromes" in the next chapter. For the present purpose it is sufficient to say that even if the whole isthmus of Rongotai were cleared and the north-south runway extended (at great cost) to I.C.A.O. dimensions for a Class C aerodrome, the constriction of the approaches in Evans Bay and Lyall

Bay and the obstruction of the circuit area by close ranges of hills on both sides (Mount Victoria (650 feet) and Mount Crawford (530 feet)) would render it unsafe for the operation of large transport aeroplanes.

268. The situation of Paraparaumu is less critical, but the hills which extend along the east side at a distance of two miles constitute obstructions in the circuit zone which make it impossible to comply with present proposals for I.C.A.O. Standards applicable to Class C aerodromes. We have not worked out in detail the runways which would be required, but it appears probable that the approaches of some of them in instrument flight conditions would also be obstructed to a dangerous extent. Whether instrumental aids and operational systems will be developed to such an extent as to make it possible to construct an international aerodrome at Paraparaumu it is not possible to forecast. In view of the distance from Wellington of any area where these adverse factors would not be encountered, we do not consider that it would be justifiable to attempt to construct an international land aerodrome to serve Wellington at present. In fact, if a solution more distant than Paraparaumu should be sought, there would be advantage in locating the international aerodrome at Palmerston North, which is a secondary centre of population and communications. Connection with Wellington by internal air service would still be necessary. We do not consider there is a case at present for building an international aerodrome 100 miles from Wellington. It has been suggested that Blenheim might be a suitable location for an international airport for Wellington. Its separation from Wellington by water, in our view, rules it out.

Christchurch

269. The site of the present aerodrome at Harewood is ideal in itself for development as an international aerodrome. We have examined proposals for its development in discussion with the District Engineer and the Harewood Overseas Air Terminal Committee. Plans have been prepared for the development of the aerodrome up to I.C.A.O. Class B standards. We think that development to I.C.A.O. Class C4 will be adequate, and that the aerodrome could be readily and cheaply extended to comply with this standard. A wind analysis shows that landing strips in two directions only would give a usability factor of approximately 98 per cent. We recommend that the aerodrome should be designed on this basis, but provision should be made for light aircraft in a turfed area of smaller dimensions.

270. Before a decision is taken to proceed with the development of Harewood it will be necessary to find a solution for the operational problem involved in the proximity of the Air Force aerodrome at Wigram. The two aerodromes are four miles apart. In consequence,

flying operations at the two aerodromes suffer mutual interference and involve an element of risk. We understand that interference with the Air Force training programme at Wigram is already experienced, and expansion of the training programme or increased civil traffic at Harewood will accentuate the difficulty. When Harewood is developed as an international airport and equipped with instrument landing aids it will be impossible to operate at Wigram simultaneously in instrument flying conditions. In our view, there should be a minimum distance of ten miles between two such major aerodromes.

271. While it is not necessary to stop flying at either aerodrome at present, we are convinced that the inevitable growth of traffic will in a few years make it necessary to close one of them, or to regulate flying at the Wigram aerodrome to such an extent that it will cease to serve its purpose as a principal Air Force aerodrome. It could be retained for secondary purposes. It is clearly necessary to face this issue now and decide whether the Harewood scheme should be abandoned in favour of another site, or whether the ultimate closing of Wigram as an Air Force station and the transfer of operations elsewhere should be planned.

272. Any alternative to Harewood which might be selected should not be materially less conveniently situated than is Harewood. We found only one site which would satisfy this condition and at the same time was sufficiently remote from Wigram. This area is seven miles north of the city, near the coast south of the Waimakariri River and immediately south of the locality known as Stewart's Gully. The engineering problems involved in construction on this site are a matter for investigation. The only other possible alternative appears to be about 15 miles north-west of Christchurch, along the south bank of the Waimakariri river. Its remote situation appears to rule it out.

273. If no acceptable alternative to Harewood is available for the international airport, then it is necessary to face the issue that Wigram must be gradually reduced to secondary Air Force activity and the major activities transferred elsewhere. There appear to be two alternatives in the vicinity of Christchurch, both of which were developed as aerodromes during the war, and where the cost of constructing runways, both because of the gravel subsoil and because of the work done during the war, would be minimised. These are Norwood and Te Pirita.

274. We are informed that the capital investment at Harewood is in the region of £350,000, and at Wigram approximately £870,000. We are also informed that, since it is planned to develop the district adjoining Wigram aerodrome as an industrial area, the sale value of the land is estimated at approximately £265,000, and of the buildings and other services £442,000. There would be comparatively little, if any, loss of capital in disposal.

275. The larger development expenditure at Wigram might suggest that this aerodrome should be retained rather than Harewood. We would not advise this course, for the following reasons :

- (a) Wigram is within three miles of a range of hills to the south-east, which in fact would constitute a circuit obstruction for an international civil aerodrome.
- (b) Wigram is not located on the gravel subsoil which makes Harewood and other sites inland from Christchurch so suitable for construction. Runways at Wigram would be more costly than at Harewood.
- (c) Wigram is situated on the edge of an industrial area which is to be vigorously developed. It appears that the aerodrome will be surrounded on two sides by a built-up area, and there will be sundry obstructions in the form of high chimneys and buildings.

276. A statement of the views of the Harewood Overseas Air Terminal Committee is attached as Appendix J.

Water aerodromes

277. The I.C.A.O. Aerodrome classification B2 recommended is based on the use of flying-boats of approximately the size of the Short Solent. If at some future date a flying-boat of the Saunders Roe SR45 class (350,000 lb. all-up weight) were to operate to New Zealand, the harbours at Auckland and Wellington would appear to be suitable.

278. *Auckland*.—It is unnecessary to say anything about the suitability of Waitemata Harbour, which has been used for so many years. We only wish to call attention to the need for reviewing carefully proposals for major capital expenditure on the development of the seaplane base, in view of the uncertainty that flying-boats will be available for the replacement of the Solent flying-boats at the end of their period of operation (*vide* Chapter 5, paragraphs 90–93).

279. *Wellington*.—We do not feel satisfied that the condemnation of Wellington Harbour as a suitable place for the operation of flying-boats, which was based on investigations made some ten years ago, is valid. The advances which have been made in flying-boat design and the greater size and better performance of modern flying-boats justify a fresh investigation, which should be undertaken by pilots with up-to-date experience of flying-boat operation. Trials may be necessary to give a satisfactory answer to all the questions which arise, and they should be undertaken with flying-boats having a good reserve performance. The favourable factors in flying-boat operation at Wellington, which are absent in some other harbours we have inspected, is that there is a water area of adequate depth extending up to five miles in all directions, and

that between the hills surrounding the harbour there is air manœuvring space of at least six miles in all directions. The rough water, which was one of the factors on which it was condemned, will probably not be a serious factor for large flying-boats. Sheltered moorings and embarkation area are essential, and if Evans Bay does not always afford this, alternative mooring and disembarkation areas might be located. No large capital expenditure for this purpose would be justified, particularly in view of the doubt whether seaplanes will continue to be operated after the retirement of the Solents. For the same reason it must be carefully considered whether it would be justifiable to institute a seaplane service to Wellington, with no certainty that aircraft will be available to operate it for more than five to seven years.

CHAPTER 20—INTERNAL AERODROMES

280. We recommend that, where possible, all aerodromes on the National Airways Corporation's trunk routes should ultimately be developed to I.C.A.O. D5 standard. It may only be necessary to undertake initial construction to E5 standard at most of these aerodromes, bearing in mind the policy to operate Lodestars and Dakotas on the trunk routes for some years.

281. At aerodromes served by minor air services operated with smaller aircraft, the ultimate standard recommended is I.C.A.O. Class E6. Initial construction to I.C.A.O. F class will probably be adequate at most of these aerodromes for some time. At other minor aerodromes principally used by flying club and taxi aircraft, I.C.A.O. Class G should be adequate.

282. The standards recommended are generally in line with those now being adopted by other countries with similar problems and with proposals prepared by the Director of Civil Aviation. The assessment of the standard required will have to be made individually for each aerodrome.

283. We comment below only on particular internal aerodrome problems to which our attention has been called or which appear to have special features.

Rongotai

284. We have examined plans of the proposed development of Rongotai to I.C.A.O. Class E standard. This appears to be the maximum I.C.A.O. Aerodrome class which can be achieved without incurring heavy capital expenditure in extending the runway into deep water in Evans Bay. Moreover, it is doubtful whether such further extension would be

justified, in view of the limitations imposed by hills which restrict the air approaches. This means that the classes of aircraft which will be able to operate at Rongotai with safety will be limited and operations in instrument flight conditions will be strictly limited.

285. We appreciate that there is no alternative site for the construction of an aerodrome in the vicinity of Wellington, and it is necessary that Wellington should have an aerodrome convenient of access from the city. It is only on this basis that the proposal to construct an aerodrome at Rongotai can be justified. We recognise that a great deal of thought and careful planning have been devoted to this project. Nevertheless, we feel bound to draw attention to certain unsatisfactory features of the scheme and to suggest certain minimum improvements :—

- (a) The satisfactory development of this aerodrome for safe operation of the internal air services and other air traffic will involve clearing the greater part of the isthmus of Rongotai of houses and other obstructions. While some of the clearing can be deferred, the ultimate effect of building an aerodrome on this site should be faced before the project is commenced.
- (b) The proposed north-south landing strip is sited in the best position now attainable, but is too far west, with consequent encroachment on the approaches at the north end by the slopes of Mount Victoria in the vicinity of the Patent Slip and at the south end by the hills projecting into Lyall Bay at Arthur's Nose. The best position for the runway would be on a parallel line further east, passing through the site of the Power-house. We appreciate that the Power-house cannot be demolished now, but it will be found necessary to do so later and to relocate the landing strip.
- (c) The proposal to build the landing strip initially 300 feet wide and to demolish houses only sufficient for this purpose is one with which we cannot agree. The minimum width recommended by I.C.A.O. for any landing strip at any aerodrome is 500 feet, and this is based on the supposition that the aerodrome will be built in open country and not surrounded by a crowded residential district. For an instrument runway on a Class E aerodrome, the width of strip recommended by I.C.A.O. is 1,000 feet. There is a danger not only to aircraft but to local residents in the present proposals. The minimum width of strip which we could recommend for initial construction is 500 feet. To give the I.C.A.O. side clearance of 1 in 7, houses 20 feet in height should be set back 150 feet, making a total clearance of 800 feet in width.

- (d) An isolated landing strip with no taxiway to serve it will retard operations to such an extent as seriously to limit the traffic-handling capacity of the aerodrome. Dependent on the position of the embarkation area, the time needed to clear the runway may reduce the rate of traffic handling by as much as one-half. Without a taxiway, we do not think that the aerodrome will be able to handle the traffic at peak periods after a few years, which has been estimated by the National Airways Corporation at one aircraft every three minutes. The minimum width of strip required to accommodate both the runway and a taxiway we consider would be 700 feet, which would necessitate the clearing of houses up to 1,000 feet.
- (e) For the foregoing reasons, we believe that the main road subway under the airfield as at present planned will be found too short. The relative costs of building the full length of subway necessary in the first place, or extending the subway later, should be explored.
- (f) To reduce the congestion of aircraft near the runway it would appear to be desirable that all hangars and service buildings should be located on or in the vicinity of the existing landing ground south-east of the strip. Only the administration and passenger-handling buildings would then be located in the north-west corner in Evans Bay.

Paraparaumu

286. When Rongotai is developed, the main purpose of Paraparaumu will be to serve as an alternate for Rongotai. For this purpose it will be necessary to retain a landing ground. The high range of hills extending along the east side of the aerodrome, which reach 1,200 feet within two miles, makes it impossible for this aerodrome to comply even with I.C.A.O. Class E standards in regard to circuit clearances. The fact that all other sides of the aerodrome are open, however, makes it possible to operate safely with stringently enforced operational procedures and limitations. The National Airways Corporation have in fact operated safely under the present rules for some time. In view of the projected development of Rongotai and our recommendation that an international aerodrome should not be built in this vicinity, it would not appear necessary to undertake any major development of this aerodrome.

Palmerston North

287. Although we have advised against an international aerodrome at Palmerston North, it will remain an important internal aerodrome, and ultimate development to Class D5 would appear to be desirable. So long as the National Airways Corporation base is located at this

aerodrome it has a dual importance, and the necessity of maintaining it in serviceable condition is emphasised. When we visited Palmerston North the aerodrome had been closed to light aeroplanes, and the flying club was therefore out of action, for seven weeks because the surface had been cut up by heavy aeroplanes. There was, in those conditions, a risk of accident even to transport aeroplanes. In our view, it will be necessary to construct hard runways to maintain the aerodrome in serviceable condition for the purpose of the internal air services.

Hastings and Napier

288. The situation of these two towns, each with a population of approximately 20,000 and thirteen miles apart, provides an example of the need for joint planning. From the point of view of economic air transport operation and economy of airport development and operation, there is no question that these two towns should be served by one conveniently located aerodrome. This would be so even were the population of each to grow to perhaps two or three times the present population. Both towns are at present served by the Napier aerodrome, which, when current extension work is finished, will be adequate for the National Airways services. The aerodrome is two and a half miles north of Napier (four miles by road) and fifteen and a half miles north of Hastings. Hastings has a small flying club aerodrome at Bridge Pa, five miles south of the town.

289. Both towns are anxious to have their own aerodrome, and the Hastings civic authorities have proposed developing what is known as the Karamou site, just north of the town on the Napier road. This site, which is already fringed by building development, we consider to be too near to the town. The approaches to the aerodrome will inevitably be obstructed by surrounding buildings or the development of the aerodrome will interfere with town planning.

290. The Ministry of Works have already investigated a site midway between the two towns. Although the site is level and open, it is low-lying, marshy ground, and subject to flood. It has been estimated that the cost of developing an aerodrome on this site would be in the region of £300,000, which would hardly be justified. Before abandoning the solution of a joint aerodrome, we recommend that an exhaustive investigation should be made to endeavour to find a site for an aerodrome which will serve both towns equally, and with little more inconvenience than is involved for Napier with the use of the present aerodrome. Only if this is proved to be impracticable should two separate projects be approved. The cost of operating air services to serve two such towns separately would counterbalance any apparent immediate saving. This is a case essentially where national planning rather than local planning is required.

Dunedin (Taieri)

291. Taieri aerodrome has been allowed to develop to a dangerous extent beyond its original purpose. Initially the aerodrome was developed as a flying club aerodrome, to be used and operated only in fair-weather conditions by light manoeuvrable aircraft. The site was chosen because it was the nearest area of flat land to the city of Dunedin suitable for that purpose. Inevitably, as the years passed and aviation developed, the aerodrome has had to be extended to meet contemporary aircraft demands. Buildings and ancillary services have also been developed, mainly for Air Force purposes during the war, so that to-day the capital investment in the aerodrome is quite considerable. But it is no longer a safe aerodrome for modern aircraft. Aircraft performance characteristics have become steadily more exacting in respect of aerodrome requirements, as wing and power loadings have increased through the years. To-day, in order to ensure safe operations, it is necessary to have unobstructed circuit and approach zones stretching out anything from three to five miles from the centre of an aerodrome.

