

ROYAL AUSTRALIAN SURVEY CORPS  
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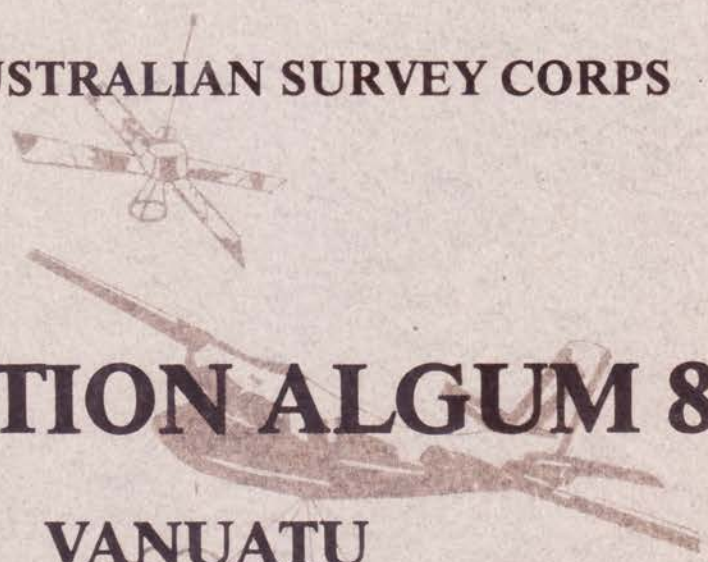
ROYAL AUSTRALIAN SURVEY CORPS

# OPERATION ALGUM 84

## VANUATU

# PROJECT REPORT

4 FIELD SURVEY SQUADRON



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DET 4 FIELD SURVEY SQUADRON

OPERATION ALGUM 84

AMENDMENTS

Amendment No	Date of Issue	Details	Signature/Date
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OPERATION ALGUM 84

PROJECT REPORT

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## OPERATION ALGUM 84

### PROJECT REPORT

- References:
- A. Army Office A384-1-182 of 16 May 1984.
  - B. Headquarters Field Force Command Operation Instruction 8/84 of 13 Jun 84.
  - C. CDFS Operational Instruction 2/1984 of 15 Jun 84.
  - D. Unreferenced Financial Instruction of 27 Jun 84.
  - E. Army Office A719-3-230 SVY100885 of 29 Jun 84.

### INTRODUCTION

1. OPERATION ALGUM 84 was the first phase of a three phase Defence Co-operation Programme control survey and aerial photography project in the Republic of Vanuatu. The operation was conducted by Det 4 Fd Svy Sqn between 30 Jun 84 and 22 Sep 84.

#### Background

2. Vanuatu is a recently independent nation of the South West Pacific. The Government of Vanuatu intends to declare an Exclusive Economic Zone (EEZ) similar to other nations in the region, and asked the Australian Government for assistance to carry out the base point survey.

3. A reconnaissance was carried out in Oct 83 to determine the feasibility, resource implications and the operational concept of an EEZ base point survey in Vanuatu.

4. As a result of that reconnaissance, it was decided that the operation would take place in three phases each of approximately three months, over a period of two years. Phase One of the operation would cover the southern portion of the archipelago (excluding Matthew and Hunter Islands) and commence in Jul 84. Co-ordination of the base points would be effected photogrammetrically and the task of OP ALGUM would be to provide the necessary survey control and aerial photography.

5. The Vanuatu Dept of Surveys, Mapping and Valuation would take the leading role in the control survey, Australia providing the technical advice, specialist equipment and the aerial photography.

6. Allocated Tasks. Det 4 Fd Svy Sqn was tasked with:

- a. providing technical advice and assistance to the Vanuatu Survey Dept in obtaining survey control by Doppler Satellite techniques and conventional survey to determine maritime base point co-ordinates by occupation or photogrammetric surveys.
- b. providing technical advice and assistance to the Vanuatu Survey Dept in obtaining survey control by recovery of existing suitable stations, Doppler Satellite techniques and conventional survey to permit aerotriangulation of the proposed 1:80 000 scale (nominal) photography.
- c. obtaining mapping quality photography at a nominal scale of 1:30 000 of the Vanuatu archipelago.
- d. providing technical advice and assistance to the Vanuatu Survey Dept to obtain survey control by Doppler Satellite techniques at existing stations to enable survey adjustment of existing UK DDS and French IGN observations to produce a high quality homogeneous network.

- e. providing technical advice and assistance to the Vanuatu Survey Dept in preparation of observation and station records of all stations visited and established.
- f. obtaining identification photography of stations described in subparagraphs 6a, 6b and 6d above.
- g. providing technical training to Vanuatu Survey Dept personnel in accordance with the Memorandum of Understanding.
- h. assisting the Vanuatu Survey Dept to connect Doppler Satellite stations to sea level.
- i. obtaining available tide gauge data.
- j. assisting the Vanuatu Survey Dept to connect 512 STRE Doppler Satellite Stations 31329 and 31330 to sea level.
- k. obtaining from the Vanuatu Survey Dept any survey intelligence from UK DOS and French IGN surveys, not previously obtained.
- l. obtaining large scale photography as requested.

#### Area of Operations

7. The archipelago of Vanuatu covers an area of 11 800 sq km, occupying seven degrees of latitude between 13 deg S and 20 deg S and four degrees of longitude from 166 deg E to 170 deg E. The islands form the shape of an irregular 'Y' and lie some 800 km west of Fiji.

8. The largest islands in the group are Espiritu Santo and Malekula. The capital and main commercial centre is the city of Port Vila on the island of Efate. The islands are primarily of volcanic origin with a number of still active volcanoes and in the main are ringed with coral reefs. The land areas are jungle covered with terrain ranging from undulating to rugged with some areas rising to a height of 2 000 metres. A map of the area, showing Vanuatu's relationship with Australia is attached as Annex A.

#### OPERATIONAL SUPPORT

##### Air Support

- 9. Movement of 4 Fd Svy Sqn personnel from ADELAIDE to SYDNEY was by civil air on 26 Jun 84.
- 10. Insertion into the area of operations was as follows:
  - a. advance party by civil air from SYDNEY to PORT VILA via NOUMEA on 30 Jun 84.
  - b. main body by RAAF C130 from SYDNEY to PORT VILA via BRISBANE on 6/7 Jul 84.
- 11. One Beechcraft Queenair fitted with WILD RC10 aerial camera was used to obtain positive identification photography of all new and existing control points, mapping photography at 1:30 000 scale (nominal) and urban photography at 1:10 000 scale (nominal). This aircraft was provided by Airsearch Aviation Australia Pty Ltd and is on charter to the Australian Army.

12. Extraction was affected by civil air between 15 Sep 84 and 22 Sep 84. 4 Fd Svy Sqn personnel made individual arrangements for return to ADELAIDE.

#### Sea Support

13. The Vanuatu Government provided two vessels for the transportation of control survey teams for the following periods:

- a. ROCINANTE, 21 Jul 84 to 15 Sep 84.
- b. MANGARU, 12 Aug 84 to 3 Sep 84.

14. These vessels are sister ships, approximately 46 feet long with a speed of 6.5 knots, pictured at Annex B. Both were equipped with wooden dinghies complete with outboard motor. Whilst these proved to be adequate for ship to shore movement of stores and personnel, one outboard motor had to be hired and both dinghies were damaged during the operation. It is recommended that consideration be given to purchasing one or more flat bottomed aluminium barges with 30HP outboard motors for use in further phases. These would provide a safer platform for stores and personnel movement from ship to shore.

#### Transport

15. The Vanuatu Survey Dept provided a Datsun Dual Cab 4WD Diesel Utility for the duration of the operation. In addition one hire car, a Daihatsu Charade XG was used for the period 3 Aug 84 to 23 Sep 84. Both vehicles proved to be invaluable for day to day running and movement of the aerial photography team to and from the airport.

#### Darkroom Facilities

16. The X-ray Dept of the Georges Pompidou Hospital was used for all film and brovide processing. This proved to be an excellent venue as the X-ray Dept is no longer operating and we were able to use the darkroom facilities at any time.

17. Film drying proved to be a problem as no portable film drying equipment was available from Australia prior to insertion and no film drying equipment was available in Vanuatu. Some kind of film drying equipment will be required for OP ALGUM 85.

#### Support Base

18. Port Vila was used as the support base with Luganville, on Espiritu Santo, planned as a forward base for aerial camera operations. Due to unfavourable weather conditions which restricted aerial camera operations, the forward base was not occupied.

#### Vanuatu Survey Dept Participation

19. The Vanuatu Survey Dept committed surveyors Russell Fox and Moses Williams for the duration of the operation. In addition, another five surveyors spent periods of two weeks or more involved in geociever operations.

20. Survey assistants were provided by the Dept for the duration of the operation.

#### Airsearch Aviation Participation

21. Airsearch Aviation provided two personnel for the duration of the operation, one pilot and one pilot/LAME. The assistance provided by the personnel from Airsearch Aviation is to be commended considering the adverse conditions encountered throughout the operation. Their conduct was exemplary throughout the operation.

Aviation Fuel/Oil

22. Bulk AV6AS was available in ground at Port Vila and was purchased against the Australian High Commission account and charged against DP AL6UM.
23. Aviation oil was purchased by local purchase order from Air Melanesiae in 20 litre containers as required.

