1949

NEW ZEALAND

AIR DEPARTMENT

(REPORT ON THE) FOR THE YEAR 1948-49

Presented in Pursuance of Section 7 of the Air Department Act, 1937

REPORT BY THE HONOURABLE F. JONES, MINISTER IN CHARGE OF THE AIR DEPARTMENT FOR THE YEAR ENDED 31st MARCH, 1949

MR. SPEAKER,—

I have the honour to present to Parliament the report of the Air Department for the year ended 31st March, 1949.

REPORT BY THE CHIEF OF THE AIR STAFF FOR THE YEAR ENDED 31st MARCH, 1949

The Hon. the MINISTER OF DEFENCE, Wellington.

I have the honour to submit the following report on the Royal New Zealand Air Force for the year ended 31st March, 1949.

The R.N.Z.A.F. has emerged from the abnormal and unstable conditions of the "interim" period depleted in trained man-power and vested with three main commitments—firstly, training members up to the high standards of efficiency demanded of a modern fighting service, secondly, continuing to fulfill operational tasks, and, thirdly, reorganizing practically all phases of Air Force administration to meet modern needs. These three tasks, which are interdependent, have placed a considerable burden on the R.N.Z.A.F. in view of the shortage of trained man-power.

Efforts to attract recruits of suitable calibre have met with only partial success, and a vigorous recruiting campaign must be pursued during the coming year to attract the right type of young New Zealander as soon as he leaves school. Cadet entries are being encouraged, and the Service is providing every facility for their welfare and training.

At the end of March, 1948, all "interim" engagements expired, and the R.N.Z.A.F. reached its lowest point in effective strength. Although recruiting in the twelve months since that date has resulted in the enlistment of 870 personnel, nearly all untrained, releases during the same period amounted to 731 trained personnel, with the result that the technical capacity of the Service was further reduced and the already acute unbalance of trades was aggravated. Trade training and the continued enlistment of ex-R.A.F.

tradesmen provide the only solution to these problems. The strength of the Air Force at 31st March, 1949, was 398 officers, 2,428 airmen, and 223 airwomen, a total of 3,049, of which total over 600 were non-effective undergoing training. The increase over last year's total is 202.

With the accent being placed on training and the necessity to concentrate training activities on certain stations to effect economies in equipment and administrative support, the accommodation problems at Wigram and Hobsonville have become acute. Although certain of the present accommodation assets of the Service are not being fully used, it is because they are situated at locations which cannot be effectively utilized until the trained element of the R.N.Z.A.F. is considerably augmented. While the R.N.Z.A.F. cannot expect a permanent rebuilding programme in the immediate future, at least additional training and domestic accommodation must be provided at the two major training stations as soon as possible.

The commitments of the R.N.Z.A.F. during the year included the segregation, custody, and disposal of equipment in conjunction with the War Assets Realization Board; the operation of overseas air transport schedules to Japan and Singapore (No. 41 Squadron); the maintenance of No. 14 Squadron in Japan as the New Zealand Air Component of the British Commonwealth Occupation Force until its withdrawal to New Zealand at the end of 1948; the maintenance of No. 5 Flying-boat Squadron on a skeleton basis in Fiji; and the operation of No. 75 Squadron equipped with Mosquitos at Ohakea. The last 11 Mosquitos were flight delivered to New Zealand during the year, making the total number received 76. Flying training at Wigram and trade training at Wigram and Hobsonville were intensified and extended.

A rearming programme is being formulated, and the replacement of interim operational and training aircraft with modern types in use in the Royal Air Force should commence in 1950.

During the year close liaison was maintained with the Royal Air Force and the Royal Australian Air Force. Demonstrations and lectures by specialist teams from the R.A.F. and R.A.A.F. proved invaluable in providing the R.N.Z.A.F. with first-hand information on modern doctrine and developments in air warfare.

In March, 1949, the Chief of the Air Staff visited Australia to discuss aircraft-production and joint planning with the Royal Australian Air Force.

Operations

Squadron Activities.—No. 14 Squadron continued to represent the R.N.Z.A.F. as the New Zealand Air Component of the British Commonwealth Occupation Force in Japan. The squadron ceased operational flying in Japan on the 1st September, 1948, and officially handed over the administration of the British Commonwealth Air Station at Bofu, which had been the responsibility of the squadron for nine months, to the United States Air Force. Prior to the squadron's embarkation from Iwakuni the Commander-in-Chief, B.C.O.F., Lieutenant-General H. C. H. Robertson, C.B.E., D.S.O., paid a fine tribute to its work and efficiency. Following its return to New Zealand in December, 1948, the squadron was re-formed at Ohakea. The ferrying of Mosquito aircraft from the United Kingdom by No. 75 Squadron was completed in May, 1948, when the seventy-sixth aircraft arrived in New Zealand. Since that date the activities of No. 75 Squadron have been focused on training in all phases of fighter-bomber operations. Equipped with Catalina flying-boats and based at Lauthala Bay, Fiji, No. 5 Squadron continued to provide search-and-rescue facilities in Fiji and operate a two-aircraft detachment at Hobsonville for similar duty. Numerous flights to islands in the Lau and Fiji Groups were made at the request of the United Kingdom High Commissioner for the Western Pacific in addition to the squadron training programme, which included flights between New

Zealand and Fiji for the purpose of carrying Air Force supplies and personnel. In December, 1948, nine flights transporting food and medical supplies were made to islands of the Lau Group to assist in the relief of the hurricane-devastated area. Two complete transport crews remain attached to No. 24 Commonwealth Squadron in the United Kingdom.

Co-operation with Other Services.—During the year exercises were carried out by Mosquito, Catalina, and Harvard aircraft with the newly-formed squadron of R.N.Z.N. frigates. Seven Army pilots completed their basic air-observation-post training in the R.N.Z.A.F. and were converted to Auster aircraft, which are standard British equipment for that duty. Mosquito aircraft also co-operated with the Army in anti-aircraft artillery shoots. These activities demonstrated, in small measure but practical manner, the integrated role of the three Services which is receiving continued emphasis.

Liaison Visits.—Teams from the Empire Air Armament School and Central Fighter Establishment visited the R.N.Z.A.F. during the year. An R.A.A.F. Lincoln with a land/air warfare team arrived in December, 1948. These teams gave lectures and demonstrations on developments in their specialist spheres to officers of the three Services. Such visits contribute considerably to keeping the Air Force abreast of modern trends and developments.

Statistics.—A summary of flying statistics is given at Appendix A. Although the hours flown, 19,709, show a decrease from the total flown in the preceding period (20,927), they represent an increase of approximately 5,000 hours in true service flying due to the cessation of Air Force quasi-civil transport services.

Miscellaneous Flying Activities

Extra Service tasks in conjunction with other State Departments showed some increase over last year's operations in this sphere.

The inter-departmental Committee for the co-ordination of air services required by State Departments charged the R.N.Z.A.F., in conjunction with the Soil Conservation and Rivers Control Council, with the task of investigating the practibility of aerial top-dressing marginal land in New Zealand. Preliminary experiments commenced in July, 1948, with specially modified Avenger aircraft. Field trials proved successful at Raglan and Sanson, and experimental operations on a larger scale at Masterton are now being planned. Essential air-lifts within New Zealand were provided by the General Purpose Flight, which also undertook extensive aerial fire patrols (with Auster aircraft) from Rotorua during the summer months: No. 41 Squadron (Dakota aircraft) assisted the Civil Aviation Branch in the calibration of radio navigation aids within New Zealand and the Pacific Area, provided instrument flying practice for pilots of Tasman Empire Airways Ltd., transported and air-dropped supplies in support of deer-control activities and also air-dropped prefabricated mountain huts in the North and South Islands. Daily meteorological flights were carried out from Ohakea to obtain upper air temperatures to assist meteorological forecasting. Air search and rescue operations were undertaken on twenty-four occasions and in the "Kaka" search involved the use of twenty-seven Service aircraft.

Air Transport Services

The overseas air transport activities of the R.N.Z.A.F. which have been prominent since 1942 have been progressively reduced, and at present the R.N.Z.A.F. has no routine overseas air-transport schedules. After two years of continuous operation the courier service to Japan was terminated in April, 1948, and No. 41 Squadron was diverted to the urgent task of providing an air lift from Singapore to New Zealand for ex-R.A.F. tradesmen who had enlisted in the R.N.Z.A.F. in England. These airmen, who were transported to Singapore by the R.A.F. Transport Command, were urgently required

in New Zealand to reinforce the technical strength of the R.N.Z.A.F. The service to Singapore via Norfolk Island, Brisbane, Cloncurry, Darwin, and Sourabaya was inaugurated on the 24th April, 1948, and continued on a fortnightly basis until September, when the flow of R.A.F. recruits ceased because of the diversion of R.A.F. Transport Command to the Berlin air lift. An analysis of the Singapore schedule is as follows :—

Total number of trips	8
Passengers carried	148
Freight and mail	13,803 lb.
Hours flown	640

The routine schedule to Norfolk Island was also terminated in July, 1948, following the disestablishment of the R.N.Z.A.F. Station at Norfolk. Within New Zealand No. 41 Squadron provided weekly lifts between Whenuapai and Wigram for the dual purpose of training and the carriage of stores and service personnel between R.N.Z.A.F. stations. The General Purpose Flight established at Ohakea provided essential air lifts in New Zealand.

Since September, 1948, the R.N.Z.A.F. has been represented in the Berlin air lift by three crews flying R.A.F. Dakota aircraft.

Ancilliary Services

Meteorological Services.—The meteorological service required by the Air Force is provided by the Meteorological Branch of Air Department. The report of the Director of Meteorological Services appears in a separate section of this report. Shortage of staff continues to restrict the provision of forecasting services.

Air Traffic Control Division.—This division of the Civil Aviation Branch provides air traffic control and flight information services for the R.N.Z.A.F. in addition to discharging its civil aviation responsibilities.

All personnel at Air Force stations are members of the Territorial Air Force and work as members of the R.N.Z.A.F.

Search and Rescue.—The Air Traffic Control Division also co-ordinates search-and-rescue operations, in which the Air Force assisted on twenty-four occasions during the year.

The activities of this Division are detailed in the report of the Director of Civil Aviation.

Aeronautical Research

The defence science organization, established in 1947, now includes the Advisory Aeronautical Research Committee which was separately established in June, 1947. This Committee is now on the same level, in its own sphere, as the Defence Scientific Advisory Committee.

The Defence Scientific Corps, comprised of officers who are primarily scientists and secondarily members of the Armed Forces, was further augmented by four well-qualified officers who are to engage in research projects co-ordinated by the Commonwealth Advisory Committees on Defence Science and Aeronautical Research.

The full report on defence science research is submitted separately by the defence scientific organization.

Personnel

During the year the number of personnel serving on indefinite engagements has been substantially reduced and the number on regular engagements has increased. Service on a temporary basis is being discouraged as far as possible with the ultimate object of having the R.N.Z.A.F. fully manned with personnel on regular engagements.

On the publication of provisional establishments, manning plans for officers, airmen, and airwomen were revised. The manning position at the end of March, 1949, is as follows:—

	Officers.	Airmen and Airwomen.	Total.
Permanent service	156	265	421
Short service (two to eight years)	182	2,183	2,365
Temporary service	60	203	263
	398	2,651	3,049

Officers.—In addition to the strength of officers shown above, 20 officers seconded from other Services are serving with R.N.Z.A.F. Following amendments to the manning plans, it became possible to offer further extensions of service to serving officers, and during the year 53 Regular Commissions were granted in the R.N.Z.A.F. and 4 were granted in the New Zealand Defence Scientific Corps.

Officers and N.C.O. aircrew released during the year numbered 60 and 13 respectively.

Manning.—During the year a total of 870 recruits for ground trades was enlisted in the Regular Air Force from the following sources:—

(*a*) From U.K. ex-R.A.F. tradesmen	174
(*b*) From New Zealand—	
Airmen	577
Airwomen	119
	870

The progress in recruiting has been offset by the releases during the same period numbering 731, comprising 652 airmen and 79 airwomen.

In order to encourage younger men of good calibre to enlist as technical and as administrative tradesmen a Cadet Entrant Scheme was introduced during the year. The age-limits are "over 16 but not over 17½ on enlistment," and 22 Cadets were selected for enlistment in this period.

Statistics have again shown that the flow of recruits into the Service is directly related to the intensity of recruiting publicity campaigns, and it is clear that an intensified recruiting programme is necessary if the depleted domestic trades of the R.N.Z.A.F. are to be augmented and a balance of trades achieved in the near future.

As the manning plans have been developed, further extensions of service have been offered to serving airmen, and promotions of airmen and airwomen in several trades have taken place.

Non-Regular Forces.—Following the advertising campaign to publicise vacancies in the Territorial Air Force and Air Force Reserves for personnel who served in the Commonwealth Air Forces during World War II, a total of 3,053 applications was received.

	Officers.	N.C.O. Aircrew.	Ground Trades.	Total.
T.A.F.	701	270	113	1,084
Active Reserve	734	200	233	1,167
General Reserve	448	89	265	802
Total	1,883	559	611	3,053

It will be possible to absorb only a fraction of the officer and aircrew applicants in the Territorial Air Force and Active Reserve, but the number of trained applicants for the ground trades is well below requirements. The General Reserve consists of personnel who have no obligation to undergo annual training but who are willing to serve in the R.N.Z.A.F. in time of national emergency.

Women's Auxiliary Air Force. The strength of the W.A.A.F. at the 31st March was 16 officers and 223 airwomen.

Exchanges.—The policy of exchanging officers with the Royal Air Force has continued, with marked benefits to the R.N.Z.A.F. In addition to the posts mentioned in last year's report, the appointment of the Director of Medical Services (Air) and O.C. Flying Wing, Wigram, are currently held by R.A.F. officers on exchange. A total of 8 R.N.Z.A.F. officers are on exchange duties in the United Kingdom. The full value of the reciprocal exchange policy will be apparent in the near future when the first R.N.Z.A.F. officers to benefit by experience under the scheme will return to New Zealand. During the year one officer attended the Joint Services Staff College, two officers the R.A.F. Staff College, and one officer the Air Weapons Course.

Honours and Awards. Honours and awards conferred on R.N.Z.A.F. personnel during the year were as follows:

	Conferred 1st April, 1948, to 31st March, 1949.
Honours	
Officer of the Order of the British Empire	3
Member of the Order of the British Empire	6
British Empire Medal	5
Awards	
Air Force Cross	4
Commendations	4
Legion of Merit (American—Degree of Officer)	4

Casualties:

	From 1st April, 1948, to 31st March, 1949.	
	In New Zealand.	Overseas.
Killed (Service accidents)	6	..
Killed (non-Service accidents)	2	..
Died of natural causes	3	..
	11	..

Five deaths resulting from Service accidents were caused in two aircraft accidents, and one was caused through a motor-vehicle accident.

Medical and Dental

The R.N.Z.A.F. Medical Service is still unable to give more than limited attention to the many problems of aviation medicine, owing to the lack of staff. Every effort is being made to obtain suitable officers to give aviation medicine, psychology, and the medical aspects of high-altitude flying, fatigue, and flying safety the attention they demand.

The medical treatment of serving personnel, the boarding of recruits for the Regular and non-Regular Air Force, and the boarding of personnel prior to their demobilization fully taxed the resources of the Service medical staffs and the civilian medical practitioners who assist on a part-time basis. The general standard of health of serving personnel was excellent, the incidence of sickness being the lowest recorded since 1939.

The Dental Service provided by the Royal New Zealand Army Dental Corps was improved as a result of the increase in staff, and almost complete dental fitness in the Air Force was achieved.

Training

Flying Training.—By the end of April, 1948, preparations were completed for recommencing flying training at Wigram. A Flying Wing had been created within which three schools were established to cover a wide range of instruction.

No. 1 Flying Training School was organized to provide pilot training for courses of 12 Cadets every four months. The first course entered Wigram in May, 1948. The duration of these courses is eighty-two weeks, and No. 1 course will complete training by December, 1949. No. 1 Flying Training School also provided refresher flying for 16 re-engaged Pilots who had just qualified at the end of the war.

The Advanced Flying School, with its two sections—the Central Flying School and the Instrument Flying School—provided tuition for 16 officers, who received instructors' categories on all three types of training aircraft in use, and 18 pilots, who obtained their Instrument Ratings. The Central Flying School supervised the Government-subsidized A.T.C. flying training scheme, testing and grading 150 Cadets, and also provided two conversion courses to Auster aircraft for Army officers selected for Air Observation Post duties.

The Navigation School is providing instruction for 24 Cadet Navigators using Anson aircraft in initial phases and Dakota aircraft detached from No. 41 Squadron for advanced work later in the course. When necessary these schools have also taken part in search-and-rescue operations.

Technical Training. The technical training activities at Hobsonville and Wigram have been considerably expanded during the year. Accommodation and training facilities at these stations must be increased to cater for the priority task of training, and works-development programmes are being prepared. Personnel now under training are more than treble the numbers at the same period last year, while 170 completed trade courses during the year.

In addition to *ab initio* courses, conversion training of airmen to the higher standards of the new trade structure was initiated in signals, medical, equipment and administrative trades. The training of airwomen in certain administrative and supply trades will commence shortly.

Routine trade test examinations were conducted in April and October to enable personnel who have had trade experience following technical training courses to qualify for higher trade classification.

Non-Regular Forces

Considerable progress has been made in the organization of the non-Regular elements of the Air Force. The administrative structure for the direction and training of all the non-Regular Forces has been established and is now operating in support of the current activities of the Territorial Air Force and the Air Training Corps. The re-activation of the T.A.F. commenced in September, 1948, by the formation of four T.A.F. squadrons, one in each of the four main centres. The fifth and remaining squadron will later be formed at Auckland. The squadrons which operate from Whenuapai, Rongotai, Wigram, and Taieri have been initially equipped with Tiger Moth and Harvard aircraft. Flying operations commenced in December, 1948, and it is planned to provide three of the squadrons with Oxford aircraft later this year.

Applicants for service with the Active Reserve force of 2,000 trained personnel have been enlisted and their training will commence later in 1949. The number of applications from officers and aircrew for service in the T.A.F. and Active Reserve has been satisfactory, but applications for service in ground trades have to date met approximately only one-fifth of the requirements. Non-Regular activities are considerably handicapped at the present time by lack of appropriate accommodation, particularly in Wellington.

The activities of the Air Training Corps continued at a satisfactory level during the year. Summer camps held at Whenuapai, Ohakea, and Weedons provided over 1,000 N.C.O.s and Cadets with practical instruction in aeronautical subjects and a first-hand insight into the varied activities of an R.N.Z.A.F. station. *Ab initio* flying training was again enthusiastically carried out by 149 Cadets under the Government-subsidized A.T.C. Flying Training Scheme. In addition, 104 Cadets who received flying training last year in this scheme also received refresher training.