292. Taieri is situated at the head of a valley and is surrounded on three sides by high hills less than a mile from the boundary of the aerodrome, making it virtually impossible for modern transport aircraft to take off in safety except in one direction—that is, down the valley. In the same wind conditions, the approach to land has to be made over the hills at the head of the valley. In any other direction, if an engine were to cut out soon after take-off, the aircraft would have a reduced or no rate of climb, and its chance of survival we consider would be very small indeed. This hazard is bad in fair-weather conditions, but bad weather, with low cloud and low visibility is frequently experienced in the vicinity of this aerodrome during the winter months. It is then dangerous. We therefore recommend that the aerodrome be abandoned as soon as possible and a new site developed in a less dangerous locality.

293. During our visit to Dunedin we undertook a brief and superficial survey of the country surrounding the city. Two sites were suggested to us by the local authorities—one at Green Island Beach and the other on reclaimed land at the head of the harbour. Both these sites we considered to be totally unsuitable for development as aerodromes, even for light aircraft. There is only one locality in the vicinity of Dunedin where an aerodrome for transport aircraft could be made with reasonable safety. This is further down the Taieri Valley, where open approaches from two opposite directions can be secured. An aerodrome with two opposed open approaches is at least four times as safe as an aerodrome with one open side only. The vicinity of Momona, in the centre of the widest part of the valley, on partially consolidated land protected by the flood-water stop-bank, and fifteen miles from Dunedin, appeared

to us to be the most suitable area. An aerodrome on this site we consider could be provided with four safe directions for take-off and landing. This could be achieved by siting two runways crossing at an oblique angle with unobstructed approach paths up and down the valley for five miles at least in any of the four directions. The mountains on the west side of the valley and the hills on the east side are undesirable features, but they are five miles apart, which gives some latitude of manœuvre for aircraft of the types which will serve Dunedin, and which provides scope for the development of safe operational procedures. The locality is easily accessible from Dunedin by the main south road, and the disadvantage of road distance will be more than offset by the improvement in regularity and safety of scheduled services. We therefore recommend that an investigation of sites in this locality be carried out at an early date, and that Taieri aerodrome should be closed for air transport services as soon as a new aerodrome can be prepared.

Otago Harbour

294. We examined the Otago Harbour Board's proposal for the development of an international flying-boat base in Otago Harbour. We found that the harbour is too restricted by hills surrounding it on all sides to afford adequate air approaches and air manœuvring space. The water area is adequate only in one or two directions, and there is doubt whether the depth of water in these is adequate. Most of the area outside the shipping channel is shoal, and the shipping channel is tortuous and obstructed. The harbour is unsuitable for regular operation by large flying-boats.

295. We see no reason why small seaplanes should not be operated in Otago Harbour if it were found desirable to connect Dunedin with the lakes and other water areas where landing grounds do not exist.

Central Otago

296. Each of the more important townships in this area is anxious to be included in the National Airways Corporation routes, and considerable rivalry exists as to which possesses the most suitable aerodrome or site. In the course of our tour we visited Queenstown, Cromwell, Alexandra, and Wanaka, and inspected the aerodromes and proposed new sites at each place. We think that the proposed new site at Alexandra, on what is known as the "high terrace," is the most suitable for the operation of National Airways Corporation scheduled air services. Being on the fringe of the mountain area and in a wide valley, it will afford the greatest safety and regularity factors. If this aerodrome site is developed as proposed and served by the National Airways Corporation, arrangements could be made for passengers from such towns as Cromwell, Wanaka, Queenstown, and Roxburgh to be connected with the service

by air taxi services from the local aerodromes. As explained in Chapter 5 (paragraph 100) we do not consider that it would be an economic proposition to serve all such minor centres direct by scheduled services. The aerodrome at Alexandra should be developed to I.C.A.O. E5 standard. The other centres need only landing grounds of I.C.A.O. F or G standard. It would not be justifiable, for example, for Cromwell to develop a new aerodrome on the new site selected. The present landing ground could be adequately improved.

Invercargill

297. *Land aerodrome.*—We were asked to look at an alternative to the present aerodrome on a site at Sandy Point. The present aerodrome suffers from the disadvantage of being below sea-level and needing pumping. It appeared to us that hard runways would be necessary. Both this and the new site appear to be equally acceptable from the point of view of air operations, while the site on Sandy Point has the advantage of being above sea-level. We understand, however, that consolidation of the soil may be expensive. We are unable to offer any comment of value on these sites. The solution depends almost entirely on the result of engineering surveys and estimates.

298. *Bluff Harbour.*—We inspected Bluff Harbour and were shown plans prepared by the Harbour Board of seaplane alighting channels which could be made available. Superficial examination shows that the harbour is free from the disadvantages attaching to many harbours in New Zealand, in that it has open approaches in all directions except the south, where it is obstructed by the Bluff itself. While there is ample open water, only restricted areas have ample depth. It appears that, with careful layout of channels, adequate marking, and perhaps some dredging, Bluff Harbour would be suitable for the regular operation of flying-boats. In expressing this opinion, we should not be understood as expressing a view on the economic desirability of operating overseas air services by flying-boat to Invercargill. Like Otago Harbour, Bluff Harbour would be suitable for the operation of small seaplanes to the lakes and other water areas where no landing grounds can be made.

CHAPTER 21—AERODROME EQUIPMENT: FIRE AND CRASH

299. While we are not called on to comment in detail on the problems of aerodrome equipment, our attention has been drawn to one aspect of aerodrome equipment and manning the importance of which cannot be over-emphasised. The Director of Civil Aviation has been devoting vigorous attention to this problem but we could not help observing that the organisation and equipment at civil aerodromes in New Zealand for dealing with accidents resulting in fire is wholly inadequate. Great risk is at present being accepted.

300. Experience shows that more aircraft accidents occur while landing or taking off than during any other phase of flight. It follows that special arrangements should exist at all aerodromes to deal quickly and effectively with such accidents. In spite of enormous experience and the development of techniques and equipment during the war, it cannot be said that a full solution of the problem has anywhere been reached. Nevertheless, it is incumbent on all aerodrome authorities to provide the best organisation possible to limit the effects of aircraft fires and to rescue people involved in them. The organisation is expensive in equipment and in personnel.

301. The International Civil Aviation Organisation has given some attention to the problem of prescribing standards of equipment and systems, but the study is by no means complete. Attention is directed to the Report of the Third Session of the Aerodromes, Air Routes, and Grounds Aids (AGA) Division (Doc. 4809), Part VIII of which sets out systems and scales of equipment.

302. While complete security can never be achieved, we strongly recommend that Government should make funds available for the provision of a greatly improved scale of equipment at all the important aerodromes. The equipment includes crash, fire-fighting, and rescue vehicles equipped with extinguishing apparatus, tools, protective clothing, lighting, first aid, and radio communication. The scale of equipment required varies with the amount of traffic and the size of aircraft using the aerodrome.

303. The problem of personnel for the fire-fighting crews is a difficult one. At most aerodromes it will be impossible to provide the whole of the fire-fighting crew on a whole-time basis, and a system of enrolling and training volunteer personnel from among those employed at the aerodrome is inevitable. At international aerodromes and at some internal aerodromes with heavy traffic we consider it necessary to employ a nucleus professional fire and crash crew. At other major aerodromes there should be a special fire officer, who would have the responsibility of organising and training the fire crews and taking charge of operations. Wherever fire-fighting and crash rescue vehicles are provided, drivers and the minimum crew should be employed whole time to stand by during flying hours. At smaller aerodromes the officer in charge of the aerodrome should be responsible and should receive special training to enable him to train other personnel in the volunteer crews and to take charge of operations.

304. It will be appreciated that expenditure on fire and crash rescue equipment is in the nature of an insurance premium, and, although it may be impossible to provide any fully effective system, the State and aerodrome authorities cannot neglect the obvious duty to provide what is possible to minimise loss of life and property.

305. We draw attention to the apparent lack of precautions against fire, and provision of static fire-fighting equipment during refuelling operations. Regulations should be promulgated prescribing the minimum precautions to be observed against the common risks—namely, static discharge, smoking, &c. In some countries more elaborate precautions are enforced as a condition of insurance of aircraft.

CHAPTER 22.—AERODROME ECONOMICS AND MANAGEMENT

State and local responsibility

306. It is apparent that there is need for a considerable programme of aerodrome construction and development in New Zealand. The appointment of the Aerodromes Committee indicates that Government fully appreciate this, and our tours through New Zealand have reinforced our views. The difficult nature of the terrain magnifies the problem and increases the cost of the aerodrome programme which has to be faced. The development is not limited to the preparation of landing areas and runways. Hangars, workshops, passenger terminals, administration and control buildings, roads and supply services have to be provided on a considerable scale to meet the intensive development of air transport which is planned.

307. While Government have undertaken much of the construction work on existing aerodromes and undertake the maintenance at most of the aerodromes, partly as the result of the country's need in wartime, there appears to be as yet no clear-cut policy regarding ownership and the responsibility for development of the aerodromes required for civil aviation. In many places the land was originally acquired by the local authorities and it has been added to by State acquisition of more land. At some aerodromes passenger and administrative buildings have been erected by the local authorities, at others by Government. It appears that local authorities are still expected to bear part of the cost of development, though it is recognised that in most places they cannot bear it all. The situation is complicated by the fact that local authorities have been permitted to levy charges, usually in the form of a rental paid by the National Airways Corporation, to recoup themselves for some of their cost, while no charges are levied in respect of the larger Government expenditure. It seems desirable that a clear policy should be adopted and the relative responsibility of the State and local authorities determined.

308. Apart from questions of policy relating to nationalisation of air transport, many countries have recognised the need for the State to take responsibility for the provision of aerodromes and other air route organisation on which the development of air transport depends. It is very well known that airports and aerodromes cannot pay for themselves,

and are unlikely to do so generally until civil aviation has developed considerably. Moreover, the cost of constructing modern aerodromes is beyond the financial capacity of many municipalities. Only in the United States have the bulk of the civil aerodromes been provided by the municipalities concerned, and even in the United States the Federal Government have now had to take a hand. The problem is partly analogous with the provision of roads, and there appears to be no escape from the conclusion that a country such as New Zealand can only be equipped with the aerodromes which it needs if the responsibility is shouldered by the State. Unless the State is prepared to finance the provision of air route and aerodrome organisation required for the national air transport plan, there must inevitably be discordance. There will be failure to provide the essential aerodrome requirements in some places, and maybe uneconomic over-provision in others.

309. If the State accepts the responsibility for the construction, maintenance, and operation of the aerodromes, there appears to be no virtue in divided ownership of the land, and we recommend that the land required for aerodromes in the national programme should be acquired by the State and administered by the Civil Aviation Directorate. In this we recognise that Government should determine the extent to which aerodromes meet a national requirement, and that outside the national programme of aerodrome construction, there will be local needs. Such needs could be met by local or private enterprise, and we recommend that there should be freedom for the development of aerodromes in this way under the technical control of a licensing system such as exists today, and subject to normal control of the finances of local bodies.

310. We are far from advocating that local authorities should have no interest in the aerodrome which serves their city or locality. On the contrary, we think it highly desirable and necessary, particularly in a country such as New Zealand, where there is a vigorously developed local consciousness and initiative. Least of all would we advocate anything which would retard development already undertaken or contemplated by local authorities which would contribute to the national plan, pending a settlement of the policy and of general principles governing the participation of local authorities.

311. The appropriate field of activity for local authorities at a State aerodrome is in all those matters which directly affect the public using or visiting the aerodrome. With complete national planning, the local authorities will be unable to contribute to or influence greatly the operational services, including the aerodrome itself and its technical equipment and services. These will all conform to the national plan. There are a number of services, however, in which local authorities can

greatly assist in making the aerodrome serve the public in the manner in which it should be served. Among such services which directly affect the travelling and visiting public are the passenger terminal, including waiting rooms, restaurants, dressing rooms and lavatories; the sale of papers, books, tobacco, and other commodities; accommodation and enclosures for the public visiting the aerodrome; access roads, car parks, local transport systems, lighting, gardens, &c. The popularity of air travel depends to some extent on these terminal facilities and amenities, and it is the proper interest of local authorities to ensure that they are of a standard appropriate to the city or locality which the aerodrome serves.

312. For this purpose, we recommend the establishment of local advisory committees, on which should be represented the Director of Civil Aviation (through the airport manager or other senior official in charge of the aerodrome), civic authorities, chambers of commerce, and other appropriate local associations. Bearing in mind that passenger terminal buildings must be planned as part of the aerodrome, in proper relationship to accommodation for administration, air traffic control and other technical services, such local committees might in appropriate cases be given certain powers of expenditure of funds, partly provided by the State and partly from local resources, for the purpose of improving and maintaining the standard of amenities. Where catering is not provided by the national operator, as may well happen at international airports, it would be appropriate that the local advisory committee should take responsibility for the provision of catering adequate for the passengers and public using the aerodrome.

313. The establishment of main and district aerodrome boards on the parallel of the main and district highways boards established under the Main Highways Act, 1922, has been advocated. Whether such boards were advisory or had executive powers, we do not consider such an organisation to be appropriate. As we have said, the provision of aerodromes to serve the national air transport plan is a matter for national planning and can be most effectively handled by the department of Government concerned, with review, if necessary, by a committee such as the existing Aerodromes Committee. The organisation of the national air route system is in this respect more akin to railways than to roads. We can see only a clogging of the machinery by the establishment of an elaborate system of boards to do the work which should be done in the departments. *Ad hoc* arrangements can be made to consult local authorities at such stages in the development of the plan as may be found necessary. As we see it, the local aerodrome committees which we have advocated are all that can be effectively employed in this direction.

Aerodrome management

314. The proper operation and development of an aerodrome requires that there should be unified control of the administration and all activities of the aerodrome. The need for this has been proved in most countries, and we find a lack of such unified control in New Zealand. The administration and operation of State civil aerodromes should be the responsibility of the Director of Civil Aviation, and in the organisation we have proposed it is the particular responsibility of the Director of Air Routes and Aerodromes. This requires that, at every aerodrome, there should be one person in charge of the aerodrome who should be responsible for its management, the control of the public, and generally for the co-ordination of all the activities which are carried on at an aerodrome. In some countries a cadre of aerodrome officers has been established, which provides the staff both for air traffic control and aerodrome administration. An aerodrome officer of senior rank in charge of a large airport has his staff of air traffic controllers and others engaged on administrative duties. At smaller aerodromes, one officer may have to combine all the duties. While providing for specialisation in air traffic control, this has the merit of providing a wider field and greater scope within the cadre. In the United Kingdom, airport commandants have been appointed for all the major aerodromes, and they are responsible for the co-ordination of all services on the aerodrome, including its administration, business management, and technical services. In other countries, particularly where aerodromes are provided by municipal authorities and technical services by the State, airport managers without any technical responsibilities are employed by the aerodrome authority.

315. It will be necessary for New Zealand to develop its own particular system, but the need for appointing one officer to be in charge of each aerodrome of any importance will be essential. At the major aerodromes, a whole-time officer will be needed. At other aerodromes of less importance and activity, it will be necessary to appoint one of the officers of the Civil Aviation Directorate as officer in charge. The most appropriate officer would be the senior air traffic control officer.