Motor Spirit

24. Two by 200 litre drums of MT Super were purchased for use by the field parties. Whenever possible, the hire car was also refuelled from this bulk supply.
25. Diesel was provided by the Public Works Dept out of the Survey Dept fuel allocation.

Communications

26. Radio equipment was provided by the Communications Cell of the Vanuatu Police Dept as follows:
- a. Survey teams - CODAN 7924 HF Manpack Radios.
  - b. Government ships - RACAL TRA922 HF Radios.
  - c. Support base - CODAN 6801 HF Radio.
27. The frequency allocated was 7.767MHz. Some problems were encountered with comms, due to atmospheric disturbances on this frequency, however alternative frequencies were provided for emergency use. A 5MHz frequency will be made available for DP AL6UM 85 to overcome the problems encountered this year.
28. Training on the equipment was conducted by the Police Communications Adviser, WO2 A.P. Ellis, RASIGS. WO2 Ellis has recommended that more extensive training in the use of the Codan radios be undertaken prior to field deployment in DP AL6UM 85.
29. On occasion the inter-island microwave telephone system was used to facilitate communications. This network is extremely reliable and most islands have at least one phone, however the Posts and Telecommunications Dept are currently removing some phones for non-payment of accounts.

OPERATIONSGeneral

30. Three survey teams were deployed in the field during DP AL6UM 84, two control survey teams with Magnavox MX1502 for the duration of the operation and a third panning team to assist in locating and panning stations on the island of Erromango.
31. The control survey teams were manned by one RASVY member and three Vanuatu Survey Dept personnel. From 24 Aug 84 to the completion of Phase One, one control team deployed without RASVY personnel.
32. The progress of the operation was hampered by poor weather conditions. Prevailing weather conditions from 1 JUL 84 to mid Aug 84 were predominantly warm, slightly humid days with seven to eight octals cloud cover and rain. From mid Aug 84 to 15 Sep 84 the weather improved and the days were predominantly sunny and warm to hot with one to four octals cloud cover with occasional evening showers. Cloud buildup would occur between 0730 and 0815 and would generally clear between 1630 and 1730.

Training

33. Training in the use of the Magnavox MX1502 was carried out by the advance party commencing 4 Jul 84 and continued as on-the-job training in the field. Training was also conducted on the erection and operation of the pneumatic telescopic HILDMAST and in preparation of field records to RASVY specifications.

Station Preparation

34. A number of stations had been located and panelled prior to the arrival of the advance party. Unfortunately, all of these stations (except EFY 2) had to be revisited and repanelled, as the panel dimensions used by the Vanuatu Survey Dept were insufficient.

35. The following existing control, by island, were either not found or considered unsuitable for use:

- a. Tanna
  - (1) Loanvialu
  - (2) Point 6
  - (3) Noumou
- b. Erromango
  - (1) EDY 13
  - (2) EDY 14
- c. Efate
  - (1) EFZ 10
  - (2) EFZ 7

With the exception of stations Point 6, EDY 13 and EDY 14, new sites were selected and new control established. Point 6, EDY 13 and EDY 14 were replaced by TNY 4, EDY 11 and EDY 15 respectively.

36. In total 32 existing stations were visited and panelled, of these 3 were re-observed with Magnavox MX1502 to provide data required to produce a high quality homogeneous survey network. The stations re-observed were TNY 4, EFY 10 and ST Emae. A minimum of 40 acceptable balanced satellite passes were observed at these stations. Locations of existing stations visited shown at Annex C.

Geociever Operations

37. Geociever operations commenced on 10 Jul 84 and ceased on 17 Sep 84. A total of 18 new stations were established with a minimum of 20 acceptable balanced satellite passes at each station. In order to maximize the number of new stations established, taking into consideration the limited availability of Vanuatu Government shipping, only point positioning was used, to enable the Magnavox MX1502 to work independently.

38. Observations were not carried out at stations D4 (17deg 16min S, 168deg 28min E) and D16 (17deg 04min S, 168deg 16min E) due to inaccessibility. It is unlikely that these stations could be established by Doppler survey. Locations of new stations established are shown at Annex D.

Aerial Photography

39. Ident Photography. Photography was obtained for all new and existing control stations visited using a WILD RC10 aerial camera with superwide angle (f=88mm) lens cone mounted in a Beechcraft Queenair. Details

of all ident photography acquired is shown at Annex E.

40. Line Photography. Monochrome photography was acquired at 1:30 000 nominal scale using a WILD RC10 aerial camera with wide angle (f=152mm) lens cone. Due to the prevailing weather conditions only Class Y photography could be acquired. A total of 342 line km of Class Y photography was acquired from a total requirement of 4 260 line km. Details of line photography acquired is shown at Annex F.

41. Urban Photography. Colour photography at 1:10 000 nominal scale of Port Vila and Luganville was not acquired due to the prevailing weather conditions. At the request of the Vanuatu Survey Dept some photography of Port Vila was acquired in monochrome. A total of 68 line km was acquired from a total requirement of 130 line km. Details of urban photography acquired in monochrome is shown at Annex G.

42. Film Processing. All monochrome film was processed in Port Vila using the facilities described previously.

#### Tide Gauge Data

43. Only one permanent tide gauge exists in Vanuatu, this is maintained at Port Vila. Observational data at this tide gauge was obtained for the period 2 Jul 84 to 17 Sep 84.

44. Temporary tide gauges were installed by the RAN Hydrographic Service for the duration of hydrographic surveys conducted by them from May 84 to Aug 84. In addition a connection from the permanent tide gauge to station EFY 8 was carried out. This information is available from the RAN Hydrographic Service, Sydney.

#### Sea Level Connections

45. Where possible, all new stations were connected to sea level.

46. Sea level connection to 512STRE Doppler Station 31330 had been carried out by the Vanuatu Survey Dept in conjunction with the RAN Hydrographic Team prior to the commencement of OP ALGUM 84. We were given to understand that sea level connection at station 31329 had also been completed however this proved to be incorrect. Sea level connection at 512STRE Doppler Station 31329 remains outstanding. Vanuatu Survey Dept have undertaken to complete this task prior to OP ALGUM 85.

#### Aircraft Usage

47. Operations in country commenced on 23 Jul 84 and ceased on 15 Sep 84. A total of 86hrs 20mins including ferry time to and from MELBOURNE were used. Recon for OP ALGUM 85 used 13hrs 51mins from the above total. Details are shown at Annex H.

ADMINISTRATION AND LOGISTICSManning

48. Manning shown as annex 1.

Visits

49. LTCOL P. Gould, SO1(OP) FFCcmd designate, visited OP ALBUM 84 from 1 Sep to 4 Sep 84.

50. MAJ P. Bion, SO2(EQUIP) DSVY-A and DC 4 Fd Svy Sqn designate, visited OP ALBUM 84 from 15 Sep to 23 Sep 84 for the purposes of recon for OP ALBUM 85.

Passports/Visas

51. All members not in possession of an Australian Passport were issued with an Official Passport. The service given by the passport office in Adelaide was excellent.

52. No visas are required for entry to Vanuatu.

Finance

53. Support. OA1 No 15028-7 funded at \$A25 000 was forwarded to the Australian High Commission, Port Vila. Details of all monies committed in Vanuatu are shown at Annex J. The information contained in the Annex is provided from records kept by the Det Comd. RFD Adelaide and RFD Sydney were approached to provide details of obligations against Charge Code 3098-2060. The information provided by those agencies was both incomplete and in cases, incorrect. The exchange rate used in this report is 82.5VT = \$A1.

54. Local Purchase. On advice from Mr G. Ramsey, 2nd Sec (C & A) at the Australian High Commission, all local purchases were made using Dept of Foreign Affairs form FF13(FA) - Purchase Order. The procedures prescribed in paras 7 to 10 of Ref D were considered to be inappropriate as it was unlikely that departmental purchase orders SP 57 or SP 27 would be accepted by local traders. A record of purchases was maintained by the Det OC.

55. Petty Cash. A petty cash advance of \$A200 in equivalent local currency was maintained by the Det OC. This proved to be invaluable for purchasing minor items including stationery, hardware and air freight and passage on the local airline. Petty cash was accounted for in the manner prescribed in Ref D.

56. Pay. All members made arrangements for pay in advance and personal allotments prior to their departure from Australia.

57. Outfit Allowance. All members were paid the basic and tropical element of Outfit Allowance.

58. Overseas Allowances. Whilst in hotel accommodation members were in receipt of Short Term Duty Travelling Allowance at the rate of 4070VT per day for the first 28 days and at 3320VT per day thereafter. In the field members were in receipt of Living Allowance at the rate of 2330VT per day under tentage and 2260VT per day on board ship. The rates for Living Allowance are subject to confirmation by DCS-A. The allowances did not contain a component to cover accommodation expenses. Separation Allowance, Gp 3 Post Allowance and Field Allowance was paid as applicable.

Accommodation

59. Hotel accommodation was maintained for the duration of the operation at the Hotel Solaise in Port Vila, consisting of two self-contained flats with sleeping facilities for six personnel. This accommodation was invaluable as it provided work and storage area needed in addition to that provided by the Vanuatu Survey Dept.

