



OP NERVOSE 84
PROJECT REPORT

4 FIELD SURVEY SQUADRON

ROYAL AUSTRALIAN SURVEY CORPS

4 FIELD SURVEY SQUADRON

PROJECT REPORT

OPERATION NERVOSE 84

21 DECEMBER 1984

DISTRIBUTION

Dept of Defence (Army Office) - DSVY-A	3
- DBOP-A	2
HQ FF Comd - Ops Br	2
- SQ1(SVY)	1
HQ 4MD	2
HQ 7MD	2
41 Sup Bn	1
Army Svy Regt	1
School of Mil Svy	1
1 Fd Svy Sqn	1
2 Fd Svy Sqn	1
5 Fd Svy Sqn	1
161 Recce Sqn	1
171 Comd & Liaison Sqn	1
Syd Wksp Coy	1
Adl Wksp Coy	1
4 Tpt & Mov Bp	1
<u>Internal</u>	
OC	1
2IC	1
Det IC	1
File	1
Library	1

4 FIELD SURVEY SQUADRON
PROJECT REPORT - OPERATION NERVOSE 84
21 DECEMBER 1984

Title Page	
Distribution	ii
Contents	iii
Introduction	1
Mounting	2
Operations	3
Administration & Logistics	5
Conclusions & Recommendations	15
ANNEX:	
A. Background of Operations Diagram.	
B. Area of Operations Diagram.	
C. Chronological Sequence of Events.	
D. APR Operations Report.	
APPENDIX 1. APR Equipment Report.	
2. APR Daily Log.	
3. APR Data Processing Report.	
4. APR Network Diagrams.	
E. Ground Control Report.	
F. Field Completion (Op LONG WALKABOUT) Report	
G. Station Ident Photography Report.	
APPENDIX 1. Ident Photography Acquisition Report.	
2. Ident Photography Diagram.	
H. Nominal Roll.	

PROJECT REPORT - OPERATION NERVOSE 84

- References:
- A. CoSC MINUTE 18/1981 dated 8 Apr 81.
 - B. Dept of Defence (DGOP-A) Tasking Directive (A474-1-199) dated 2 Aug 83.
 - C. 4 Fd Svy Sqn Concept of Operations (R788-2-H83) dated 7 Mar 84.
 - D. HQ 4 MD Mounting Instruction 2/84 (788-2S-48) dated 11 May 84.
 - E. FIELDFOR SYDNEY OPORD 11/84 (SIG SVY 06719) of 170515Z May 84.
 - F. 4 Fd Svy Sqn OPORD 2/84 (R788-2-H83) dated 24 May 84.
 - G. 4 Fd Svy Sqn Reconnaissance Report (R788-2-H83) dated 31 May 84.
 - H. Dept of Defence (DSVY-A) Technical Instruction (A474-5-65) dated 5 Jun 84.

INTRODUCTION

1. This report covers the execution of survey tasks in the Northern Territory conducted by Det 4 Fd Svy Sqn during the period 1 Jun to 11 Oct 84. This operation was assigned the nickname NERVOSE 84 and included technical tasks which were originally to have been carried out as Op LONG WALKABOUT 84.

Background

2. The 1:50 000 mapping requirement for the Northern Territory is included in reference A. Current tasking to achieve this requirement is reflected in reference B. The previous programme (NT TACMAP and its extensions) had resulted in control acquisitions (Op BRASS KEY 76 and Op CYNTHIA 79) suitable for 1:50 000 mapping coverage shown at Annex A. Ops NERVOSE 82 and NEURATION 83 provided the horizontal control requirement necessary for 1:50 000 mapping based on 1:80 000 photography in those areas shown at Annex A. Both of these operations were initially to have included the acquisition of vertical control using APR but, due to various factors, this did not eventuate.

3. At the Feb 84 Survey Planning Conference the decision was taken that all future 1:50 000 mapping would be compiled from 1:65 000 aerial photography. This resulted in a requirement for horizontal control to be established, additional to that previously obtained on Ops NERVOSE 82, NEURATION 83 and BRASS KEY 76. The requirement for vertical control to be obtained by APR was not affected by the decision and therefore the acquisition of this control via Op NEURATION 84 was authorized. The original plan to obtain all the vertical control required for the NERVOSE and NEURATION areas was truncated at latitude 19 deg South, and the nickname changed to NERVOSE 84 for political reasons.

4. Area of Operations. A diagram depicting the Area of Operations is at Annex B.

5. Allocated Tasks. The following tasks were allocated for completion:
- a. Establish vertical control by flying a network of 13 700 line kilometres of Airborne Laser Terrain Profiles (APR). The network is disposed as follows:

(1) East Arnhem Block	-	3 700km
(2) Barkly Block	-	3 900km
(3) Victoria River Block	-	6 100km
 - b. Connect the APR network to the Australian Height Datum (AHD) at approximately 120 locations.
 - c. Repanel, if necessary, and obtain absolute imagery of 44 horizontal control points. This being horizontal control established on previous operations but not successfully identified.
 - d. Field annotate 21 x 1:50 000 line maps currently in production in the NT TACMAP area in accordance with current specifications.

Concept of Operations

6. The concept of operations called for self-contained mobile parties capable of rapid re-deployment dependent upon equipment or weather constraints. It was planned to maximize the use of existing resources in the AO, with minimum use of tented accommodation, thereby reducing the administrative overhead as well as reducing the logistic burden associated with moving bases.
7. This concept, reflecting the tasking which had been resolved and incorporating the funding previously forecast was submitted vide reference C.
8. The feasibility of this concept was confirmed by a reconnaissance conducted in the AO by unit, HQ 4 MD and HQ 7 MD personnel in the period 13-21 May 84.