Aerodrome revenue and charges

316. It is well appreciated throughout the world that, in the present state of development of aviation, the cost of providing and operating aerodromes, with their expensive ancillary services, far exceeds the revenue which can be derived from their operation and the ability of the limited number of users of the aerodrome to meet the cost. The high capital cost and comparatively low revenue-earning capacity is one, but not the only, factor in reaching the conclusion that the responsibility for providing aerodromes must be mainly that of the State. There are only a few aerodromes in the world where revenue covers a

substantial proportion of the cost. These are believed to be confined to a few municipal aerodromes in the United States, where special sources of revenue are exploited extensively ; even there many of the technical services of the aerodrome are not included in the cost. There is very wide variation in the principles which are applied in different countries and at different aerodromes to this problem of charges and raising of revenue. Hence there is wide disparity in the charges which are levied on aircraft using aerodromes throughout the world. This has led to an investigation which the International Civil Aviation Organisation has put in hand. A comprehensive study of the whole problem is being made with a view to advising contracting States on the subject. Article 15 of the Chicago Convention prescribes that there shall be uniform charges for the use of aerodromes and air navigation facilities, including radio and meteorological services, as between national and other aircraft engaged in similar operations. This condition, which is applicable at international aerodromes, has a bearing on the principles governing charges at other aerodromes.

317. It is becoming clearly recognised that, although the cost of providing and operating aerodromes can not be fully recovered from the aircraft using the aerodrome, the system of charges should be related to the capacity of the user to pay, which may be measured in certain well-recognised ways. A study of this subject has recently been made by the Civil Aviation Branch in New Zealand. This study reveals thought in line with international thought on the subject. While not agreeing with some of the conclusions as to methods to be adopted, we commend this study to Government.

318. If our recommendation that Government should own and operate all the aerodromes required for the national system of air services be adopted, this problem becomes almost wholly one for Government ; it is one of the important problems in the sphere of the Director of Civil Aviation. Even to-day, when the bulk of the expenditure on aerodromes, even though they may be municipally owned, is borne by Government, Government are concerned with the apportionment of charges and should receive proportionate revenue. To the extent that municipalities and others provide and operate public aerodromes, measures should be taken to secure that a uniform system is followed.

319. While it is right that the taxpayer should meet part of the costs of providing aerodromes and their ancillary technical and other services, it is equitable and in fact essential that the user—that is, the passenger, the consignor and the consignee of goods, the user of the air mail system, and the operator of private aircraft—should bear a fair proportion. Since scheduled air transport constitutes the principal air traffic using an aerodrome, charges should be fixed primarily in relation to air

transport aircraft and they should bear a reasonable relationship to the total cost of air transport. Such charges may have the result of raising the cost of air transport, and will thereby be passed on to the passenger, the consignor and consignee, and the public user of the air mail system, by the normal process of adjusting fares and rates to the cost of air transport. Unless this is done, the true costs of air transport are concealed, and it continues to be developed on an artificial economic basis. The problem is to determine what charge for the use of aerodromes and ancillary services can be added to the cost of air transport without adversely affecting the volume of traffic and therefore the revenue of the air transport operators. The answer to this question sets the pattern for the system of aerodrome charges for other users. Flexibility should be maintained in the system, so that particular classes of flying—*e.g.*, private flying—may be encouraged by adjustment of the scale of charges. It is not an unusual practice to exempt flying clubs from charges for the use of State aerodromes.

320. For administrative and other reasons, it is desirable that the scale of charges should be simple. The scale can therefore only be broadly related to the factor of ability to pay referred to above. It has been proposed that the National Airways Corporation should be charged for the use of aerodromes, &c., on the basis of a percentage of revenue earned. While perhaps this reduces it to the simplest possible basis it does not provide a solution applicable to other operators, and in particular it is not appropriate at international aerodromes where uniformity must be preserved between New Zealand aircraft and aircraft of other countries operating like services. It would be impracticable internationally to levy charges on the basis of a percentage of revenue of the airlines using an aerodrome. Many international air services operate to half a dozen or more countries, and there is no rational basis on which such a levy on revenue earned could be raised. It would not be a proper solution to make the levy only on revenue derived from traffic embarked at a particular aerodrome. Some aerodromes of vital importance in the operation of air services are mainly refuelling aerodromes and generate little traffic. We recommend that charges should be levied on the basis of usage—that is, a system of landing and housing charges similar to that which has been so long established almost throughout the world.

321. Buildings such as hangars, workshops, stores, offices and passenger accommodation, which are used solely by one operator or owner of aircraft present no problem. The owner or operator should, if the accommodation is provided by the aerodrome owner, pay rent on an ordinary commercial basis of assessment. In the case of an air transport operator the costs are wholly attributable to air transport operation, and should therefore be reflected wholly in the air transport operator's accounts.

322. Hangars which are provided by the aerodrome authority for common use, and therefore only partially or occasionally used by a particular operator, should be operated on a normal commercial basis of charge. The most appropriate basis is that of a housing charge related to the area of the hangar occupied and the period of occupation, which should be such that, when the hangar is occupied to a reasonable percentage of capacity, revenue will cover the annual recurring cost—*i.e.*, interest on capital, maintenance, operation, lighting, &c. The weight of an aeroplane is roughly proportional to the area it occupies, and it is convenient for several reasons to establish the housing charge on a weight scale.

323. The charges for the use of the aerodrome and all its ancillary services by aircraft should, we recommend, be based on a landing charge graduated according to the weight of the aircraft. It can be shown that the revenue-earning capacity of a transport aeroplane is related roughly to the "all up" weight of the aeroplane. The revenue-earning capacity of a transport aircraft on each stage of a flight, and therefore related to each landing, is measured by the payload capacity and the miles flown on that stage—*i.e.*, capacity ton miles operated. Apart from variations in efficiency of aircraft, the capacity ton miles operated per stage or landing varies in proportion to the weight of the aircraft. A scale can be determined on the basis of aircraft weight, in convenient steps or blocks, within which broadly all the aircraft carry out operations with comparable conditions of stage length and payload.

324. Specific landing charges can be fixed equated to a cost per capacity ton mile which bears a reasonable and acceptable relationship to the present level of total cost per ton mile of air transport and to the other elements which make it up—*e.g.*, petrol and oil, crew salaries, maintenance costs, administrative costs, &c. So far as investigations have gone, they appear to show that a cost of 2 or 3 per cent. of total costs in respect of charges for aerodromes and air navigation services would represent an increase over prevailing scales of charges throughout the world, but would not constitute an unacceptable burden affecting the development of air transport. This may be expressed alternatively as a cost of 1½d. per capacity ton mile or 0·15d. per capacity passenger mile, in an operation whose total cost is 5s. per ton mile. This cost can readily be converted to a generalised scale of charges per landing based on the weight of the aircraft.

325. The application of the above system of charges does not debar their conversion, for administrative convenience in the case of large users, to a period basis of charge, which can be worked out for each operator to whom it is desired to apply such a system. The relationship of such consolidated charges to the scale of charges levied on aircraft

of other nationalities is, however, necessary to comply with the Convention. Moreover, the continued adjustment of such charges to equate to the normal weight scale and therefore to keep it in relationship to cost per ton mile is believed to be necessary for a proper understanding and therefore development of the economics of air transport and of airports.

326. Coupled with the system of levying charges on aircraft, there should be vigorous development of ancillary sources of revenue. These sources are well known and understood. They comprise revenue from restaurants and other services provided for the public, car park charges, public enclosure charges, &c. The development of this source of revenue we have recommended above should be within the field of the local aerodrome committees. Other sources of revenue have been exploited in some countries. In the United States, for example, the aerodrome authority commonly makes a levy on petrol sold or sells the concession for supply of petrol and oil. This has the same effect as landing charges in that it raises the cost of air transport, but it does not result in such equitable distribution as the landing charge system.

Aerodrome licensing

327. There is no need for the application of the aerodrome licensing system to State aerodromes, since a "licence" in this sense is a permit to do something which would otherwise be illegal. That does not apply to State aerodromes provided by the competent departmental authority. In the case of State aerodromes, all that is necessary is publication of the approval of the aerodrome for use by civil aircraft, subject to conditions prescribed. This procedure is appropriate also for Air Force aerodromes which may be made available in varying degrees and for different purposes for use by civil aircraft. What follows may be read as applicable both to the licensing of non-government aerodromes—*i.e.*, private or local authority—and to the approval of State aerodromes.

328. The system of aerodrome licensing at present in force in New Zealand is based on the severe physical limitations of the majority of the existing aerodromes. This has necessitated a system of licensing which states categorically which types of aircraft may use a particular aerodrome under specified loading and weather conditions. This we consider to be a safe and practicable method in the circumstances prevailing. However, we feel that if this system is allowed to continue indefinitely, it will ultimately break down owing to the impossibility of specifying precisely the conditions under which each type of aircraft can operate safely under varying conditions. To keep such a system up to date will become increasingly difficult as time passes and the number of aircraft types increases. To specify safe operating conditions at every aerodrome for each type of aircraft, bearing in mind such variable

factors as wind strengths, weather conditions, runway lengths, temperatures, power loadings, &c., would entail continuous revision and amendment of every aerodrome licence—a process which will ultimately break down under its own weight. We therefore recommend that the existing system be continued only until such time as it is considered that a similar system to the one which it is proposed to adopt in the United Kingdom (as explained in the next paragraph) can be conveniently introduced without penalising commercial operations.

329. The basic principle of the proposed United Kingdom system is that it shall be the aircraft operator's (pilot's) responsibility to ensure that, under the weather conditions prevailing at the time, the loading of his aircraft is such that its residual performance will enable him to take off or land in accordance with the operating limits specified in the aeroplane flight manual and within the limits of the take-off and landing areas available at the aerodrome. To enable him to make this calculation, he must be in possession of two sets of data :—

- (a) The precise dimensions of the runways, their bearing strength, and the angle subtended by any fixed obstruction in his line of flight beyond the ends of the runway he intends to use, which would have the result of reducing the effective length of his take-off or landing run. (NOTE.—This information would normally be made available to him through the medium of the Air Pilot, but should, of course, also be obtainable from the air traffic control or briefing office at the aerodrome. Changes in dimensions or other conditions of aerodromes will normally be notified in the first place by Notice to Airmen, and subsequently by amendments incorporated in the Air Pilot, it being the responsibility of the aerodrome licensee in the case of licensed aerodromes to notify changes in aerodrome dimensions or conditions to the civil aviation authorities.)
- (b) The relationship between the all-up weight of his aircraft, the ambient temperature and density, the rate of climb of his aircraft with one engine inoperative and the other engine(s) working within their approved condition, all of which information he will obtain from the aeroplane flight manual and meteorological brief. (NOTE.—For details of flight manuals and their relationship to certificates of airworthiness, see Part II of this Report—Chapter 11.)

330. The advantage of this system, as opposed to the system at present in force, lies in the fact that the final responsibility for the safe operation of aircraft is placed where it should be—fairly and squarely on the shoulders of the pilot. It is up to him to match the performance of his aircraft against the aerodrome and weather conditions prevailing

and ensure that each flight is undertaken within the prescribed safety limits. Under the present system, this calculation is done for the pilot through a system of inelastic and arbitrary regulations, the observance of which must surely come into disrepute in the course of time as their application becomes more and more complicated.

331. Therefore, in the case of State aerodromes, all that will be required will be that their physical dimensions and other details be published in the Air Pilot or other readily available aeronautical publications. In the case of private and municipal aerodromes open to use by civil aircraft generally, a licence will be issued in the normal manner, to ensure that the aerodrome complies with minimum equipment and safety standards as prescribed in the licence. The licensee will, however, not be responsible for the safety of individual operations on his aerodrome; that will continue to be the responsibility of the pilot. The licensee's only continuing responsibility will be to maintain his aerodrome and equipment in accordance with the published dimensions and conditions and to notify the Civil Aviation Directorate of any changes.

332. A private aerodrome which is used solely by the owner and not for any operation of other aircraft or any operation involving the carriage by air of persons or goods for hire or reward (which includes flying club operations) does not need to be licensed, since the safety of the public is not at stake.

APPENDIX A

LIST OF PLACES VISITED AND INSPECTED

Alexandra—

Aerodromes—

- (a) Present site.
- (b) Proposed site.

Auckland—

Aerodromes—

- (a) Whenuapai.
- (b) Mangere.
- (c) Proposed new sites—
 - (i) Pakuranga.
 - (ii) Mangere.

New Zealand National Airways Corporation—Maintenance bases—

- (a) Whenuapai.
- (b) Hobsonville.

Tasman Empire Airways, Ltd.—

- (a) Operating base and engineering workshops, Mechanics Bay.
- (b) Airframe maintenance base, Hobsonville.

Aero Club.

College of Technology, Auckland University College.

Aircraft Services, Ltd., Mangere.

Air Traffic Control Centre.

R.N.Z.A.F. Station, Whenuapai.

Blenheim—

Aerodromes—

- (a) Woodbourne.
- (b) Omapa (aerial inspection).

Aero Club.

Christchurch—

Aerodromes—

- (a) Wigram.
- (b) Harewood.
- (c) Prospective sites.

Lyttelton Harbour.

Suggested flying-boat bases—

- (a) Sumner.
- (b) Lake Ellesmere.

New Zealand National Airways Corporation—Maintenance base,
Harewood.

Air Work (N.Z.), Ltd., Harewood.

National School of Engineering, Canterbury University College.

Air Traffic Control Centre.

App. A

Cromwell—

Aerodromes—

- (a) Present site.
- (b) Proposed site.

Dunedin—

Aerodromes—

- (a) Present site, Taieri.
- (b) Alternative sites.
- (c) Suggested sites—
 - (i) Green Island.
 - (ii) Harbour Foreshore.

Dunedin Harbour.

Aero Club.

Hastings—

Aerodrome.

Aero Club.

Invercargill—

Aerodromes—

- (a) Present site.
- (b) Proposed site.

Bluff Harbour.

Napier—

Aerodrome.

Aero Club.

Nelson—

Aerodrome.

Aero Club.

Nelson Harbour (aerial inspection).

New Plymouth—

Aerodrome.

Aero Club.

Oamaru—

Aerodrome, Waitaki.

Ohakea—

Aerodrome.

R.N.Z.A.F. Station.

Palmerston North—

Aerodrome, Milson.

New Zealand National Airways Corporation, maintenance base.

Aero Club.

Queenstown—

Aerodrome.

Southern Scenic Air Trips, Ltd.—operating and maintenance base.

Rotorua—

Aerodromes—

(a) Present site.

(b) Proposed site.

Aero Club.

Blackmores' Air Services, Ltd.—operating and maintenance base.

Rukuhia—

Aerodrome.

Aero Club.

Tauranga—

Aerodrome.

Aero Club.

Air Traffic Control.

Timaru—

Aerodromes—

(a) Present site—Saltwater Creek.

(b) Proposed new site—The Levels.

Aero Club.

Wanaka—

Proposed aerodrome sites.