60. As no accommodation element was included in the members allowances, payment for accommodation was made direct by the Australian High Commission from funds provided as indicated in para 53, on presentation of a monthly account.

61. This arrangement eased the accounting procedures for both the hotel and the members and was acceptable to the Australian High Commission. Effective accommodation costs were 1 654VT (\$A20) per day per man.

#### Medical

62. No major health problems requiring medical treatment were encountered during the operation, however minor ailments such as coughs and colds were prevalent. One member had problems with slow healing sores. Malarial prophylaxis were taken each week by all members. All members were inoculated against Hepatitis B prior to departure from Australia.

#### Morale

63. Morale remained high throughout the operation.

#### Rations

64. Tinned and fresh rations were purchased in bulk at Port Vila by field parties prior to leaving for the field. Prices in general are 30% higher than in Australia, however the local meat is excellent and comparatively cheap. Fresh rations in limited quantities were available from most of the outlying islands.

#### Air Freight/Charter

65. Two operators provide freight and charter facilities to all islands. The main operator, Air Melanesiae has regular flights to most islands in the archipelago each week. When necessary Air Melanesiae facilities were used for recovery and resupply of stores, rations and personnel.

66. The support given to Airsearch Pty Ltd Beechcraft Queen Air VH-CLH by Air Melanesiae staff was commendable.

#### Rear Link Communications

67. Communications with Australia were provided by the Australian High Commission. Facilities provided were:

- a. Telex, limited transmission only; and
- b. Telephone.

68. The International Telephone Credit Card provided through Telecom Australia to the Detachment Commander was not accepted for use in Vanuatu. Vanitel, the private company maintaining overseas communications in Vanuatu ceased recognition of all International Telephone Credit Cards except DTC Card in 1981 after independence. A Register of Trunk Calls 0117 was not maintained as all calls were registered by the switchboard operator at the Australian High Commission.

#### Stores and Equipment

69. Power Generating Equipment. Two Yamaha EF2000 generators were purchased in Australia prior to the commencement of OP ALGUM, specifically because no service backup was available for Honda generators. A Honda dealership operates in Port Vila and an agency is to be established in Luganville later this year. The Yamaha generators proved to be extremely reliable and easy to operate, however they are too bulky and heavy to be considered as suitable for use during further phases of OP ALGUM. It is recommended that the smaller Honda generators be used for subsequent phases of OP ALGUM.

70. Short Range EDM. Two AGA Geodimeter Model 16 short range infra-red EDM were purchased in Australia prior to the commencement of OP ALBUM 84. Both equipments performed well throughout the operation.

71. Pneumatic Telescopic Hilomast. Two Hilomast were purchased for use on OP ALBUM. This equipment is easy to erect and worked extremely well throughout the operation. The size and bulk of the masts however provided problems with safe transportation from ship to shore. Despite regular maintenance and oiling, corrosion due to the salt water/air environment was a problem. It is suggested that the masts be refurbished and treated with a corrosion inhibitor prior to OP ALBUM 85. A description of the masts is attached as Annex K.

72. Magnavox MX1502. Two satellite surveying sets, Ser No 344 and 351, were hired for the duration of the operation, with one set of spare parts. Machine No 351 performed flawlessly for the duration of the operation, however the second machine Ser No 344 needed repair on three occasions. A significant proportion of the downtime was caused by resupply problems from Australia. The spare parts kit was found to have defective circuit boards, however this did not contribute significantly to machine downtime. The RAEME Technicians report is attached as Annex L.

73. Oxygen. Problems were encountered with the provision of Medical Grade Dry oxygen. The requirement exists for bottled oxygen in aluminium bottles due to standard iron bottles effecting aircraft navigation equipment. Both the pilot and the air camera operator experienced breathing difficulties when operating on oxygen.

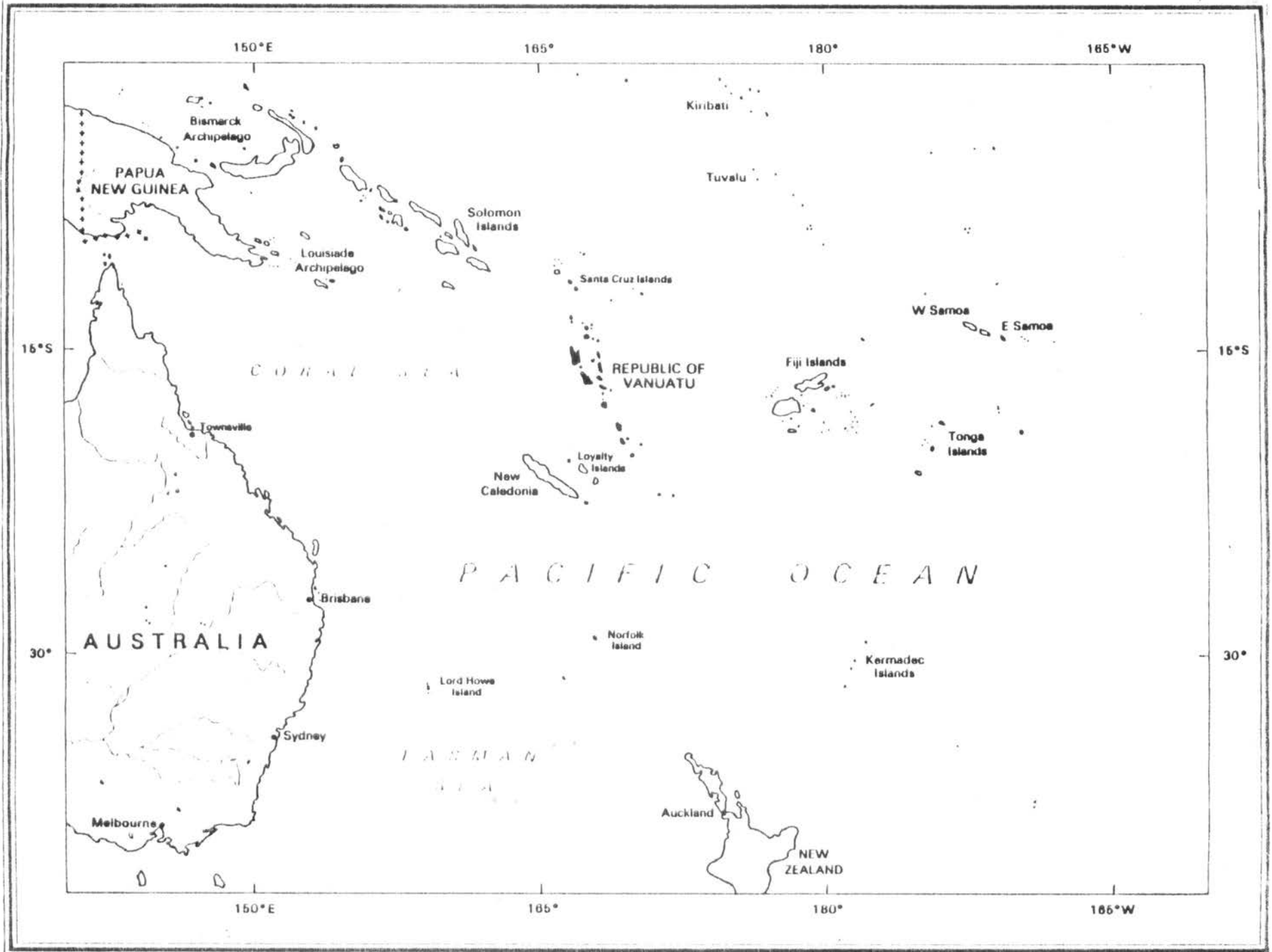
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(I.S. ROSE)  
CAPT  
DET COMD

- Annexes:
- A. Area of Operations.
  - B. Vanuatu Government Vessels.
  - C. Locations of existing Stations.
  - D. Locations of New Stations.
  - E. Identification Photography.
  - F. Line Photography.
  - G. Urban Photography.
  - H. Aircraft Usage.
  - I. Manning.
  - J. Finance.
  - K. Description of Pneumatic Hilmast.
  - L. RAEME Technicians Report.

Enclosures: 1. After Action Report OP ALGUM 84 dated 22 Oct 84.