Equipment

Equipment and interchangeable spares have been standardized on British types wherever possible, and only those American aircraft which are essential to the fulfilment of current commitments are retained. However, the limitation of life of aircraft is governed by two factors—the maintenance backing available and the progressive-age factor. The maintenance backing for the British types of aircraft in service to-day is generally satisfactory, with the exception that the provisioning of some consumable spares is causing trouble due to the lack of adequate consumption data. In the case of American-type aircraft the maintenance backing is strictly confined to the planned life of the aircraft type, and, in fact, is becoming increasingly critical owing to the fact that the aircraft types are old and out of current production. It will be necessary to commence a major rearming programme before the end of 1950.

The aircraft strength at the 31st March, 1949, stood at 432. Of this total, 14 Mosquito aircraft were flight delivered from United Kingdom during the year, bringing the total received in New Zealand to 76, and so completing the contract (four aircraft were lost *en route*). Two Devon aircraft were also received and placed in service for use in the General Purpose Flight. Included in the 101 aircraft which were converted for instructional use, released to aero clubs, sold, or destroyed were 19 lend-lease Corsair aircraft which were destroyed in Japan prior to the withdrawal of No. 14 Squadron and 19 Tiger Moths which were issued to aero clubs. One C 60 (Lodestar) aircraft was transferred to the Civil Aviation Branch of Air Department for D/F calibration, and an order was placed in United Kingdom for two Miles Aerovan aircraft for experimental work in soil conservation. All Hudson aircraft were withdrawn from service, and only five selected aircraft, together with a small spares backing, were retained in long-term storage. The reduction to spares of surplus Dakota, Catalina, and Anson aircraft is proceeding.

Following a comprehensive review of all motor transport operated by the R.N.Z.A.F. a re-equipping and purchasing programme extending over a five-year period was formulated and submitted for financial approval.

Acute man-power shortages in the domestic trades necessitated the arrangement of contracts with civilian caterers at Woodbourne, Mangaroa, Weedons, and Shelly Bay. The messing under these arrangements has been satisfactory to date, and the standard of messing provided by the Service at other R.N.Z.A.F. stations has been maintained.

Although substantial progress has been made in the segregation of surplus and obsolescent stocks and their disposal through the War Assets Realization Board, this commitment continues, through staff shortages, to prove an embarrassment to the R.N.Z.A.F. The establishment of stores held at consumer units was reduced and a system of provisioning by stores depots on a regional basis was introduced. The adoption

of a fixed provisioning cycle by the R.N.Z.A.F. will permit the recording of consumption data of recurring and non-recurring issues and stocks held. This monthly cycle has been arranged to anticipate a similar provisioning period of the Royal Air Force so that R.N.Z.A.F. demands may be integrated with those of the R.A.F.

Movement Section.—During the year the R.N.Z.A.F. was made responsible for arranging and co-ordinating all overseas passages for Navy, Army, and Air Force. The Movements Section, Auckland, also arranges all shipping of equipment into and from the Port of Auckland for the three Armed Services.

A summary showing the traffic for the year is as under:—

	Passengers.	Freight. lb.	Mail. lb.
(*a*) *Air Traffic*—			
Overseas	446	155,733	14,795
Internal	2,240	742,584	360
(*b*) *Sea*—		Tons.	
Disembarked	475	3,280	
Embarked	95	1,760	
(*c*) *Rail*	..	920	
(*d*) *Road*	..	1,803	

Technical Services

As the technical services of the R.N.Z.A.F. were reorganized in 1947 to conform with the pattern set by the Royal Air Force, the period 1948–49 was one of consolidation of this organization and of expanding effort in the field. Priority was given to all servicing tasks in the immediate support of flying, and some major servicing of aircraft has been deferred, by utilizing serviceable equipment held in stock, pending an increase in the strength of technical tradesmen. For the same reason it was again necessary to place contracts with civil organizations to assist with aircraft storage and major servicing.

A factor which is assuming increasing proportions is that wartime equipment, due to age and deterioration, is now absorbing considerable technical effort in its servicing.

For economy and efficiency, and in order to make the best use of Ohakea as a flying station, it was decided that all the repair-depot facilities of the R.N.Z.A.F. and the majority of the aircraft storage functions would be concentrated at Woodbourne. The engine-repair line for Merlin engines has already been installed there, and the remaining equipment is now being transferred from the existing repair depot at Ohakea to Woodbourne.

A major developmental task was dealt with during the year in successfully solving the cylinder overheating problems encountered in certain aircraft installations. The modifications designed by the R.N.Z.A.F. were approved for use within the Service and for incorporation in the Sandringham flying-boats of Tasman Empire Airways Ltd.

Overseas developments in the field of radio aids to navigation are being watched closely with a view to their adoption in New Zealand when some degree of finality has been reached. In the meantime the existing facilities operated by the Civil Aviation Branch are regarded as reasonably adequate for present and short-term Service requirements.

Essential communication services for the administration and operation of the R.N.Z.A.F. have been maintained at a reduced level. The standard of maintenance provided by the Post and Telegraph Department in connection with the R.N.Z.A.F. operated telephone and teleprinter channels has been excellent.

A close liaison with the electronic section of the Department of Scientific and Industrial Research has been maintained during the year, and measurements of cosmic radiation at high altitudes have been carried out at Ohakea in a specially-equipped Mosquito.

Works Services

R.N.Z.A.F. facilities at Norfolk Island, Tonga, and Nausori (Fiji) were withdrawn, and control of these airfields was passed to the Australian Government in the case of Norfolk Island, and to Civil Aviation Branch of Air Department in the case of Tonga and Nausori. The New Zealand Works Department will continue to maintain the latter two aerodromes on behalf of the appropriate Governments. Part of the R.N.Z.A.F. station at Ardmore was loaned to the Education Board; the Movements Section, Auckland, was relocated in Fanshawe Street to release premises required for other purposes; nine blister-type hangars were renovated and repossessed at Ashburton Airfield for storage purposes; and a detachment from Wigram was established at Burnham Military Camp as a temporary expedient pending the recovery of accommodation blocks at Wigram which are currently occupied by the Immigration Department.

Approval was received to erect forty housing units on New Zealand stations and twelve houses at Lauthala Bay, Fiji, as the first stage of a Service housing programme. It is of considerable importance to expedite this programme, since the conversion of existing buildings has virtually ceased owing to the lack of further suitable buildings. Recruiting and the retention of much-needed trained personnel in the Service depends to a large degree on the provision of married accommodation.

Major works within the long-term rebuilding programme included the preparation of an internal fire-prevention scheme using augmented water-supplies and sprinkler systems connected with automatic-alarm systems. The establishment of a major repair depot for the R.N.Z.A.F. at Woodbourne has commenced, and progress has been made in augmenting the storage capacity at Te Rapa and Weedons in order that temporary buildings at Mangaroa may be released. The rebuilding of Te Rapa in permanent materials is proceeding, all barrack accommodation having been brought up to a satisfactory standard. Modernization of messes throughout the R.N.Z.A.F. by the introduction of labour-saving equipment is progressing.

The standard of maintenance provided by the Ministry of Works has been high.

Organization

The reorganization of the R.N.Z.A.F. has proceeded in conformity with approved plans. This has principally been evidenced by the introduction of a "three wing" organization on stations. Under this arrangement flying, administrative, and technical wings function under individual commanders, the whole organization being co-ordinated by the station commander. A new recruiting organization has been established with recruiting offices at Auckland, Wellington, and Christchurch. The detailed control and supervision of non-Regular Forces has been delegated to Reserve Wings established on the three main R.N.Z.A.F. stations in Auckland, Wellington, and Christchurch, with a Directorate of Reserves at Air Department co-ordinating all non-Regular activities. The basis of the plan for the division of the R.N.Z.A.F. into two functional groups has been laid down. The peace establishment of the R.N.Z.A.F. has been prepared in conjunction with a representative of the Treasury and submitted to the Air Board.

The Post-war Planning Committee and the Planning Executive have now been disbanded, and the responsibility for planning passed to headquarters staffs.

Administrative procedures have been overhauled, and the examination, review, and reissue of orders and regulations continues.

Education

The number of education officers in the R.N.Z.A.F. is still insufficient to cope with the growing commitments of the Education Branch, and the assistance of part-time teachers has been secured wherever possible. The range of education instruction required

in the R.N.Z.A.F. stretches from the late primary-school standard to Stage I university standard. The educational standard of recruits is causing concern, and considerable effort is necessary after entry to raise it to a suitable level before the airman's technical training is commenced.

Serving personnel are given every opportunity for voluntarily improving their education. Service education will be assured by the system of higher and lower educational tests, now well established, to ensure that airmen reach a sound educational standard before they are promoted. A syllabus of studies for these examinations has been approved by the Education Department, and this approval is the first step towards the recognition of these Service tests as the equivalent of certain public examinations.

University and professional studies are encouraged, and two R.N.Z.A.F. scholarships in aeronautical engineering have been granted.

Emphasis has been placed on the vocational and resettlement aspects of Service education, which are of paramount importance to the large element of short-service personnel.

Accidents

An examination of all accidents that occurred in the period appears in the report of the Inspector of Accidents at page 44 of this report.

Public Relations

Reports on the work performed by the R.A.F. Missing Research and Inquiry Service were received regularly throughout the year, and 657 next-of-kin were notified of the results of investigations on individual cases. Eight hundred and fifty-seven photographs of the temporary crosses placed over graves of deceased Service personnel were also forwarded to next-of-kin.

Historical Records

Narratives entitled, "Air Transport," "Man-power," "Publicity," "Repair and Maintenance," "Signals," "Supply," "Defence of the Pacific, 1942," and "Operations in the South Pacific to December, 1943," have been completed, and a booklet prepared by the Historical Records Section, "The Assault on Rabaul," has been published by the War History Branch of the Department of Internal Affairs.

While research is being continued, the first drafts of the histories of New Zealanders in the R.A.F. and operations in the Pacific have been commenced. This work is directed by the Editor-in-Chief, New Zealand War Histories, and the staff is provided by the R.N.Z.A.F.

Conclusion

Continued advances have been made, primarily in the sphere of administration and organization. The tangible translation of the previous year's work was mainly evidenced in the aircrew and trade-training activity. The Air Force is entering upon its first year of orderly expansion following three and a half years of inevitable preoccupation with the multitude of matters forming the aftermath of the war.

I wish to express my thanks to all ranks of the Royal New Zealand Air Force, civilian staff at Air Department, and to Departments with which the Air Force is closely associated for their services and assistance during the past year.

I have the honour, &c.,

A. de T. Nevill,
Air Vice-Marshal,
Chief of the Air Staff.

APPENDIX A—FLYING STATISTICS FOR YEAR 1ST APRIL, 1948, TO 31ST MARCH, 1949

	Flying-hours.
Operational units—	
No. 14 (F) Squadron	1,575
No. 5 (F.B.) Squadron	1,327
No. 75 (B.R.) Squadron	1,263
Total	4,165
Transport units—	
No. 41 Squadron	3,892
General Purpose Flight	2,688
Total	6,580
Training—	
No. 1 Flying Training School	4,200
Air Navigation School	900
Instrument Flying School	750
Central Flying School	1,125
Total	6,975
Miscellaneous—	
Communications Flight, Rongotai	530
Search and rescue	841
Meteorological flights	294
Forestry fire patrol	77
Station flying for communications	377
Total	2,119
Grand total	19,839

REPORT OF THE DIRECTOR OF CIVIL AVIATION FOR THE YEAR ENDED 31st MARCH, 1949

The Hon. the MINISTER OF DEFENCE.

I HAVE the honour to submit the following report on civil aviation for the year ended 31st March, 1949.

SECTION I—ADMINISTRATION

1. ORGANIZATION

Although there has been a considerable increase in the staff of the Civil Aviation Branch during the year, it cannot be said that the branch is yet in a position to fulfil its proper role or to provide the varied services now universally accepted as complementary to air transport in all its forms. World-wide factors have a direct bearing on conditions which are not by any means peculiar to New Zealand. A shortage of fully-qualified technical personnel is still a problem to all administrations, while extensive research is being undertaken in order to determine, from their multiplicity of designs, the best equipment and aids to navigation, to achieve the main objective—namely, safety in the air.

We in New Zealand have many problems which are largely local in character, and whilst solutions can and will be found it is not possible or practicable to initiate and pursue research work which would embrace all our requirements. It is therefore of vital concern to study the trends in larger countries, such as Great Britain and America, from whom guidance is available. In effect, the International Civil Aviation Organization (ICAO), with its various international conferences and publications, represents the channel through which New Zealand is able to obtain the benefit of what in pounds shillings and pence would entail research at an almost prohibitive cost.

In many directions it has been necessary to adopt practices and procedures which, although the best available at the present time, will assuredly be improved upon in the future.

Shortage of labour, both technical and otherwise, is a potent factor, particularly in the development of aerodromes and ground facilities.

Many proposals dealing with the internal organization of the branch are under consideration, and it is anticipated that, following the very comprehensive survey and recommendations made by the United Kingdom Mission, headed by Sir Frederick Tymms, this side of civil aviation will develop upon a sound basis.

The manning of units, both within New Zealand and in the islands, still presents many problems, but in all cases existing establishments have been able to meet their commitments.

The issue of notices and publications remains an important function, and particularly so the dissemination of aeronautical information. This vital service to pilots, operators, and all those associated with ground organization is now being brought into line with the standard practices and procedures as recommended by ICAO.

2. GENERAL

During the year New Zealand was represented at those Conferences which were considered important enough to warrant direct representation.

The Second Assembly of the International Civil Aviation Organization (ICAO) was held in Geneva from 1st to 21st June, 1948, and New Zealand was represented by a small delegation including Mr. Foss Shanahan, Assistant Secretary of External Affairs, as Leader, and Mr. E. A. Gibson, Director of Civil Aviation. This Assembly, which was attended by more than 250 delegates and observers from 37 member nations, 7 non-member States, and 10 international organizations, reviewed the entire field of international air transportation.

An ICAO North Pacific Regional Meeting was held in Seattle, U.S.A., on 13th July, 1948, to examine the needs of international flight in the North Pacific. New Zealand was represented by Dr. R. G. Simmers, Deputy Director of Meteorological Services, who also acted on behalf of the Civil Aviation Branch.

In January, February, and March, 1949, important divisional meetings of ICAO were held at Montreal. At the Communications Division, New Zealand was represented by Mr. I. A. Scott, Deputy Director of Civil Aviation, and Mr. D. F. Jenkins, Principal Communications Officer, while Mr. Scott and Mr. E. F. Carpenter, Chief Aeronautical Engineer, covered the meetings of the Operations Division and the Airworthiness Division. Many technical problems were dealt with at these meetings.

Discussions were held during the year among representatives of New Zealand, Australia, and the Colonial Secretary's Office, Suva, in order to resolve particular items as they arose. Matters considered included the question of the future location of the International Airport in Fiji (as a preliminary investigation prior to the meeting of the South Pacific Air Transport Council), the introduction of landing fees at this airport, and the subject of fares and rates.

One of the most important conferences was the third meeting of the South Pacific Air Transport Council (SPATC) held in Wellington in November–December, 1948.

This Council, which was set up as a result of a recommendation made by the Wellington Civil Aviation Conference in February, 1946, is an advisory body having among its functions the continual review and promotion of progress and development of Commonwealth civil air communications in the South Pacific. The Council is also required to advise member Governments on the development, installation, operation, and maintenance of such technical and other facilities, including aerodromes, as are considered by the Council to be necessary in their respective territories for the safe and efficient operation of existing or contemplated Commonwealth air services in the South Pacific or on the main-trunk routes traversing that area. There are two standing committees established by the Council—the Committee for Air Navigation and Ground Organization (S.P. CANGO), and the Committee of Meteorologists (S.P. COMET).

The two Committees met in Wellington in November, 1948, and delegates were present from the United Kingdom, Australia, Fiji, and New Zealand.

At the conclusion of these meetings the third meeting of the South Pacific Air Transport Council was convened in Wellington on the 29th November, being attended by delegations from the United Kingdom, Canada, Australia, Fiji, and New Zealand. This was the first meeting of the Council at which Canada has been represented as a full member State.

The Conference met under the chairmanship of the Hon. F. Jones, Minister in Charge of Civil Aviation, who also led the New Zealand delegation. The Australian delegation was led by the Hon. A. S. Drakeford, Minister of Civil Aviation in Australia (permanent Chairman of the Council), the United Kingdom delegation by Sir Patrick Duff, United Kingdom High Commissioner in New Zealand, the Canadian delegation by Mr. A. Rive, Canadian High Commissioner in New Zealand, and the Fiji and Western Pacific High Commission delegation by Mr. J. F. Nicoll, Colonial Secretary, Fiji. Advisers from seven airlines also attended, these being B.O.A.C., C.P.A., B.C.P.A., QANTAS, T.A.A., N.Z.N.A.C., and T.E.A.L.

The Secretariat was provided by the Civil Aviation Branch, which also was responsible for the organization arrangements of the Conference.

The matters dealt with by the Council at this meeting included a review of the operation of the trans-Pacific and trans-Tasman services. Consideration was also given to the operation of regional services in the South Pacific Area, and to the report of the

Inter-governmental Commission on the location and development of an international airport at Fiji. This Commission was set up following a recommendation made at the second meeting of the Council held in 1947.

The reports of the third meetings of S.P. CANGO and S.P. COMET were considered and adopted by the Council, subject to certain amendments.

3. International Civil Aviation Organization

New Zealand is a contracting State to the Convention on International Civil Aviation, drawn up at Chicago on the 7th December, 1944, with the principal object of bringing about the orderly development of international civil aviation. In the convention, which was ratified by New Zealand on the 7th March, 1947, it was provided that thirty days after the Governments of twenty-six nations (half the number of those represented at the Chicago Conference) had ratified the Convention, a new organizaton, to be known as the International Civil Aviation Organization, was to come into existence.

Anticipating that a considerable time was certain to elapse before twenty-six Governments ratified the Convention, the Conference provided for a provisional body to function in the interim period. This Provisional International Civil Aviation Organization (PICAO) was established in August, 1945, and was replaced by the permanent body—the International Civil Aviation Organization (ICAO)—on the 4th April, 1947. Montreal is the permanent site of the Organization's headquarters. At present there are fifty-one member nations of the Organization.

Under the terms of an agreement ratified by the United Nations General Assembly on the 14th December, 1946, ICAO is a specialized agency related to the United Nations.

Among international organizations with which ICAO works closely are the International Air Transport Association, the Federation Aeronautique Internationale, the International Telecommunications Union, the International Meteorological Organization, and the Universal Postal Union.

All member States of ICAO are sovereign and equal, the Organization being governed by an Assembly in which each State has one vote. The Assembly meets annually: the first meeting took place in Montreal in May, 1947, and the second in Geneva in June, 1948. The Assembly is the Organization's legislative body. It elects a Council of twenty-one members to serve as the executive body. New Zealand has been represented at both Assemblies.