MOUNTING

9. Authorization. The HQ FF Comd OPRD 11/84 (reference E), providing authorization for the operation and allocating funds, was not available until 17 May 84, two weeks before the operation was to commence. DSVY-A Technical Instruction (reference H) was not received until five days after the operation commenced.

10. Manning. Both the original detachment commander and the identified reserve were posted with little warning. Advice of posting not being received until Nov 83 and Apr 84, effective Jan 84 and Jul 84 respectively. The supplementary reserve (WO1 Munro) confirmed in Feb 84 was therefore charged with final preparations and subsequent running of the operation. The APR manager (det from 2 Fd Svy Sqn) was identified in late Apr 84 and was not available until 29 May 84. Only three personnel of the eight required for the APR teams were attached from 2 Fd Svy Sqn.

OPERATIONS

General

11. The insertion of the detachment went as planned, leaving Adelaide by rail on 1 Jun 84, subsequently continuing to Ngukurr, arriving on 6 Jun 84. The field completion team separated from the main body at Mataranka, proceeding to Daly River where they arrived on 7 Jun 84.

12. AAAvn and the APR aircraft rendezvoused with the detachment on the 7th and 20th Jun 84 respectively. A chronological sequence of events is attached at Annex C.

AAAvn Spt

13. A total of 260 hours RW were allocated to the op. A further 40 hours were authorized on 4 Sep 84, but not required due to the slow subsequent progress of the APR.

14. Two LDH were deployed until 22 Jun 84, after which, due to low usage rates, this was reduced to one.

15. Spt was provided by:

- | | |
|-----------------------------|-------------------------|
| a. 162 Recce Sqn | 7 Jun to 30 Jul 84, and |
| b. 171 Comd and Liaison Sqn | 30 Jul to 4 Oct 84. |

16. Serviceability. General serviceability was good, with the following downtime:

- a. 2 days (3-5 Aug) with battery failure.,
 - b. 1/2 (11 Aug) due to metal chips in engine transmission, and
 - c. 6 days (19-24 Aug) due to engine transmission fault necessitating replacement.
- None of these problems affected operations due to concurrent APR unserviceabilities.

APR

17. The initial test flights of the APR were successful and profiling commenced on 23 Jun 84. Subsequent progress was intermittent due to APR unserviceabilities compounded by aircraft problems and unsuitable weather.
18. The expected completion date for APR operations was 14 Aug - by this date less than half the requirement had been achieved. This resulted in an extension of the period of operations to early Oct 84. Progress continued to be spasmodic and eventually when operations ceased, only the East Arnhem and Barkly blocks had been completed - 60% of the total.
19. A detailed report on APR ops is included at Annex D.

Ground Control

20. The control connection plan, approved through the Army Svy Regt by DSVY-A in 1982, was subjected to a number of changes prior to final acceptance in Nov 83. This plan was amended by the APR team manager with DSVY-A concurrence after deployment. Subsequently further amendments were requested by Army Svy Regt and incorporated in the plan.
21. A total of 51 connections of the network to the AHD were carried out by third order spirit levelling. Three connections were made to doppler stations established by translocation specifically to control the network, the remainder were to existing benchmarks.
22. A detailed report on control connections is included at Annex E.

Field Completion

23. Field completion of the 21 x 1:50 000 sheets originally tasked was successfully carried out in the period 7th to 19th Jun 84. At this time areas of extensive development requiring supplementary photography were identified. This photography was subsequently obtained using the APR aircraft during periods of APR unserviceability. A further two sheets were provided by the Army Survey Regiment in late August for field completion. This was carried out, once again during periods of APR unserviceability.
24. A report on field completion is attached at Annex F.

Station Ident Photography

25. A total of 51 stations were successfully photographed from 3 000 metres. These include the 44 stations outstanding from OP Nervose B2.
26. A separate report of this phase of operations is included at Annex 6.

ADMINISTRATION AND LOGISTICS

Personnel Aspects

27. Manning. Refer to Nominal Roll at Annex H to this report for details of personnel detached/attached to Op NERVOSE. To maintain a mobile capability, numbers were reduced wherever possible, using minimal support from other units, which entailed all personnel being utilized for additional tasks such as hygiene duties, driving, cooking, assistance to other trades, etc, when not actively engaged in their normal employment. The force initially comprised 12 personnel detached from 4 Fd Svy Sqn with 5 personnel changed after approx 3 months, 6 personnel attached from other units with 5 changed at various times, and 4 AAAN personnel with change-overs occurring about every 2-3 weeks. In addition, a civilian was employed throughout, as a pilot of the APR charter aircraft.
28. Pay and Allowances. All pay and allowances were paid in accordance with existing accounting procedures and in close liaison with RFO, 4MD. No problems which could not be readily resolved were encountered.
- a. Pay. Difficulties were anticipated in providing pay each fortnight in the field therefore approval was sought and granted from RFO Adelaide for members to receive 6 pays in advance prior to departure. Each member was required to deposit sufficient cash for their needs during the operation into a Commonwealth Savings Bank (CSB) account, which could be drawn from at any CSB agency. This scheme worked well, as there was an agency at each community/township Post Office within the AO. With an extension to the operation period, it was necessary to organize payment by cheque for the last three pay periods. This arrangement was satisfactory, where cheques were issued on time, but unfortunately was largely spoiled by the late delivery of mail through Central Registry, 4MD, and Australia Post.
 - b. Travelling Allowance. Paid only during the insertion and extraction phases of the operation, except for a few occasions when drivers experienced mechanical failure with their vehicle, necessitating overnight accommodation locally, pending repairs, or when it was impossible to provide rations and bedding during a journey.