Wellington—

Aerodromes—

(a) Rongotai.

(b) Paraparaumu.

Proposed flying-boat base, Evans Bay.

De Havilland Aircraft Company (N.Z.), Ltd., Rongotai.

Air Traffic Control Centre.

App. B

APPENDIX B

AUTHORITIES WITH WHOM DISCUSSIONS HAVE BEEN HELD

The Hon. the Minister of Defence.

Government departments, officials, and committees—

Air Secretary, Air Department.
Director of Civil Aviation, and principal officers of the Civil Aviation Branch.
Chief of Air Staff, R.N.Z.A.F., Wellington.
Director, Technical Services, R.N.Z.A.F., Wellington.
Inspector of Accidents, Air Department.
Prime Minister's Department.
Public Service Commission.
Crown Law Office.
National Provident Fund.
New Zealand Aerodromes Committee.
Ministry of Works, Wellington, and District Engineers.

Aircraft operators and pilots—

New Zealand National Airways Corporation.
Tasman Empire Airways, Ltd.
Southern Scenic Air Trips, Ltd.
Blackmores' Air Services, Ltd.
New Zealand Airline Pilots' Association.

Aircraft manufacturing and servicing—

De Havilland Aircraft Company (N.Z.), Ltd.
Aircraft Services, Ltd., Mangere.
Air Work (N.Z.), Ltd., Harewood.
Handley Page and Miles Aircraft—New Zealand agent.
Hawker Siddeley Aircraft, Ltd.—Air Chief Marshal Sir Keith Park,
New Zealand representative.
Shell Oil Company (N.Z.), Ltd.

Educational—

Auckland University College—College of Technology.
Canterbury University College—National School of Engineering.
Canterbury International Air Race Council.

Local bodies and associated committees—

Alexandra.
Auckland.
Blenheim.
Cromwell.
Christchurch.
Dunedin (including Green Island and St. Kilda).
Hamilton.
Hastings.
Invercargill.

Local bodies and associated committees—*continued*

Napier.
Nelson.
New Plymouth.
Oamaru.
Palmerston North.
Queenstown.
Rotorua.
Tauranga.
Timaru.
Wellington.

Nelson Marlborough West Coast League of Local Bodies.

Nelson Provincial Progress League.

Otago Expansion League.

Otago Regional Planning Council.

Dunedin Development Council.

South Island Local Bodies Association.

Southland Progress League.

Harbour boards—

Auckland.
Bluff.
Dunedin.
Lyttelton.
Nelson.
Wellington.

Airport boards and committees—

Frankton (Central Otago).
Harewood Overseas Air Terminal Committee (Christchurch).
Invercargill.
Napier.
New Plymouth.
South Canterbury (Timaru).
Wanaka.

Chambers of commerce and representatives of industry—

Blenheim.
Canterbury (Senior and Junior).
Dunedin (Senior and Junior).
Invercargill.
Nelson.
Oamaru.
South Canterbury.
Wellington.

App. B

Otago Manufacturers' Association.

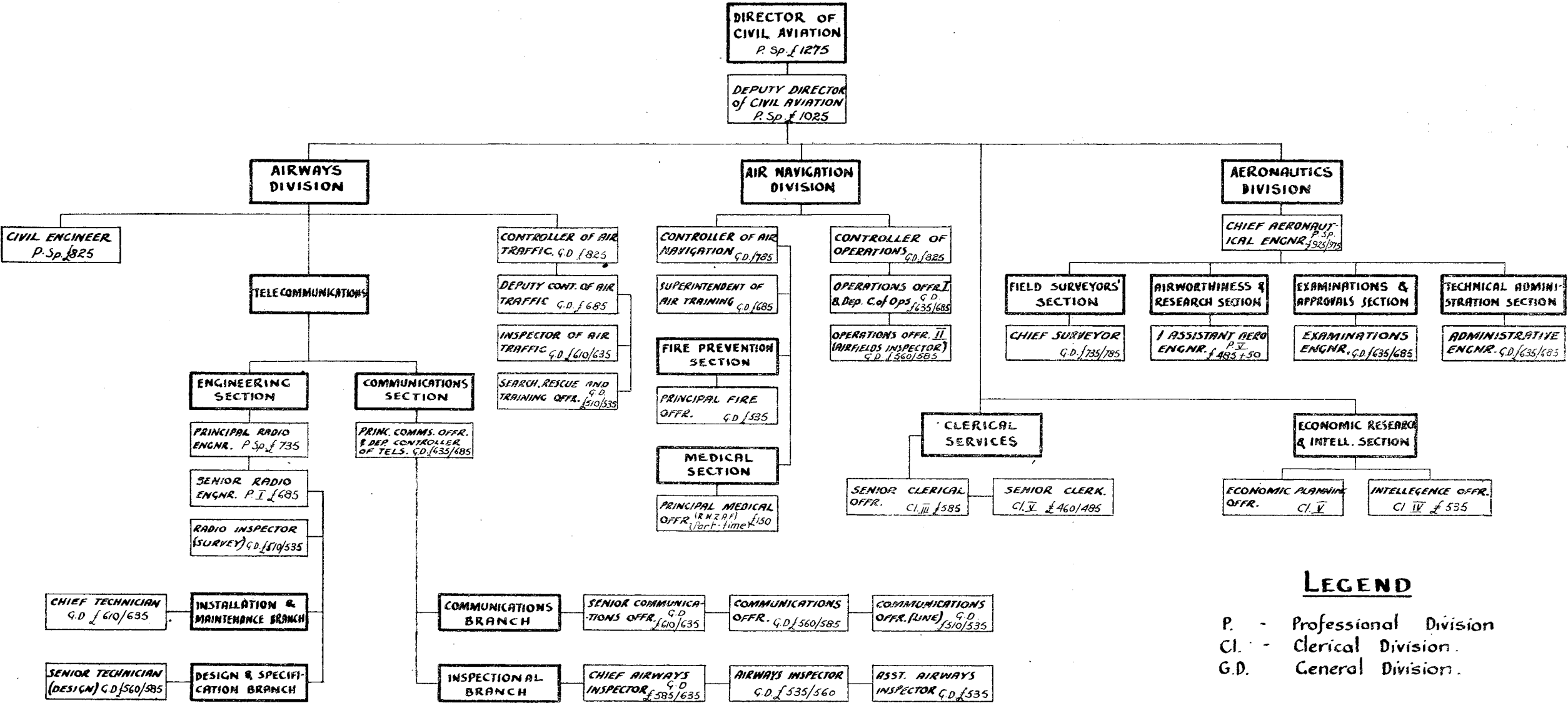
Aero clubs—

Royal New Zealand.
Alexandra.
Auckland.
Canterbury.
Cromwell.
Hawkes Bay and East Coast.
Marlborough.
Middle Districts.
Napier.
Nelson.
New Plymouth.
Otago.
Rotorua.
South Canterbury.
Southland.
Tauranga.
Waikato.
Wellington.

APPENDIX C
(Vide Chapter 2, paragraph 25)

CIVIL AVIATION BRANCH.

PLAN SHOWING PRINCIPAL OFFICERS AT HEAD OFFICE - OCTOBER 1948.



LEGEND

- P. - Professional Division
- Cl. - Clerical Division
- G.D. - General Division

APPENDIX D
(Vide Chapter 2, paragraph 38)

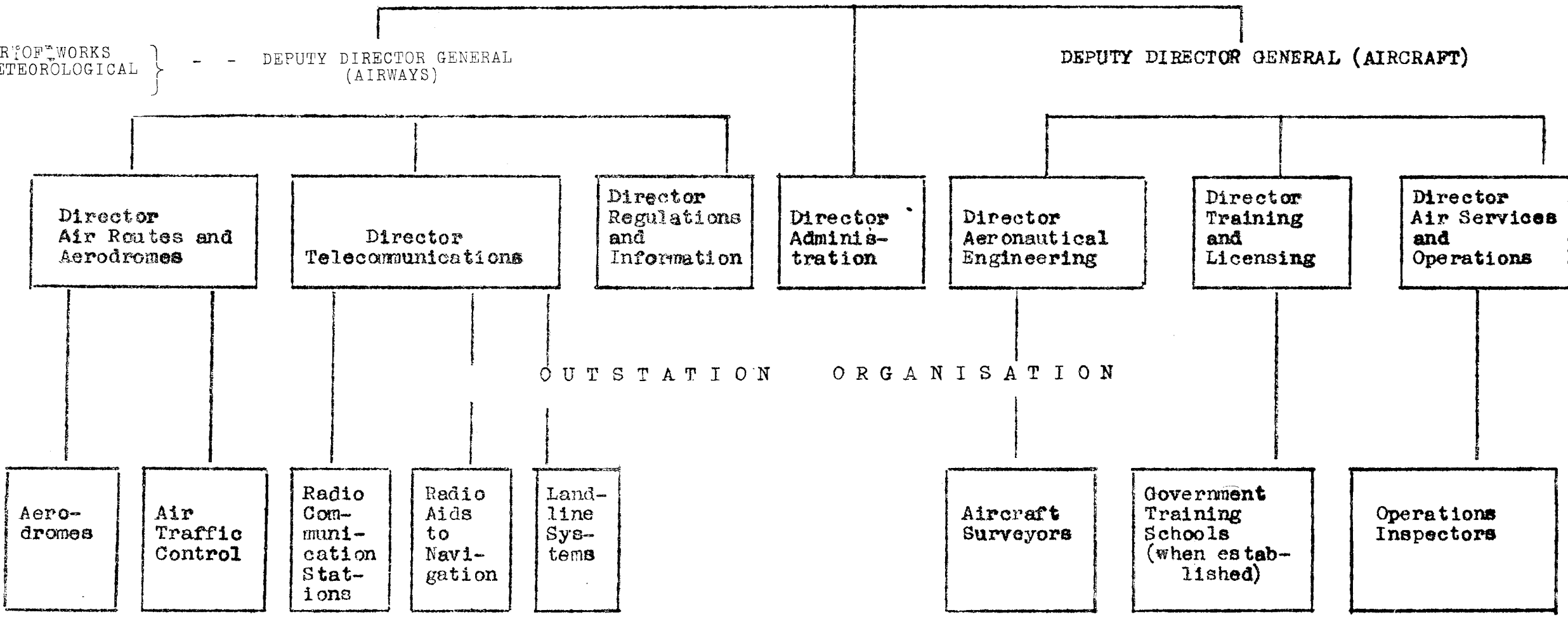
RECOMMENDED ORGANISATION OF THE CIVIL AVIATION DIRECTORATE

DIRECTOR GENERAL OF CIVIL AVIATION

COMMISSIONER OF WORKS
DIRECTOR, METEOROLOGICAL
SERVICES

- - - DEPUTY DIRECTOR GENERAL
(AIRWAYS)

DEPUTY DIRECTOR GENERAL (AIRCRAFT)



APPENDIX E

DISTRIBUTION OF DUTIES, CIVIL AVIATION DIRECTORATE

(Vide Chapter 2, paragraph 40)

AIRWAYS DIVISION

Air Routes and Aerodromes Branch—

1. Planning, construction, operation, and maintenance of Government civil aerodromes, including the acquisition and leasing of land.

(NOTE.—For the purpose of planning and liaison with the Ministry of Works, the Air Routes and Aerodromes Branch will have the assistance of the Civil Engineer attached to the Airways Division.)

2. Air traffic control.
3. Search and rescue.
4. Equipment of aerodromes and air routes.
5. Lighting and marking of aerodromes and air routes.
6. Manning of aerodromes and air routes.
7. Management of Government aerodromes, including leasing of premises, grant of concessions, collection of charges, &c.
8. Licensing of non-Government aerodromes.
9. Organisation, equipment, manning, and direction of the crash and fire-fighting service.
10. I.C.A.O. Standards: AGA; ATC; SAR; RAC (part); DIP; MET (in liaison with Director, Meteorological Services).

(NOTE.—The responsibilities of this Branch cover all aerodrome and air route organisation other than telecommunications and meteorological services.)

Telecommunications Branch—

1. Planning, construction, operation, and maintenance of all aeronautical telecommunication services and radio aids to navigation.

(NOTE.—For construction and maintenance of buildings, the Branch will work in collaboration with the Civil Engineer attached to the Airways Division. The Ministry of Works will be the executive authority for construction and maintenance.)

2. Provision, maintenance, and installation of telecommunications equipment.
3. Manning of telecommunication stations.
4. I.C.A.O. Standards: COM and COT.

Administration Branch—

1. Budget and accounts, and measures for the control of expenditure.
2. Establishments and staff matters generally, including appointments, promotions, leave, disciplinary action, etc.

App. E

Administration Branch—*continued*

3. Office organisation, equipment, and management.
4. Registry ; general records.
5. General correspondence.
6. Registration of aircraft ; issue and renewal of licences and certificates and maintenance of registers.
7. I.C.A.O. Standards : REG.

(NOTE.—The Administration Branch is the Branch responsible for the maintenance of Government policy and procedures in finance, establishment, and other like matters, and is responsible through the Director General to the Air Department for such matters.)

Regulations and Information Branch—

1. Liaison with I.C.A.O., Commonwealth, and other international organisations, and co-ordination of action by all other branches arising therefrom.
2. Co-ordination of legislation and drafting of regulations in collaboration with the Crown Law Office and branches of the Directorate.
3. Preparation and promulgation of Notices to Airmen and other notices of non-statutory character.
4. Aviation intelligence and general publicity.
5. Co-ordination of the production of aeronautical charts.
6. International Conventions and Agreements relating to aviation, in collaboration with the departments concerned.

AIRCRAFT DIVISION

Aeronautical Engineering Branch—

1. Supervision of the airworthiness of aircraft and the issue of certificates of airworthiness.
2. Inspection of aircraft, aircraft equipment, aircraft engineering workshops, stores, and distributing organisations for the purpose of 1.
3. Supervision of the work of licensed aircraft engineers.
4. Examination of aircraft engineers.
5. Investigation of design and approval of modifications.
6. Approval of firms under the “ approved firms ” system.
7. Preparation of Notices to Aircraft Engineers.
8. Investigation of defects and failures of aircraft material or components.
9. Initiation of research and development work.
10. I.C.A.O. Standards : AIR ; OPS (part).

Training and Licensing Branch—

1. Formulation of standards of qualification of aircrew personnel.
2. Examination of aircrew personnel.
3. Promotion, development, and supervision of flying club training.
4. Administration of Government grants to flying clubs.
5. Organisation and supervision of special schools for the training of aircrew and ground personnel.
6. Liaison with educational and other authorities in connection with aeronautical education and training.
7. I.C.A.O. Standards : PEL.

(NOTE.—The examination of specialist personnel such as aircraft engineers and radio operators is best done by the Aeronautical Engineering and Telecommunications Branches, but the organisation and supervision of special training schools should be co-ordinated by the Director of Training.)