Since August, 1945, when the interim Council first met, ICAO and its provisional predecessor have done much to bring uniformity and co-operation to the world of international air transport. Technical standards have been drawn up to apply to international air transport operations, covering such subjects as rules of the air, meteorological codes, dimensional practices, personnel licensing, aeronautical maps and charts, and aircraft nationality and registration marks. The technical annexes relating to Rules of the Air (Annex 2) and Meteorological Codes (Annex 3) became effective in New Zealand on 1st January, 1949. Annex 5, which contains dimensional units to be used in air-ground communications, was brought into use in international air services operating through New Zealand on the 1st January, 1949. The Standards and Recommended Practices for Aeronautical Charts (Annex 4) were implemented in principle on the 1st March, 1949. Annex 1, being Standards and Recommended Practices for Personnel Licensing, becomes effective on the 1st May, 1949, but it was necessary to notify ICAO that New Zealand would be unable to implement the annex on the effective date, as the provisions of the annex will be incorporated in the new Civil Aviation Regulations at present in course of preparation. Among other things, the recommendations, both technical and administrative of the United Kingdom Mission, require the most careful examination before the regulations are finally approved.

4. LEGISLATION

(*a*) *Civil Aviation Act, 1948.*—This Act, passed during the 1948 session of Parliament, made provision for the following:—

(i) Ratified New Zealand acceptance of the Convention on International Civil Aviation signed on behalf of the Government on the 7th March, 1947.

(ii) Authorized the issue of regulations for the efficient and smooth development of civil aviation in New Zealand.

(iii) Created the position of Director of Civil Aviation.

(iv) Repealed the Air Navigation Act, 1931, but provided that the regulations in force under that Act remain as effectual as though they had originated under the new Act.

(*b*) *The New Zealand National Airways Amendment Act.*—This Act, passed in December, 1948, amends the New Zealand National Airways Act of 1945, and provides that all air services within New Zealand are to be operated only by the New Zealand National Airways Corporation, or pursuant to a permit or contract under the provisions of the Amendment Act.

Aero clubs are exempted from the provisions of the Act, provided all persons carried are club members and the aircraft used are owned or hired by the club.

The Act provides for the taking of land for the Corporation under the Public Works Act, 1928.

The new Act is to be read together with and deemed part of the New Zealand National Airways Act, 1945. It repeals the Transport Licensing (Commercial Aircraft Services) Act, 1936, and section 93 of the Statutes Amendment Act, 1945.

(*c*) *The Quarantine (Air) Regulations 1948.*—These regulations (administered by the Health Department) became effective as from 1st April, 1948, and provides measures for the prevention and control of infectious diseases which may be carried by aircraft or persons, livestock, and goods carried by air to and from New Zealand.

(*d*) *The New Zealand National Airways Regulations 1949.*—On the 1st February, 1949, the New Zealand National Airways Regulations 1949 were issued pursuant to the New Zealand National Airways Amendment Act of 1948, and set out the conditions and requirements in connection with the issue of permits and temporary authorities for the operation of air services other than by the New Zealand National Airways Corporation.

The regulations also provide for penalties for offences and non-compliance with the regulations.

(*e*) *International Agreements:*—

(i) Preliminary discussions have been held with France concerning the use of aerodromes at Aitutaki and Faleolo on the air route between New Caledonia and French Oceania. Meantime New Zealand has granted permission for the operation of French aircraft on her territory.

(ii) A draft inter-governmental agreement between the United Kingdom, Australia, and New Zealand has been prepared on the subject of traffic rights for British Commonwealth Pacific Airlines. This agreement, which is still under discussion, lays down the condition on which B.C.P.A. may fly over and operate on the territories of each of the participating Governments.

(iii) Also under discussion is a bilateral agreement between New Zealand and Canada regularizing the operations of B.C.P.A. between the two countries and replacing the informal agreement by which these operations are at present carried on.

(iv) A draft inter-governmental agreement between the United Kingdom, Australia, and New Zealand has been prepared to replace a previous agreement as to the operation of Tasman Empire Airways, Ltd. The new agreement proposes the continued operations of this company for another three years.

(v) A similar draft agreement has also been prepared as to the continued trans-Pacific operations of B.C.P.A. between Australia and North America, and New Zealand and North America.

(vi) New Zealand and the Government of Fiji and the Western Pacific High Commission have prepared a draft agreement establishing the duties of the two Governments in respect of the administration of the international airport at Nadi.

5. United Kingdom Civil Aviation Mission, 1948

Considerable prominence has already been given to the United Kingdom Civil Aviation Mission which, during the year under review, was invited to report on aviation matters in New Zealand. The report of the Mission, together with a large number of recommendations, was presented to both Houses of Parliament towards the end of 1948, since when steps have been taken to adopt many of the suggestions made in the report. It will be appreciated, however, that very many of the Mission's recommendations involve issues which require considerable investigation, both on the part of the Civil Aviation Branch alone and jointly by the branch in collaboration with other interested parties such as the operating companies, including New Zealand National Airways Corporation, and bodies representing local interests, the Ministry of Works, and other Government Departments.

Some of the recommendations involving policy will require direction to the Department from Government before they can be implemented.

SECTION II—AERODROMES AND RELATED GROUND FACILITIES

1. General

There is still a large amount of development and construction work required, particularly in respect of the following :—

(*a*) Aerodromes serving overseas and internal air routes which have yet to be developed to meet ICAO standards and recommended practices.

(*b*) Smaller landing-grounds to serve club and private flying, and air-taxi work.

(*c*) Buildings, such as those required for aeradio and other technical purposes, hangars, and passenger terminal buildings.

General shortages of man-power, plant, and materials have again limited the resources which it has been possible to make available for civil aviation works. The following is a broad outline of the works actually accomplished :—

2. New Aerodromes

Hokitika.—Constructional work which involves a large amount of heavy plant work was commenced about a year ago, and steady progress has been made under difficult conditions both as to the country to be worked and the equipment available. It was originally intended to build an airfield to ICAO Class F as a first stage, but this was recently amended to Class E, to enable the airfield to be used by Lodestar aircraft suitable for operating a trans-alpine service to Christchurch. It is anticipated that the new field will be available for use towards the end of next summer.

International Airport, Auckland.—As the Air Force aerodrome at Whenuapai cannot indefinitely serve also as the civil airport for internal and international air services, detailed consideration has been given during the year to the location of an alternative site suitable for the development of a major airport.

Two particular areas are at present under survey—the first at Pakuranga, in the East Tamaki district, and the second at Mangere, north of the present aerodrome. A close examination of the engineering, operational, and financial factors involved in this project is being made, and it should soon be possible to reach a decision on the site most suitable for development.

Rotorua.—Plans for an aerodrome located near Hinemoa Point are being finalized. Construction work may commence this winter.

Wellington.—General proposals for the development of Rongotai as an airport suitable for internal air services have been formulated and announced by Government. These will call for the construction of an airstrip 300 ft. wide and 4,770 ft. long, extending from Lyall Bay to a reclaimed area in Evans Bay.

Evans Bay.—Plans to develop Evans Bay to a limited extent as an alternate to Mechanics Bay are in course of preparation.

Timaru.—Land has been acquired for the construction of an aerodrome at Levels to replace the existing aerodrome at Salt Water Creek.

3. Development of Existing Aerodromes

(*a*) *Construction*

An assessment of air service requirements for the proposed Royal tour emphasized the need for the further development of the aerodromes used by the internal air services; and, in fact, presented a fixed date by which certain minimum development had to be completed. At those aerodromes proposed to be used for the Royal flight works selected were accordingly given a high priority, and extensions to give strips, each of length 5,000 ft., were carried out at New Plymouth, Paraparaumu, Gisborne, Napier, Nelson, Taieri, and Waitaki.

Other development works carried out during the past year have been of a very minor nature.

(*b*) *Planning*

Plans for the further development of Harewood (Christchurch) and of Palmerston North are in hand.

Surveys to determine the manner in which the Invercargill airport may most economically and conveniently be developed, are also nearing completion.

General development schemes at other aerodromes have been prepared, although no immediate action is contemplated.

4. Maintenance

The cost of maintenance of all aerodromes in New Zealand, with a very few exceptions, has been borne by the Government. Eighty-two aerodromes were involved last year, the cost being approximately £275,000.

5. Night Flying

No new installation has yet been completed, nor, in fact, any work on the ground carried out, but equipment is on order, both locally and overseas, with a view to installing—

(*a*) Permanent airport lighting at Whenuapai and Ohakea Aerodromes;
(*b*) Temporary airport lighting at Paraparaumu, Woodbourne, Harewood, Palmerston North, Nelson, Waitaki, and Taieri Aerodromes.

6. Airport for Overseas Services

The R.N.Z.A.F. station at Whenuapai continues to be utilized as an interim overseas airport, with Ohakea as an alternate. A certain amount of work, both to the buildings and to the surrounding areas, has been carried out, but expenditure is being kept to a minimum in view of the probable development of a new aerodrome for overseas services. The flying-boat base at Mechanics Bay, Auckland, continues to serve a similar function for marine craft, with Evans Bay as an alternate.

7. Pacific Aerodromes

(*a*) *International Airport, Fiji*

At Nadi Airport, on behalf of the other interested British Commonwealth Governments, New Zealand has continued to discharge the full responsibility for administration, operation, maintenance, and development. The future of this airport was clarified earlier in the year, when it was finally agreed that a new international airport should be built at Suva Point. When this is completed Nadi will be taken over by the Air Force. In the meantime, however, heavy expenditure will be required to maintain serviceability of the runways, and work to this end at an estimated cost this year of £165,000 is under way. During the past year the work carried out has been confined to maintenance and provision of staff accommodation. Detailed investigation of the proposed new site at Suva Point will commence shortly.

(*b*) *Other Pacific Aerodromes*

N.A.C. Regional Pacific Air Services have operated through Nadi and Nausori Aerodromes (Fiji), Faleolo Aerodrome (Samoa), Aitutaki and Rarotonga Aerodromes (Cook Group), and Fua'amotu Aerodrome (Tonga). Each of these aerodromes is under the administration of Air Department, with the New Zealand Ministry of Works undertaking maintenance and general improvements where necessary. No major works have been undertaken during the past year.

SECTION III—AERONAUTICAL ENGINEERING DIVISION

1. During the year the Division, under the Chief Aeronautical Engineer (Mr. E. F. Carpenter, A.F.R.Ae.S.), was organized into four Sections as follows:—

Engineering and Research.
Field Surveys (including four district offices).
Examinations and Approvals.
Technical Administration.

The technical staff of the Division was augmented by the following new appointees:—

Mr. W. H. Dunn, A.M.C.Tech. (Mech. Adm.), A.M.I.Mech.E., A.F.R.Ae.S., Senior Aeronautical Engineer in Charge of Power-plants and Associated Equipment.

Mr. F. J. Thompson, B.Sc. (Mech.Eng.), D.I.C. (Aero), A.F.R.Ae.S., Senior Aeronautical Engineer in Charge of Airframes, Structures, and Associated Equipment.

Mr. F. F. J. Butler, Surveyor, Grade I, in Charge of Defect Investigation.

Mr. J. W. Scott, Surveyor, Grade I, Aircraft Surveyor.

Mr. A. Brazier, A.F.R.Ae.S., Surveyor, Grade I, Aircraft Surveyor.

2. Overseas Duty

During the year the Chief Aeronautical Engineer (Mr. E. F. Carpenter) attended as a New Zealand delegate two important International Conferences, viz. :—

(*a*) The Commonwealth Advisory Aeronautical Research Council held in Melbourne, at which were represented scientists from the United Kingdom, Canada, South Africa, Australia, and New Zealand.

(*b*) The third session of the " Air " and " Ops " Divisions of ICAO held in Montreal, and at which fifteen member States were represented. (This item is referred to in further detail under Section I, Subsection (5), of this report.)

Whilst in Australia the Chief Aeronautical Engineer arranged and supervised on behalf of the New Zealand Government flight performance tests carried out on Tasman S. 25 aircraft by R.A.A.F. at Point Cook.

Mr. D. D. Anderson, Surveyor in charge of the Auckland district, was seconded for a period of six months to the United Kingdom for the purpose of gaining experience with the work of the Air Registration Board, and also with the construction of the new Solent aircraft at Short and Harland, Ltd., Belfast.

Mr. J. B. Flynn, Examining Surveyor, visited Australia to confer with the Department of Civil Aviation, Melbourne, on matters associated with defect investigations and also standards and practices for the examination and licensing of aircraft maintenance engineers.

Mr. L. F. Kenna, Aeronautical Engineer, visited Australia for the purpose of witnessing and evaluating the results of flight tests carried out on Sandringham S. 25 aircraft at Point Cook, and also conferring with members of the Australian Civil Aviation Administration on matters relating to performance-testing of aircraft.

3. Local Discussions and Conferences

During the year meetings in Wellington were initiated by the Division—

(*a*) With representatives of the New Zealand Aircraft Workers' Union for the purpose of drawing up rules for the conduct of Aircraft Maintenance Engineers' Examinations.

(*b*) With delegates from various parts of New Zealand representing gliding interests and for the purpose of forwarding the work of the New Zealand Gliding Association.

(*c*) With representatives from New Zealand National Airways Corporation for the purpose of drafting the Corporation's Maintenance Manual, and facilitating the issue of an Airline Maintenance Rating.

(*d*) With divisional staff, including district office staff, for the purpose of co-ordinating the work of the Division and overcoming practical difficulties experienced in the field.

4. Summary of the Work of the Division

(*a*) *Engineering Section*

(i) Technical analysis and approval of 148 Certificates of Airworthiness.

(ii) Investigation of 142 aircraft modifications, and 12 major repair schemes.

(iii) Miscellaneous detail design projects in connection with the rework and conversion of Douglas D.C. 3, Lockheed Lodestar 18–50, Short Sunderland, Cessna, D.H. 82, and Gemini aircraft, and Pratt and Whitney engines.

(iv) Conduct of a series of flight performance tests on Short S. 25 aircraft and Gemini aircraft.

(v) Performance analysis of Short S. 25, Short Solent, Constellation, Douglas D.C. 6, and D.C. 4 aircraft.

(vi) Publication of Flight Inquiry Reports entitled :—

" A Photographic Method for Determining Aircraft Take-off Performance."

" Determination of Accelerate/Stop Distance, and Landing Distance Over 50 ft. Screen (D.H. 89 and Lockheed 10A)."

" Report on Cylinder Head Cooling Modifications—Sandringham S. 25, Series IV, Aircraft."

" Determination of Airfield Length—Lockheed 10A."

(vii) Preparation of New Zealand standards to cover aircraft drafting procedure.

(viii) Design for installation of V.G. recorders in Short S. 25, Lockheed Lodestar 18-50, and Douglas Dakota D.C. 3-(C) aircraft, including preparation of *pro forma* and instructions for use by air transport operators.

(ix) Standardization of procedure covering weight and balance control in transport aircraft.

(*b*) *Field Surveys Section*

(i) Aircraft reconditioned, or converted, to Certificate of Airworthiness standards	25
(ii) Aircraft surveyed for renewal of Certificate of Airworthiness	211
(iii) Foreign Certificates of Airworthiness validated	1
(iv) Notices to Aircraft owners and Ground Engineers prepared	44
(v) Oral examination of applicants for Aircraft Maintenance Engineers' Licences	68
(vi) Supervisory visits made to approved aircraft firms	298
(vii) Accidents to aircraft investigated and reported upon	9

(*c*) *Examination and Approvals Section*

(i) Aircraft Maintenance Engineers examined for issue or extension of licences—	
Oral	68
Written	194
(ii) Aircraft Maintenance Engineers' Licences recommended for issue	51
(iii) Number of firms approved	16
(iv) Extensions to existing ratings issued	19
(v) Approved firm ratings cancelled	1
(vi) Total number of firms approved as at the date of this report	78

(vii) A register of approved New Zealand firms (provisional) issue has also been published.

(*d*) *Technical Administration Section*

(i) Notices to Aircraft Owners and Engineers published	44

(ii) Revision and reissue of schedules of modifications and special qualifications for all New Zealand civil aircraft has been completed.

5. Research and Development

The branch has been represented by a senior technical officer of the Division at each meeting of the New Zealand Advisory Aeronautical Research Council. Such research as has been undertaken to date relates mainly to statistical and operational research, and in particular has reference to a programme of VG recording which it is planned to continue for a further extended period.

As the result of recommendations contained in the final reports of the " Air " and " Ops " Divisions of ICAO (third session) it is also planned to initiate further statistical research in the near future.

SECTION IV—AIR NAVIGATION SECTION

Crash/Fire Organization

An important phase in the development of aerodromes and associated services is the provision of an adequate crash/fire organization.

With the approval of the Government, a progressive programme has been adopted whereby modernized equipment will be available at all the main aerodromes throughout New Zealand.

Firemasters have been appointed to the larger aerodromes, and, under the direction of the Principal Fire Officer on the staff of the Civil Aviation Branch, training of crews in fire and crash work and in the manning of fire-tenders is proceeding. The crews are drawn from all branches of ground staff and include employees of operating companies.

Aeronautical Mapping

With the rapid increase in the intensity of air traffic it was realized that a comprehensive programme of aeronautical mapping was urgently necessary in order to ensure adequate coverage of the Dominion with suitable maps and charts of all types.

The Civil Aviation Branch is responsible for the initiation of the mapping programme, for the aeronautical data included therein, and for the issue of all aeronautical maps and charts for civil use, while the Lands and Survey Department has accepted responsibility for their compilation. The closest liaison exists between the Departments.

The compilation of aeronautical maps and charts has been carried out in general conformity with the Standards and Recommended Practices laid down by the International Civil Aviation Organization, any differences being due to problems peculiar to New Zealand topography.

The production of the following aeronautical charts was initiated:—

(i) *Approach and Landing Charts.*—These charts display the approved instrument approach procedures to be followed by pilots when approaching an aerodrome in instrument flying conditions, also a detailed drawing giving the layout of the aerodrome, obstructions in the vicinity, position and features of the radio aids serving the aerodrome, and a profile drawing of the terrain along the line of the approach.

(ii) *Facility Charts.*—These supply pilots with all the details necessary to enable them to conduct their aircraft from point to point along the airways. The details given on these charts are overprinted on an outline chart and show position and direction of airways, directional flight levels, minimum safe altitudes of airways, position and details of all radio aids serving the routes, position and distance between reporting points, radio beacons, and airports.

(iii) *Aeronautical Charts (Scale 1/500,000).*—This series of charts is required to replace the obsolescent New Zealand Aeronautical Strip Map which was compiled before the war, to which amendments are necessary, as shown by the large-scale topographical surveys which have been carried out since 1940. The series will be needed by all pilots and is being compiled from the latest survey data, showing all topographical, hydrographic, and coastal detail, with a distinctive colour overprint showing the aeronautical radio aids to air navigation.

(iv) *Aeronautical Plotting Charts.*—A programme was laid down for compilation of a series of 1/3,000,000 scale, plotting charts covering the areas flown by our airlines. These charts are an inexpensive sheet drawn on the Mercator projection and showing basic topographical detail. The plotting series is necessary for air navigators to enable them to plot the movement of the aircraft and observations obtained by radio or astronomy.

Progress made with the production programme during the last twelve months is detailed hereunder :—

(i) *Approach and Landing Charts.*—Eleven sheets (including three second editions) have been published covering main airports. Charts for all airports on the internal air routes will be published during the middle portion of 1949.