- c. Incidental Element of Travelling Allowance. Paid to all personnel for the duration of their absence from parent unit.
- d. Meal Element of Travelling Allowance. Paid as necessary, to personnel travelling for long periods by vehicle on re-supply/administration tasks, when it was impractical to provide rations.
- e. District Allowance. Paid to all personnel for the duration of their stay within the AD, based on Gove, NT.

29. Medical and Dental. Health was generally good throughout the operation with no serious illnesses or injuries occurring. Four members sought the services of a doctor at various times, all with minor complaints. A mild form of diarrhoea with symptoms lasting about 2 days was experienced by several members during a ten day period at Ngukurr. First aid kits were prepared by DSU Adelaide RAP, and provided a sufficient range of medical requisites and medication to satisfy most needs. Health care facilities in charge of a nursing sister were available at each location where a main or forward base was established, hence no medic was attached to the force. A doctor was available for consultation at each location on a regular weekly visit, and Borroipoola had a doctor in attendance full time. HQ 7MD Medical Centre undertook to resupply medical stores on request and to coordinate all necessary action in the event of a MEDIVAC situation through the Royal Flying Doctor Service. Treatment at all medical centres was recorded on a F MED60, for forwarding to HQ 7MD for payment/record action. No member required dental treatment.

30. Dress. Not all attached personnel arrived in the AD with the minimum requirement for protective clothing, as itemized in reference D. Accordingly mixed dress had to be worn on some occasions which is not an acceptable practice in the field wherever members come under public scrutiny. The tendency for members to wear civilian dress items in isolated field locations is due mainly to the heavy weight material used to produce protective clothing J6, being uncomfortable to wear in hot and humid conditions when undertaking any task involving physical activity. Lightweight clothing is recommended for issue to all personnel engaged in future operations in tropical areas.

31. Discipline. No incidents occurred requiring disciplinary action.

32. Morale. Morale remained very high throughout the duration of the operation, even though hold ups due to unsuitable weather and equipment failures were common.

33. Rest Days. Rest days in the field were limited by operational demand to periods during equipment breakdown. Accrued balance in accordance with reference D was taken on return to unit.

34. Visitors.

MAJ P.A. BYSOUTH	OC	162 Recce Sqn	1-7 Jul 84
LT G.A. McCALL		162 Recce Sqn	1-7 Jul 84
MAJ A.S. BYRNES	OC	171 Comd & Liaison Sqn	30 Jul - 3 Aug 84
MAJ E.R. SCHULZE	OC	4 Fd Svy Sqn	14-20 Aug 84

Logistic Aspects

35. Accommodation. The force was fully self sufficient in all aspects regarding provision of rations and quarters, however, local resources were utilized where possible.

36. Main Bases.

- a. Ngukurr. An air-conditioned room, a cell block, kitchen and toilet facilities plus power were made available (through District HQ, Katherine) at Ngukurr Police Station, requiring only minimal stores and tentage to complete the Base.
- b. Elliott. Two buildings, including kitchen and toilet facilities plus power were available for use (through District HQ, Tennant Creek) at Elliott Police Station, again requiring minimal stores to establish the Base.

37. Forward Bases.

- a. Daly River. The visitors quarters at the Daly River Mission were rented on a daily basis, as required by the field completion party.
- b. Port Keats. A small self contained house was made available free of charge by the aboriginal community, for use by the field completion party during their stay.
- c. Borrooloola. Some accommodation and use of power, kitchen and toilet facilities etc, were made available for no charge (through District HQ, Tennant Creek) at the Borrooloola Police Station, requiring minimal stores and tentage to maintain the camp. The APR team stayed at the Borrooloola Inn prior to the establishment of the base camp, for three separate overnight stays. An account was tendered by the management for payment by RFD Adelaide.

- d. Gove. Panelling and APR teams occupied quarters administered by the NABALCO mining company, for various periods. Accommodation charges were billed periodically by the company, and forwarded to RFO Adelaide for payment.
- e. Tindal. Accommodation was available at RAAF Base Tindal, free of charge, on request to the caretaker, and was used on numerous occasions by small parties.

38. Rations. A cash advance was initiated by 41 Sup Bn through RFO Adelaide, on application from 4 Fd Svy Sqn. Based on an estimated cost of rations per man per day over the duration of the operation. This amount was available for the purchase of rations by cheque and acquitted by maintenance of a sub-imprest account, verified by weekly reconciliation returns. The final cost of rations per man per day was \$7-94, about \$0-50 higher than initially estimated. Due to the very high price of foodstuffs at Ngukurr and Borroloola, the allowance per man per day was later raised to \$8-60.

39. Transport.

- a. Vehicles. The following vehicles by type (including total distances travelled) were used by the detachment. Vehicles required in excess of unit resources were supplied on loan by 41 Sup Bn with concurrence of HQ FF Comd.