AREA OF OPERATIONS

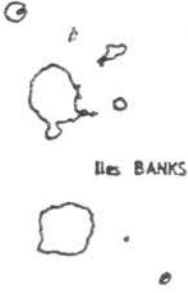


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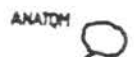
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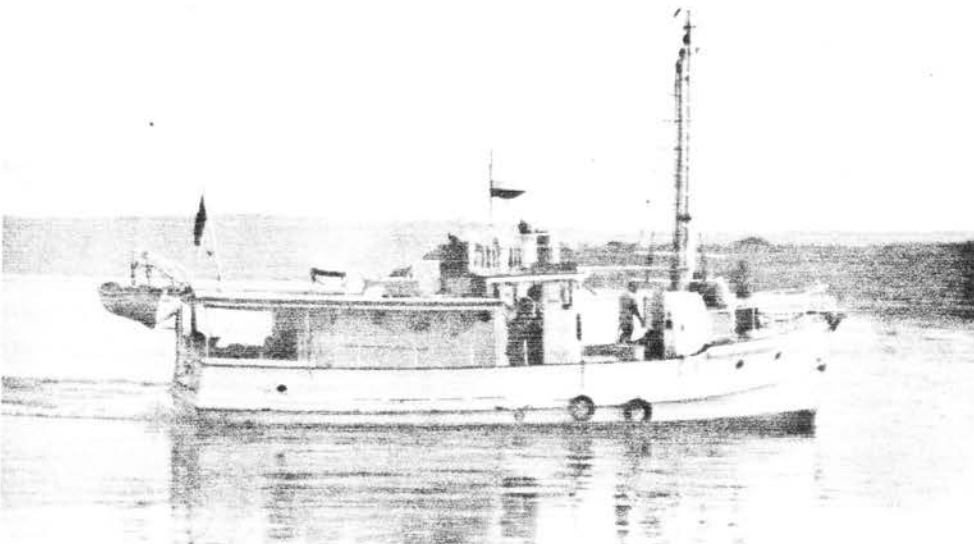
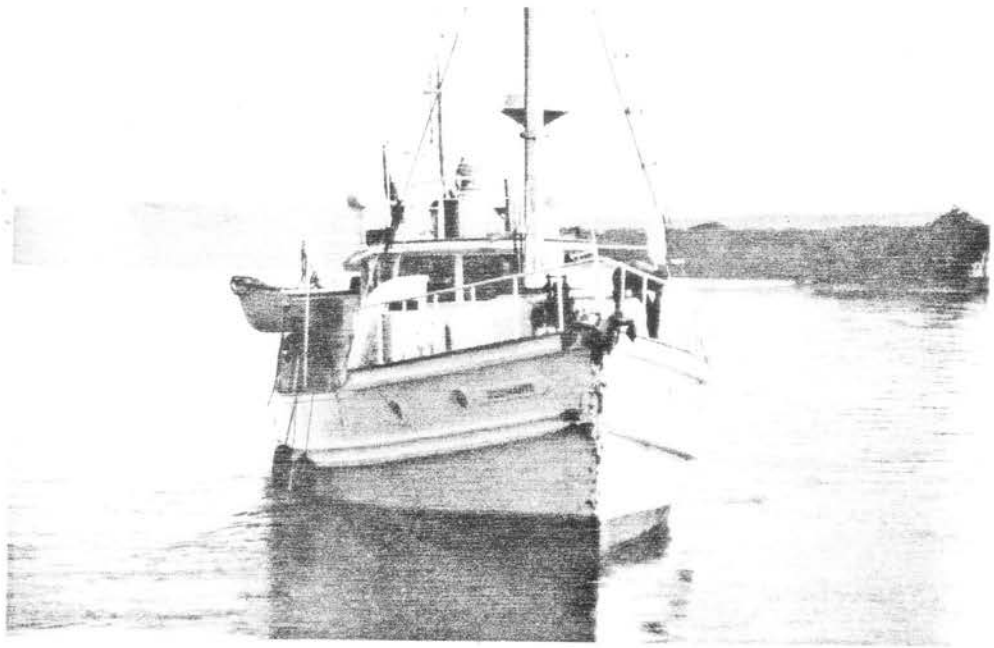
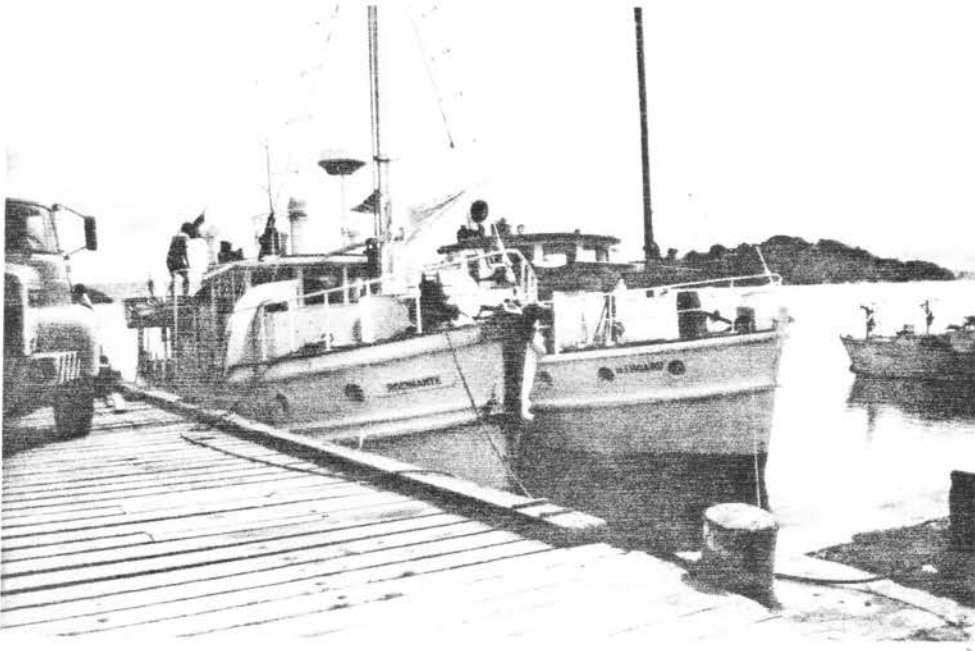
REPUBLIC OF VANUATU



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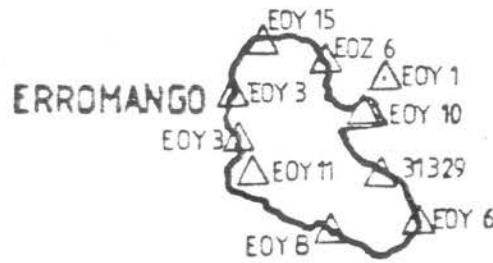


ANNEX B 20  
PROJECT REPORT  
OF ALGUM 84  
DATED 11 FEB 85





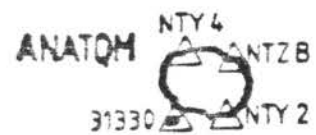
EXISTING STATIONS



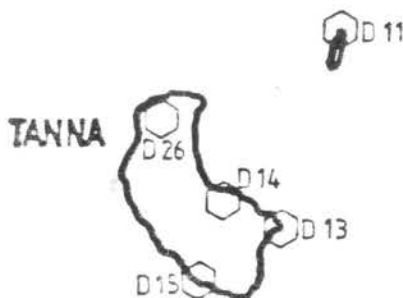
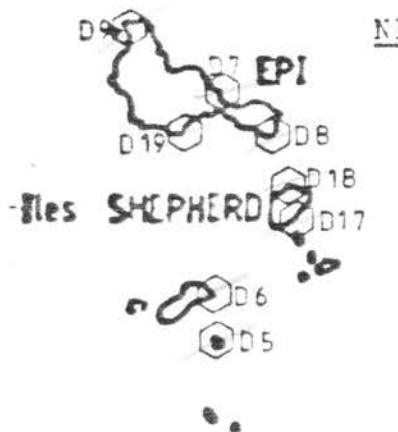
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LEGEND