(ii) *Facility Charts.*—The compilation of this series is almost complete, and publication of all the sheets of the series is expected during the month of June.

(iii) *Aeronautical Charts, scale 1/500,000.*—Work has begun on the compilation of this series. Two of the sheets, the Dunedin and the Christchurch sheets, are well under way and are expected to be published later in 1949. The complete series should be published by late 1950.

(iv) *Aeronautical Plotting Charts.*—Two sheets of this series have been published, one, the Fiji - Samoa - Cook Islands sheet, and the other the Auckland-Fiji sheet. It is intended to compile during 1949 plotting sheets to cover air routes across the Tasman Sea.

SECTION V—OPERATIONS SECTION

During the year 1948–49 the activities of the Operations Section have been largely confined to administrative matters, and little inspectional work in connection with civil flying operations has been possible. It is hoped with the appointment of inspection staff during 1949 to remedy this position.

Regulations

Draft regulations affecting aircraft operation and implementing I.C.A.O. standards have been completed and are awaiting promulgation. It is hoped that they will become effective during 1949.

Radio Calibration

With the installation of a number of homers during the past year the amount of radio calibration work to be carried out has increased considerably. An R.N.Z.A.F. Dakota aircraft has been used for this work to date. The Civil Aviation Branch is now being equipped with its own aircraft, and a Lockheed Lodestar and two Airspeed Oxford aircraft have been allocated to form the calibration flight. These aircraft will require considerable modification before they can be brought into service.

Examinations

During the year officers of the Operations Section examined 275 pilots for the issue of " A " Licences and 156 pilots for the issue of an extension for additional type or types of aircraft to " B " Licences.

Aerodrome Inspection

Regular inspections were made of all aerodromes and landing-grounds available for use by civil aircraft.

Aerodromes

The extension of aerodromes at New Plymouth, Napier, Nelson, Westport, Waitaki, and Taieri has enabled the Civil Aviation Branch to approve higher operating weights for the commercial aircraft using these fields.

SECTION VI—AIR TRAFFIC CONTROL AND SEARCH AND RESCUE

The period under review marks the first complete year of operation by Air Traffic Control as a civil organization. Nevertheless, the service remains common to both civil aviation and the R.N.Z.A.F., and A.T.C. personnel requirements on Air Force stations are drawn from this organization.

It has been appreciated that in the event of future hostilities the A.T.C. organization, by virtue of its trained personnel and extensive communication network would require to revert immediately to R.N.Z.A.F. status.

As a result of the large increase in scheduled air traffic along defined routes between the main centres and in order to achieve greater regularity of services irrespective of weather conditions, certain controlled air routes were designated during the year, and on the 1st June, 1948, these routes were cleared for flight under Instrument Flight Rules.

The steady progress being made with the installation of additional radio navigational aids, together with the practical experience in this type of operation gained by both pilots and ground personnel is resulting in a service which has gained favourable comment from qualified aviation authorities from overseas.

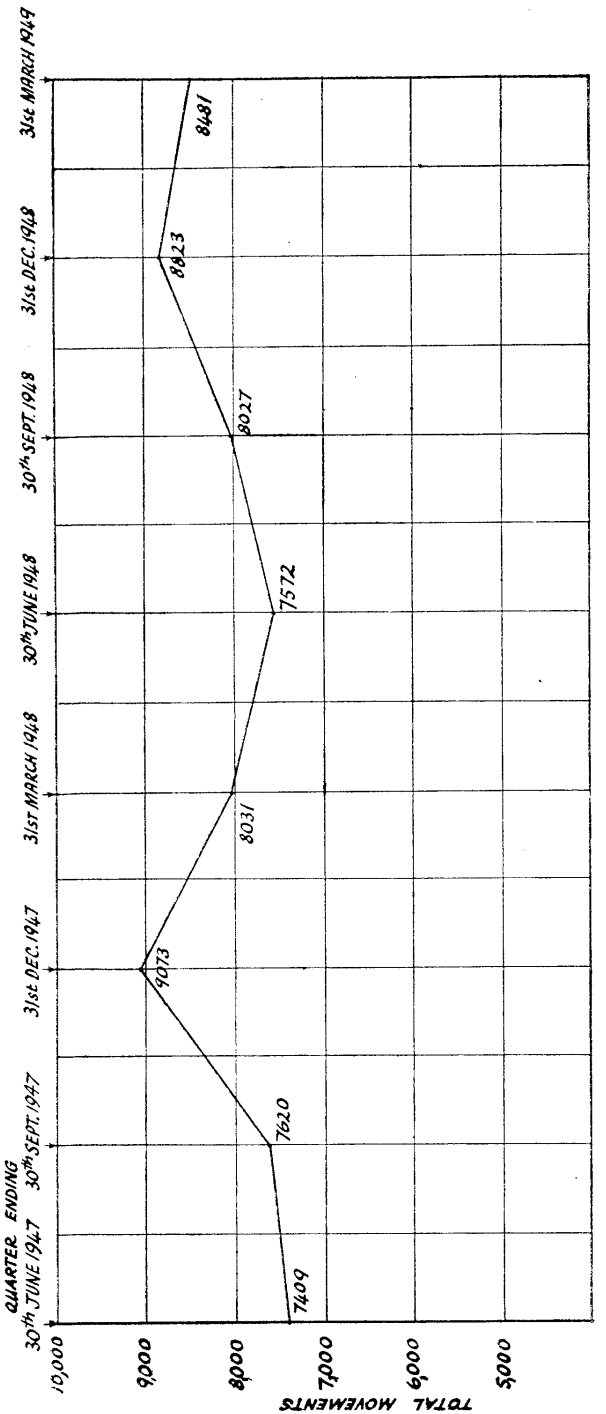
Staff training has given some concern, but with the establishment of a school for A.T.C. in the near future this problem should be largely overcome.

To discuss common problems, several conferences have been held between this Branch and representatives of the operating companies and the New Zealand Airline Pilots' Association, which have undoubtedly been advantageous to all concerned.

The search-and-rescue organization, operating through the rescue co-ordination centres established at the four area control centres, has participated in thirty-eight distress incidents. On twenty-three occasions the assistance of search-and-rescue aircraft was required for operations involving eleven aircraft, ten marine craft, and two mercy flights. During these operations a total of approximately 923 hours was flown, covering some 138,360 air-miles.

The present search-and-rescue organization is primarily intended to render assistance to all aircraft in distress. With the increasing number and variety of emergency operations which the organization has been called upon to undertake, the need for a more comprehensive organization has become apparent, involving the co-operation and assistance of various Government Departments and other interested bodies.

Initial action to effect a widening of the scope of the present organization to co-ordinate the efforts and facilities of these Departments and organizations, especially in the rescue phase of operations, has been undertaken by Air Department.



GRAPH SHOWING TRAFFIC MOVEMENTS AT AIR TRAFFIC CONTROL CENTRE, WELLINGTON, 1ST APRIL, 1947, TO 31ST MARCH, 1949

SECTION VII—TELECOMMUNICATIONS SECTION

Communications

During the year considerable work has been carried out to provide new facilities and to improve the existing facilities. On the air-ground communication side the transition from medium-frequency to high-frequency which was foreshadowed in 1947–48 has been completed, the new frequencies actually coming into service on the 20th December, 1948. On that date all the medium-frequency air-ground channels were closed down and high-frequency air-ground channels were brought into service. All air-to-ground communications on internal services are now on a universal air-to-ground frequency of 3,298·5 kilocycles per second, while internal ground-to-air communications are now on various frequencies between three and four megacycles per second, the individual frequencies being so allocated as to minimize the mutual interference between nearby ground stations. At the designated international airports other high-frequency channels are also maintained for long-distance communications. On the same date the two existing point-to-point frequencies were replaced by a much more comprehensive network of high-frequency point-to-point channels. In accordance with International Civil Aviation Organization recommendations, one frequency common to all stations is designated the "calling frequency" and is used by each station to establish contact with the station for which the station has traffic. After establishing two-way contact the stations then work on a different "working frequency." This procedure gives economy in both frequencies and operating personnel.

Technically, the change-over involved a very considerable amount of design and engineering work. Three or four extra transmitters and extra receivers were required at each station. Altogether a total of seventy extra high-frequency transmitters were brought into service, of which forty were war surplus aircraft types which had to be modified for ground use. Forty extra receivers were similarly modified and brought into service. Suitable power-supply units had to be designed for these transmitters and receivers, forty receiver-power-supply units and fifty transmitter-power-supply units being buit to Civil Aviation Branch designs and specification by private contractors. Use of the war surplus equipment, nevertheless, resulted in a very considerable financial saving. Petrol- or Diesel-driven standby generators were also provided at all stations as a safeguard against interruption of the normal electricity supply. A total of twenty stations was involved in the change-over.

Simultaneously with the change-over, the aeradio channels previously operated on behalf of the branch by the Post and Telegraph Department at "Wellington Radio" were transferred to Paraparaumu, where a complete aeradio station, including suitable transmitting and receiving equipment, was installed for the purpose.

In October, 1948, the very-high-frequency aerodrome control channels were changed from 116·1 to 118·1 megacycles per second (the new International World Guard Frequency), in accordance with the recommendations of the International Civil Aviation Organization South Pacific Regional Air Navigation meeting.

Radio Beacons

In order to permit the introduction of Instrument Flight Rules in New Zealand on the 1st June, 1948, medium-frequency radio beacons were installed as an urgent measure in temporary buildings, and using improvised aerial systems, at Gisborne, Hamilton, Napier, New Plymouth, Palmerston North, Tauranga, and Wanganui. The installation of permanent buildings and the erection of more efficient aerials using 180 ft. masts is required urgently, and this work is being included in the 1949–50 works programme. A total of twelve radio beacons has already been installed, and these are

being maintained by the Civil Aviation Branch. The siting and detailed planning of the radio beacons to be installed at Ohura and Pahiatua has been completed, and these beacons should also be in operation in the near future.

Radio Ranges

The Ministry of Works has repaired the breakwater around the Wellington (Porirua) radio range site, and the site has thus been stabilized. A series of flight checks and ground checks has shown the courses to be stable. However, multiple splits exist on the portion of the south leg south of Rongotai and on the west leg of the range over the Marlborough Sounds. This trouble is not entirely due to the site chosen, but is due to the geographical configuration of the area to be served by the installation. It is probable that the trouble can be reduced by swinging the range legs on to new courses, and preliminary trials with new courses have already been carried out. The radio range has been in use as a radio beacon since 1st June, 1948.

In order to provide navigational assistance on the proposed new air route Auckland–Ohura–Wellington, the south leg of the Whenuapai Radio Range has been experimentally swung on to that direction, and operational trials are being made of the new alignment. If the trials prove successful, the new alignment will be retained and the fan-marker now sited at Mangere will be replaced by a fan-marker on the new course. A new site has already been selected in the Titirangi area, and work is progressing on the planning of the new fan-marker.

Direction Finding Stations

The medium-frequency direction-finding stations were closed down on the 20th December, 1948, simultaneously with the change-over of the communications channels to high-frequency.

On the 30th September, 1948, the high-frequency direction-finding station at Waiuku was opened to take the place of the station at Musick Point operated on behalf of the Civil Aviation Branch by the Post and Telegraph Department. A new high-frequency direction-finding station has been installed at Nadi and will be brought into service after flight-checking.

Co-operation With Australia

In May, 1948, the Senior Radio Engineer of the branch visited Australia in order to obtain information regarding 200 megacycles per second radar (Distance Measuring Equipment) (D.M.E.) and to arrange for the experimental installation of such equipment in New Zealand. The opportunity was taken to observe the progress in the development of radio navigational aids by the Australian Council of Scientific and Industrial Research, and in the application and operation of radio navigational aids by the Australian Department of Civil Aviation, and to study the organization of the Australian Airways Engineering Section. The radio manufacturing potential in Australia was also investigated from the aeronautical point of view.

Research

In order to provide more exact engineering and operational performance information regarding low-frequency radio beacons, the Inter-departmental Radio Research Board has, at the request of the Civil Aviation Branch, agreed to support a programme of research into the fundamental radio propagation characteristics throughout New Zealand in respect of these frequencies. These characteristics have never been previously investigated at frequencies below the broadcast or medium-frequency band.

Organization and Staff

To cope with the complexity and multiplicity of radio communication and radio navigational equipment now being either commissioned or planned, additional staff has been recruited for the Radio Engineering Section. The additional staff includes two professional radio engineers, Mr. R. C. Davison, M.Sc., who came from the Department of Scientific and Industrial Research, and Mr. A. Hartley, B.Sc., Grad.I.E.E., M.I.R.E., who came from the Ministry of Civil Aviation, London.

Mr. R. J. Dippy, O.B.E., B.Sc., A.M.I.E.E., was recently appointed Controller of Telecommunications, and is expected to arrive in August, 1949.

SECTION VIII—AIR TRANSPORT OPERATIONS

(*a*) Internal Scheduled Services

At 31st March, 1949, services were being operated by New Zealand National Airways Corporation over the following routes :—

Route No.	Route.	Route Miles.	Frequency.
1	Auckland-Dunedin (via Palmerston North, Wellington, and Christchurch)	719	Twice daily in each direction, plus one daily return trip Palmerston North–Dunedin, plus one daily return trip Auckland–Wellington.
2	Dunedin–Invercargill	107	Four times daily in each direction.
3	Nelson–Wellington–Blenheim ..	168	Wellington–Nelson five trips daily in each direction ; Wellington–Blenheim four trips daily in each direction.
4	Auckland–Wellington (via New Plymouth and Palmerston North)	332	Once daily in each direction.
5	Auckland–Gisborne (via Tauranga) ..	226	Once daily in each direction, plus one daily return trip Auckland–Gisborne direct.
6	Gisborne–Wellington (via Napier and Palmerston North)	226	Once daily in each direction, plus one daily return trip Wellington–Gisborne direct.
7	Auckland–Kaitaia (via Whangarei and Kaikohe)	148	Twice daily in each direction.
8	Auckland–Wellington–Christchurch–Dunedin	703	One return trip daily Auckland Christchurch. One return trip daily Auckland–Wellington–Christchurch. One return trip daily Auckland–Wellington–Dunedin. One return trip daily Christchurch–Dunedin.
9	Wellington–Westport (via Nelson) ..	191	Once daily in each direction.
10	Westport–Hokitika (via Greymouth) ..	78	Once daily in each direction.
11	Hokitika–Okuru (via Wataroa–Waiho and Haast)	135	One return trip thrice weekly in each direction, plus one return trip thrice weekly Hokitika–Wataroa–Waiho.
12*	Auckland–Wellington (via Rotorua and Hamilton)	402	Once daily in each direction.
13	Auckland–Chatham Islands (via Wellington)	788	Not yet placed on regular schedule.
	Total route miles	4,223	

* Includes Palmerston North on north-bound trip; route mileage then 414. No services operated on Sundays.

Traffic statistics for these routes for the year ended 31st March, 1949, were—

Route No.	Route.	Hours Flown.	Miles Flown.	Passenger-miles Created.	Passenger-miles Used.	Percentage of Seat Utilization.	Passenger Ton-miles.	Baggage Ton-miles.
1	Auckland–Dunedin ..	8,823	1,368,051	20,675,497	17,027,637	82	1,243,066	208,872
2	Dunedin–Invercargill ..	2,234	217,531	1,305,186	917,418	70	66,600	8,365
3	Nelson–Wellington–Blenheim	4,827	477,483	3,834,932	2,784,101	73	194,312	29,317
4	Auckland–Wellington ..	1,540	208,880	3,178,828	2,577,132	81	176,834	28,864
5	Auckland–Gisborne ..	1,666	224,612	3,181,076	2,380,550	75	159,877	27,051
6	Gisborne–Wellington ..	938	114,094	1,685,792	1,211,190	72	84,719	14,363
7	Auckland–Kaitaia ..	1,563	150,244	1,503,920	1,157,805	77	78,444	11,799
8	Auckland–Wellington–Christchurch–Dunedin	5,744	810,253	17,096,396	14,212,798	83	1,008,823	181,640
9	Wellington–Westport ..	1,170	130,411	1,544,426	1,042,661	68	72,983	11,535
10	Westport–Hokitika ..	370	29,484	88,452	48,390	55	3,383	473
11	Hokitika–Okuru ..	847	75,400	241,005	76,430	32	5,399	761
12	Auckland–Wellington ..	1,060	126,442	1,354,773	868,639	64	60,105	9,754
13	Auckland–Chatham Islands	12	1,576	40,976	18,448	45	1,190	149
14	Auckland–Dunedin (Freight Only)	592	81,370	..	..	..	..	..
	Totals	31,386	4,015,831	55,731,259	44,323,199	80	3,155,735	532,943

Route No.	Route.	Excess Baggage Ton-miles.	Freight Ton-miles.	Mail Ton-miles	Total Ton-miles Created.	Total Ton-miles Used.	Percentage of Aircraft Utilization.
1	Auckland–Dunedin	16,461	70,716	58,204	2,112,926	1,597,319	76
2	Dunedin–Invercargill	419	1,861	1,446	117,916	78,691	67
3	Nelson–Wellington–Blenheim ..	2,585	15,427	1,463	399,252	243,104	61
4	Auckland–Wellington	2,418	7,228	5,421	329,385	220,765	67
5	Auckland–Gisborne	2,805	3,358	970	314,190	194,061	62
6	Gisborne–Wellington	1,472	3,289	2,463	180,981	106,306	59
7	Auckland–Kaitaia	1,030	1,257	912	151,015	93,442	61
8	Auckland–Wellington–Christchurch–Dunedin	19,270	46,492	31,927	1,821,080	1,288,152	71
9	Wellington–Westport	905	3,587	2,028	147,319	91,038	62
10	Westport–Hokitika	35	215	224	7,355	4,330	59
11	Hokitika–Okuru	248	2,593	2,869	19,493	11,870	61
12	Auckland–Wellington	748	1,439	651	125,129	72,697	58
13	Auckland–Chatham Islands ..	..	..	2	5,167	1,341	26
14	Auckland–Dunedin (Freight Only) ..	..	36,988	..	255,518	36,988	14
	Totals	48,396	194,450	108,580	5,986,726	4,040,104	67

During the year ended 31st March, 1949, 174,836 passengers, 1,934,626 lb. of freight, and 752,492 lb. of mail were carried on these routes.

Aircraft used in the operation of services on these routes were—

Lockheed Lodestar	11
Lockheed Electra	2
Douglas D.C. 3	7
Douglas C. 47 (Freighter)	5
D.H. 89 B Dominie	7
D.H. 83 Fox Moth	3
Total	35

This represents an increase of two over the total number of aircraft operated by New Zealand National Airways Corporation during the year ended 31st March, 1948.

The following changes in internal services took place during the year :—

(*a*) The Auckland–Christchurch and Auckland–Christchurch (via Wellington) services were supplemented on 13th December, 1948, by the following additional services :—

Auckland–Dunedin (via Wellington).
Christchurch–Dunedin.