	<u>ARN</u>	<u>Loan/Unit Veh</u>	<u>Dist</u>
(1) Truck Cargo 3/4ton 65			
	29-664	Unit	10 585km
	29-700	Unit	14 962km
	32-277	Loan	15 935km
	32-289	Loan	16 840km
	33-684	Loan	12 563km
(2) Truck Cargo 5ton 65			
	171-664	Loan	9 367km
(3) Truck Cargo 2-1/2ton 65			
	170-514	Loan	2 471km
	171-042	Loan	9 719km
(4) Truck Cargo 2-1/2ton 65 w/winch			
	170-098	Unit	9 068km

(5) Trailer Cargo 1/2ton GS

Qty 3	Loan
Qty 1	Unit

 Total Distance 101 510km

- b. Repair. vehicle repairs were mainly carried out by the attached vehicle mechanic, and on three occasions by Wksp Pl HQ 7 MD. Repair requiring the use of specialized equipment were carried out by Dee Jay Engineering at Katherine. Wksp Pl HQ 7 MD provided excellent co-operation and ready support in supplying or procuring spare parts, arranging repairs, documentation/payment and recovery when required - all unit members were very helpful. Parts replaced on various vehicles are listed below, but do not indicate the larger volume of maintenance/repairs not requiring spare parts.

<u>ARN</u>	<u>Replacement Part</u>
32-277	Distributor, speedometer cable, rear universal joint
32-289	Alternator, shock absorber, steering damper, headlight, front spring.
33-684	Rocker cover gasket, headlight, front brake shoes.
29-664	Clutch plate
171-042	Air compressor bracket, front propeller shaft
170-098	All main engine gaskets, fuel line, front propeller shaft, valve guider, clutch hydraulic line, complete overhaul of cylinder head/exhaust valves, gearbox.
171-664	Water pump, fuel pump, coil.

- c. Recovery. Truck 2 1/2 ton ARN 170-098 was recovered by Wksp Pl HQ 7 MD from Larrimah to Katherine for repair. The vehicle was not repaired in time for the extraction phase, and was later driven to Darwin by Tpt Pl personnel and backloaded to Adelaide by civilian transport under HQ 7 MD arrangements. This was more economical than the administrative costs of two drivers plus fuel.

d. Accidents. Two minor accidents occurred involving Landrovers in off-road situations. In both cases damage was limited to a jerrycan holder and chassis sub-frame with total cost of repairs estimated at \$282-00.

e. Vehicle Equipment Write-off. The following items were written off during the operation:

<u>Item</u>	<u>Qty</u>	<u>Tot Value</u>
1200 x 20 tyres	2	\$334-04
750 x 16 tyres	11	\$984-42
750 x 16 tubes	3	\$ 19-17

f. Drivers. A high proportion of detachment drivers were comparatively inexperienced. It is recommended that unit members, as necessary, receive further driver training with greater emphasis on vehicle maintenance.

g. Vehicle Serviceability. On most occasions, on the spot repairs were sufficient to get the vehicle operational again, but given the isolation of the AO and consequent difficulty of resupplying parts, plus the long distances that RAEME personnel must travel to affect repair, even minor mechanical problems can add several hours or days to a planned journey. This is unacceptable when operational demands require stores and personnel must be moved within a given time-frame. It is recommended that only late model vehicles, whether CL or GS, be used for future operations

(1) Landrovers. Performed fairly well overall and are still reasonably reliable.

(2) Truck 2^{1/2} and 5 ton. Performed fairly well but are becoming very unreliable mechanically because of age; three of the four trucks used were prone to breakdown

40. Stores. Stores remained the overall responsibility of the Admin/Log Ofcr throughout the operation. Periodic spot checks and constant reminders to individuals and groups regarding the care and security of stores were necessary to ensure control, as it was impracticable to maintain a fully secured stores system at each location. No stores were damaged beyond reasonable wear and tear and losses were minimal. The following comments are provided:

a. Loan Stores. 2 x MX1502 Satellite Surveying sets and the APR complete with CES were loaned from 2 Fd Svy Sqn. This equipment was despatched directly to the AO from 2 Fd Svy Sqn.

- b. Hire Stores. A 5.5 x 5.5 x 2.1m ATCO hut plus airconditioning unit was hired and fixed onto a Truck Cargo 2¹/₂ ton 6S, to be used for APR repairs and equipment storage, and later as a photographic darkroom.
- c. Stores Demand. By direct request through LPO Log Coy HQ 7 MD and SQMS 4 Fd Svy Sqn for documentation and supply. Both the LPO and SQMS liaised directly as required. This arrangement worked well, and evolved as a result of discussion with SQ2(LOG) HQ 7 MD during the reconnaissance phase.

41. POL.

- a. All drummed fuel required to be pre-positioned at selected locations was requested initially through HQ 7 MD. SQ2(LOG) HQ 7 MD approved the following procedure for subsequent supplies:
- (1) Direct liaison with the POL Cik/Asst LPO for further supplies of drummed fuel required to be positioned at given locations by the contractor.
 - (2) Use of issued FST 18 POL Purchase Orders by Det Admin/Log Oftr to purchase motor spirit (kerbside), bulk aviation fuel and drummed (all types) from contract fuel agents. A pad of 50 purchase orders were issued, of which 41 were used and 9 cancelled and returned.
- b. Bulk aviation fuel was purchased at the following locations:
- (1) Darwin, NT
 - (2) Grootte Eylandt, NT
 - (3) Gove, NT
 - (4) Tindal, NT
 - (5) Kununurra, WA
 - (6) Mt Isa, QLD
 - (7) Bourke, NSW
 - (8) Broken Hill, NSW
 - (9) Mascot, NSW and
 - (10) Essendon, VIC.

c. Total fuel quantities purchased plus supplies from Army/RAAF resources were:

(1) Motor Spirit.