Air Services and Operations Branch—

1. Economic studies and analyses of air transport operations.
2. Maintenance and examination of statistics on air transport and other operations.
3. Economic analyses of results of the air transport operating agencies for the Air Department.
4. Advice on the development of air transport, air survey, and other commercial operations, and organisation of operations as necessary.
5. Technical supervision of the operations of air transport and other undertakings as required by law.
6. Operation of departmental aircraft employed on transport, calibration, inspection, etc.
7. Issue of air service certificates (if required).
8. Liaison with Inspector of Accidents, investigation of accidents when necessary, and consequential action.
9. I.C.A.O. Standards : OPS ; RAC (part) ; MAP ; FAL.

APPENDIX F

EXAMPLES OF TRENDS OBSERVED IN REGULATION OF CIVIL AVIATION

(Vide Chapter 8, paragraph 112)

“(A) There is a tendency to extend Government control, through the medium of Regulations, Directions, Notices to Airmen, Notices to Aircraft Owners and Engineers, Requirements, and other instructions, beyond the usual level of Government regulation of an activity. Measures which have been taken amount also to an assumption of the management of operations.”

Example 1

Among the conditions attaching to an Air Service Certificate is that the operator must produce for the approval of the Director of Civil Aviation a “draft Operations Manual covering details of operating methods, procedures, and limitations of route” (Air Service Certificate application form). Notice to Airmen 52/1948, issued over the signature of the Director of Civil Aviation “by direction of the Minister of Defence,” lays down (in paragraph 33) :—

(c) The airline shall revise the Operations Manual from time to time where necessary as the result of changes in the airline operations, aircraft or equipment, or in the light of experience, and any such revision shall be subject to the prior approval of the Director.

(d) The airline shall furnish copies of the Operations Manual to such of its personnel as the airline considers necessary, to the Director, and to such other persons as the Director considers necessary.

(e) The airline shall ensure that all copies of the Operations Manual are kept up to date.

(f) The airline shall ensure that all operating personnel are properly instructed with regard to their particular duties and responsibilities and the relationship of such duties to the operations system.

Example 2

Notice to Airmen 52/1948, paragraph 35 :—

(a) An airline shall provide a training and checking organisation to ensure that members of its operating crews maintain their competency.

(b) The training and checking organisation shall include provision for the making in each calendar year of three checks of a nature sufficient to test the competency of each member of its operating crews and at intervals of not less than three months.

(c) The training and checking organisation of each airline and the details of the syllabus, tests and checks employed therein, shall be subject to the approval of the Director.

Example 3

Notice to Airmen 52/1948, para 11 (a), reads—

An aircraft shall not be used in any class of operation unless the particular type of aircraft is authorised and approved for such use by the Director.

Regulation 5 (1) (i) states that no person shall fly an aircraft unless certain general conditions are complied with, one of which is—

The aircraft shall be certified as airworthy in the prescribed manner, and any terms or conditions on or subject to which the certificate of airworthiness was granted shall be duly complied with.

The former provision can be construed as giving the Director wider powers than he has under the latter provision, and implying that the Director is assuming functions better left to the operator.

Example 4

Notice to Airmen 52/1948, para 18 (a), reads—

No person except a member of the crew of an aircraft or an authorised person shall be admitted to the pilot's compartment during flight.

“ Authorised person ” is defined as “ any person authorised by the Director.” This is inimical to the best interests of civil aviation, as well as being impracticable. A responsible operating company should have discretionary power, subject to the final authority of the captain, to admit to the pilot's cockpit persons whose admission may be of benefit to the company's operations or to civil aviation in general, without having to seek the approval of the Director of Civil Aviation. The Director of Civil Aviation is concerned with the authorisation of persons having duties to perform in the administration of civil aviation.

“ (B) *Broadly speaking, the regulation of an activity should be directed in accordance with a published code of law—that is, Regulations, Directions, etc., issued with statutory authority. The administration of such a code inevitably involves the exercise in some degree of the technical judgment of the Government officials entrusted with it, but a code of law whose substantive content is limited to a requirement to satisfy an officer of Government conflicts with the spirit and traditions of British jurisprudence.*”

Example

See comments in paragraphs 121 to 124 of this Report on the Air Service Certificate.

“ (C) *Regulations or rules of comparable importance have been promulgated both in Regulations issued under the Act and in Directions issued in pursuance of the Regulations. There appears to be no advantage in maintaining two forms, i.e., Regulations and Directions, for the promulgation of rules having legal force. Instructions on procedure need not be issued in a document having legal force.*”

Example 1

Schedule IV of the 1933 Regulations contains, *inter alia*, “ General Rules for Air Traffic ” which are of the same nature as the “ Rules of the Air ” of Air Navigation Direction 5.

Example 2

Schedule V of the 1933 Regulations, dealing with the licensing of personnel, in some cases lays down the detailed requirements for particular licences (*e.g.*, pilot's licences), in other cases leaves these

App. F

details to be prescribed in Directions (*e.g.*, radio operators' licences, AND-1), and in yet other cases states that particulars of the requirements for obtaining a licence will be supplied by the Controller of Civil Aviation (paragraph 3 of Schedule V).

Example 3

The instruments and equipment, other than radio apparatus, to be carried in aircraft are laid down in Schedule II of the 1933 Regulations, whereas the radio apparatus to be carried is laid down in AND-2.

Example 4

Approximately the same provision is sometimes contained both in the Regulations and in the Directions, *e.g.* :—

Regulations, Schedule II, paragraph 12 (a).—"If at any time the Minister considers modifications to an aircraft in respect of which a certificate of airworthiness is in force to be necessary for safety, he may require such modifications to be carried out as a condition of the certificate of airworthiness remaining in force."

Air Navigation Direction 3, paragraph 3.—"That if at any time an authorised person (as defined in the principal Regulations) considers a modification to any such aircraft to be necessary for safety, such modification shall be carried out as a condition of the certificate of airworthiness of such aircraft remaining in force."

Example 5

Schedule II of the 1933 Regulations, paragraphs 5 to 8, deals with the validation of a foreign certificate of airworthiness. The same ground is covered in Leaflet P.16 of the New Zealand Civil Airworthiness Requirements introduced by AND-4. These New Zealand Civil Airworthiness Requirements are, presumably, those referred to in Schedule II, paragraph 3 :

A certificate of airworthiness shall not be issued unless—

- (a) The design of the aircraft in regard to safety conforms to certain minimum requirements approved by the Minister,

but are nowhere stated to be so ; instead, they are introduced by AND-4, which is concerned only with the approval of "any person, company, or firm undertaking the design, construction, overhaul, maintenance, or supply of civil aircraft."

"(D) *Directions have been issued to amend or repeal Air Navigation Regulations issued under the Act. There can be no doubt that these Directions are ultra vires.*"

Example

Air Navigation Directions (AND-5) conflict with, and presumably in part supersede, Schedule IV of the Regulations.

“ (E) *While there may be some doubt about the legal force of some Directions, there can be no doubt that Notices to Airmen and other publications, which have likewise been used, not only for the promulgation of Regulations, but ostensibly to amend Regulations issued under the Act, have no legal force.*”

Example 1

Notice to Airmen 6/1948 amends paragraph 22 of Schedule V of the Regulations, which prescribes the occasions for medical re-examination of pilots.

Example 2

Notice to Airmen 13/1948 adds to the list of compulsory equipment laid down in paragraph 39 of Schedule II of the Regulations.

Example 3

Notice General/1 of Notices to Aircraft Owners and Engineers (1948 Consolidated Issue) modifies the provisions of paragraph 37A of Schedule II of the Regulations concerning the daily inspection of aircraft.

Example 4

Regulation 36 requires notification to be given of accidents. Notice General/3 of Notices to Aircraft Owners and Engineers extends this to cover forced landings and non-scheduled landings.

The following examples illustrate inappropriate wording. In each case a small change in phraseology would remove the implication that the Notice created a statutory requirement :

Example 5

Notice to Airmen 1/1948 : “ The following precautions and instructions are to be observed by all concerned in the refuelling of aircraft . . . ” (The substance of this Notice is repeated in Notice to Aircraft Owners and Engineers, General/15, and is there correctly worded in such a way that it does not purport to give instructions.)

Example 6

Notice to Airmen 5/1948 : “ trailing aerials (if aircraft are so fitted) shall be used for all radio communications. The following precautions are to be adopted . . . ”

APPENDIX G

EXTRACT FROM UNITED KINGDOM DRAFT REGULATIONS GOVERNING AIRCRAFT PERFORMANCE

(*Vide* Chapter 17)

5. A public transport or an aerial work aeroplane shall not fly or attempt to fly unless :—

(1) The weight of the aeroplane immediately before the commencement of the proposed flight is such that one of the following conditions is complied with—

- (a) The wing loading of the aeroplane, as certified by the Board, shall not exceed 20 lbs. per square foot ; or
- (b) The stalling speed of the aeroplane in the landing configuration, as certified by the Board, shall not exceed 60 knots ; or
- (c) The aeroplane, with any one of its engines inoperative and the remaining engines developing maximum continuous power, shall have a positive rate of climb, as certified by the Board, at an altitude of 5,000 feet above sea level in conditions of standard atmosphere ; and

(2) The person in command of the aeroplane has satisfied himself that the surface of the landing strip from which the flying machine is about to take off at the aerodrome of departure is capable of satisfactorily supporting the weight of the aeroplane for the take-off, and that the distance estimated to be required for the take-off under the conditions prevailing at that time does not exceed the length of the said landing strip ; and

(3) Having regard to the best information available to him at the time of the start of the proposed flight as to the conditions likely to prevail at the aerodrome of destination when the aeroplane arrives there, the person in command of the aeroplane has satisfied himself that the surface of any landing strip which may be used for the landing will be capable of satisfactorily supporting the weight of the aeroplane at the time of such landing, and that the distance estimated to be required for the landing, under the conditions expected to prevail at that time, does not exceed 70 per cent. of the length of any such landing strip. Provided that, where a visual approach and landing is expected to be made, this may be increased to 80 per cent. of the landing strip. For the purpose of so satisfying himself the person in command of the aeroplane shall proceed on the following assumptions as to the conditions of wind which may prevail at the aerodrome of destination at the time he expects to arrive there :

- (a) That conditions of still air will prevail and that the landing will accordingly be made on the most suitable landing strip available for use under those conditions ; and
- (b) That other conditions of wind, such as may reasonably be expected, will prevail, and that the landing will necessarily have to be made on any of the available landing strips other than that most suitable for landing in conditions of still air.

(4) In complying with the requirements specified in subparagraphs (2) and (3) of this paragraph, and in so far as they are applicable, in paragraph 7, regard shall be had to the meteorological conditions including wind and atmospheric density and to the particulars of the performance of the aeroplane given in its certificate of airworthiness or in any documents associated therewith, or in the absence of such particulars or any of them to the best available data in respect of the particular aeroplane.

(5) The several distances and lengths referred to in subparagraphs (2) and (3) of this paragraph shall be computed as follows :

- (a) The take-off distance shall be measured along the ground (or water) in the direction of take-off from the point at which the aeroplane is to start its run for that purpose to the point above which the aeroplane, after taking off, would attain a height of 50 feet above the ground (or water) and be flying at a safe speed.
- (b) The landing distance shall be measured along the ground (or water) in the direction of landing from the point above which the aeroplane, when descending in preparation for landing, would be at a height of 50 feet above the ground (or water) and flying at a safe speed, to the point at which, on completion of its landing, it would first come to rest, or, in the case of a seaplane, first be under full control on the water.
- (c) The length of the landing strip for take-off shall be that part of the surface of the aerodrome of departure which is available for the purpose, is capable of satisfactorily supporting the weight of the aeroplane and is free from obstructions measured in the direction in which the take-off is to be made from the point at which the aeroplane is to commence its run for that purpose to the limit of the available aerodrome surface : Provided that, if obstructions exist in the immediate vicinity of the limits of the landing strip over which the aeroplane would pass during the take-off, that part of the landing strip which lies within a distance 30 times the maximum height of any such obstructions above aerodrome level, measured from the base of such obstructions in the reverse direction to that of the take-off, shall not be regarded as free from obstructions for the purpose of computing the length of the landing strip for take-off.
- (d) The length of the landing strip for landing shall be that part of the surface of the aerodrome of destination which is available for the purpose, is capable of satisfactorily supporting the weight of the aeroplane and is free from obstructions, measured in the direction in which the landing may be made :

Provided that, if obstructions exist in the immediate vicinity of the limits of the landing strip over which the aeroplane would pass during landing, that part of the landing strip which lies within a distance 30 times the maximum height of any such obstructions above aerodrome level, measured from the base of such obstructions in the direction of landing, shall not be regarded as free from obstructions for the purpose of computing the length of the landing strip for landing.

App. G

6. A public transport aeroplane shall not fly or attempt to fly unless the person in command of the aeroplane has satisfied himself that, in the event of the engine or any one of the engines becoming inoperative at any stage of the proposed flight subsequent to the take-off and initial climb :

- (a) *In the case of an aeroplane which is unable to comply with condition (c) of sub-paragraph (1) of paragraph 5.*—Having regard to the nature of the route proposed to be flown and the conditions of cloud and visibility forecast along the route the aeroplane can be flown at such heights, save during the approach for landing or alighting at the intended destination, as would enable it to reach a safe landing place, and the person in command to select such place in sufficient time to make a landing thereat.
- (b) *In the case of an aeroplane which is unable to comply with either condition (a) or condition (b) of sub-paragraph (1) of paragraph 5.*—Having regard to the conditions to be expected on the proposed flight, the weight of the aeroplane will not exceed the weight at which it would be capable of maintaining a safe height along the route of the proposed flight until a landing could be made by a safe margin either at the aerodrome of departure or at an aerodrome along the route of the proposed flight or along a divergence from that route planned in advance to provide for such a contingency.

7. In addition to observing the conditions set out in paragraph 6, a public transport aircraft employed on flights over water, during the course of which it may be at any time more than 30 minutes' flying distance at its most economical cruising speed at sea level, as certified by the Air Registration Board, from the nearest shore, must comply with the following conditions :

- (a) The weight of the aeroplane at take-off must be such that, with the critical engine inoperative and its remaining engines operating at maximum continuous cruising power, it shall be able to maintain a rate of climb, as certified by the Air Registration Board, of 100 feet per minute in the atmospheric conditions expected to obtain during the flight at 5,000 feet above sea level.
- (b) Having regard to the conditions of wind expected to prevail during the flight, sufficient fuel shall be carried in the aeroplane to ensure that, in the event of engine failure during any period of the flight when the aircraft is over water, it shall be able to reach the nearest landing ground.

Performance Sheets

8. A public transport aeroplane employed on a regular line or service shall not fly or attempt to fly unless the person appointed for the purpose by the owner or hirer thereof has completed for the proposed flight a performance sheet containing the particulars specified in paragraph 9 of this section relating to the performance characteristics of

the aeroplane and the said performance sheet has been submitted to and examined by the person in command of the aeroplane in order to assist him to ascertain whether the requirements of paragraphs 5, 6, and 7 can be complied with.