The statistics for all these services are included in the Auckland-Wellington-Christchurch-Dunedin service (Route No. 8).

(*b*) The Wellington–Hokitika (via Nelson and Westport) service ceased on 8th September, 1948, and was replaced by two services—namely, Wellington-Westport (via Nelson) and Westport–Hokitika (via Greymouth). Traffic statistics for the former service Wellington–Hokitika are included in the Wellington–Westport service for the purposes of the above summary.

New services commenced during the year were—

(*a*) Auckland–Dunedin (via Wellington and Christchurch) freight service commenced in August, 1948. This service was terminated on 10th December, 1948.

(*b*) Auckland–Wellington (via Hamilton and Rotorua) service commenced on 27th September, 1948. Palmerston North is included in the North-bound trip, increasing the route-mileage to 414 miles.

Gisborne Aerodrome was not used between 13th May, 1948, and 14th December, 1948, because of damage caused by serious flooding.

The Auckland terminal was transferred from Mangere to Whenuapai on 24th May, 1948.

The following is a summary of scheduled traffic statistics for all internal services for the years 1935–1949 :—

Year ended,	Hours Flown.	Miles Flown.	Passengers.	Freight.	Mail.	Passenger-miles.	Freight Ton-miles.	Mail Ton-miles.
				lb.	lb.			
31st March, 1935	315	31,500	595	2,637	1,841	10,000	120	75
31st March, 1936	3,220	346,171	9,106	26,123	19,431	860,295	1,758	957
31st March, 1937	6,588	776,938	24,251	44,074	111,377	2,673,860	2,047	9,288
31st March, 1938	11,327	1,331,100	43,782	81,853	216,238	5,518,363	4,301	18,205
31st March, 1939	12,821	1,574,395	53,039	166,278	316,380	6,787,026	9,054	29,248
31st March, 1940	10,541	1,326,234	51,802	223,018	234,989	6,478,540	12,247	21,729
31st March, 1941	5,036	645,702	37,023	206,936	130,806	4,373,822	9,585	12,555
31st March, 1942	5,206	688,723	38,058	194,858	165,670	5,062,938	9,434	17,616
31st March, 1943	5,576	685,953	30,634	174,757	220,527	4,655,774	9,423	23,887
31st March, 1944	6,421	832,966	37,435	191,113	244,614	6,371,007	11,426	29,677
31st March, 1945	7,129	965,787	51,754	272,251	313,013	9,299,979	18,824	44,040
31st March, 1946	8,541	1,108,134	60,193	338,950	428,709	10,158,221	22,587	52,935
31st March, 1947	16,443†	1,502,494*	110,767†	634,495*	605,086*	21,870,438†	90,471†	85,387†
31st March, 1948	26,735	3,320,992	154,329	1,211,345	597,231	35,695,285	126,010‡	97,310
31st March, 1949	31,386	4,015,831	174,836	1,934,626	752,492	44,323,199	242,846‡	108,580

*Does not include miles flown, freight, freight or mail carried by R.N.Z.A.F. Air Transport. †Includes hours flown, passengers carried, passenger-miles, freight ton-miles and mail ton-miles by R.N.Z.A.F. Air Transport. ‡ Includes excess baggage ton-miles.

The following licences were held at 31st March, 1949, by New Zealand National Airways Corporation staff :—

"B" Licence	132
Navigator's Licence—	
First Class	11
Second Class	18
Radio Telegraph Operator's Licence—	
First Class	8
Second Class	2
Third Class	117
Temporary	8
Radio Telephone Operator's Licence	4
Flying Instructor's Authority	13
Instrument Rating	61
Aircraft Engineer's Licence	99

(*b*) Internal Non-scheduled Services

The following is a traffic summary of non-scheduled services for the year ended 31st March, 1949:—

Trips	3,385
Hours flown	1,937
Miles flown	213,970
Passengers	7,901
Freight (lb.)	442,662

These services were operated by New Zealand National Airways Corporation, New Zealand Aerial Mapping, Ltd., Blackmore's Air Services, Ltd., Southern Scenic Airtrips, Ltd., and Airwork (New Zealand), Ltd., using the following aircraft:—

Lockheed Lodestar.	Beechcraft A.T. 11.
Douglas C. 47B.	Waco.
Douglas D.C. 3.	De Soutter.
De Havilland D.H. 89.	Percival Proctor.
De Havilland D.H. 38.	Auster.
De Havilland D.H. 82.	Miles Whitney Straight.

In addition, New Zealand National Airways Corporation continued to operate the freight service between Paraparaumu and Woodbourne under charter to the New Zealand Railways, and the traffic statistics for this service for the year ended 31st March, 1949, were:—

Trips flown	2,230
Hours flown	1,482
Miles flown	181,630
Freight ton-miles	600,682
Freight (lb.)	17,286,265

Aircraft used were Douglas C. 47 freighters.

(*c*) External Scheduled Services

(i) *Tasman Empire Airways, Ltd.*

From 1st April, 1948, until 16th June, 1948, the Auckland–Sydney service continued to be wholly operated by other airlines under charter to Tasman Empire Airways, Ltd. On the latter date Tasman Empire Airways, Ltd., recommenced operating a daily service using three Short S. 25 flying-boats, but, in view of the traffic offering, the charter services were continued throughout the year.

Route details are as follows:—

Route	Auckland–Sydney.
Route-miles	1,342.

Traffic statistics for the year ended 31st March, 1949, in respect of the flying-boat services operated by Tasman Empire Airways, Ltd., were—

Hours flown	4,575
Miles flown	744,113
Passengers	10,915
Freight (lb.)	116,372
Mail (lb.)	173,111
Passenger-miles created	16,245,700
Passenger-miles used	14,646,044
Percentage of seat utilization (per cent.)	90
Passenger ton-miles	1,385,030
Excess baggage ton-miles	14,450
Freight ton-miles	48,512
Mail ton-miles	103,563
Total ton-miles created	1,794,779
Total ton-miles used	1,565,009
Percentage of aircraft utilization (per cent.)	87

Traffic statistics for the charter services operated on behalf of Tasman Empire Airways, Ltd., for the year ended 31st March, 1949, were—

Hours flown	3,591
Miles flown	595,814
Passengers	13,682
Freight (lb.)	260,806
Mail (lb.)	172,604
Passenger-miles created	20,325,999
Passenger-miles used	18,358,880
Percentage of seat utilization (per cent.)	90
Passenger ton-miles	1,741,483
Excess baggage ton-miles	20,027
Freight ton-miles	124,760
Mail ton-miles	103,761
Total ton-miles created	2,494,113
Total ton-miles used	2,004,969
Percentage of aircraft utilization (per cent.)	80

The following is a summary of traffic statistics for Tasman Empire Airways, Ltd., for the years 1941–49, and includes services flown by other airlines under charter to Tasman Empire Airways, Ltd. :—

Year Ended,	Hours Flown.	Miles Flown.	Passengers Carried.	Freight.	Mail.	Passenger-miles.	Freight Ton-miles.	Mail Ton-miles.
				lb.	lb.			
31st March, 1941	1,181	174,200	1,507	18,800	78,179	2,019,380	11,246	46,768
31st March, 1942	1,382	211,920	1,959	32,230	167,275	2,625,060	19,280	100,066
31st March, 1943	1,265	192,960	2,256	35,195	101,741	3,023,040	21,054	60,863
31st March, 1944	1,502	229,140	2,924	40,024	94,106	3,918,160	23,943	56,296
31st March, 1945	2,798	427,460	5,803	84,189	142,812	7,796,020	50,363	85,432
31st March, 1946	3,270	493,764	6,100	99,584	214,792	8,174,000	60,019	128,492
31st March, 1947	4,863	778,704	11,648	176,687	278,789	15,608,320	105,697	166,776
31st March, 1948	6,128	991,916	18,792	223,229	331,926	25,194,933	122,506	198,556
31st March, 1949	8,166	1,339,927	24,597	377,178	345,715	33,004,924	207,749	207,324

Licences held by the staff of Tasman Empire Airways, Ltd., as at 31st March, 1949, were—

"B" Licence	28
Navigator's Licence: First Class	11
Radio Telegraph Operator's Licence—	
First Class	9
Third Class	1
Instrument Rating	26
Flying Instructor's Authority	6
Aircraft Engineer's Licence	40

(ii) *New Zealand National Airways Corporation*

New Zealand National Airways Corporation continued to operate services in the South-west Pacific over the following routes:—

Route No.	Route.	Route Miles.	Frequency.
1	Auckland–Lambasa (via Suva)	1,453	Once weekly in each direction.
2	Auckland–Norfolk Island	661	Once weekly in each direction.
3	Auckland–Rarotonga (via Norfolk Island, Nadi, Nausori, Tonga, Apia, and Aitutaki)	3,820	Once fortnightly in each direction.
		5,934	

Traffic statistics for these routes for the year ended 31st March, 1949, were:—

Service.	Auckland–Lambasa.	Auckland–Norfolk Island.	Auckland–Rarotonga.	Total.
Hours flown	1,024	303	1,332	2,659
Miles flown	157,940	46,270	199,423	403,633
Passengers	Not available for individual services			6,390
Freight (lb.)	Not available for individual services			66,410
Mail (lb.)	Not available for individual services			22,970
Passenger-miles created	4,106,440	677,525	3,124,385	7,908,350
Passenger-miles used	3,042,922	581,680	1,717,018	5,341,620
Percentage of seat utilization (per cent.)	74	85	55	68
Passenger ton-miles	262,756	51,272	147,592	461,620
Excess baggage ton-miles	2,423	657	1,079	4,159
Freight ton-miles	8,062	1,817	11,813	21,692
Mail ton-miles	8,677	231	6,691	15,599
Total ton-miles created	439,460	67,712	233,760	740,932
Total ton-miles used	281,918	53,977	167,175	503,070
Percentage of aircraft utilization (per cent.)	64	80	71	68

Aircraft employed on these services were Douglas (D.C. 3) aircraft and one Short Sunderland flying-boat.

(iii) *Pan-American Airways, Inc. (U.S.A.)*

Pan-American Airways, Inc., continued to operate its service between San Francisco and Auckland (via Honolulu, Canton Island, and Nadi) with D.C. 4 (Skymaster) aircraft. The frequency was one return trip per week until 15th February, when it was increased to two return trips per week.

Traffic to and from New Zealand for the year ended 31st March, 1949, was :—

Hours flown	4,970
Miles flown	971,871
Traffic entering New Zealand—	
Passengers	1,786
Freight (lb.)	35,232
Mail (lb.)	4,654
Traffic leaving New Zealand—	
Passengers	888
Freight (lb.)	20,970
Mail (lb.)	3,998

(iv) *British Commonwealth Pacific Airlines*

The service between Vancouver and Auckland (via San Francisco, Honolulu, Canton Island, and Nadi), inaugurated during April, 1947, continued to be operated under contract by Australian National Airways Pty., Ltd., until 21st April, 1948, with D.C. 4 aircraft. Thereafter it was operated by British Commonwealth Pacific Airlines using D.C. 4 aircraft with a frequency of one return trip per fortnight until 22nd February, 1949, when the frequency was changed to one return trip per week with D.C. 6 aircraft.

Traffic to and from New Zealand for the year ended 31st March, 1949, was :—

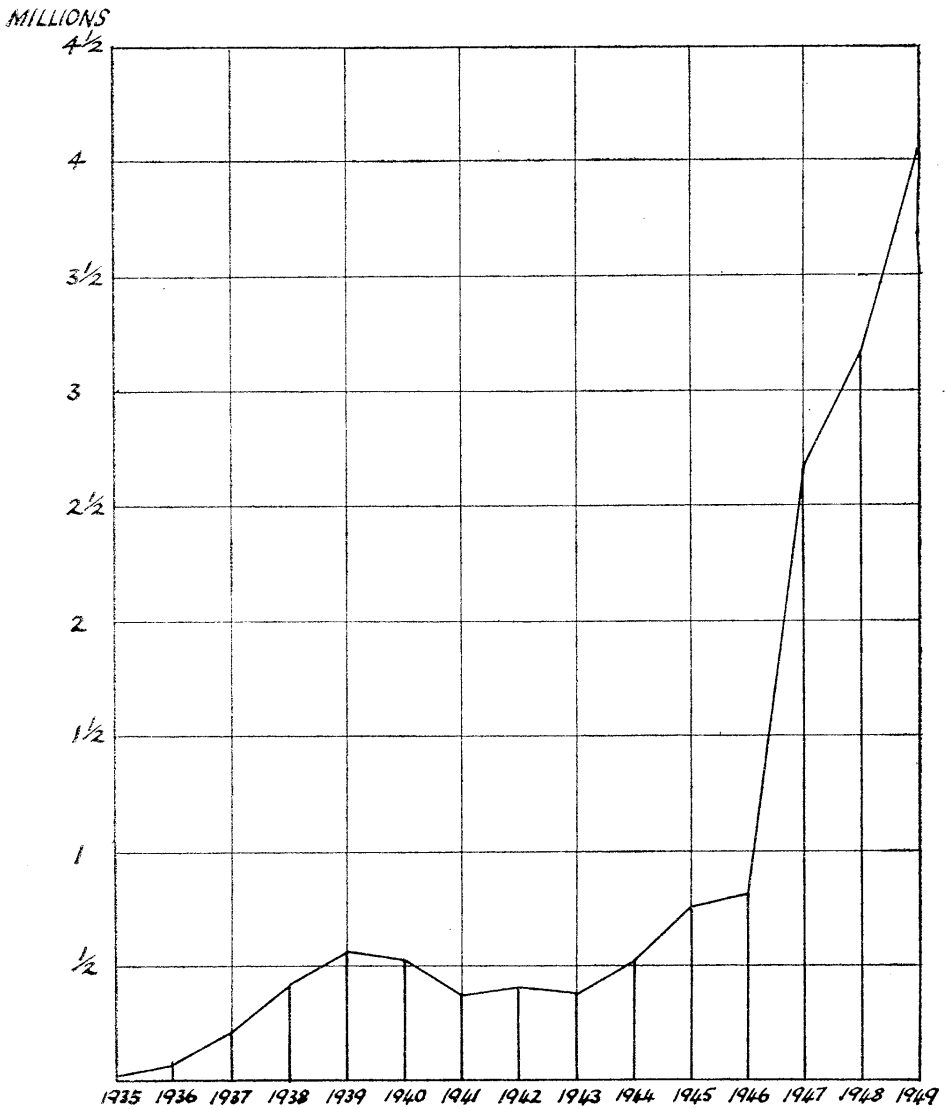
Hours flown	2,037
Miles flown	427,458
Traffic entering New Zealand—	
Passengers	746
Freight (lb.)	50,991
Mail (lb.)	2,117
Traffic leaving New Zealand—	
Passengers	296
Freight (lb.)	17,364
Mail (lb.)	10,476

(*d*) External Non-scheduled Services

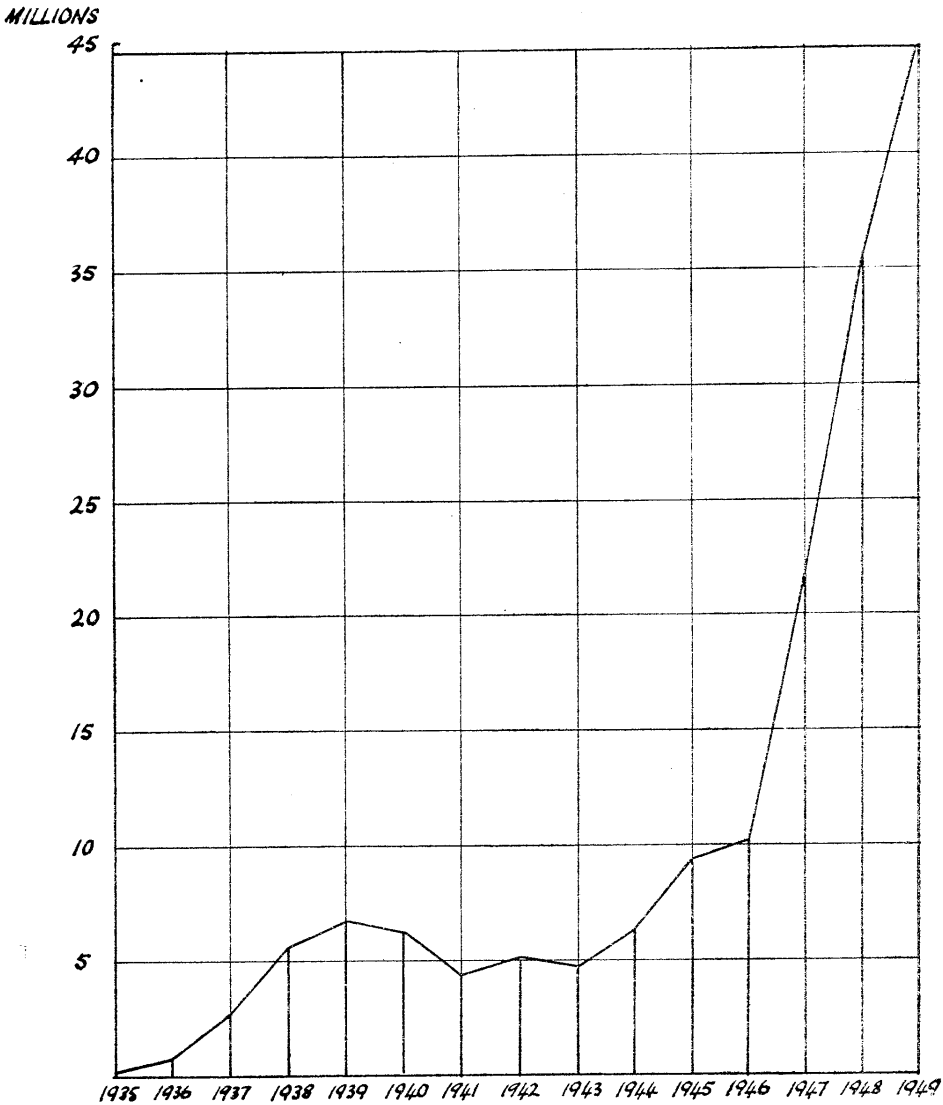
The following is a summary of external non-scheduled services for the year ended 31st March, 1949 :—

Trips	1
Hours flown	2
Miles flown	324
Passengers	20
Freight (lb.)	524

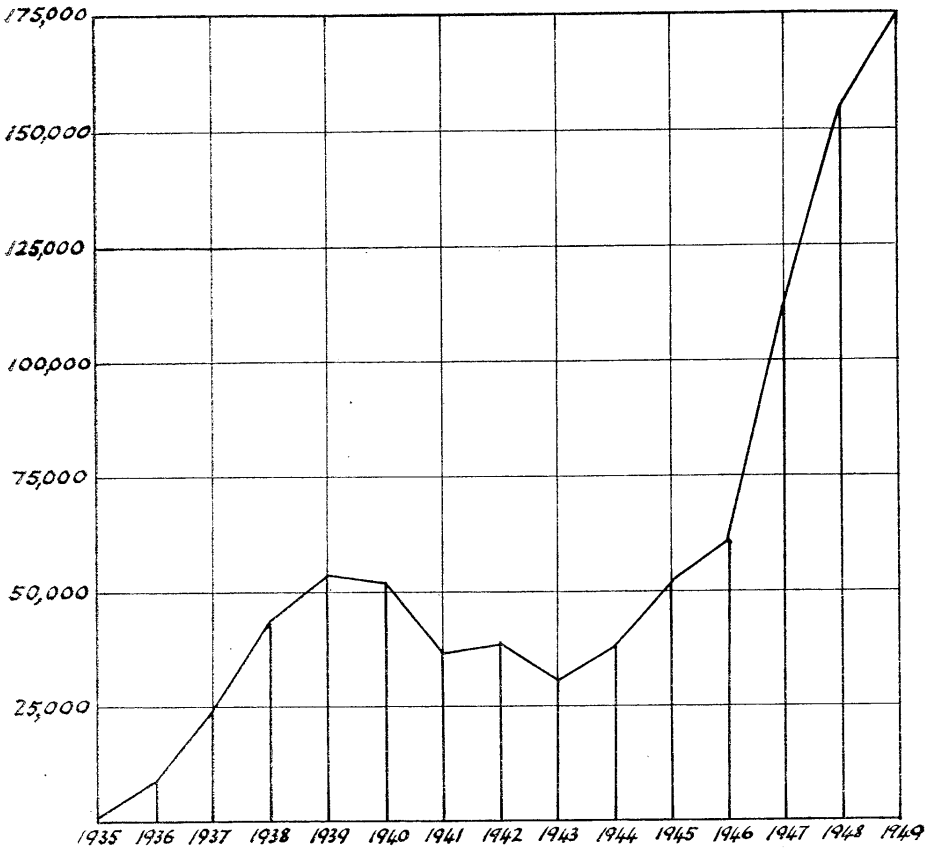
New Zealand National Airways Corporation operated non-scheduled services under charter to Tasman Empire Airways, Ltd., and the statistics for those services are included in Tasman Empire Airways, Ltd., charter services.