Kerbside purchase of MSS/MSP	12 1231i
MSS issued from Army/RAAF	5 8861i
Drummed MSS (56 drums)	<u>11 2001i</u>
	<u>TOTAL 29 2091i</u>

(2) AVGAS.

Bulk AVGAS	16 0921i
Drummed AVGAS (161 drums)	<u>32 2001i</u>
	<u>TOTAL 48 2921i</u>

(3) AVTUR.

Bulk AVTUR	3 8961i
Drummed AVTUR (174 drums)	<u>34 8001i</u>
	<u>TOTAL 38 6961i</u>

All bulk AVTUR was purchased using SP27 Purchase Orders issued from AAVN.

d. Distribution of drummed fuel:

	AVGAS	AVTUR	MSS
Daly River Mission	--	35	15
Ngukurr	82	49	29
Elcho Is	--	4	--
Borrooloola	34	66	6
Elliott	45	20	6

Fuel was re-distributed as required between locations depending upon the operational situation. Security of drums prior to use was reasonable. There was some doubt as to whether 7 drums were in fact delivered or stolen.

e. Contaminated Fuel. 24 drums of AVTUR were considered to be contaminated by water or paint, and 21 were returned to the fuel agent for testing and credit. All AVGAS proved usable.

- f. Return of Empty Drums. A total of 97 drums were returned for credit at \$30 each. The bulk of remaining drums have been stacked at Daly River Mission (27), Roper Bar (148), Borroloola (86) and Elliott (17), with the balance considered uneconomical to recover. Fuel agents have been requested to backload empties on routine delivery runs, and HQ 7 MD have been notified of all details.
- g. Lubricants. All oils and greases were supplied from Main Base, from initial stocks held and resupply from Sup Pl HQ 7 MD.
- h. LPG. A total of 270kg of LPG was consumed, all from stocks initially deployed.

42. Movement. Movement of stores and personnel was processed through 4 Tpt and Mov Gp Adelaide, Tpt and Mov Pl Darwin and MCO Sydney as required, on submission of appropriate documentation, and achieved by the use of road transport, rail, coach, RAAF courier and civil air services. Resupply stores required urgently or having 'air movement only' status were despatched by air freight services, otherwise road transport was used. Delivery times stated by the various transport organizations were generally not kept, and stores were often carried forward to another destination, requiring redirection. This problem caused some changes to the operation plan at times, and was always a nuisance. To keep a record of the expenditure involved, it is recommended that units initiating movement of stores/personnel advise the operation unit by signal of the costs.

43. Canteen. A canteen account was opened with a loan of \$1200 from 4 Fd Svy Sqn Regt Funds. The canteen operated from all main and forward bases, and realized a profit of \$594, after payment of all accounts. Supplies were generally obtained from wholesale sources in Darwin.

44. Mail. Numerous cases occurred during the first ten weeks of the operation, of mail taking about 14 days to reach Ngukurr from Adelaide. The main problem was discovered in Central Registry at Keswick Barracks, where mail was being held until sufficient was available to fill pre-paid airmail bags. Delivery times improved when this practice was stopped. The failure of Katherine Post Office to transfer mail onto the twice weekly mail plane to inland areas also caused hold-ups.

45. Finance Aspects.a. Summary of Expenditure

Item Code 233-1-01 Travel and Subsistence	\$42 218 ⁽¹⁾
Item Code 233-1-05 Freight and Cartage	\$ 6 378
Item Code 234-2-02 Rations	\$18 995
Item Code 234-2-03 POL	\$60 369 ⁽²⁾

- (1) Includes \$11 128 for rail insertion/extraction of vehicles between Adelaide and Alice Springs.
 (2) POL expenditure is less the value of 97 empty drums returned for credit at \$30 each (\$2 910), but includes the amount of \$8 820 for 294 drums awaiting return.

b. Budget Allocations.(1) Travel and Subsistence.

(FY83/84) \$10 000 authority HQ FF COMD 8-83 of 25/5/84 FPC 35118
 (FY84/85) \$40 000 authority HQ FF COMD (SVY) 1/84-85 OF 16/5/84 FPC 35192
TOTAL \$50 000

(2) Freight and Cartage.

(FY83/84) \$ 1 000 authority HQ FF COMD 8-83 OF 25/5/84 FPC 35118
 (FY84/85) \$ 4 000 authority HQ FF COMD (SVY) 2/84-85 OF 16/5/84 FPC 35192
 (FY84/85) \$ 2 000⁽¹⁾ authority HQ FF COMD (SVY) 12/84-85 OF 14/8/84 FPC 39018
TOTAL \$ 7 000

- (1) Additional funds requested and approved during Aug 84, mainly to cover air movement costs of APR equipment, when the operation period was extended.
 (3) Rations. Total advance was \$ 25 230, of which \$20 571 was available for the purchase of rations, based on total mandays at \$8-60 per day.
 (4) POL. \$60 000 was forecast during estimates prepared in 1983.

- c. Accountability. Expenditure was contained within the limits of funds allocated to each FPC, however, there were problems in establishing the correct final amounts for T & S and F & C, especially when funds allocated to a particular FPC are split and the line number changed at the finish/start of two consecutive financial years or when there is a considerable difference between the reported cost and the final actual cost. In the former case it is often difficult to ensure that accounts are presented and paid for within the FY in which the services were rendered or goods received and in the latter case the reported costs received from unit orderly rooms or MCO sources are very often estimates only.
- d. Petty Cash. A \$200 advance was obtained through RFD Adelaide and proved sufficient to cover routine expenditure.