9. Every performance sheet required by paragraph 8 of this section shall contain the following particulars :

- (a) The nationality and registration marks of the aeroplane.
- (b) Sufficient data to enable the particular flight to be readily identified.
- (c) An estimate of the number of hours' flying which can be completed with the amount of fuel proposed to be carried, having regard to the expected power output of the engine or engines during the proposed flight.
- (d) The weight at which the aeroplane complies with conditions (a), (b) or (c) of sub-paragraph (1) of paragraph 5 of this section, whichever is applicable, and of paragraph 7 if applicable.
- (e) An estimate of the distance required for take-off of the aeroplane, having regard to its weight and to the conditions expected to prevail at that time. The length of the landing strip available for the take-off.
- (f) An estimate of the distance required for landing of the aeroplane at the aerodrome of destination having regard to its weight on arrival there and to the conditions likely to prevail, assuming (i) conditions of still air and (ii) conditions of wind which would make it necessary to land on any landing strip there other than that most suitable for landing in conditions of still air. The lengths of the several landing strips available at the aerodrome of destination in respect of which the foregoing assumptions are made.
- (g) In a case where an aeroplane is required to comply with condition (b) of paragraph 6 of this section, an estimate of the height above sea level which the aeroplane, having regard to its weight and to the conditions expected to prevail on the proposed flight, will be able to maintain in the event of failure of the engine which would most adversely affect the performance of the aeroplane. In addition, if the estimate of fuel endurance referred to in (c) above would be adversely affected in the event of engine failure, appropriate particulars of this adverse effect.
- (h) The data used in making the estimates referred to above, excluding, however, data scheduled in the certificate of airworthiness of the aeroplane or in any documents associated therewith.
- (i) The signature of the person who completes the performance sheet.

Provided that this requirement shall only apply in cases of public transport aeroplanes for which the necessary performance data have been scheduled by the Air Registration Board, and further it shall not apply to aircraft of under 2,500 lbs. all-up weight, or engaged upon training duties or local pleasure flights.

APPENDIX H AIRCRAFT DATA FOR AERODROME CLASSIFICATION (Vide Chapter 18)

Aircraft.		Engines.		Take-off Distance (Feet).				Landing Distance (Feet), all Engines.		Wheels.		Aerodrome Classification Calculated on Critical Figure.	Source.		
				All Engines.		I.C.A.O. "One Engine Out" Case.									
Type.	Weight (lb.).		Make.	No. and h.p.	Unstick.	Clear 50 ft.	Unstick.	Clear 50 ft.	Accelerate to Stop.	Clear 50 ft. to Stop.	Touch Down to Stop.	Equivalent Single-wheel Loading.	Tire pressure (lb. per Square Inch).		
	Take-off.	Land-ing.													
Dove DH 104	8,500	..	Gipsy Queen 71	2 x 345	1,740	2,625	1,740	4,230	4,230	2,490	..	3,800	50	E7	M.C.A.
"	8,500	..	"	2 x 340	..	2,370	..	4,920	4,920	2,250	..	..	..	D7	Maker's Hdbk.
"	8,500	..	"	2 x 345	..	2,500	..	5,200	3,900	2,460	..	4,250	..	E7	C.A.B.
Prince	8,500	..	"	2 x 330	..	3,360	..	..	..	3,300	..	4,250	60	F6	BOAC
Concordia	10,650	..	Leonides 550	2 x 520	2,160	3,120	2,160	4,950	4,950	..	..	4,800	40	D6	M.C.A.
Marathon	11,440	..	Gipsy Queen 71	2 x 500	1,800	3,360	1,875	3,570	3,570	3,330	..	5,500	..	F6	BOAC
"	18,000	..	"	4 x 345	2,640	2,871	..	3,600	3,600	2,400	..	..	..	E	M.C.A.
"	18,000	..	"	4 x 330	3,630	3,630	..	..	..	..	..	4,125	..	E6	M.C.A.
Lodestar	18,000	16,000	Pratt and Whitney Hornet	2 x 1,200	1,000	1,840	3,350	4,950	5,500	2,500	2,000	9,250	40	C6	BOAC
"	18,500	..	Ditto	2 x 850	860	1,825	..	..	..	..	..	..	..	..	Maker's (N.Z.)
"	17,500	..	Ditto	2 x 850	860	1,825	..	..	..	..	..	..	..	..	Maker's (N.Z.)
Dakota (DC3)	28,000	..	Pratt and Whitney R. 1830	2 x 1,200	1,800	2,640	1,800	..	4,860	..	..	12,600	..	D6	Hdbk.
" (DC3)	25,200	24,400	Ditto	2 x 1,200	..	2,000	..	3,900	..	3,315	..	..	45	E6	M.C.A.
" (DC3)	26,900	..	"	2 x 1,200	1,750	2,100	1,750	4,850	4,080	2,700	1,600	13,450	38-51	D6	Aviation World
Viking IB	34,000	..	Hercules 634	2 x 1,690 (or 1690)	2,670	3,600	2,880	..	5,760	..	..	15,500	60	C6	C.A.B.
"	34,000	32,500	"	2 x 1,690	1,200	3,450	1,200	3,600	3,900	3,300	1,860	..	56	E6	M.C.A.
" IB	34,000	..	"	2 x 1,690	1,200	3,450	1,200	3,600	3,900	3,300	1,860	..	56	E6	Maker's Hdbk.
Viking IB	34,000	32,500	Hercules 634	2 x 1,675	..	4,860	..	..	..	4,800	..	17,000	56	D6	BOAC
"	34,000	31,000	"	2 x 1,690	..	2,550	..	..	..	..	..	17,000	..	G6	Aviation World
Apollo	37,000	..	Armstrong Siddeley (Mamba)	4 x 1,140	1,920	2,400	2,250	2,820	2,820	3,000	..	11,000	50	G6	M.C.A.
Convair 240	34,500	37,600	Pratt and Whitney R. 2,800	2 x 2,400	2,370	3,195	2,895	..	4,620	3,000	..	19,750	90	D5	M.C.A.
"	40,500	38,600	Ditto	2 x 2,400	..	2,200	..	3,800	..	4,140	..	20,250	90	E4	M.C.A.
"	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Aviation World

Martin 202	39,200	38,000	Pratt and Whitney R-2800	2 x 1,500	2,230	2,880	4,110	..	..	53	E6	Aviation World	E6
Wayfarer	35,000	..	Hercules 672	2 x 1,675	1,905	4,200	1,955	..	..	40	E6	Maker's Hdbk.	..
Viscount VC2	40,000	35,000	Rolls-Royce Dart	2 x 1,490	1,590	4,050	2,520	..	18,000	38	E5	M.C.A.	E6
Viscount VC2	39,050	35,520	"	4 x 1,430	2,700	3,450	3,450	..	11,500	80	F	Maker's Hdbk.	E6
				4 x 1,550	1,550	3,500	3,600	..	2,040	..		Aug., 47	
Viscount VC2 Mk. 2	43,500	36,800	Rolls-Royce Naiad	4 x 1,500	2,100	4,320	3,750	..	2,230	..	D		..
Ambassador	47,000	..	Centaurus 661	2 x 2,700	2,160	4,230	2,550	..	13,500	64	E5	M.C.A.	..
Ambassador	52,000	50,000	"	2 x 2,600	..	3,040	6,300	..	..	64	B	Maker's Hdbk.	D5
Ambassador	45,000	38,000	Dorval 5	2 x 2,500	4,044	..	4,350	..	..	..	D5	BOAC	..
Canadair C102	55,000	52,500	Merlin 24	4 x 3,500 lb.	2,775	3,180	4,200	..	16,500	..	D5	M.C.A.	..
Laurestrian	58,000	..	"	4 x 1,620	3,000	..	4,950	..	32,500	48	D5	Aviation World	D5
York	71,000	64,000	"	4 x 1,620	*3,840	..	5,400	..	..	43	D5	BOAC	D5
Skymaster	68,000	63,500	Pratt and Whitney R-2000	4 x 1,450	4,500	3,900	5,550	..	22,000	70	C5	M.C.A.	..
DC4	73,000	63,500	Pratt and Whitney 25 D13G	4 x 1,450	2,250	..	5,050	..	4,620	..	D4	Aviation World	D5
DC4	73,000	63,500	Ditto	4 x 1,450	..	..	5,300	..	3,650	90	C4	C.A.B. (N.Z.)	..
Canadair DC4M1	80,000	68,000	Rolls-Royce Merlin 624	4 x 1,740	3,360	3,840	5,490	..	24,000	87	C5	M.C.A.	..
Canadair DC4M1	82,000	70,000	Ditto	4 x 1,760	1,700	..	5,800	..	..	87	C	M. of S.	..
Tudor IV	80,000	74,000	Merlin 621	4 x 1,725	3,250	..	6,150	..	..	60	B4	M.C.A.	C4
Hermes IV	82,000	75,000	Hercules 763	4 x 2,100	3,660	4,350	6,150	..	36,000	60	B4	M.C.A.	C4
DC6	93,200	75,000	Pratt and Whitney R-2800	4 x 2,100	3,240	3,720	6,810	..	23,000	70	B5	M.C.A.	C5
"	93,200	75,000	"	4 x 2,100	3,255	4,260	5,220	..	1,500	93	C1	M.C.A.	..
"	93,200	75,000	"	4 x 1,800	3,900	..	6,600	..	28,000	105	B4	Aviation World	C5
DH 106 Comet	100,000	..	D.H. Ghost	4 x 5,000 lb.	4,950	4,530	5,850	..	45,000	88	C4	M.C.A.	C4
Constellation 749	102,000	84,500	Wright Cyclone	4 x 2,500	2,700	3,255	4,605	..	32,000	85	D5	M.C.A.	..
"	102,000	84,500	"	4 x 2,500	3,550	3,550	4,950	..	..	..	C3	C.A.B. (N.Z.)	..
"	102,000	84,500	"	4 x 2,500	..	..	4,905	..	..	84	D5	Aviation World	D5
Constellation 649	94,000	84,500	Wright C18 BDI	4 x 2,100	3,060	..	4,200	..	..	80	D4	Aviation World	..
Bristol MRE	103,000	95,000	Centaurus 663	4 x 2,810	2,580	3,060	4,245	..	29,000	82	E5	M.C.A.	E5
Stratocruiser	135,000	121,700	Pratt and Whitney R-4360	4 x 3,500	4,110	4,800	6,750	..	42,000	90	B4	M.C.A.	B4
"	142,000	121,700	"	4 x 2,800	4,060	..	5,375	..	..	100	B	Aviation World	..

*Aviation World; †BOAC.

For notes see page 128.

App. H

NOTE

The data in the foregoing table are related to sea-level in the standard atmosphere and to maximum all-up weight of the aircraft for take-off and landing respectively. It will be observed that alternative data are in some cases furnished. When these data are collected from several sources and tabulated, it is always found that the estimates vary widely. Some of these variations can be accounted for by differences in aircraft weight or engine power. But when all such obvious factors have been allowed for, there is still a big spread between the several estimates.

The reasons for this are that many of these estimates are based upon calculations, not upon flight tests. The calculation of aircraft performance is far from an exact science, and small changes in the assumed values of some of the parameters are likely to make considerable differences in the final answer. The remedy for this is, of course, to make flight tests instead of relying on calculations.

Flight test results, however, often show equally big variations. This is because the technique of making such tests is not completely standardised. For instance, the accelerate-stop distance and the distance to climb 50 feet in the I.C.A.O. "one engine inoperative" case are extended very considerably if the pilot delays for a second or two before taking the appropriate action on the stopping of the critical engine; again, the several distances will vary according to the nature of the aerodrome surface; yet again, the I.C.A.O. draft Airworthiness Standards (paragraph 2. 3. 3. 1) leave to the applicant for a certificate of airworthiness the fixing of the "critical point"—that is, the point at which, for the purpose of determining the take-off performance characteristics, the failure of the critical engine is assumed to occur. Bearing in mind that throughout the whole take-off process the pilot must, if an engine fails, always be able either to bring the aeroplane to a standstill or complete the take-off, this means that the later the critical point is fixed, the longer will be the accelerate-stop distance and the shorter will be the distance to 50 feet. It is not unlikely that different flight tests on the same aeroplane will be related to differently chosen critical points, and hence the measured distances will also differ. For all of these reasons, and many others, it is to be expected that different flight test measurements of take-off performance will show wide variations.

APPENDIX I

INTERNATIONAL AIRPORT AT AUCKLAND

(Vide Chapter 19)

Whenuapai

Whenuapai falls short of I.C.A.O. recommended Standards for a Class C4 international aerodrome on five main counts :—

- (1) Runway lengths and gradients.
- (2) Approach obstructions.
- (3) Circuit obstructions.
- (4) Side clearances from such obstructions as hangars, control towers, buildings, &c.
- (5) The usability factor obtainable.

(1) *Runway lengths and gradients.*—The longitudinal slopes at the ends of all the runways, with the exception of the 04 end of the main runway, exceed the required I.C.A.O. gradients by considerable amounts. This has the result of reducing the effective lengths of the runways to the following dimensions :—

Runway.	Effective Length.	I.C.A.O. Requirement (Class C), Allowing for Equivalent Altitude.
		Ft.
04	5,680	6,285
08	2,970	5,340
13	3,600	This runway is not usable, on account of approach obstructions.

The draft I.C.A.O. Standards require that a secondary runway be at least 85 per cent. of the length of the main runway. Runway 13 cannot be considered as an effective runway for international purposes, and it will be seen that the 08 runway has an effective length of only 55 per cent. of that required. The cost of extending runway 08 up to the required length would be prohibitive, if indeed it were possible, as the ground falls away steeply from both ends of this runway.

(2) *Approach obstructions.*—Runway 13/31 is obstructed by a hill with an elevation of 220 feet above the aerodrome, approximately 5,500 feet from the north-west end of the runway ; this gives an approach surface slope of 1 in 25, compared with an I.C.A.O. requirement of 1 in 40. The runway cannot be resited. For the purpose of an international aerodrome it may be ignored.

(3) *Circuit obstructions.*—The surrounding hills within three miles in several directions infringe the I.C.A.O. 150 ft. horizontal surface and conical surface circuit safety zone requirements.

(4) *Side clearances.*—Several buildings on the aerodrome, in relation to the main runway (04), infringe the I.C.A.O. requirements for clearances from runways—viz., No. 1 hangar by 425 feet ; No. 2 hangar by 25 feet ; Air Force administration building by 170 feet ; control tower by 325 feet.

App. I

(5) I.C.A.O. AGA document 4809 recommends that a sufficient number of runways be provided at an international airport to give at least a 95-per-cent. usability factor, this factor to be calculated on the assumption that aircraft can land or take off with a cross-wind component of 13 knots. The only two runways at Whenuapai that can be used in calculating the usability factor are runways 04 and 08. The usability factor obtained from these two runways has been calculated at 98 per cent., the 04 runway alone having a usability factor of 95.1 per cent. Runway 08, however, is of inadequate length and should be ignored for this purpose. Even so, it could be said that on this count Whenuapai meets AGA requirements. This calculation, however, ignores the incidence of gust winds of short duration with a cross-wind component exceeding 13 knots. Such winds are a fairly common occurrence throughout the year at Whenuapai. On other occasions, both by day and by night, the aerodrome would be unusable owing to other prohibitive weather conditions such as fog, low cloud, and heavy rain. Meteorological records show that on about 180 occasions (2 per cent. of observations) in a year conditions of low visibility or low cloud ceiling below the declared weather minimum for Whenuapai occur. The true usability factor of the aerodrome, for reasons of wind and weather, may therefore be reduced to less than 95 per cent. This percentage is insufficient to permit regular safe scheduled international operations.