GRAPH SHOWING TOTAL TON-MILES FLOWN ON SCHEDULED INTERNAL SERVICES, 1935 TO 1949



GRAPH SHOWING PASSENGER-MILES FLOWN ON SCHEDULED INTERNAL SERVICES, 1935 TO 1949



GRAPH SHOWING PASSENGERS CARRIED ON SCHEDULED INTERNAL SERVICES, 1935 TO 1949

SECTION IX—AERO CLUBS

Despite many difficulties, particularly in relation to increasing costs in the maintenance and operation of light aircraft, the aero club movement reveals that there is an active public interest in what may be termed private aviation.

A paragraph in the report of the United Kingdom Civil Aviation Mission states—

> 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.

Certain recommendations were made by the United Kingdom Mission, and in general these followed the lines upon which the Department was endeavouring to find a mutually satisfactory solution. It has at all times been an accepted fact that some form of financial assistance to aero clubs is justified, but at the same time it is the Government's responsibility to ensure that with the expenditure of public funds, a national asset emerges.

The Civil Aviation Branch has already studied the question from many aspects in an endeavour to present to the Government a suitable formula which would satisfy all requirements. Inquiries were made in Canada, United Kingdom, Australia, and

South Africa, and it is interesting to note that at the time of the inquiries no form of subsidy had yet been instituted in either the United Kingdom or in South Africa, although in both countries proposals were under consideration.

The total number of aero clubs affiliated to the Royal New Zealand Aero Club is twenty-four, of which two, Napier and Stratford, are not at present undertaking flying operations. The Kaitaia Club has only been operating for a short period.

During the year two additional clubs commenced activities, bringing the number operating at 31st March, 1949, up to twenty-four.

The operations of these organizations during the year may be summarized as follows:—

(*a*) *Training*

Aircraft in use	108
Pupils under instruction at 31st March, 1949	765
Hours flown	25,747
Membership—	
Associate	3,359
Flying	2,686

(*b*) *Commercial*

Hours flown	4,174
Miles flown	417,400
Number of trips	5,651
Passengers carried	11,292

The types of aircraft used by the clubs are—

D.H. 82 Tiger Moth.	D.H.C. 1 Chipmunk.
Percival Proctor.	D.H. 83c Fox Moth.
Miles Whitney Straight.	D.H. 90.
Miles Magister.	D.H. 94.
Miles Geminie.	Percival Vega Gull.
Auster.	Taylor Cub.
Rearwin.	Waco.
Beechcraft.	

SECTION X—ACCIDENTS

During the twelve months under review civil aviation in New Zealand suffered two of the worst and most tragic air disasters in the country's history of air transport.

On the afternoon of the 23rd October, 1948, New Zealand National Airways Corporation's Lockheed Electra "Kaka" crashed into the western slopes of Mount Ruapehu with the loss of all eleven passengers and the two pilots. Although operations were tremendously hampered by the adverse weather conditions which prevailed at the time, the search-and-rescue organization functioned smoothly with the mobilization of all available resources, which included the Police Department, National Broadcasting Service, Army and R.N.Z.A.F., local bodies, and volunteer organizations and individuals. A Board of Inquiry under the chairmanship of Sir Harold Johnston, K.C., was set up to make a full investigation into the accident, and the findings of the Board have already been given full prominence in the daily press.

The second major disaster occurred on the 18th March, 1949, when the Corporation's Lockheed Lodestar "Kereru" crashed shortly before it was due to land at Paraparaumu Airport. The full complement of thirteen passengers and two pilots were killed instantly. A Board of Inquiry has been appointed to investigate and report on the crash, but as at the 31st March had not commenced its sittings.

During the year under review other fatal accidents occurred in which a total of seven people lost their lives.

The separate report of the Accidents Investigation Branch appears at page 44.

SECTION XI—AIRCRAFT

During the past twelve months thirty-three aircraft have been added to the Civil Register. The Government allotted nineteen gift Tiger Moth aircraft to aero clubs for training purposes, and to date three of these machines have been registered.

Additions to the Register are as follows:—

Public transport aircraft	1
State aircraft	3
Private aircraft	13
Club aircraft	15
Sports club aircraft (N.A.C.)	1
	33

Details are:—

Four Chrislea C.H. 3 Super Ace II aircraft, each powered with a Gipsy Major X engine, imported from England, by an approved private importing agency.

One D.H. 83 Fox Moth, powered with a Gipsy Major engine, ex R.N.Z.A.F-N.Z. 566, overhauled to civil requirements for National Airways Corporation. Before being taken over by R.N.Z.A.F. this aircraft was registered in the name of Air Travel (N.Z.), Ltd., as ZK-ADI.

One Fairchild Argus II aircraft, powered with one Warner Super Scarab 165 h.p. engine. This aircraft was imported by a private owner and assembled in the Dominion.

One Lockheed Lodestar aircraft, powered with two Wright R. 1820–87 engines, ex R.N.Z.A.F.-N.Z. 3510. At the present time this aircraft is undergoing overhaul to the requirements of the Civil Aviation Branch.

Twenty-four D.H. 82 Tiger Moth aircraft, powered with Gipsy Major engines, ex R.N.Z.A.F. Fifteen of these Tiger Moths were overhauled to civil requirement standards for aero clubs, and included twelve of the forty-two aircraft sold to aero clubs in the previous year.

The other three registered formed part of the nineteen gift machines allotted to aero clubs in the current year. Eight were overhauled for private owners, and one was reconditioned for the National Airways Corporation Sports Club.

New types of aircraft appearing on the register for the first time are, Chrislea C.H. 3 Super Ace II, Fairchild Argus, and Short Solent Flying Boats.

During the year eighteen aircraft were removed from the register, and were made up as follows:—

The De Havilland Dove, D.H. 104 aircraft, ZK-AQV, which was imported in the previous year, was sold to the R.N.Z.A.F.

Catalina P.B. 2B-1 flying-boat, ZK-AMI, owned by Tasman Empire Airways, Ltd., was returned to the R.N.Z.A.F. in exchange for a similar type of flying-boat, now registered ZK-AMP.

The veteran Tasman flying-boat "Ao-tea-roa," ZK-AMA, which was withdrawn from service in September, 1947, after lying idle for several months, was sold by public tender in June as an obsolete aircraft. This flying-boat had made 1,236 crossings of the Tasman and carried 20,000 passengers during its six years of service.

Two aircraft, a Lockheed Electra 10A, ZK-AGJ, which crashed at Tauranga, and a Lockheed Lodestar, ZK-ALZ, which was damaged by fire at Palmerston North while undergoing overhaul in February, 1947, were written off and reduced to spares.

One privately-owned Tiger Moth, ZK-AQQ, was totally destroyed by fire while being transported by rail from Lumsden to Harewood for overhaul.

Twelve aircraft (including four private, seven aero club, and one commercial company aircraft) that had crashed were removed from the register, made up as follows:—

Eight D.H. 82 Tiger Moths (including one that went missing on a flight from Hastings to Taupo in June, 1947).
One D.H. 80 Puss Moth
One Avro Avian IVM
One Miles Magister
One Douglas Dakota C. 47B

Change of ownership of aircraft was carried out in twenty-nine cases, and included the following types of aircraft:—

Thirteen D.H. 82 Tiger Moth.
Two D.H. 83 Fox Moth.
One D.H. 89 Dragon Rapide.
Two D.H. 94 Moth Minor.
Five Proctor V.
Two Avro Avian IVM.
One Auster J. 1.
One Miles Magister.
One Ercoupe.
One Cub J. 3.

Included in the above items were the two Fox Moths and the Dragon Rapide which were transferred from Air Travel (N.Z.), Ltd., to New Zealand National Airways Corporation.

On 31st March, 1949, there were 257 aircraft on the Civil Register, comprising the following types and categories:—

(*a*) Airspeed Oxford	2		D.H. C 1 Chipmunk	2	
Auster V	5		Ercoupe	1	
Avro Avian IVM	1		Fairchild Argus II	1	
Avro Tutor 626	1		Lockheed Electra 10A	4	
Beechcraft	2		Lockheed Lodestar 18–56	13	
Cessna Crane	2		Miles Gemini	3	
Chrislea Super Ace	4		Miles Magister	2	
Desoutter	1		Miles Whitney Straight M 2A	4	
Douglas Dakota	13		Monocoupe M 5	1	
D.H. 60 Moth	1		Monospar S.T. 25	1	
D.H. 60M Moth	1		Percival Proctor Mk. I	7	
D.H. 80 Puss Moth	1		Percival Proctor Mk. II	1	
D.H. 82 Tiger Moth	130		Percival Proctor Mk. V	8	
D.H. 83 Fox Moth	6		Percival Vega Gull	1	
D.H. 89A Rapide	1		Piper Cub J. 2	2	
D.H. 89B Dominie	6		S.A.S. Monoplane	1	
D.H. 90A Dragonfly	1		Waco	2	
Porterfield 35W	1		Piper Cub J. 3	3	
D.H. 94 Moth Minor	5		Rearwin	4	

Marine Aircraft

Catalina PB2B1 flying-boat ..	1	Short Solent flying-boat ..	4
Short S. 25 flying-boat ..	4	Walrus Amphibian ..	1
Short Sunderland Mk. II flying-boat	2		

(*b*) Public transport aircraft	50
Private aircraft	42
Aero club aircraft	131
Private club aircraft	1
Private companies' aircraft	19
Private Companies : imported aircraft for resale	8
State aircraft	6
Total	257

Of the above total shown on 31st March, 1949, 165 were in service on current Certificates of Airworthiness, the remainder being at approved repair stations for rebuild, overhaul, or pre-delivery test.

SECTION XII—LICENSING

By comparison with the year 1947-48 the issue and renewal of licences for the current year has remained fairly stable.

The following table sets out the types and number of licences current as at 31st March, 1949, together with comparative figures for the year ended 31st March, 1948 :—

Licence or Certificate.	Total Current as at 31st March, 1948.	Total Issued, 1st April, 1948, to 31st March, 1949.	Total Current as at 31st March, 1949.
Pilot's "A" Licence	875	371	1,003
Pilot's "B" Licence	264	101	297
Navigator's Licence—			
First Class	22	8	35
Second Class	29	1	22
Radio Telegraph Operator's Licence—			
First Class	20	2	19
Second Class	2	..	2
Third Class	78	32	111
Temporary	14	13	12
Radio Telephone Operator's Licence	7	1	9
Flying Instructor's Authority	68	21	71
*Instrument Rating	Non existent	96	82
Aerodrome Licence (Public)	8	16	24
Aircraft Engineer's Licence	171	51	204

*An instrument rating is a rating in a pilot's licence authorizing him to fly under instrument flight rules. Instrument flight rules were introduced in New Zealand on 1st June, 1948, over certain air routes between the main centres in order to ensure greater regularity of air services irrespective of weather conditions.

An aircraft engineer may hold one or more categories of a licence subject to fulfilling examination and experience requirements. The five categories of licence are as follows :—

Category "A."—Certification of safety for flight and of certain minor repairs, modifications, and replacements of airframes ; and consisting of subdivisions for seaplanes, landplanes, all aeroplanes, and restricted class.

Category "B."—Certification of airframes after overhaul, major repairs or modifications ; and including subdivisions for seaplanes, landplanes, all aeroplanes, and restricted class.

Category "C."—Certification of aircraft engines before flight and of certain minor modifications and replacements; and containing classes for all aircraft engines, air-cooled engines, liquid-cooled engines, and restricted classes of engines.

Category "D."—Certification of aircraft engines after overhaul, major repairs or modifications, and having classes for all aircraft engines, air-cooled engines, liquid-cooled engines, and restricted classes of engines.

Category "X."—Certification of the overhaul, repair, or modification of specialized equipment—namely, compasses, electrical apparatus (excluding radio), instruments, magnetos, parachutes, variable-pitch propellors, radio and electronic equipment.

The 204 holders of Aircraft Engineers' Licences current at 31st March, 1949, are licensed in the various categories as set out hereunder, with the licences issued in each category during the year shown in parentheses:—

Category "A"	120	(15)
Category "B"	28	(2)
Category "C"	117	(13)
Category "D"	28	(4)
Category "X"	84	(17)

The following list shows the number of *ab initio* trainees who were trained by affiliated aero clubs or the companies during the twelve months ended 31st March, 1949, and who were subsequently issued with "A" Licences:—

Auckland	24	South Canterbury	8
Canterbury	34	Southland	4
Central Hawkes Bay	2	Southern Scenic Airtrips, Ltd.	1
Gisborne	2	Stratford	2
Hauraki	6	Tauranga	11
Hawkes Bay and East Coast	29	Waikato	13
Marlborough	7	Waikato Aviation Co.	1
Middle districts	9	Wairarapa and Ruahine	7
Nelson	11	Wanganui	13
New Plymouth	5	Wellington	16
Otago	15	West Coast United	6
Piako	16		
Rotorua and Bay of Plenty	15		257

The following table shows the results of the various examinations conducted by the branch during the year:—

Examination.	Number Conducted.	Number of Candidates.	Number Passed.	Number Failed.
Pilot's "B" Licence	3	84	66	18
First-class Navigators	2	17	8	9
Aircraft Engineers—				
Category "A"	2	52	19	33
Category "B"	2	21	6	15
Category "C"	2	72	14	58
Category "D"	2	5	3	2
Category "X"	2	44	26	18
	15	195	142	153

I have, &c.,

E. A. GIBSON,
Director of Civil Aviation.

APPENDIX—GLOSSARY OF TECHNICAL TERMS

In view of the appearance in the report of a number of unfamiliar words peculiar to aeronautics, it has been considered desirable to include a brief explanation of their meanings.

Aeradio station is an aeronautical communications station operated to provide communication for aeronautical purposes.

Apron is a paved or surfaced area where aircraft stand for purposes of loading or unloading passengers, cargo, refuelling, parking, or maintenance.

Dimensional practices comprise the adoption and use of standard units of measurement in communications between ground and aircraft stations.

Direction-finding station is a radio-station equipped with special apparatus for obtaining radio bearings.

D.M.E. is a radar navigational system used by aircraft to determine their position, and/or distance in respect to the airfield.

Instrument rating is a rating in a Pilot's Licence authorizing him to fly under instrument flight rules.

"*Q*" *Code* is a code consisting of three-letter abbreviations designed to expedite radio communications procedures between aircraft and ground stations.

Radio Beacon is a special radio navigational aid, the emissions of which are intended to enable a mobile station to determine its radio bearing or direction with reference to the radio beacon station.

Radio calibration is the checking of the operational accuracy of any radio aid to navigation or landing.

Radio channel is any link of radio communication between two stations.

Radio fan-marker is a low-powered radio beacon emitting a vertical fan-shaped pattern.

Radio frequency indicates the number of oscillations per second of a particular radio signal.

Radio range: A form of radio beacon the emissions of which provide definite track guidance along four paths, one in each quadrant, emanating from the range station.

Splits and legs are terms used in reference to radio ranges. *Legs* are the track delineated by a radio range. *Splits* are multiple patterns occurring on one or more legs resulting in false tracks.

REPORT OF INSPECTOR OF ACCIDENTS FOR THE YEAR ENDED 31st MARCH, 1949

The Hon. the Minister of Defence.

I Have the honour to submit the following report in respect of aircraft accidents which occurred in the R.N.Z.A.F. and in civil aircraft operation during the year ended 31st March, 1949.

During the period under review there were two fatal accidents involving R.N.Z.A.F. personnel. One occurred during aerobatic practice at low altitude in a Mosquito aircraft and resulted in the two occupants being killed, the other in an Oxford aircraft which failed structurally while being flown in conditions of abnormal turbulence and caused the death of the crew of three. In the remaining fifteen accidents no injury was caused to personnel and only one resulted in major damage to the aircraft.

Error on the part of the pilot was the cause of three minor accidents, and inexperience with particular equipment caused four forced landings.

Apart from one accident, which occurred during supply-dropping operations and was due to weather conditions, the remaining accidents were on the ground. These accidents were spread over a total flying-time of approximately 19,800 hours. One minor accident occurred during Territorial Air Force training.

At the close of the year a total of forty-six accidents had occurred in civil flying within the Dominion. Six of these accidents caused fatalities, injuries resulted from five, and in the remaining thirty-five accidents no injury was caused.

Of the total reportable accidents six occurred in scheduled airline operation, thirty-two in aero club flyng, five in private flying, and three in commercial operations.

The following tabulation shows the degree of injury in the four classes of flying:—

Type of Flying.	Number of Accidents.		Number of Occupants of Aircraft Involved in Accidents.			Degree of Injury.					
						Crew.			Passengers.		
	Total.	Fatal.	Crew.	Pass.	Total.	Fatal.	Serious.	None.	Fatal.	Serious.	None.
Scheduled air-line services ..	6	3	11	39	50	6	..	5	24	..	15
Aero club	32	1	32	12	44	1	3	28	1	2	9
Private	5	2	5	5	10	2	..	3	1	..	4
Commercial	3	..	3	1	4	..	1	2	..	..	1
Totals	46	6	51	57	108	9	3	38	26	2	29

Of the forty-six aircraft involved in accidents, fourteen were destroyed and eighteen were substantially damaged.