CONCLUSIONS & RECOMMENDATIONS

Conclusions

46. The low mean time between failures of the APR equipment experienced on this operation raises doubts as to its continued viability for deployment.
47. The inability to effect field repair on the APR equipment due to the unavailability of spare or replacement modules resulted in prolonged down time, thereby exacerbating the situation.
48. It is not viable to deploy the levelling teams with the equipment (as required by SOPs) and obtain unadjusted corrected loop closures of the network before the APR aircraft leaves the AO if APR progress is spasmodic due to breakdowns. Furthermore, to achieve this aim it would be necessary to leave the aircraft idle for about 7 to 10 days after completing flying to allow the level teams to complete their work.
49. The lack of continuity in personnel operating the equipment is apparent in anomalies in procedures and methods employed.
50. Aerial navigation in featureless terrain is very difficult, requiring substantial corrections at times to get back on track, usually close to identifiable points, such as CPs and IPs. This must raise doubts as to the validity of some of the data.

Recommendations

51. A thorough overhaul of the APR equipment must be carried out. This should include an assessment of the viability of the technology employed in the system to be supported by field repair. It should also be considered in terms of the possible replacement of all or part of the system with newer, up-to-date and therefore more reliable and supportable components.

52. Sufficient and comprehensive spares must be made available to ensure timely and efficient field repair with minimum effect on task progress.

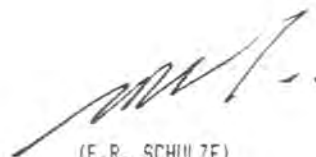
53. If serviceability of the APR cannot be absolutely guaranteed, then levelling teams should not be deployed until profile acquisition is complete; in the next field season if necessary.

54. A dedicated team, or at least a manager at warrant rank level, or even a civilian STO, be allocated to the equipment on a full-time basis for periods of no less than two years. This would ensure familiarity and competence with what is in essence a complex, non-user-friendly, prototype equipment which is developing idiosyncrasies which require experience to surmount.

55. A re-assessment of operating methods and procedures needs to be carried out to confirm, hopefully, that incestuous training methods have not led to a lack of expertise and understanding of the equipment's capability.

56. An investigation be carried out into providing navigation assistance to the APR aircraft in featureless terrain to ensure the aircraft remains on track with the minimum of correction, thereby ensuring a stable platform. This may be possible to achieve with the deployment of mobile aircraft navigation beacons.