Pakuranga and Mangere Sites

Access.—Pakuranga is several miles nearer to the centre of the city than Mangere, and the site is conveniently located with reference to proposed new road and rail development schemes, which will bring it within ten and a half miles by fast motor road from the city. Mangere aerodrome is situated on an isolated peninsula served only by second-class roads, which for a greater part of their length pass through a congested suburban area. There are no plans to develop new roads into this area.

Land and construction factors.—Mangere is situated on agricultural land of considerably higher value than Pakuranga. The Pakuranga site is less undulating than Mangere, and it would appear that the volume of earthworks involved in developing the Pakuranga site would be materially less than that involved at Mangere. We understand that it would be necessary to import a considerable volume of hard fill into Mangere for the stabilisation of the runways, owing to the comparatively low bearing value of the soil. At Pakuranga, on the other hand, the soil is thought to have a higher bearing value, and the two small volcanic cones existing on the site would provide all the hard fill necessary for the stabilisation of the runways, thus reducing the cost of construction.

Topographical factors: operational.—From the point of view of flight obstructions, Mangere is a somewhat better site than Pakuranga, where a low range of hills and two volcanic cones of about 200 feet in height on the edge of the aerodrome site have to be taken into account in planning. The volcanic cones would not constitute flightway obstructions, and their effect as circuit obstructions would be minimised

if they were reduced in height by 50 to 100 feet, which could possibly be accomplished by using the material obtained as fill for the runways, taxiways, aprons, &c. While these two cones appear to be the biggest drawback to the development of the Pakuranga site, we do not feel that they constitute a prohibitive feature. The runways would need to be carefully planned to minimise their effect. As regards runway lengths, Mangere is circumscribed on three sides by water, which in effect would limit its development to I.C.A.O. Class C Standard—if provision is made for the installation of approach lighting and instrument landing equipment. An alternative site immediately north of the site under consideration might avoid this restriction. On the other hand, the Pakuranga site is much less constricted, and I.C.A.O. Class B runways could be constructed there if necessary. Such meteorological data as are available suggest that two runways only will suffice at either site. The plans should make provision for at least a clear thousand feet extension of the strip at either end of the main runway to facilitate the installation of approach lighting and instrument landing beacons and markers.

Meteorological conditions.—No adequate weather records are available to enable a comparison to be made between the two sites. Local opinion, however, is that Mangere would be less subject to fog than Pakuranga.

Domestic accommodation.—One of the major problems to be considered when siting and developing a new international airport is the provision of domestic accommodation for the airport staff and associated workers. The new housing estate to be developed immediately across the Tamaki River from the Pakuranga site would offer a simple and convenient solution to this problem if the Pakuranga site were adopted.

APPENDIX J

VIEWS OF HAREWOOD OVERSEAS AIR TERMINAL COMMITTEE

(*Vide* Chapter 20)

(1) That the location of Wigram Station is unsuitable on account of its close proximity to Christchurch, a rapidly developing city with built-up and heavy industrial areas adjacent to the aerodrome, and many large buildings already established with high chimneys, which will mean additional high-tension wires.

(2) That Wigram abuts on the main trunk railway from Picton to Bluff, and on the very vital railway line to our coal supplies on the West Coast, making the occupancy of the aerodrome in times of national emergency a risk, and from a military point of view, a strategic disadvantage.

(3) That Wigram abuts on the main highway to the south and to the Lakes districts, with further problems in case of emergency.

(4) That it is at a point where the main electric supply cables cross from Lake Coleridge Power-station to the distribution centre for the city's supply.

(5) That with the built-up area adjacent to Wigram there is lack of room for extension of this field, which is dangerous from the point of view of training pilots.

(6) There are no sealed runways at Wigram, and to seal runways, on the evidence submitted to you, would be twice as costly as Harewood, as the natural foundations are poor in comparison with alternative sites such as Te Pirita or Norwood, which are also near already established military training centres.

(7) As the adjacent heavy industrial area is extending, now is the time for a decision on the change of site, so that advantage may be taken of the market for ready sale of land, and of the high recovery value of hangars and other buildings.

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

PART I—GOVERNMENTAL ORGANISATION FOR THE ADMINISTRATION OF CIVIL AVIATION

Departmental organisation

S. 1: There is no justification at present for setting up a separate department of State for civil aviation. The association of civil aviation with the Royal New Zealand Air Force has been beneficial to civil aviation, but the essential co-operation could and would be maintained even if they were not both linked by the Air Department. Civil aviation should remain attached to the Air Department, but if Government should consider the establishment of a Minister of Transport and a Transport Department for the co-ordination of all forms of transport, the desirability of incorporating civil aviation in that department should then be considered. (Paragraphs 1-4.)

S. 2: Civil aviation should not be administered as a branch of the Air Department. It should have semi-autonomous status attached to the Air Department. For this purpose it could be called a "Directorate." It should have clearly defined powers and responsibilities, for which the Director of Civil Aviation would answer to Government through the Air Department. At the same time, the powers and responsibilities of the Air Department in relation to Government and in relation to the Civil Aviation Directorate should be clearly defined. Recommendations regarding these separate powers and responsibilities are made in the Report. The head of the Civil Aviation Directorate should be the adviser of Government on civil aviation problems. (Paragraphs 5-14.)

S. 3: Since the Air Secretary, as the head of Air Department, carries on behalf of Government certain responsibilities in relation to both the administration of civil aviation and the operation of air transport which has been entrusted to a national corporation and to a Commonwealth Government-owned company, he should not be a director of either of these operating organisations. (Paragraphs 15; 16.)

S. 4: With the proper organisation of the Air Department and Civil Aviation Directorate to take their full responsibility for the formulation of policy and advice on policy, it will be unnecessary for the Prime Minister's Department to take such an active part as it has in the past in connection with civil aviation development and administration. (Paragraph 17.)

Organisation of the Civil Aviation Directorate

S. 5: Because of the far reaching effects of civil aviation policy and its consequent importance, and because of the multifarious activities which have to be directed by any Government civil aviation administration, we recommend that the status of the post of Director of Civil Aviation should be raised to Director General of Civil Aviation. (Paragraphs 7-9.)

S. 6: The internal organisation of the present Civil Aviation Branch is susceptible of improvement. In order to secure a pyramidal devolution of responsibility from the head of the Directorate downwards, to clarify the responsibility of each branch in the Directorate,

and to make proper provision for the continuing growth in importance of certain related functions, we recommend the organisation of the Directorate in two divisions—Airways, and Aircraft (operation and engineering)—each under a Deputy Director General. Each division should consist of three branches headed by Directors. There should be a separate administration branch answerable direct to the Director General. (Paragraphs 23–47.)

S. 7: We emphasise the importance of three of the proposed new branches, whose functions are divided in the present organisation—namely, Aerodromes and Air Routes Branch, Training and Licensing Branch, and the Air Services and Operations Branch. We do not recommend separate branches or sections for “Planning” and “Air Safety,” although these have frequently been advocated in the post-war planning of civil aviation administrations. (Paragraphs 26 ; 28 ; 29 ; 41 ; 44 ; 46 ; 47.)

Boards and committees

S. 8: We consider that standing boards and committees should be kept to a minimum. They tend to create work incommensurate with the results achieved. *Ad hoc* committees or meetings to consider problems arising in the planning work done by the appropriate branches are, in our view, more appropriate and preferable. Nevertheless, we advocate the establishment of an Advisory Committee on Air Regulations. (Paragraphs 48–52.)

S. 9: We do not find that the conditions or the problems to be dealt with in New Zealand justify the establishment of an Air Registration Board on the lines of the Air Registration Board of the United Kingdom. The counterpart of the work of the Air Registration Board which arises in New Zealand can be effectively performed by the Civil Aviation Directorate, since it constitutes a problem precisely comparable with the other problems of technical regulation dealt with by the Directorate. (Paragraph 51.)

S. 10: In view of evidence that the Regulations, Directions, and other pronouncements by which the technical regulation of civil aviation is achieved are not appropriately related to the practical factors in aircraft operation, we recommend the establishment of an Advisory Committee on Air Regulations, comprising representatives of the Director General of Civil Aviation, and operators and others technically concerned with the operation of aircraft. The committee should have the function of advising the Director General on proposed regulations. (Paragraphs 52 ; 115–119.)

S. 11: In order that New Zealand administration may be kept in closer touch with the activities of I.C.A.O., particularly in the framing of international standards, and with the problem of translating international standards into national regulations, we recommend that Government should consider the possibility of maintaining a civil aviation representative at Montreal to participate in the framing of the international standards and another representative in London to participate in their implementation in a country with larger technical resources than New Zealand can command. (Paragraphs 53–55.)

Staffing of the Civil Aviation Directorate

S. 12 : The duties and responsibilities of the Director General of Civil Aviation require that the post should be filled by the best man available, irrespective of seniority. We recommend that this post be excluded from the provisions of the Public Service Act. For similar reasons, we recommend that the posts of Deputy Directors General and Directors should be excluded from the appeal provisions of the Public Service Act. (Paragraphs 56 ; 59.)

S. 13 : Since the administration of civil aviation requires the services of a number of officers with mature experience, which normally cannot all be obtained in the Government service, and since it is necessary to attract and retain the services of suitable men, we believe that a general raising of the scale of remuneration of the senior posts in the Directorate, including in particular the post of Director General, Deputy Director General and Director, is justifiable, and will be found necessary. (Paragraphs 57 ; 58 ; 60.)

S. 14 : In view of the necessity of ensuring that the administration, technical regulation, and operation of civil aviation do not become stereotyped and divorced from practical experience, we recommend development of arrangements for the exchange of officers, on secondment or other basis, with other Commonwealth administrations and with operating organisations. We also recommend that consideration should be given to the equalisation of terms and conditions of service, including superannuation terms, in order to facilitate the transfer of officers from one employment to other kindred employment in civil aviation, when such a change would be in the interests of civil aviation development and of the individual. (Paragraphs 61-69.)

PART II—MEASURES FOR THE EFFICIENT, SAFE, AND ECONOMIC OPERATION OF AIRCRAFT

Planning

S. 15 : Planning should be the responsibility of the Director of Civil Aviation, who should submit plans covering all phases of civil aviation development for consideration by Government. *Ad hoc* committees can perform useful service in reviewing prepared plans for Government, but much time is wasted in committees of too wide membership, which attempt to evolve detailed plans. (Paragraphs 70-74.)

S. 16 : Planning should be undertaken in proper sequence starting with the air services to be operated, then the aerodromes required, then the ancillary air navigation services needed. Reviews at appropriate stages in consultation with the departments concerned will determine the modifications which must be made in the plans and the phasing of implementation to fit them to the resources of the country. (Paragraphs 71-80.)

International air services

S. 17 : International air services are desirable to serve Auckland, Wellington, and Christchurch. There is no justification for the operation of international air services to other places, whether as central distributing points or otherwise. (Paragraph 82.)

S. 18: Auckland is the only practical terminal for trans-Pacific services. Since it should also be a terminal for trans-Tasman services, it must be organised to receive both landplane and seaplane services. (Paragraph 83.)

S. 19: It would be desirable to connect both Wellington and Christchurch by trans-Tasman services. Since Wellington can only be served by flying-boats and Christchurch by landplanes, it would be necessary for Tasman Empire Airways to operate both seaplanes and landplanes. Co-operation with the New Zealand National Airways Corporation would facilitate the latter. (Paragraphs 84-88.)

S. 20: The choice of Solents for the next stage of operation by Tasman Empire Airways appears to be sound, but the restriction to day flying, which has been accepted, adversely affects the utility and economy of the service and is inconsistent with current operational practice with comparable landplanes. (Paragraphs 86-87.)

S. 21: There is grave doubt whether suitable seaplanes will be available to take the place of the Solents at the next stage of re-equipment. Proposed capital expenditure at the Mechanics Bay seaplane base, which cannot be fully amortised or recovered, should therefore be carefully reviewed and alternatives sought. The location of an engine repair shop with its attendant engine test beds in the middle of the city may be open to objection on the score of noise nuisance. (Paragraphs 89-93.)

Internal air services

S. 22: The permanent location of the New Zealand National Airways base at Palmerston North, which is an artificial hub for air services, should be reviewed in the light of the proposed development of aerodromes at Rongotai and at Auckland. (Paragraph 95.)

S. 23: There would be advantage in the development of some of the minor air services initially on a non-scheduled basis and their operation by locally established companies under contract with the National Airways Corporation. There should be freedom for the operation of "taxi" services by such local operators. There appears to be scope for the use of small seaplanes or amphibians in this field. (Paragraphs 96-100.)

Economic studies of air transport

S. 24: The economic results of air transport operation should be analysed and reviewed by Government and the Directorate of Civil Aviation should be organised for this purpose. (Paragraph 101.)

Air route organisation

S. 25: The working efficiency of the air traffic control, radio, and meteorological services at aerodromes would be improved if these services were housed together in properly planned control buildings. The relative responsibilities of the commander of aircraft and of the Air Traffic Control should be clearly defined. (Paragraphs 105 ; 106.)

S. 26: The Search and Rescue system of New Zealand is organised on sound principles. We recommend its extension to cover searches by flying club and private aircraft. (Paragraph 107.)

S. 27: The radio services available are generally admitted to be inadequate for the air services now operating. Instrument landing systems at Whenuapai and Ohakea should be installed as soon as possible. (Paragraphs 108–109.)

S. 28: We recommend the review of the relative responsibilities of the Post and Telegraph Department and the Civil Aviation (Telecommunications) organisation. Calibration of radio aids to navigation is an essential service for which the Directorate of Civil Aviation should be organised and equipped. (Paragraphs 108 ; 111.)

Regulation of aviation

S. 29: There is a tendency to over-regulation and the extension of Government control beyond the usual levels of governmental regulation. This sometimes amounts to an assumption of management. (Paragraph 112.)

S. 30: There is also a tendency to reduce the code of law to a requirement to satisfy a specified or unspecified official—a practice which is not in accordance with the traditions of British jurisprudence. (Paragraph 112.)

S. 31: There appears to be no merit in the three-tier system of law codification which has been adopted—namely, the Act, the Regulations, and Directions. The latter are not sanctioned by the Act. All regulations intended to have statutory effect could with advantage be issued in the statutory Regulations. (Paragraph 112.)

S. 32: Directions and sometimes documents of lesser status have been used to cancel or amend statutory Regulations. This appears to be *ultra vires*. (Paragraph 112.)

S. 33: The powers and functions to be exercised by the Minister under the Act and Regulations should, where appropriate, be formally delegated to the officers required to exercise them. (Paragraph 112.)

S. 34: Proposed regulations and the form in which it is proposed to issue them should be submitted to careful scrutiny by the Air Department in consultation with other departments concerned and by the Crown Law Office, to ensure that they have the overall effect desired by Government and are *intra vires* the Act. (Paragraphs 113 ; 115.)