- △ EXISTING STATIONS
- ◻ STATIONS REOBSERVED WITH DOPPLER

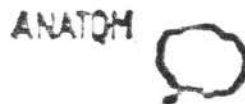


NEW DOPPLER STATIONS



LEGEND

○ NEW DOPPLER STATIONS



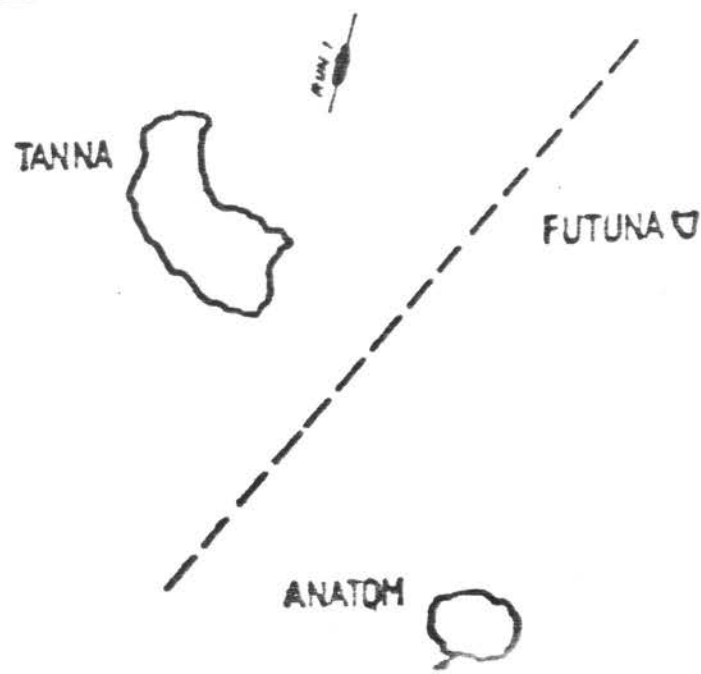
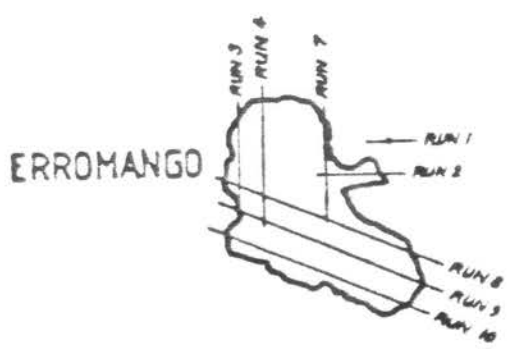
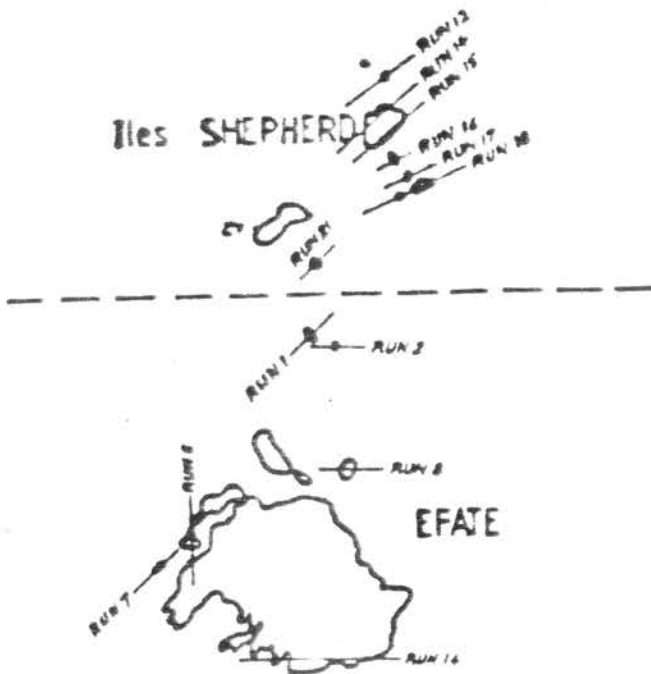
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31330 ✓	---	20 15	169 46	---	---	---		05	13	043-047	10,000
NTY 2 ✓	---	20 15	169 50	---	---	---		05	14	048-057	10,000
PAY 1 ✓	---	19 32	170 12	---	---	---		13	2	007-021	10,000
D 12 ✓	11899	19 31	170 13	212 - 215	20	Short Base		07	6	018-020	10,000
AWY 1 ✓	---	19 16	169 36	---	---	---		01	7 & 8	022-029	5,000
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D 15 ✓	11902	19 35	169 18	201 - 203	24	Level		04	6	018-021	5,000
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THY 1 ✓	refer to memorandum 788/7/15 Folio 29	19 38	169 22	---	---	---		04	5	013-017	5,000
D 13 ✓	11900	19 32	169 30	204 - 207	32	Level		05	10	032-034	10,000
D 13 ✓	11900	19 32	169 30	204 - 207	32	Level		05	7	023-026	10,000
D 14 ✓	11901	19 29	169 23	207 - 209	25	Baro		03	1	001-003	5,000
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EOY 8 ✓	---	18 57	169 11	---	---	---		05	5	016-019	10,000
EOY 6 ✓	---	18 55	169 19	---	---	---		06	6	023-025	10,000
31329 ✓	---	18 51	169 16	---	---	---		06	5	018-022	10,000
EOY 3 ✓	---	18 49	169 01	---	---	---		06	3 & 4	009-017	10,000
EOY 3 ✓	---	18 49	169 01	---	---	---		05	2	004-007	10,000

STN No	PROCESS No	LAT(S)	LONG(W)	JULIAN DAYS FROM TO	PASSES	SEA LEVEL CORRECTION	STN TARGET DIA	MISSION No	STN No	PHOTO No	FLYING HT (ft) (When Known)
BOY 10 ✓	--	18 46	169 14	---	--	--		7	2 & 3	001-010	10,000
BOY 5 ✓	--	18 44	169 00	---	--	--		4	4	010-012	5,000
BOY 1 ✓	--	18 42	169 18	---	--	--		5	1	001-003	10,000
BOY 6 ✓	--	18 41	169 10	---	--	--		6	1 & 2	001-008	10,000
BOY 11 ✓	--	18 51	169 02	---	--	--		6	7	026-028	10,000
BOY 15 ✓	--	18 39	169 04	---	--	--		5	3	008-011	10,000
BOY 15 ✓	--	18 39	169 04	---	--	--		7	1	001-003	10,000
EFY 7 ✓	--	17 49	168 22?	---	--	--		1	9	034-039	5,000
EFY 8 ✓	--	17 46	168 17	---	--	--		2	11	032-035	10,000
31331 ✓	--	17 44	168 20	---	--	--		2	2	004-006	5,000
	--	17 44	168 20	---	--	--		6	9	032-034	10,000
	--	17 44	168 20	---	--	--		2	1	001-003	5,000
	--	17 44	168 20	---	--	--		6	8	029-031	10,000
S.W. BASE ✓	--	17 44	168 12	---	--	--		10	10	035-037	10,000
BOY 139 ✓	--	17 41?	168 19	---	--	--		1	10	040-042	5,000
BOY 139 ✓	--	17 41?	168 19	---	--	--		2	14	044-047	10,000
EFY 11 ✓	--	17 41	168 35	---	--	--		2	3	007-009	5,000
EFY 11 ✓	--	17 41	168 35	---	--	--		2	13	039-043	10,000
EFY 11 ✓	--	17 41	168 35	---	--	--		1	7	024-027	5,000
EFZ 8 ✓	--	17 36	168 29	---	--	--		2	9	026-028	10,000
EFZ 8 ✓	--	17 36	168 29	---	--	--		1	6	020-023	5,000
D 1 ✓	11888	17 33	168 27	192 - 194	20	Vertical & Dist		2	8	022-025	10,000
D 1 ✓	11888	17 33	168 27	192 - 194	20	Vertical & Dist		1	5	017-019	5,000
EFZ 6 ✓	--	17 32	168 23	---	--	--		2	7	019-021	10,000
EFZ 6 ✓	--	17 32	168 23	---	--	--		12	1	001-007	10,000
EFY 2 ✓	--	17 38	168 09	---	--	--		1	1	001-005	5,000
D 10 ✓	11897	17 34	168 13	203 - 205	21	Level		2	15	048-052	10,000
D 10 ✓	11897	17 34	168 13	203 - 205	21	Level		1	2	006-008	5,000
D 3 ✓	11890	17 26	168 19	226 - 228	25	Level		2	4	010-012	10,000
D 3 ✓	11890	17 26	168 19	226 - 228	25	Level		6	12	042-044	10,000
EFY 10 ✓	11911	17 28	168 29	229 - 233	47	Vertical & Dist		1	4	014-016	5,000
EFY 10 ✓	11911	17 28	168 29	229 - 233	47	Vertical & Dist		2	6	016-018	10,000

STN No	PROCESS No	LAT(S)	LONG(E)	JULIAN DAYS FROM TO	PASSES	SEA LEVEL CORRECTION	STN PANEL DIAG	MISSION No	RUN No	PHOTO No	FLYING HT (ft) (93mm lens)
D 2 ✓✓	11889	17 48	168 33	258 - 260	20	Level		1	8	028-033	5,000
ST MATASO ✓	--	17 15	168 25	---	--	--		2	10	029-031	10,000
D 5 ✓✓	11892	17 08	168 26	235 - 237	21	Level		10	3	007-009	10,000
ST EMAE ✓✓	11910	17 06	168 21	240 - 244	41	Baro		10	2	004-006	10,000
D 6 ✓✓	11893	17 04	168 26	244 - 247	21	Level		13	1	001-006	10,000
ST TONGARIKI ✓	--	17 00	168 43 <sup>?</sup>	---	--	--		10	4	010-012	10,000
D 17 ✓✓	11904	16 55	168 34	255 - 257	22	Level		10	5	013-015	10,000
D 18 ✓✓	11905	16 52	168 33	253 - 257	21	Short Base		10	6	016-018	10,000
D 8 ✓✓	11895	16 50	168 28	251 - 253	20	Short Base		10	7	019-021	10,000
D 19 ✓✓	11906	16 48	168 17	248 - 250	23	Level		10	9	025-027	10,000
D 7 ✓✓	11894	16 45	168 22	249 - 251	21	Level		10	8	022-024	10,000
ST FORE- LAND ✓✓	--	16 42	168 07	---	--	--		10	10	028-030	10,000
D 9 ✓✓	11896	16 34	168 10	245 - 247	21	Level		10	11	031-033	10,000

MAPPING PHOTOGRAPHY FLOWN

ANNEX F TO  
OF AUGUST 84  
PROJECT REPORT  
DATED 11 FEB 85



ANNEX G TO  
OF AIGUM 84  
PROJECT REPORT  
DATED 11 FEB 85



Matao Tiupéniu  
(le du Diable ou Devil's Point)

BAIE DE MÈLÈ

PORT-VILA

ERALAP

Norbow (Pte)

MANNING

<u>Serial</u>		<u>Name</u>	<u>Period</u>
1.	48744	Capt I. R. Rose	30 Jun - 22 Sep 84
2.	313931	WO2 R. J. Williams	7 Jul - 18 Sep 84
3.	552471	Cpl R. D. Clarke	7 Jul - 20 Sep 84
4.	321968	LCpl S. F. M <sup>C</sup> Guinness	30 Jun - 22 Sep 84
5.	3179082	Cfn G. A. Richmond	7 Jul - 15 Sep 84