A Dec 04

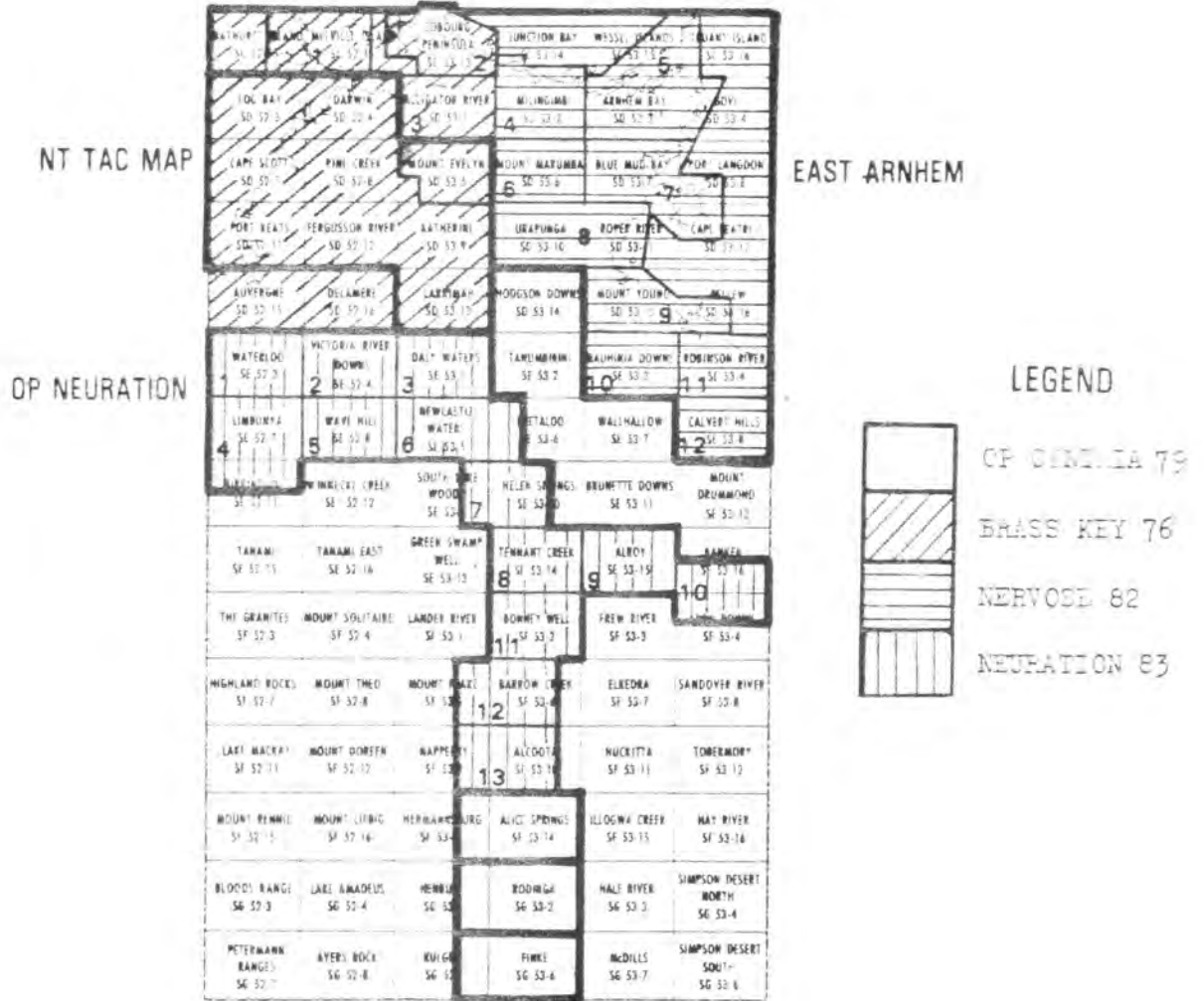


(E.R. SCHULZE)

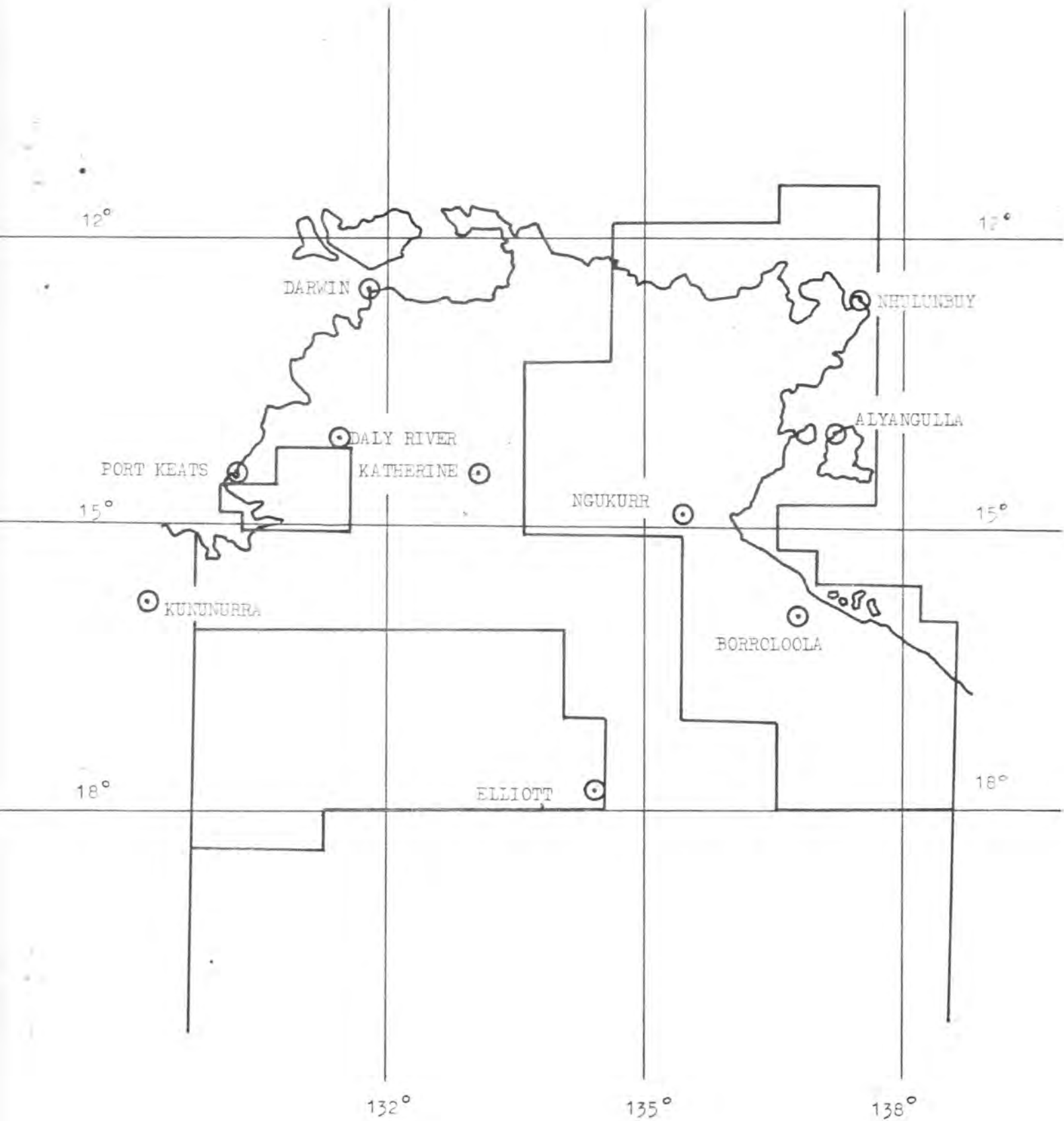
Major

Officer Commanding

NORTHERN TERRITORY



OPERATION NERVOSE 84
AREA OF OPERATIONS



CHRONOLOGICAL SEQUENCE OF EVENTS

01 Jun Det depart Adelaide.
06 Jun Main Body arrive Ngukurr.
07 Jun Field Completion (FC) teams arrive Daly River.
AAAAn RV with det at Ngukurr.
08 Jun Commence FC.
Commence recon of existing vertical control.
Panel existing horizontal control points.
14 Jun FC teams move to Pt Keats.
20 Jun FC complete, teams move to Ngukurr.
APR acft RV with det at Ngukurr.
23 Jun Commence APR ops in East Arnhem Block.
01 Aug Commence APR ops in Barkly Block.
20 Aug Completed APR ops in East Arnhem Block.
25 Aug Complete connection of APR network to AHD in East Arnhem Block.
Level teams move to Borroloola.
27 Sep Complete APR ops in Barkly Block.
Move to Elliott.
Commence Victoria River Block.
04 Oct Release APR acft and AAAAn.
05 Oct Complete connection of APR network to AHD in Barkly Block.
06 Oct Depart AD.
11 Oct RTU.