S. 35: Certain regulations appropriate to the supervision of commercial air transport operations, when applied to the operations of a national operator, have the effect of imposing an unnecessary departmental control over the management of an organisation which itself has been set up by Government. Statutory provisions relating to licensing are not generally appropriate for Government employees in respect of their official duties. (Paragraphs 114 ; 115.)

S. 36: We recommend the establishment of an Advisory Committee on Air Regulations, comprising representatives of the Director of Civil Aviation, the operators of aircraft, pilots and others technically concerned, to examine proposed regulations in relation to practical operational factors. (Paragraphs 116–119.)

Air Service Certificate

S. 37 : The Air Service Certificate system, involving a great measure of detailed supervision by the Director of Civil Aviation over the management and organisation of a national operating agency, according to a code of standards which is largely unwritten, is unnecessary and inappropriate. It should not be applied to the national operating agencies, the boards of which are directly responsible to Government for the efficiency with which they carry out their mandate, while they are responsible also for compliance with the coded law. (Paragraphs 121-130.)

S. 38 : The Air Service Certificate system may usefully be applied to commercial operators of scheduled air services, but it is unnecessary in the case of non-scheduled air transport operators. (Paragraphs 131-132.)

Airworthiness of aircraft

S. 39 : There is no need for a full code of New Zealand civil airworthiness requirements. The airworthiness requirements of the countries of origin of the aircraft must inevitably be accepted, with such limited modifications as may have been found necessary in New Zealand. It would not be worth while or even practicable to establish the organisation required for an occasional New Zealand designed aircraft. (Paragraphs 134-138 ; 143.)

S. 40 : Proposed aircraft modifications arising out of New Zealand operations should be submitted for approval after full investigation by the operator, who should employ qualified aeronautical engineers for this purpose. (Paragraphs 139-142.)

S. 41 : Since the major functions of the Air Registration Board in the United Kingdom do not arise in New Zealand, there is no need for a similar body in this country. (Paragraph 145.)

Type record and import control

S. 42 : There has been misconception regarding the content of the "type record" of an aircraft and the stage at which it is available. The type record contains the evidence on which a certificate of airworthiness is issued, and is not available until the certificate of airworthiness for the prototype has been issued. It is required for the purpose of approval of modifications. (Paragraphs 146-150 ; 157.)

S. 43 : The "aeroplane flight manual," not the type record, contains a statement of the verified performance of the aircraft. The flight manual is a necessity for the proper operation of the aircraft. It is not available until the certificate of airworthiness for the prototype aeroplane is issued. (Paragraphs 151-155 ; 158.)

S. 44 : Many new aeroplanes are ordered before construction and testing of the prototype, and therefore before the type record and flight manual are available. While the supply of these documents may be made a condition of purchase, they may not be available to determine whether the purchase should be made. (Paragraphs 156-161.)

S. 45 : The use of the import control as a means of technical control of aviation is open to doubt. Control of the purchase of aircraft with Government funds by refusal of an import licence by officers of Government is inappropriate. (Paragraphs 159-160 ; 162-163.)

Air service licence

S. 46 : No licence is necessary in the case of the National Airways Corporation. It is appropriate only to scheduled air services operated by private enterprise. In the circumstances existing in New Zealand, a contract granted by the National Airways Corporation would serve the same purpose. The technical standard of scheduled air services operated by private enterprise under contract with the National Airways Corporation should be controlled by the Air Service Certificate system, which is within the province of the Director of Civil Aviation. (Paragraphs 164-165.)

S. 47 : No air service licence is necessary for non-scheduled services operating within the defined field open to private enterprise. The technical requirements for safety of such operations should be adequately secured by observance of the coded law. (Paragraphs 164-165.)

Investigation of accidents

S. 48 : There should be a statutory requirement to report all major or serious accidents and power to carry out investigation as at present. (Paragraphs 168-170.)

S. 49 : The Director of Civil Aviation should assist the Inspector of Accidents as necessary, and should be fully informed with regard to all investigations, in order that action may be taken to avoid recurrence. (Paragraphs 174-176.)

S. 50 : For the safety of aviation, it is necessary for the Director of Civil Aviation to investigate all minor accidents not investigated by the Inspector of Accidents, and all incidents which might have resulted in accident ; but there is no need to make this a statutory requirement. (Paragraphs 171-180.)

Training

S. 51 : In New Zealand, as elsewhere, civil aviation is dependent on war-trained personnel. There is a present need for conversion training and for planning ahead to ensure the supply of the new men who will shortly be needed, not only as replacements, but to meet the demands of expansion. (Paragraphs 181-183.)

S. 52 : There is a continuing need for providing air experience for air traffic controllers and close collaboration between the aircrews and air traffic control personnel. (Paragraphs 184-185.)

S. 53 : The training of radio operators and technicians is a common problem for the operators and the Civil Aviation Directorate. Specialised training is required, and a school of instruction for this purpose will probably be found necessary. (Paragraphs 186 ; 191.)

S. 54 : The aeronautical engineering staff of the Civil Aviation Directorate cannot be produced by direct training. All must have some experience in engineering workshops or aircraft operation. Some must

be professionally qualified aeronautical engineers. A co-ordinated scheme linking up the Universities, technical schools, operators' engineering establishments, and the Aeronautical Engineering Branch of the Civil Aviation Directorate, is needed. (Paragraphs 187 ; 191-193.)

S. 55 : While the conversion training of pilots and the development of co-pilots to command is a current problem which is receiving the attention of the operators, there is a need to look ahead to future sources of supply of pilots to supplement the Air Force supply. Flying clubs constitute an efficient and economical medium for initial training and selection. (Paragraphs 188-190.)

S. 56 : The Civil Aviation Directorate staff and organisation for the examination of candidates for licences should be strengthened to eliminate delays and ensure a steady supply of licensed personnel for employment by the operators. (Paragraph 196.)

Flying clubs

S. 57 : Flying clubs have proved everywhere a national asset in war. They are also a national asset in the development and operation of civil aviation and air transport. They constitute the most economical initial training and selection ground for pilots. (Paragraphs 197-200.)

S. 58 : We recommend consideration of a scheme of financial assistance to flying clubs, the object of which should be to reduce flying charges to a level which will enable sufficient flying to be sold to maintain costs at an economic level and to raise commercial revenue to the maximum. (Paragraphs 203-208.)

S. 59 : Air Training Corps training should be paid for by Government at a rate which covers the whole costs of the flying club, thus reducing the need for direct subsidy. (Paragraph 202.)

S. 60 : Part of the financial assistance to flying clubs should be in the form of provision of aircraft and spares on a basis which will eliminate the need for financial provision for replacement reserves. Financial assistance towards operating costs may take the form of bonuses for training accomplished. In the case of small clubs, a fixed grant towards standing charges may also be necessary. (Paragraphs 205-208.)

S. 61 : The Director of Civil Aviation should have the responsibility of developing and supervising the flying club organisation and should be required to prepare proposals for consideration by Government. (Paragraph 209.)

PART III—I.C.A.O. STANDARDS

S. 62 : The application of I.C.A.O. Standards in New Zealand should be judged in the light of the general exposé in Chapter 16.

Aircraft performance standards

S. 63 : International Standards of performance of aircraft have not yet been agreed, and there are few existing aircraft which comply with all the I.C.A.O. proposals now in draft. The Standards when adopted will not apply to existing aircraft. (Paragraphs 224 ; 232 ; 235.)

S. 64 : New Zealand is recommended to collaborate with the United Kingdom in framing performance regulations for the interim period until aircraft and aerodromes are available which comply with the inter-

national standards yet to be introduced. The task requires large technical resources which are not at the command of every country, (Paragraph 234.)

S. 65 : The United Kingdom draft interim regulations governing aircraft performance (see Appendix G) in the conditions applicable to the Tasman crossing prescribe a rate of climb of 100 feet per minute with one engine inoperative at 5,000 feet in the atmospheric conditions expected to prevail. Generally speaking, this will be somewhat below the draft requirements of I.C.A.O. Relevant figures for the Sandringham and Solent flying-boats are examined. The Solents are expected to comply with the I.C.A.O. draft Standards in this respect. (Paragraphs 237 ; 238.)

S. 66 : In applying airworthiness and operational standards in New Zealand the separate functions of the regulatory authority and the operator should be carefully observed. The former is responsible for prescribing the standards, the latter for their application and day to day observance. (Paragraph 231.)

PART IV—AERODROMES

Aerodrome standards

S. 67 : It is not possible to assess the aerodrome standards required in New Zealand by referring solely to the I.C.A.O. AGA Standards. The OPS and AIR Standards must also be taken into consideration. In applying these three sets of Standards, allowances must be made for contemporary aircraft which cannot, and will never be required to comply with all the provisions of these proposed standards. (Paragraphs 239-245.)

S. 68 : The " approach " and " circuit " clearance requirements of the AGA Standards may be impossible to satisfy at some aerodromes in New Zealand in hilly terrain. Safety should be preserved by the selection of aircraft with suitable performance characteristics and by a sacrifice of regularity in scheduled air services. We recommend that New Zealand should pursue with I.C.A.O. the development of special standards and procedures for such terrain. (Paragraphs 246-247.)

S. 69 : We recommend the preparation of aerodrome zone plans for all important aerodromes, with particular reference to the installation of approach lighting and instrument landing systems and the use of the powers conferred by the Public Works Act, 1928, to control structures in the aerodrome zone. (Paragraphs 248-251.)

S. 70 : The standard recommended for the development of international aerodromes in New Zealand is I.C.A.O. Class C4. While I.C.A.O. Standards carry no obligation in respect of internal aerodromes, we recommend I.C.A.O. Class D5 as the maximum which need be aimed at for major internal aerodromes. (Paragraphs 252-253.)

International airports

S. 71 : International land airports are required at Auckland and Christchurch ; and Ohakea is necessary as an alternate in case of bad weather at either of the regular airports. International water aerodromes at Auckland and Wellington are recommended. (Paragraphs 254-258.)

S. 72 : Since military and civil flying cannot both be fully developed at Whenuapai, and the aerodrome cannot be made to satisfy I.C.A.O. Class 4 Standards, we consider that a new international airport is necessary at Auckland. We recommend urgent investigation of sites at Mangere and Pakuranga and the provision of funds for the necessary meteorological and engineering surveys. (Paragraphs 259-264.)

S. 73 : We recommend that instrument landing systems and approach and runway lighting should be installed at Ohakea and Whenuapai. (Paragraphs 265-266.)

S. 74 : Rongotai could not be developed as an international aerodrome because of the surrounding hills. Paraparaumu could not be made to comply fully with international standards because of the hills on one side. We do not consider there is a case for making an international aerodrome, to serve Wellington, further away from the city. (Paragraphs 267-268.)

S. 75 : Harewood is suitable for the development of an international aerodrome for Christchurch. The Royal New Zealand Air Force aerodrome at Wigram is too close to permit the development of both, and either a decision should be taken to move the Air Force ultimately to another aerodrome or a new site should be chosen and developed now as the civil airport. (Paragraphs 269-276.)

S. 76 : The reports on which Wellington Harbour was condemned for flying-boat operation are not applicable to modern flying-boats. We believe that examination and trial by seaplane operational experts would prove it to be suitable for modern flying-boats. (Paragraphs 277-279.)

Internal aerodromes

S. 77 : The practical limit of construction at Rongotai appears to be I.C.A.O. Class E. This limits the classes of aircraft which may use it. We disagree with the proposal that initial construction should be limited to a strip width of 300 feet. The minimum strip width for safety should be 500 feet, with a clearance of houses over a total width of 800 feet. Full development will necessitate the clearance of the whole isthmus. Plans for the road subway should be reviewed accordingly. When Rongotai aerodrome is constructed, the need for further development of Paraparaumu will disappear. (Paragraphs 284-286.)

S. 78 : Runways are required at Palmerston North. (Paragraph 287.)

S. 79 : The economy of air transport and of aerodrome operation dictate that two towns situated as are Hastings and Napier should, if practicable, be served by one suitably located aerodrome. (Paragraphs 288-290.)

S. 80 : Dunedin (Taieri) aerodrome is unsuitably situated for the operation of scheduled air services and involves considerable risk. Investigation of a new site in the Taieri Valley is recommended. (Paragraphs 291-293.)

S. 81 : Otago Harbour is suitable only for the operation of small seaplanes. (Paragraphs 294-295.)

S. 82 : In Central Otago, it is recommended that an aerodrome of I.C.A.O. Class E Standard for the operation of scheduled air services be developed at Alexandra. Other towns should have smaller aerodromes for the operation of light aircraft. (Paragraph 296.)

S. 83: Bluff Harbour appears to be suitable for the operation of flying-boats. (Paragraph 298.)

Aerodrome equipment

S. 84: Attention is drawn to the urgent need to improve the fire-fighting organisation at aerodromes, both in equipment and personnel. (Chapter 21.)

Aerodrome economics and management

S. 85: There is need for a considerable programme of aerodrome construction and development in New Zealand. It is beyond the capacity of local authorities generally to provide what is required, and we recommend that the State should take over the ownership and responsibility for development of the aerodromes required for the national air transport plan. (Paragraphs 306-308.)

S. 86: The field should be left open for local and private enterprise to provide aerodromes outside the national plan, subject to technical control by a licensing system. (Paragraph 309.)

S. 87: Local authorities and associations should be associated with the development of service and amenities for the public at State aerodromes. Aerodrome advisory committees, comprising the airport manager and representatives of local authorities and other bodies, are recommended. (Paragraphs 310-312.)

S. 88: We do not recommend the establishment of a series of main and district aerodrome boards with advisory or other functions in regard to the national air route system. This can be most effectively handled by the department of Government concerned. (Paragraph 312.)

S. 89: There is a need for unified control of the administration and all activities at each aerodrome. The post of aerodrome officer in charge may combine the duties of administration and business management and co-ordination of all technical services. The administration and operation of State civil aerodromes should be the responsibility of the Director of Civil Aviation. (Paragraphs 314-315.)

S. 90: A system of charges for the use of aerodromes should be established in order to reduce the cost to the taxpayer and to ensure that air transport is not developed on an artificial economic basis. (Paragraphs 316-319.)

S. 91: We recommend a commercial basis of rent and charges for the use of hangars and other buildings, and a landing charge so fixed that it represents an equitable cost per ton-mile of air transport in relation to other elements in the total cost. (Paragraphs 320-325.)

S. 92: Ancillary sources of revenue should be developed; the aerodrome advisory committees recommended can play a useful part in this. (Paragraph 326.)

Aerodrome licensing

S. 93: The aerodrome licensing system is inappropriate for State aerodromes, whether civil or Air Force. (Paragraph 327.)

S. 94: While it is convenient in early stages of development to license aerodromes for named types of aircraft, the system must ultimately break down under its own weight. We recommend the adoption of the system now being developed in the United Kingdom. The physical characteristics of the aerodrome are published by the civil aviation administration—in the licence or otherwise. The responsibility for safe operation in accordance with the statutory regulations—that is, for ensuring that the aerodrome is adequate for the contemplated operation—rests upon the pilot. (Paragraphs 323–332.)