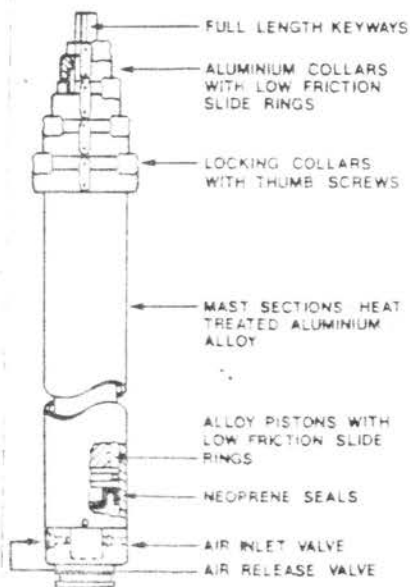
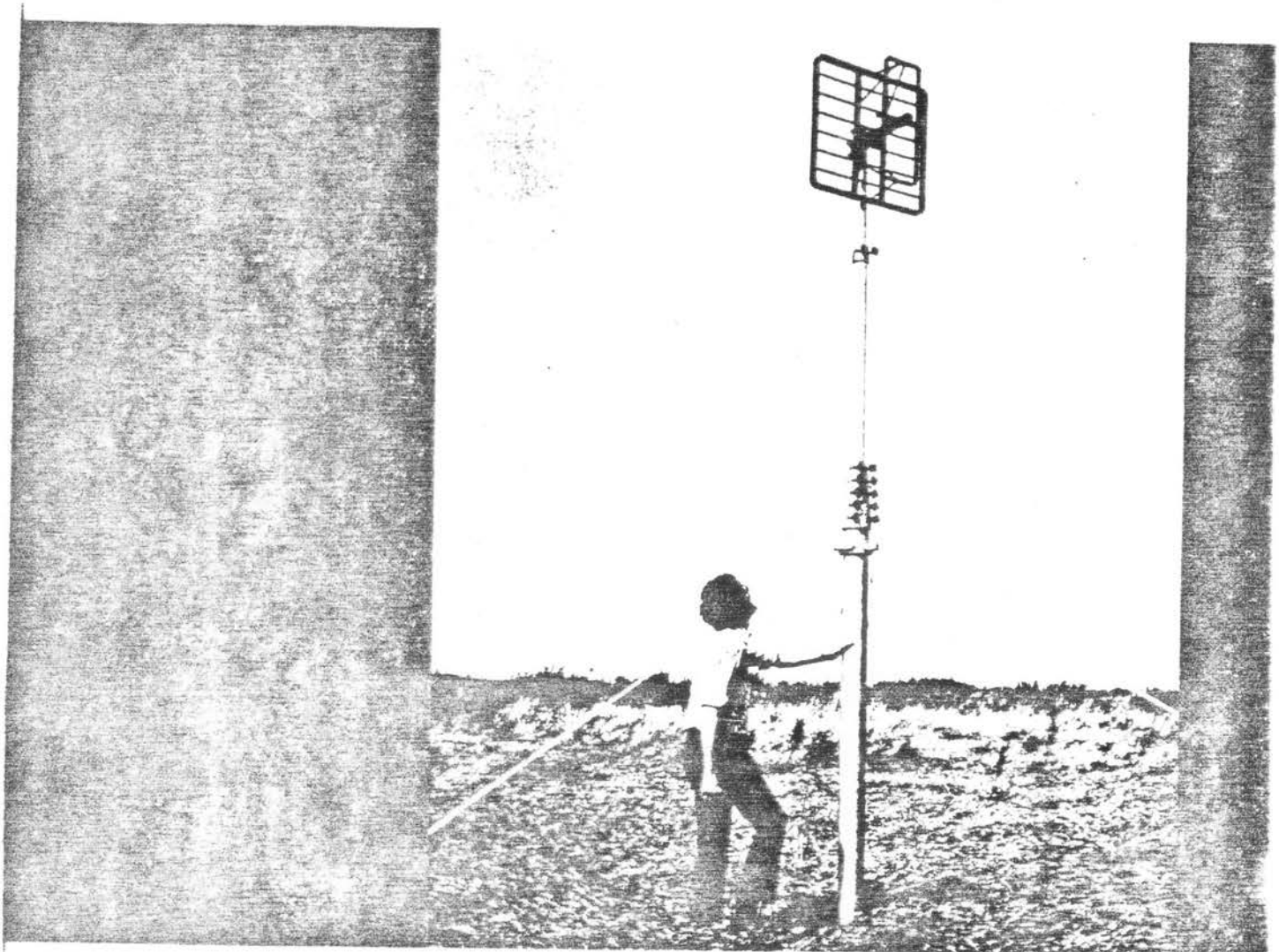
OF ALGUM 84 - EXPENDITURE

Figures are inclusive 30 Jun - 22 Sep 84, but do not include expenditure for the 1985 Recon conducted during this period. Aircraft fuel does not include fuel purchased in transit to and from Pt Vila from Australia.

<u>Serial</u>	<u>Item</u>	<u>Value VT</u>	<u>Value \$A</u>
1.	<u>Allowances</u>		
	a. Mil Pers	1,308,870	15,865.09
	b. Civ Pers		6,996.20
	c. Outfit Allow		1,150.00
			-----
			24,011.29
2.	<u>Accommodation</u>	482,450	5,847.88
3.	<u>External Freight</u>		
	a. Airfares		4,724.00
	b. Freight (Vila-Adel)		1,687.69
4.	<u>Local Purchase</u>		
	a. Car Batteries	10,640	
	b. Air Charter	89,000	
	c. Drummed Fuel	16,804	
	d. Car Hire	50,000	
	e. Drummed Fuel	16,804	
	f. Car Battery	5,870	
	g. Aero Oil	11,400	
	h. Car Hire	30,000	
	i. Aero Oil	11,400	
	j. Car Hire	12,000	
	k. Outboard Motor Hire	30,000	
		-----	
		283,918	3,441.43
5.	<u>Petty Cash</u>	80,563	976.52
6.	<u>Aircraft Fuel</u>	10,739li @ 83.2c/li	8,934.85
			-----
	TOTAL		A\$ 49,623.66
			-----

# PNEUMATIC TELESCOPIC HILOMASTS (NL Series)

ANNEX X TO  
 OP AIGUM 84  
 PROJECT REPORT  
 DATED // FEB 85



The NL series of telescopic Hilomasts are pneumatically operated with a small air compressor. The shorter models in the range can be operated with a standard vehicle foot pump.

These masts have all the features of the NK series, but are of a heavier construction and will, therefore, support larger antennas under more adverse weather conditions.

Full length keyways are also a feature and prevent relative rotation between the sections, enabling these masts to be used for directional antennas. Whether the sections are partly or fully extended, the mast can be rotated to the required direction. Locking collars are fitted to the top of each section and are locked by means of two thumb screws. The collars allow the mast to remain permanently extended without maintaining air pressure.

Although suitable for portable applications, these masts are primarily designed for vehicle installation, either bracketed to the rear or mounted through a roof bearing.

Models NL.15, NL.18 and NL.21 can be mounted onto the roof of a vehicle in a sliding carriage. In this assembly, the carriage slides to the rear of the vehicle and the mast is then tilted and clamped in the vertical position.

Hilomast

Mast	Height extended		Height retracted		Number of sections	Diameter of top section	Vertical head load	Max. wind speed unguyed	Max. wind speed with top guys	Basic weight of mast
	M	ft.	M	ft.						
NL.8	8	26	1.76	5.78	7	50	30	140	170	35
NL.9	9	29	2.43	7.98	5	76	35	130	160	38
NL.10	10	34	2.49	8.18	6	63	25	110	140	42
NL.12	12	40	2.43	7.97	7	50	25	100	130	45
NL.15	15	50	4.14	13.59	5	76	23	80	130	61
NL.18	18	60	4.20	13.80	6	63	18	70	120	68
NL.21	21	70	4.14	13.58	7	50	14	60	100	74

Wind speeds in the above table are calculated for antennas or equipment with a side surface area of 2,000 sq. cms. (2.15 sq.ft.). If larger items are fitted the operational wind speeds will be reduced. All masts in the NL series have bottom section diameter of 127 mm. Masts NL/8, NL/12 and NL/21 have a top section of 50 mm dia. for attaching antennas. Masts NL/9, NL/10, NL/15 and NL/18 have a top spigot 50 mm dia. x 130 mm long.