Airline Accidents

Two major accidents marred the hitherto safety record of internal airline operation. Both accidents occurred as the result of collision with high ground during conditions of low visibility. One caused the death of eleven passengers and the two members of the crew, and in the other fifteen lives were lost, including the two pilots. A third fatal accident caused the death of the two pilots when a freight aircraft collided with a cloud-enveloped hill. During conditions of low visibility an airline aircraft struck the water while approaching to land, and although the aircraft was damaged beyond repair no injury was sustained by the twelve occupants. Another aircraft was substantially damaged during landing owing to crew error, without injury to the occupants. Aerodrome surface condition was the cause of a light type airline aircraft being damaged during take-off.

Aero Club Accidents

One fatal accident causing the loss of two lives occurred as the result of low flying. Three pilots and two passengers were injured in three other accidents. In none of the remaining 28 accidents in this class of flying was serious injury caused, although two aircraft were destroyed and 13 sustained substantial damage.

Three serious accidents which occurred during cross-country flying arose from disregard of elementary flying precautions, and were marked adversely by lack of supervision of the actions of the pilots involved.

A student pilot was injured and the aircraft was destroyed as the result of low flying: he was carrying out these manœuvres without permission and in advance of his training.

Private Flying

A private aircraft whilst on a flight in adverse weather conditions was wrecked in the sea and the pilot, the sole occupant lost his life. A pilot and his passenger were killed when an aircraft engaged in unauthorized low flying struck a tree.

Commercial Flying

In the three accidents in this class of flying the pilot of one aircraft was seriously injured as the result of spinning into the ground while engaged in a public display of aerobatic flying.

The general accident rate and that of each class of flying within the Dominion is shown below:—

Type of Flying.	Hours of Flying.	Number of Accidents.		Hours Flown per		Accidents per 10,000 Hours Flying.	
		Total.	Fatal.	Accident.	Fatal Accidents.	Total.	Fatal.
Airline services ..	34,805	6	3	5800·8	11,601·6	1·724	0·862
Aero club ..	25,760	32	1	805·0	25,760	12·422	0·388
Private ..	2,056	5	2	411·2	1,028	24·319	9·661
Commercial ..	4,048	3	..	1349·3	..	7·411	..
All flying ..	66,669	46	6	1449·3	11,111·5	6·899	0·899

All accidents were the subject of investigation and report by the Flying Safety Organization. Boards of inquiry were appointed to inquire into and report upon the circumstance of four of the accidents in which passenger-carrying aircraft were involved.

I have, &c.,

R. C. Kean,

Inspector of Accidents.

REPORT OF DIRECTOR OF METEOROLOGICAL SERVICES FOR THE YEAR ENDED 31ST MARCH, 1949.

The Hon. the MINISTER OF DEFENCE.

I HAVE the honour to submit the following report on the work of the Meteorological Service for the year ended 31st March, 1949.

GENERAL

Routine services have been maintained on the same general level as during the previous year. Good progress has been made in the expansion of the rainfall-observing organization to meet the special needs of the Soil Conservation and Rivers Control Council. On the other hand, much-needed developments, particularly in essential meteorological services for aviation, and in research, still await the appointment and training of additional professional staff.

By agreement with the Governments of the United Kingdom, Australia, and Fiji the New Zealand Service has continued to accept responsibility for the meteorological organization covering all British possessions in the Pacific east of longitude 170° E. Aviation aspects of this work are co-ordinated under the South Pacific Air Transport Council, and separate agreements with Fiji and the Western Pacific High Commission are being prepared covering the provision of domestic meteorological services which are arranged as part of the wider scheme.

Several public lectures were given during the year by senior members of the Service to scientific and farming organizations.

A short documentary film, "This is the Weather Office," was produced by the National Film Unit and released throughout the country early in January. The film traced the various steps in the preparation of a weather forecast, starting with the making of observations by ships' officers, lighthouse-keepers, and others, and the transmission of reports to the Meteorological Office. It then dealt with the plotting of the information on the weather map, and final analysis of the chart and preparation of the forecast itself.

It has been pleasing to note during recent months that the Meteorological Service has received a considerable amount of spontaneous and favourable publicity in the press throughout the country. Constructive criticism is welcomed and can often be of great value. There appears to be a growing appreciation on the part of the general public of the value of the service which the Meteorological Branch can offer, and this is coupled with a more sympathetic realization of the limitations of the resources at our command, particularly as regards basic observational data and staff.

Pacific Science Congress.—The Seventh Pacific Science Congress included a Division of Meteorology, and the sessions, which were held successively in Auckland and Christchurch during February, 1949, were attended by a number of distinguished overseas meteorologists. The Director of the New Zealand Meteorological Service acted as Organizing Chairman of the Division, and Mr. J. W. Hutchings, Research Officer, was Organizing Secretary. All officers who could be spared without interrupting essential services attended the meetings. The papers presented, of which four were contributed by members of this Service, were of a high order, and were followed by valuable and stimulating discussions. Scientific officers in New Zealand of necessity suffer as a result of the geographical isolation of our country, and this opportunity of making contact with experts from overseas proved of inestimable value.

South-west Pacific Regional Commission of the International Meteorological Organization.—New Zealand acted as the host Government for the second session of the South-west Pacific Regional Commission of the International Meteorological Organization. The Conference was opened by the Right Honourable the Prime Minister on 12th

April, and continued until 17th April, 1948. The meetings were held in the Carter Observatory, Wellington, under the chairmanship of the President of the Commission, Mr. H. N. Warren, Director of the Australian Meteorological Service. Eleven overseas delegates or observers attended, representing Australia, New Caledonia, Indonesia, the Philippines, Burma, India, and the United States.

The Conference was convened to discuss and determine regional action on various resolutions and recommendations of the Conference of Directors of the International Meteorological Organization which had been held in Washington towards the end of 1947. In addition, various matters raised by Administrations of the region were listed for discussion and, where appropriate, for regional agreement. The agenda was concerned with details relating to the application of new international code forms for various types of weather report, and with such matters as standard hours of observation, index numbers for reporting stations, the organization of ships reports, the interchange of climatological information, and so on.

Satisfactory agreement was reached on all points, and the proceedings of the Commission were marked by the highest degree of harmony and by a very evident spirit of co-operation in approaching matters of regional concern.

Aviation Meteorological Service

The meteorological services for aviation, which are a major part of the activities of the Branch, are highly decentralized, the work being mainly carried out at branch offices with only a relatively small Head Office Aviation Section. This section is under the control of the Assistant Director.

The Branch Offices, which are all on aerodromes, are primarily concerned with the provision of forecasts and weather reports to aircraft and the training of aircrew, while the functions of the Head Office Aviation Section are almost wholly administrative, comprising the control of the branch offices and liaison with such authorities as the R.N.Z.A.F., the Civil Aviation Branch, Airlines, the International Civil Aviation Organization, and the South Pacific Air Transport Council.

The branch offices are of two types—forecasting offices, which come directly under the control of the Head Office Aviation Section, and observing offices, which are under the control of the Reporting Section of the Head Office, but which also provide such local services as are required for aviation. At the observing offices no forecasting is carried out, such forecasts as they require being provided from the forecasting offices on which they are dependent.

During the year the scale of service for aviation at the Observing Offices has been satisfactory, but the current shortage of professional staff has adversely affected both the Head Office Aviation Section and the Branch Forecasting Offices. Every effort is being made to obtain additional professional officers, but it has been found necessary meantime to postpone the reopening of the forecasting offices at Whenuapai, Ohakea, and Lauthala Bay. Those that have been in operation throughout the year have been Nadi, Mechanics Bay, Paraparaumu, Wigram, and Taieri. Of these, Nadi and Mechanics Bay maintain a twenty-four-hour forecasting service, while the other three are open only for restricted hours.

The principal difficulty at the branch offices has been in keeping pace with the increasing demands for aviation forecasts, which were 15 per cent. to 20 per cent. greater than in the previous year. In addition, the work at Nadi and Mechanics Bay has been further increased through the necessity for constructing 500-millibar weather maps, the need for which arose through the introduction of pressurized aircraft, such as the DC 6, flying at altitudes up to 17,500 ft.

That it has been possible to meet the requirements of the operating companies and the R.N.Z.A.F. to the extent accomplished is due to the loyalty and enthusiasm of the forecasters, who have continued to carry out exceptionally arduous work for

long hours under difficult conditions. It is considered, however, that the stage has been reached where any appreciable further increase in the quantity of work without additional staff, will impair the quality of work.

Forecasting: Overseas Air Routes.—Practically all the forecasting for trans-ocean air routes is carried out at Mechanics Bay and Nadi. Mechanics Bay is responsible for the forecasts for all aircraft departing from New Zealand, while Nadi is responsible for the Pacific trunk-route services running north and south from Fiji, and also for the regional air services operating through Fiji to Samoa and the Cook Islands, and to New Caledonia and other areas in the South Pacific. During the year there has been an increase in the number of forecasts for scheduled air services, chiefly due to the commencement of operations by British Commonwealth Pacific Airlines, and an increase in the schedules of Pan-American World Airways. There has been some decrease in the amount for non-scheduled services, both civil and military.

The approximate number of separate route forecasts for overseas flights issued by the two offices was—

Nadi	1,600
Mechanics Bay	800

Paucity of upper air information throughout the South Pacific is still causing concern and makes more difficult the preparation of accurate forecasts. A comprehensive network of stations throughout the area for providing this information has been approved, but all the countries concerned are experiencing difficulty in implementing the scheme. As far as can be determined, further delays will be inevitable and it will probably be some years before the full network of upper air stations is in operation.

Aviation Forecasting: Internal.—The bulk of the aviation forecasting within New Zealand has been for the scheduled services of New Zealand National Airways Corporation, but a very considerable number of forecasts has been provided also for the R.N.Z.A.F., aero clubs, &c.

Individual flight or route forecasts and terminal forecasts are supplied on request to every aircraft on cross-country flights. In addition, a considerable number of local forecasts is issued for R.N.Z.A.F. and aero-club training flights of short duration.

Although precise figures are not available, the following are the approximate numbers of written flight or route forecasts issued during the year for internal flying:—

Mechanics Bay	10,000
Paraparaumu	11,500
Wigram	4,200
Taieri	1,600

The Paraparaumu figures include about 1,500 forecasts prepared by the General Forecasting Office, Kelburn, outside the normal hours of the Paraparaumu Office.

Although these branches are classified as aviation forecasting offices, those at Mechanics Bay, Wigram, and Taieri, because of their proximity to the main cities, carry out a considerable amount of general forecasting to satisfy local requirements. The Nadi office also caters for the civil requirements in Fiji, and is responsible for the hurricane-warning organization in the South Pacific.

R.N.Z.A.F.—The Meteorological Branch is responsible for providing all the meteorological requirements of the R.N.Z.A.F., these comprising mainly forecasting and training. It has not been possible to fill the established forecaster positions at Lauthala Bay, Whenuapai, and Ohakea, and at those stations reliance has had to be placed on forecasts supplied from the nearest forecasting office. Only at Wigram have the full requirements of the R.N.Z.A.F. been met. With the increased intake into courses at Wigram there has been a considerable increase in the lecturing to pupil pilots and navigators, and also in forecasting for night flying.

Civil Aviation Branch.—Close liaison has been maintained throughout the year with the Civil Aviation Branch, particularly with the Air Traffic Control and Communications Sections, which are jointly concerned with the Aviation Meteorological Section in the provision of the day-to-day operational requirements of aviation.

During the year the Meteorological Branch co-operated with the Australian and New Zealand Civil Aviation authorities in revising the Manual of Operations for international air routes in the Fiji – Australia – New Zealand region.

Operating Companies.—Close liaison has also been maintained with the various operating companies, particularly with Tasman Empire Airways, Ltd., and New Zealand National Airways Corporation. Frequent discussions have been held with officials of the Corporation on their meteorological requirements, and on the most satisfactory way of meeting these from the meteorological resources available.

S.P.A.T.C.—The Meteorological Branch was fully represented on the Meteorological and Technical Committees of the South Pacific Air Transport Council meeting held in Wellington late in 1948.

I.C.A.O.—As meteorology is an integral part of the activities of the International Civil Aviation Organization, the Meteorological Branch has considerable interest in its work. The Assistant Director of Meteorological Services was the New Zealand delegate at the North Pacific Regional Air Navigation Meeting of I.C.A.O. held at Seattle, Washington in July, 1948. Prior to attending the meeting, he visited Melbourne for discussions on the agenda with the Australian Meteorological and Civil Aviation authorities.

New Zealand is interested in the North Pacific by virtue of the fact that the Pacific Trunk Air Services from New Zealand and through Fiji extend into that region. The principal business of the meeting was the drawing-up of recommended supplementary navigation procedures for use in the North Pacific. The aim of the Australian and New Zealand delegations of endeavouring to have the North Pacific Supplementary Procedures as similar as possible to those already in force in the South Pacific was substantially achieved, and from this aspect alone the meeting was highly successful as far as New Zealand is concerned. We are indebted to the other States represented, particularly the United States, for the favourable consideration given to our views.

General Forecasting

The organization of forecasting for the general community, as distinct from aviation forecasting, is the responsibility of the office at Kelburn, Wellington. The Aviation Forecasting Offices at Auckland, Christchurch, and Dunedin provide the forecasts which are broadcast from the local commercial broadcasting stations, and answer numerous inquiries which originate in their particular area. Otherwise, all general forecasts in New Zealand are issued from Wellington.

The general forecasting service for Fiji, including daily broadcast forecasts from the Fiji Broadcasting Company's station in Suva, is provided by the Meteorological Office at Nadi Airport. A detailed hurricane warning system for the Pacific Islands area is also provided by the Nadi office.

The principal routine task of the Kelburn office continues to be the preparation of forecasts for the press and radio. In addition to the four main broadcasts over the National Broadcasting Service network, forecasts are issued each day to eleven morning and twenty-eight evening newspapers distributed throughout the country.

Forecasts and storm warnings for shipping in the New Zealand area are broadcast twice daily by wireless telegraphy. In addition, for the benefit of coastal shipping and fishing-vessels, a corresponding forecast and selection of coast-station reports are broadcast twice each day by radio telephony from Musick Point, Wellington, and Awarua Radio Stations.

There has been a steady increase in the demands for general forecasts not only from Kelburn, but also from the Branch Aviation Offices.

The farming community in particular is making fuller use of the services available. Various Government Departments, local bodies, and organizations, such as yacht clubs, for example, are provided with a specialized service to meet their particular requirements. Special arrangements are made for Catchment Boards in the provision of warnings of heavy rainfall, and the State Forest Service receives detailed advice during periods of potential fire hazard.

Following a request from the New Zealand Railways for forecasts of heavy rainfalls in the Maraetaha section of the Gisborne line, a special study was made of conditions likely to produce excessive falls in this area.

Collection and Dissemination of Weather Reports.—A rapid exchange of information between forecasting centres is a prerequisite to making the best use of all reports available. The general supervision of the operation of the Meteorological teleprinter network in New Zealand is the responsibility of the Kelburn office. This network connects the radio stations and telegraph offices at Auckland and Wellington, and the telegraph offices at Christchurch and Dunedin with the local meteorological offices, as well as linking the meteorological branches at Whenuapai, Mechanics Bay, Ohakea, Palmerston North, Paraparaumu, Kelburn, Woodbourne, Nelson, Wigram, and Taieri.

As part of the system of international exchange, the Wellington office prepares and broadcasts in international meteorological code from Post and Telegraph Department radio transmitters a selection of weather reports collected in the New Zealand area. These "collectives" comprise reports from land stations, ships, and aircraft, as well as upper air information. Coded copies of the analyses of the surface weather charts, and of the chart for the 700-millibar level, are also broadcast. In all, these coded broadcasts now total more than 70,000 groups per month.

The corresponding analyses and "collectives" covering reports originating in the South Pacific Islands area are prepared by the Meteorological Office at Nadi and broadcast on three frequencies simultaneously from Nadi Aeradio Station.

Climatology

The observations upon which climatological statistics are based are gathered from a variety of sources and with the co-operation of various Government Departments, local bodies, and hundreds of private individuals. I wish, once again, to acknowledge our indebtedness to these observers for their valued assistance, and particularly to those many observers who every day, year after year, have retained an interest in weather observing, and have continued voluntarily to send us returns each month.

The stations which furnish climatological data are divided into three main networks—climatological, rainfall, reporting. Some notes on the changes which have occurred in observing stations and the class of observations available are given below:—

Climatological Stations. At such stations the basic instruments are a rain-gauge, and five thermometers, known as the dry bulb, wet bulb, maximum, minimum, and grass minimum. Many more instruments are available at certain selected stations. At the more fully-equipped stations the additional instruments include thermometers for measuring soil temperatures at various depths down to 3 feet, evaporimeter and anemometer, as well as automatic instruments to give continuous records of temperature, rainfall, humidity, wind, and sunshine. Observations are made daily at 9.30 a.m.

During the year a number of new stations commenced operation. At Owairaka, Auckland, a new station is run in co-operation with the Plant Research Division of the Department of Scientific and Industrial Research. Others were set up at the Soil Conservation and Rivers Control Council's Research Station at Wairenga-o-Kuri; at Flock House, Bulls; at the Horticulture Division's nursery at Levin; and at Invercargill Aerodrome. Two stations in Canterbury, one at Kimberley and the other at

Kinkora, were taken over from the Ministry of Works, and were slightly modified to conform with our standards. In anticipation of a move of the headquarters building in the Balmoral State Forest, a new station has been set up to run concurrently with the present station, in order to provide an overlap of observations for a period. With the closing of the Waipapakauri Aerodrome, the meteorological instruments were transferred to Kaitaia Aerodrome.

The total number of stations in operation at 31st March, 1949, was 114, including 12 in Pacific Islands administered by the New Zealand Government.

Rainfall Stations.—The collection of rainfall data in New Zealand depends almost entirely on the voluntary efforts of hundreds of observers who, in return for the extended loan of a gauge, agree to make daily readings and send in a monthly return. The country owes a debt of gratitude to these public-spirited people, many of whom have kept records for thirty, forty, or, in a few cases, fifty or more years.

To help in meeting the demand for more rainfall information, an additional 400 manual rain-gauges were ordered in 1946, and a campaign was launched to find additional voluntary observers who would be willing to keep rainfall records. With the co-operation of Catchment Boards and the Ministry of Works many new observers have been found, and during the past twelve months a further 79 gauges were installed. With the closing of eight stations, this brings the present total to 730. To this total must be added the rainfall records obtained from climatological stations and from a few observing stations maintained by the Ministry of Works at possible aerodrome sites.

Additional rainfall data are obtained from about a hundred private observers who are kind enough to provide us with a copy of their daily rainfall readings at the end of each year.

An order for 100 recording rain-gauges was also placed in 1946, but delivery did not commence until 1948. They are now being installed in suitable locations throughout the country, and sixteen new stations were brought into operation during the year. Records from these instruments will furnish much-needed information about high-intensity rainfalls, and about the detailed rainfall structure of storms.