## Mounting Arrangements

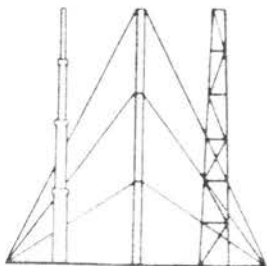
The mounting arrangements for the NL series are similar to the NK series, both in appearance and specification. They are, however designed for masts of 127 mm outside diameter. So it is important when ordering to specify the correct reference number. These have the suffix '127' and are listed below:-

* FIELD BASE GUY ASSEMBLY	NLG/127	* SIDE MOUNTING BRACKETS	NSM/127
* PERMANENT BASE GUY ASSEMBLY	NPG/127	* VEHICLE MOUNTING BEARINGS	NRB/127
* FIELD STAND for masts up to 12 metres only.	N4L/127	* TOP GUY ASSEMBLY for 8, 9, 10, 12 metre masts for 15 & 18 metre masts. for 21 metre masts.	NUG/48 NUG/70 NUG/85
* CLIMBING STEPS Single Step. Double Step.	NSP/127/1 NSP/127/2		

## Accessories

The following accessories are exactly identical to those supplied for the NK series:-

* GROUND STAKES	GS/1	* ANTENNA ADAPTOR	AF/1
* GROUND PEGS	GP/1	* SUPER MINI COMPRESSOR: FOR 240 V. AC.	EC/240
* CABLE SUPPORTS: EYE 14mm DIA.	CS/3329	FOR 12 V. DC.	EC/32
EYE 30mm DIA.	CS/3343	* FOOT PUMP WITH GAUGE	NFP.



# Hilomast Ltd

THE STREET - HEYBRIDGE - MALDON - ESSEX - CM9 7NB - ENGLAND

Tel. MALDON (0621) 56480 Telex 995855

# PNEUMATIC TELESCOPIC HILOMASTS (NL Series)

## HILOMAST 'NL' SERIES

## OPERATING INSTRUCTIONS

These masts are supplied with various types of mounting equipment, but the operating procedure for the basic mast is identical for each arrangement.

- (1) Before connecting air supply, the air release valve (situated at the base opposite the air inlet) should be closed by turning in a clockwise direction. Light finger pressure is adequate as the valve incorporates a neoprene washer.
- (2) All locking collars, with the exception of the top one, should be securely tightened by rotating the thumb screws in a clockwise direction. The locking collars are situated immediately above the guide collars at the top of each section. (See note 6)
- (3) Connect air supply using either a foot pump fitted with a pressure guage, or a compressor. NOTE: ON NO ACCOUNT SHOULD ANY OTHER FORM OF AIR SUPPLY BE USED WITHOUT THE MANUFACTURERS AGREEMENT. PRESSURES ABOVE THOSE RECOMMENDED CAN RESULT IN DESTRUCTION OF THE MAST AND POSSIBLE INJURY TO OPERATORS.

As each section extends so its locking collar must be securely clamped with the thumb screws. Then the next lower collar should be released, extended and locked - and so on until all the sections are fully extended and locked. It is now no longer necessary to maintain air pressure and the mast can be rotated to the direction required. When using the Hilomast mini-compressor, a pressure switch operates at the correct pressure (20 lbs p.s.i.) (1.4 Kgs p.s.cm.) to protect the mast.

- (4) The collars need not be locked for frequent operations of short duration.
- (5) To lower the mast, open the air release valve by turning anti-clockwise. When the air is released, unclamp the lowest locking collar. As each section descends it will bring down the next collar for release - and so on, until the mast is fully retracted. The rate of descent cannot be increased as it is controlled by the air release valve to protect the mast.

When the mast is required to operate on only one or two sections, then it is only necessary to unclamp those sections.

If the top section only is locked in its retracted position, the mast is capable of withstanding higher wind loads.

- (6) It is sometimes necessary to pack the thumb screws separately to avoid damage in transit.

#### ROUTINE MAINTENANCE

Very little maintenance is required other than wiping the mast sections at regular intervals with Shell Multi-grade Motor Oil. To protect the seals, a few drops of oil should be placed at the top of each collar so as to run down the inside of each tube. Periodically oil the thumb screw threads.

If the mast is to remain extended permanently or for long periods, a coating of Silicone Grease or Shell Ensis Fluid 256, is recommended to help prevent unsightly corrosion forming on the bare sections.

On no account should the mast be dismantled. In the unlikely event that a fault should occur, it should be returned to the manufacturer for repair.

It is possible for rainwater to enter the mast by running down the sections and passing the seals. This will not damage the masts but it should be drained periodically by opening the release valve. If a compressor is used, care should be taken to ensure that no water remains in the cylinder.

A telescopic mast is a mechanical device and is thus vulnerable to icing. However, if the release valve is left open or the inlet valve removed when not in use, in freezing conditions water cannot build up and the possibility of icing is reduced.



# Hilomast Ltd

## HILOMAST SEAL REPLACEMENT.

If the mast will not extend due to air leakage, first check that no air is escaping from the inlet or air release valves.

When the mast has been stored in a horizontal position, the seals may deform slightly and allow air to pass. It is also possible under some storage conditions, for the grease used in manufacture to harden and prevent the seal lip from touching the tube wall.

To correct this, stand the mast in a vertical position and introduce some good quality motor oil around the collars, allowing it to drain down inside the tubes. Then pull out each section in turn and thrust downward (with the air release valve closed). This forces the lip of the seal back to its original position against the wall of the tube.

It may be necessary to follow this procedure two or three times to be fully effective, but should leakage still be evident it would indicate a defective seal and the mast will have to be dismantled. It will not be possible at this stage to determine which section is leaking.

### DISMANTLING THE MAST. (See drawing on sheet 2.)

- 1) Loosen the socket head screws 'A' from the largest collar, except the one securing the nylatron key 'B'.
- 2) Holding the collar onto its tube, pull out all the remaining sections (keeping them together as one unit) until the tube stop 'C' is against the collar.
- 3) Taking care to support the extended sections, slide back the collar from the bottom tube. Continue pulling the extended sections out until the piston is free from the bottom tube.

In the case of the NP Hilomasts with the automatic locking device on the collar, it will also be necessary to loosen the extra socket head screw 'AA' and the locking device 'BB' before removing the collar from the tube. It will be helpful to note the exact position of the locking device before removing it from the collar. By counting the number of exposed threads or the number of turns when unscrewing, it is possible to return it to its original position upon re-assembly and obviates the necessity for adjustment.

- 4) Remove the air inlet valve from the base of the mast and fit into the tapped hole 'D' in the exposed piston. With a foot pump attempt to extend the remaining sections. If they extend it will indicate that the exposed seal is the one requiring replacement. If they do not extend, expose the next piston and seal using the same procedure - and so on until the faulty seal is located.

Since it is unusual for a seal to fail, it is necessary at this stage to establish the cause if possible. If small particles of metal are found around the seal, it usually indicates that something has scraped the tube. This can happen if the mast has been violently abused, if some modification with different screws or clamps has been fitted by the customer, or if the mast has not been serviced and lubricated regularly.

- 5) Clean the tubes with a cloth and examine the tube surfaces. If there are dents or sufficient surface damage to affect the seals, then the section will not function correctly and should be replaced.
- 6) Remove the faulty seal, in most cases the damage is imperceptible. Having oiled or greased the new seal, fit into the piston groove using only the fingers, do not use metal tools. The PTFE slide ring 'E' should be replaced at this stage if necessary. (See separate instructions at 6A.)

- 7) The sections must now be refitted with great care, it is easily possible to damage the new seal on the edge of the receiving tube. First oil or grease the receiving tube, checking the edge for sharpness or burrs, also check the screw holes and ensure they are completely smooth.
- 8) Line up the section to be inserted, with the new seal at a slight angle to the mouth of the receiving tube. Hold the edge of the seal down with the thumb and turning the tube, allow the compressed part of the seal to enter the receiving tube. Once all the seal is inserted, correct the angle so that the tubes line up and insert the PTFE slide ring. Keep the tube being fitted as concentric as possible with the receiving tube, until the stainless steel tube stop 'C' has just entered. The collar can now be pushed forward onto the receiving tube and when secured, it will maintain radial clearance.

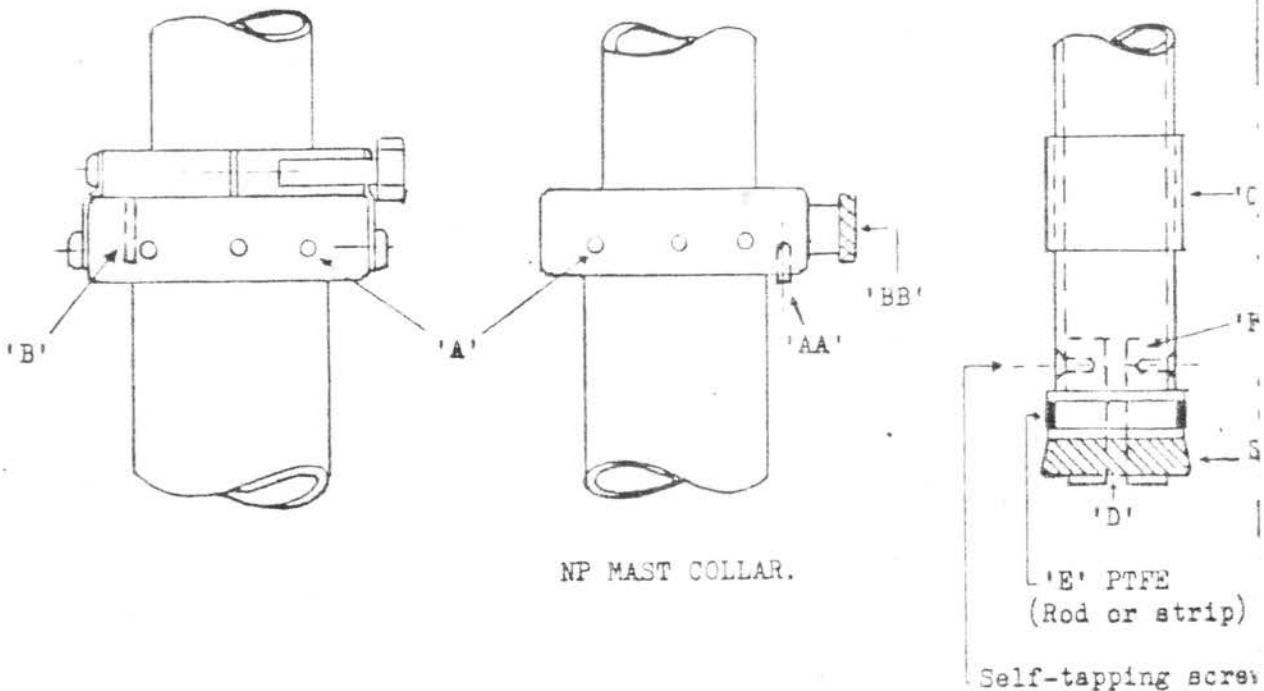
PTFE SLIDE RING REPLACEMENT.