Reporting Stations.—The main purpose of the network of reporting stations, which numbers about 100, is to supply synoptic reports several times a day for use in the preparation of weather forecasts. Such reports are received initially by the most rapid means of communication available, be it telephone, telegraph, teletype, or radio. The observations are also entered on record sheets which are sent in at the end of each month. Such returns provide a valuable source of data relating to cloud height and amount, visibility, &c. About twenty of the reporting stations combine the functions of a reporting and a climatological station. Most of these are located at branch offices of the Meteorological Service. From the latter, data are also obtained from the upper air by means of pilot-balloon observations. Temperature and humidity data from the free atmosphere are obtained by radiosonde ascents at Nadi (Fiji), Auckland, and Hokitika, and by aircraft ascents at Ohakea. High-level wind data under all weather conditions are available from radar equipment at Nadi, Whenuapai, and Ohakea.

Publications.—The Climatological Table continues to appear each month in the *New Zealand Gazette*. Reprints of this table are distributed to all climatological observers, and to some eighty other addressees.

The Annual Meteorological Observations for the years 1943 and 1944 were published, and the typing of the material for the 1945 and 1946 issues has been completed.

The paper by Dr. F. Bondy entitled "Droughts in New Zealand," which was read at the seventh Pacific Science Congress, has been submitted for publication in the *Journal of Science and Technology*.

Information Service.—Written requests for climatological data averaged about a dozen per month. Telephone inquiries were somewhat more numerous. About a hundred inquirers called personally to copy records or to discuss problems which were affected by weather or climate.

Many inquiries could be answered immediately from statistics already available, but some required detailed investigation. Among these were several analyses of storms, notably those which have affected the Manawatu Catchment, and the floods of May, 1948, in the Waipaoa and Wairoa Rivers.

Some progress has been made in the preparation of summaries of rainfall data from past rainfall records. Tabulations of periods of excessive rain and of maximum daily falls for each month of every record have been almost completed.

Monthly summaries of climatological data are supplied for publication in the *Journal of Agriculture*, *Meat and Wool*, and in the press.

Reporting Organization and Instruments

The most notable feature of the activities of the Reporting and Instruments Section during the year was the work connected with the introduction of new international reporting code forms. These codes were developed by the International Meteorological Organization and were recommended for introduction throughout the world on 1st January, 1949. They cover upper-air observations and aircraft reports, in addition to surface reports from land stations and ships at sea. The introduction of the new codes was an undertaking of considerable magnitude and entailed the rewriting of all instructions on the making of weather reports and the reprinting of the many code sheets, synoptic maps, and forms used in this connection. To ensure a smooth changeover, personal visits were made by Inspectors from the section to every one of the hundred-odd co-operative weather observers scattered throughout New Zealand, from Cape Reinga in the north to Puysegur Point in the far south-west. Arrangements were also made to change over to the new codes as many as possible of the stations outside New Zealand, as well as most of the ships on the New Zealand Selected Ships List, and many of the supplementary ships and casual traders. Opportunity will be taken during the Pacific Island cruises of the R.N.Z.N. frigates in 1949 to arrange inspections of the majority of the reporting stations in our Island network.

A conference of all Observers in Charge of Branch Observing Offices and Senior Observers of Branch Forecasting Offices within New Zealand was held in Wellington early in November, 1948, with the primary object of passing on detailed instructions concerning the new codes to all Meteorological Office staff.

Weather Reporting Organization.—During the year additional hourly weather reports were instituted from the aeradio stations at Tauranga, Rotorua, Westport, and Kaikoura. Arrangements were also made to enable emergency reports to be obtained from Seddon.

Pilot-balloon observations were commenced from Campbell Island, while a full-time meteorological observer was sent to the Kermadecs to increase and improve the pilot-balloon observations from Raoul Island.

Automatic rain-gauges of the Dines tilting syphon type were set up at the following stations: Waerenga-o-Kuri, Paeroa, Rotorua, New Plymouth, Alexandra, Taieri, Wairoa, Glenbervie, Mechanics Bay, Onepoto, Waipukurau, Stronvar, Murchison, Kaikoura, Hanmer, and Gore.

The reporting station at Norfolk Island was finally handed over to the Australian Meteorological Service, and all New Zealand personnel withdrawn in July, 1948.

Weather reports from ships have been well maintained during the year, and grateful acknowledgment is made of the excellent co-operation from the shipping of all nations that visit these waters. Unfortunately, the personal service normally provided to shipping in Wellington was curtailed owing to the resignation of the Marine Meteorological Officer in August, and this vacancy had not been filled by the end of the year. However, a full service was maintained by the Shipping Officer in Auckland, where visits were made to some seven hundred ships during the period under review. Instruments were checked, stationery and publications provided, and advice and instructions given where necessary. In addition, where practicable, all overseas ships were supplied with the latest available synoptic chart immediately prior to sailing.

Two international Aerological Periods were held during the year—namely, 1st to 10th April, and 11th to 20th November. During such periods meteorological services all over the world endeavour to obtain the maximum possible amount of upper-air information. Arrangements were made for an augmented programme of pilot-balloon observations, and special high-level soundings with Mosquito aircraft were carried out at Ohakea by the R.N.Z.A.F.

Meteorological Instruments.—Maximum and minimum thermometers have continued in short supply, as manufacturers in England have been unable as yet to catch up with the demand. Replacements for these thermometers have been made available for the main climatological stations by modifying non-standard types. Most other classes of meteorological instruments have been in good supply, and all demands have been met.

Some development work has been done on the design of a suitable whirling psychrometer for shipboard use, and two designs have been completed to a stage which warrants several units being made up and placed in service on trial. Some work has also been done on the modification of one of the obsolescent tipping-bucket rain-gauges as an anemometer recorder, and a successful experimental model has been produced.

The automatic weather station at Chesterfield Reef was purchased from the American Foreign Liquidation Commission. By arrangement with the Aerodromes Branch of the Ministry of Works, assisted by two Meteorological Branch technicians, the equipment was brought back to New Zealand in the "Golden Hind." The essential components of this station proved to be in excellent condition, and, after overhaul and a period of test, it will be available for installation at a new site which has still to be chosen.

Four type M.E. 7 radar sets for determining upper winds have been constructed by the Dominion Physical Laboratory of the Department of Scientific and Industrial Research. The set at Whenuapai passed its final acceptance tests in October. The second M.E. 7 was installed at Nadi Aerodrome, and started operation in November. The other two sets are to be located at Palmerston North and Invercargill respectively. Inquiries regarding the availability of additional radar wind-finding equipment are being made in England.

Investigations were carried out in conjunction with the Dominion Physical Laboratory and the Auckland Industrial Development Laboratory into the design of a suitable radar target for use with the M.E. 7 radar. A specification for this target was drawn up and a contract let for the supply of several thousands. These have proved very satisfactory and economical in use.

Supplies of radiosonde transmitters have been very slow in coming forward from the manufacturers in Australia, and continuity of operation at Hokitika was interrupted on this account. It was possible to keep the Auckland station in continuous operation by supplementing new supplies with repaired and reconditioned recovered transmitters The station at Nadi began making radiosonde flights in August, but full continuity was not possible until January, 1949, owing to lack of adequate supplies. Spare parts for the Fricz radiosonde ground equipment have been difficult to obtain, but supplies of all other items, apart from transmitters, have been well maintained.

Training of Observers.—Instructional courses of three months' duration for training new observers were arranged during the year at Harewood and at the Mechanics Bay Office. Thirty observers completed their initial training and were allocated to the various branches for duty.

Junior and Senior Examinations for observers were conducted throughout the Service in August, 1948.

As a preparation for the Senior Examination a correspondence course in upper-air meteorology is arranged each year, and brief personal tuition in this subject by a senior officer was arranged for the observers at Kaitaia, Whenuapai, Gisborne, Woodbourne, Nelson, Harewood, and Invercargill.

Research

Provision is made in the establishment of the Meteorological Service for a Research Section comprising two professional officers and two observers to assist with plotting and clerical duties. One of the main tasks of such a section is to carry out systematic research work in the meteorology of New Zealand and the surrounding areas. Only by using the results of basic research will the way be open for any substantial improvement in the quality of the current forecasts or any extension of the period for which forecasts can be accurately prepared. In this work great attention is paid to meteorological research being done overseas with a view to possible application of these results to New Zealand conditions. The section is also responsible for the co-ordination of research work done at branch offices of the New Zealand Meteorological Service, both in New Zealand and in the Pacific. Training of professional staff for forecasting duties is also part of the work of this section, as well as a certain amount of public relations work. Unfortunately, during the year under review only one professional officer was able to devote any considerable part of his time to research, and no observers were available to assist in this work. Again, although under normal staffing conditions the forecaster establishment is such as to permit each forecaster to devote one-quarter of his time to study and research, the current shortage of staff has necessitated most officers being kept fully occupied on routine forecasting duties. In spite of these difficulties, a limited number of research projects has been carried out, the main fields of activity being indicated below.

At Head Office the observations of earth temperature obtained during the recent frost investigations at Earnscleugh, Central Otago, have been analysed, and values of the diffusivety of the soil under varying conditions of moisture have been computed. The investigations showed that anomalous transfer of heat was taking place in the soil, and it is thought that the movement of water in the soil may play a major part in such anomalous effects. The results of such studies are now becoming of increasing value to agriculture, and records from some other parts of New Zealand have been subjected to a preliminary analysis. A paper on this subject was presented to the Seventh Pacific Science Congress by the Research Officer.

During the spring of 1948 a programme of low-level temperature soundings was organized in the Hastings fruitgrowing district by the Dominion Physical Laboratory, the soundings being conducted by staff of the Laboratory in co-operation with meteorological research staff. The preliminary results of this programme have provided valuable information, but no definite conclusions can be drawn from the results of only one year's soundings. In connection with this project, meteorological staff have worked in co-operation with the Auckland Industrial Development Laboratory and the Plant Diseases Division of the Department of Scientific and Industrial Research to test the possibility of frost protection methods in this country.

In view of the increasing importance of upper-air conditions in the South Pacific area, both for general forecasting and for aviation purposes, a start has been made with the reduction and analysis of the upper-air data collected in the Pacific during World War II. The information has been used to prepare charts of the average summer and winter pressure and temperature distribution along meridian 170° E. and extending from Antarctica in the south to Wake Island in latitude 19° North. This will prove valuable in further theoretical studies, as well as serving the practical purposes of aviation. A paper on this subject also was presented to the Seventh Pacific Science Congress by the Research Officer.

The Research Section has collaborated with the Meteorological Physics Section of the Council for Scientific and Industrial Research of Australia in a synoptic experiment designed to test the feasibility of the direct analysis of divergence from a given wind field. On occasion, the section has also given advice to the Meteorological Services of other countries on problems of which we have special knowledge.

At branch offices the following projects are in progress or have already been completed during the year:—

(*a*) *Meteorological Office, Nadi, Fiji.*—Pressure of routine work at this office has seriously interfered with any attempt to investigate the fundamental problems of tropical meteorology. However, a beginning has been made with the computation of mean values of temperature and pressure over Fiji, using the results of radiosonde and aircraft ascents. Although lack of time has made it necessary to confine the results to levels below 400 mb., the information will be useful in many phases of forecasting and will supplement the investigations already made at Head Office.

(*b*) *Meteorological Office, Auckland.*—In conjunction with the Physics Department of the local University College, work has been continued on the radiosonde method of investigating the distribution of electric potential inside various types of cloud. Although no releases have been made this year, the instrument has been modified and investigations have been made into ways of increasing its sensitivity. In addition, a study is being made of the variation of tropopause heights and high-level winds at Auckland in relation to the movement of pressure systems. In this connection a paper is being prepared by staff members entitled "A Method for the Interpretation of Radiosonde Ascents." In view of the possibility in the near future of airline flights at very high levels, some investigations have been carried out into the possibility of introducing a routine 300 mb. level chart for this region. Lack of data is here a very serious problem.

(*c*) *Meteorological Office, Paraparaumu.*—The investigation begun last year into local weather conditions at various airfields throughout New Zealand has been continued, but pressure of routine aviation forecasting has curtailed the amount of time that could be spent on this project.

(*d*) *General Forecasting Office, Wellington.*—A study of the mean vertical pressure distribution over Norfolk Island has been completed, and the results are scheduled for early publication. A statistical investigation into the heights of the 700 mb. surface over Noumea has been undertaken with a view to improving the drawing of the upper level chart in this region. Radiosonde reports are no longer available from this station, and in these circumstances a statistical analysis of past material is of very considerable value. Detailed investigations have also been undertaken into the most serious cases of flooding that have occurred during the year, with a view to improving the forecasting of heavy rainfall and the conditions under which serious flooding is likely. These investigations are still in progress.

(*c*) *Meteorological Office, Wigram.*—An investigation into the distribution of surface winds at Wigram has been completed and detailed wind roses have been prepared. This investigation was undertaken at the request of the Chief Flying Instructor in connection with the laying-down of a permanent flare-path for night flying activities.

(*f*) *Meteorological Office, Taieri.*—Work has been continued on the frost investigations for the fruitgrowing districts of Central Otago, and the Taieri office has continued to assist in the inspection and maintenance of meteorological equipment at the Government Research Orchard at Earnscleugh.

Training of Professional Staff.—During the year one course in basic meteorology for the training of prospective forecasters was conducted, the course lasting approximately two months.

Library and Publications

Library.—As in previous years, the library has continued to provide a specialized service covering all phases of the work of the Meteorological Service. In order to increase the effectiveness of this service provision has been made for the progressive extension of the libraries held at branch meteorological offices throughout the country. As part of the programme, arrangements have been made to hold one copy of the more important standard text-books on meteorology at each branch forecasting office.

The number of publications received from overseas on an exchange basis has continued to increase, and in this way a number of important additions have been made to the library. Lack of space for the adequate handling of this material is now, however, a serious problem.

As in previous years, the library has dealt with a large number of requests for information from the general public and Government Departments. The public relations aspect of the library work has continued to expand, and various articles were prepared for the press regarding the work of the Meteorological Service. An agriculture bulletin entitled "New Zealand's Weather Forecast Service" was prepared for the Canterbury Chamber of Commerce, and has had a wide circulation among farmers throughout the country.

Publications.—In addition to the routine issues of climatological information, the following publications were issued by the Meteorological Service during the year under review:—

(*a*) *Meteorological Office Notes.*—These publications contain the results of meteorological research work carried out by staff members. Where such work is not of an overspecialized nature and the results are of general interest, they are published in the *New Zealand Journal of Science and Technology*, and the Meteorological Office Note is issued as a reprint from that *Journal*. During the year three additional Notes (Nos. 32-34) were prepared for publication.

(*b*) *Technical Information Circulars.*—In order to supplement the library material circulated to branch Meteorological Offices extracts or abstracts of the more important papers appearing in overseas journals are cyclostyled and issued for retention by branches as N.Z.M.O. Technical Information Circulars. During this year circulars Nos. 56 to 67 were issued.

(*c*) *Circular Notes.*—To promote investigations into local weather phenomena and to improve the standard of forecasting and observing throughout the Service members of the staff are encouraged to prepare papers containing the results of any special work that is undertaken. These notes, which are chiefly of local interest, are cyclostyled and issued within the Meteorological Service as N.Z.M.O. Circular Notes.

(*d*) *Miscellaneous Instructional Booklets.*—These publications are issued from time to time as permanent instructional manuals for meteorological observers, voluntary observers, aviation interests, and others concerned with current procedures in the routine operation of the Meteorological Service. Five of these were published during the year.

(*e*) *Instructional Circulars.*—These cover all necessary instructions to branch offices. Circulars 92 to 122 were issued during the year.

Accommodation and Staff

Accommodation.—Attendance at Meteorological Offices is on a twenty-four hour basis and involves night shifts and work at week-ends. This creates serious transport difficulties where the offices are situated in remote localities. In 1946 approval in principle was given to a proposal for providing a limited number of dwellings for married personnel at stations which are some distance from main centres of population. Progress with the scheme initially was slow, but during the year under review one house at Paraparaumu and two flats at each of the aerodromes at New Plymouth, Harewood, and Taieri have been occupied.

A new Air Traffic Control and Meteorological Office has been built at Kaitaia Aerodrome, and some renovations have been made in the forecasting office at Mechanics Bay. A start has been made on the construction of improved quarters for the Meteorological Office at Taieri Aerodrome and plans are being prepared for a new office at Invercargill aerodrome to house radiosonde and radar-wind equipment.

An extension of the Head Office of the Meteorological Service at Kelburn is urgently required and has already been approved in principle. During the war the office expanded into a number of temporary huts alongside the main building, some of which are on City Council property. The existing space is already severely overtaxed, and until relief can be provided by means of an addition to the main building it will be impossible to vacate the huts. The Ministry of Works has been requested to prepare plans for a suitable permanent addition to the Head Office building.

Staff.—During the year there has been little improvement in the staffing position, and the Service continues to operate well below the approved establishment. Comparative figures are shown in the following table:—

	Approved Establishment.	Strength at 31st March, 1949.	Strength at 31st March, 1948.
Professional officers	48	38	36
Observers	168	127	114

Of the thirty-eight professional officers, two are Pan-American World Airways forecasters on temporary attachment to this Service, and three are recently appointed graduates just starting their initial training. Two of our senior officers are pursuing advanced studies overseas. Mr. J. F. Gabites, Officer in Charge of Aviation Forecasting Services, was awarded a Commonwealth Fund Fellowship and is working at Massachusetts Institute of Technology, and Mr. E. H. Howell, Officer in Charge of General Forecasting at Wellington, received a rehabilitation bursary and is taking an advanced course in meteorology at London University.

As a temporary expedient occasioned by the absence of the Officer in Charge of Aviation Forecasting, his position and that of the Principal Meteorologist (Islands) were combined by the transfer of the latter officer from Suva to Head Office in September, 1948.

In an attempt to overcome the critical shortage of professional officers the Public Service Commission advertised for forecasters in England. A number of applications was received, and five men were offered appointment, but none accepted. Vacancies for professional officers are being readvertised in England.

The Meteorological Service has now been included in the Public Service Scientific Bursaries Scheme, and it is hoped that in future three of the bursars appointed each year will be allocated to the Meteorological Branch. Three years must elapse before the first graduates become available, but this scheme promises to be of the greatest value.

Following recent representations to the Public Service Commission, a critical review was made of the establishment and salary scales for meteorological observers. As a result, there has been an increase in the total establishment, and a number of new positions has been created in the higher grades. Thus there are now substantially better prospects for ultimate advancement for meteorological observers.

The shortage of staff, particularly in the case of forecasters, has naturally placed an extra burden on the remaining members of the Service, and their loyal co-operation is again acknowledged with pleasure.

I have, &c.,

M. A. F. BARNETT,

Director of Meteorological Services.

Approximate Cost of Paper.—Preparation, not given; printing (803 copies), £144.

By Authority: R. E. OWEN, Government Printer, Wellington.—1949.

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