- 6A) The PTFE rings should be examined for scuffing and wear. If replacement is necessary they should be fitted before the seals. A length of PTFE should be cut so that there is a small gap between the ends when it is wrapped around the piston groove. The piston should then be pushed into the receiving tube over its entire length of travel. Should any tight spots be revealed, the PTFE should be thinned down slightly with a sharp knife or emery paper, taking care to keep the thickness as even as possible. This procedure should continue until the piston slides freely.

PISTON REPLACEMENT.

When the mast is dismantled the pistons should not be removed. They are fitted during manufacture by heat shrinking the tube onto the piston and if removed or loosened, they cannot be secured by the same system. It will be noted that the smaller tubes have the extra security of screws into the piston spigot 'F', and this method must be used to re-fit a piston.

After removing the seal and PTFE ring, coat the piston spigot 'F' with a sealing compound and insert into the tube. Drill two holes and counter-sink for the screw head, clear away all swarf and fit self tapping screws. Should air leaks be evident, use further sealer on the screw heads and around the piston where it meets the end of the tube.



**Hilomast Ltd**

The Street, Heybridge, Maldon,  
Suffolk, England

OP ALGUM 84 - AFTER ACTION REPORT

Serviceability of MX1502

1. MX1502 Ser No 351 performed without any problems.
2. MX1502 Ser No 344, performance was generally good however it was marred by several failures, which were complicated by unserviceable spares and delayed transportation of repair parts from Australia.

Recommendations

3. Hired equipments be required at Sydney Wksp Coy for at least one full week prior to the operation to enable complete testing of equipment and spares kits.
4. Civilian companies dealing with the transportation of repair parts from Australia should be made aware of the importance and urgency of the cargo.

Summary

5. Overall the operation of the Magnavox MX1502 ran smoothly enabling the completion of more Doppler stations than originally anticipated.

(G.A. RICHMOND)  
CFN



# AUSTRALIAN ARMY

Telephone (08) 2939277

4 Fd Svy Sqn  
Keswick Bks  
KESWICK SA 5035

In reply please quote: 788/2/C83

22 Oct 84

HQ FFCcmd

For Information:

DOD(AO) for DSVY-A

## OP ALGUM 84 AFTER ACTION REPORT

- References: A. HQ FFCcmd Op Order 8/84 dated 13 Jun 84.  
B. DOD(AO) A719/3/230 SVY100885 dated 29 Jun 84.

1. This after action report is submitted in accordance with Ref A. A more comprehensive report on both the administrative and technical aspects of the operation will be submitted when all details have been finalised.

### Area of Operations

2. The Republic of Vanuatu lies in the South West Pacific region occupying seven degrees of latitude between 13 deg S and 20 deg S and four Degrees of longitude from 166 deg E to 170 deg E. Matthew and Hunter Islands were specifically excluded from the AO. A map of the AO showing Vanuatu's relationship to Australia is attached as Annex A.

### Tasks

3. Details of specified tasks are given at para 8 of Ref B.

### Operations

4. Achievements. Control surveys were carried out from Anatom in the south to Epi, north of Efate. A total of 18 new control points were established and 3 existing stations were re-observed using Magnavox MX1502 satellite surveying sets. All of these stations were connected to sea level. 29 existing stations were visited and panelled with station 31330 being connected to sea level. Positive identification photography was acquired of all 50 stations. Locations of all new stations established and existing stations visited are shown as Annexes B and C respectively. Due to poor weather, the mapping and large scale urban photography tasks remain outstanding. Diagrams showing mapping and urban photography flown are Annexes D and E respectively.

5. Work Outstanding. Within the area covered by Phase One the following work remains outstanding:

- a. Station D4 (17 deg 16 min S, 168 deg 28 min E); not accessible.
- b. Station D16 (17 deg 04 min S, 168 deg 16 min E); not accessible.
- c. Station 31329; not connected to sea level.
- d. Class X mapping photography of total area.
- e. Colour urban photography of Port Vila.

Composition of the Force

6. The force comprised:

- a. CAPT RASVY as Det OC; 48744 CAPT I.S. Rose.
- b. WO2 RASVY as senior control survey adviser and Magnavox MX1502 operator; 313931 WO2 R.J. Williams.
- c. CPL RASVY as aerial camera operator; 552471 CPL R.D. Clarke.
- d. LCPL RASVY as Magnavox MX1502 operator; 321968 LCPL S.E. McGuinness.
- e. CFN RAEME as Magnavox MX1502 technician; 3179082 CFN G.A. Richmond.
- f. two civilian attachments of:
  - (1) civilian pilot from Airsearch Pty Ltd; Mr N. Faerche, and
  - (2) civilian LAME from Airsearch Pty Ltd; Mr K. Reardon.

All members met the eligibility criteria laid down in Annex A to Ref A.

Timings

7. The following timings applied:

- a. 29 May to 2 Jun 84 - liaison visit to Port Vila (Det OC only).
- b. 25 Jun 84 - Force concentrates in Sydney, less civilian attachments.
- c. 30 Jun 84 - Advance Party arrived Port Vila.
- d. 3 Jul 84 - Operation commenced
- e. 7 Jul 84 - Main Party and stores arrived Port Vila.

/f. 23 Jul 84

- f. 23 Jul 84 - FW aircraft arrived Port Vila.
- g. 14 Sep 84 - Aerial Photography operations ceased.
- h. 17 Sep 84 - Control survey operations ceased.
- i. 22 Sep 84 - Rear Party returned to Australia.

Administration and Logistics

- 8. Pay and Allowances. No problems were encountered with the arrangements which had been made for payment of pay and allowances.
- 9. Passports and Visas. Official Passports were obtained by members not already in possession of a passport. No visas are required to enter Vanuatu.
- 10. Accomodation. Suitable accomodation was obtained at the Hotel Solaise in Port Vila. Two self contained flats were booked for the duration of the operation.
- 11. Local Purchase. The arrangements made with the Australian High Commission for local purchase of minor items of equipment proved successful.
- 12. Petty Cash. A petty cash advance of \$A200 in equivalent local currency was maintained by the Det OC.
- 13. Medical. No members required medical treatment during the operation. All members were inoculated against Hepatitis B prior to leaving Sydney and took malarial prophylaxis as prescribed in Annex B to Ref A.
- 14. Morale. Morale remained high throughout the operation.
- 15. Rations. Tinned and fresh rations were available in Port Vila at prices in general 30% higher than in Australia. Limited amounts of fresh rations were available on all islands visited by the control survey teams.
- 16. Special Equipments. Special equipments used during OP ALGUM 84 were:
  - a. Yamaha EF2000 generator set (2),
  - b. AGA Geodimeter Model 16 EDM (2),
  - c. Pneumatic Telescopic Hilomast NL21 (2), and
  - d. Magnavox MX1502 Ser No 344 and 351.

All of these equipments worked well with the exception of MX1502 Ser No 344 which needed repair on 3 occasions, causing downtime of some 28 days. RAEME technicians report is attached as Annex F. The pneumatic Hilomasts, despite regular maintenance, suffered minor corrosion due to the salt water/air environment.

- 17. Visits. The following pers visited OP ALGUM 84:

/s. LTCOL


- a. LTCOL P. Gould, S01(OPS) FFCmd (designate) from 1 Sep to 4 Sep 84, and
- b. MAJ P. Bion, OC 4 Fd Svy Sqn (designate) from 15 Sep to 23 Sep 84 for purposes of recon for OP ALGUM 85.

Communications - Rear Link

18. Communications with Australia were provided by the Australian High Commission in Port Vila. Facilities provided were:

- a. telex with limited transmission only, and
- b. telephone.

This arrangement proved to be satisfactory.

  
(E.R. SCHULZE)  
MAJ  
OC

- Annexes:
- A. Map of AO.
  - B. Locations of New Stations.
  - C. Locations of Existing Stations.
  - D. Mapping Photography Flown.
  - E. Urban Photography Flown.
  - F. RAEME Technicians After Action Report.