AIRBORNE PROFILE RECORDER OPERATIONS REPORT

Task.

1. To obtain vertical control suitable for 1:50 000 mapping using the WREMAPS 11 APR in the areas identified at Annex B.

Execution

2. General Outline. The operation was conducted in two phases:

- a. Phase One. Fly 13700 line kms of APR profiles using the chartered Queen Air aircraft.
- b. Phase Two. The connection surveys of APR profiles to vertical ground control and where necessary, the upgrading of vertical control using MX 1502.

3. Deployment

- a. Phase One. Main bases - Ngukurr 20 Jun - 26 Sep 84
- Elliott 18 Sep - 07 Oct 84.

Forward bases - Gove
- Borroloola.

- b. Phase Two. Main base - Ngukurr 20 Jun - 24 Aug 84
- Borroloola 25 Aug - 05 Oct 84.

Forward base - Calvett Hills.

4. Phase One. The profiling was done in accordance with APR SOPs. Only 8100 line kms were completed due to numerous problems encountered during the Operation. These problems are outlined in Appendices 1 and 2.

5. Phase Two. See Annex E.

Observations

6. With the continual downtime in profiling, levelling teams were not always fully employed. This problem was overcome to some degree by using them to establish horizontal and vertical control using the MX 1502 and by reconnaissance and panelling of ground control. The problem could be overcome by levelling teams not being deployed until one month of successful APR profiling.

7. Reconnaissance and panelling of level traverses is required prior to profiling to save time lost due to lengthy connection surveys or in re-establishing vertical control using MX1502.

8. The use of existing mapping photography in the preselection of intersection points proved very useful.

9. Lag in the Roll and BRU units produces the largest source of error in the equipment. On current technology these units could be improved to increase overall accuracy and reduce the amount of profiles to be re flown. Approximately 20% of profiles on this operation were re flown due to lag in the Roll and BRU units.

10. Whilst profiling over sea, variations of up to six metres within seconds were encountered. It was assumed that this was LASER penetration and therefore the top readings only were accepted.

11. 70mm film sticking due to humidity resulted in some damage to film however it is still usable.

12. Scratches appear on most 70mm films. These were mainly from the film dryer but some were from the film cassettes.

13. The alignment between the aircraft horizon and the TRC plate seem to be in error by approximately 1.5 degrees. This problem should be rectified as soon as possible as it consistently give large amounts of roll and thus increases errors.

14. Some UV charts were very faint, this may have been due to use beyond its expiry date (n.b. UV chart boxes do not show an expiry date) or because they have been stored for periods in hot conditions.

15. Turbulence and/or cloud buildup prevented flying on most days after 1200hrs.
16. Haze on approximately 30% of flying days made navigation very difficult and this resulted in some long level traverses.
17. Intermittent problems with the aircraft intercom proved to be somewhat frustrating for operators whilst profiling.
18. After the problems encountered with the roll gyro, all future operations should include at least one spare roll gyro.
19. Future operations require RAEME technicians to be trained in the installation and checking of oxygen equipment, as no one is qualified.
20. The ATCO hut proved useful as a RAEME repair hut and as a darkroom.
21. The aircraft HF radio was faulty on several occasions.
22. The RAEME ground power supply unit was faulty on a few occasions.

Recommendations

23. Levelling parties only be deployed after one months successful profiling.
24. Reconnaissance and panelled is required of any suspect level traverse prior to profiling.
25. DEVV-A investigates:
 - a. updating the BRU unit,
 - b. acquiring a portable darkroom, and
 - c. replacement of aircraft intercom.

26. At least one roll gyro be included in the APR CES and taken on all future operations.
27. RAEME technicians be trained in the installation and checking of oxygen equipment.
28. Sydney Workshop Company and Airsearch engineers realign the aircraft horizon to the TRC plate.

APR EQUIPMENT REPORT

General

1. This report deals with the RAEME support supplied by Sydney Wksp Coy for Operation Nervose conducted by 4 Fd Svy Sqn using the Airborne Profile Recorder (APR).
2. The RAEME personnel in support of the APR were in two teams:
 - a. Team One - CPL A. VAN COOTEN and CFN S. BOULD
20 Jun 84 - 1 Aug 84, and
 - b. Team Two - SGT D. WALLIS and CFN M. LUEDERS
2 Aug 84 - 4 Oct 84.

Facilities

3. A truck mounted ATCO hut positioned at NGUKURR airstrip was provided by 4 Fd Svy Sqn for use as a work area from 19 Jun - 16 Sep 84. From 19 Sep - 30 Oct 84 a tent set up at Elliott police station was used and the ATCO hut was set up as a dark room.
4. An F.S. table was set up in the ATCO hut for use as a work bench and proved most satisfactory.
5. If a truck mounted ATCO hut is to be used in future operations, it is recommended a set of steps be manufactured to provide safety access.
6. A 10KVA generator was used to supply the 240V A.C. power needed to run the ground supply which provides the 28V for the work area and the aircraft during testing and this proved a satisfactory supply.

APR Spares

7. The RAEME expendable spares were kept in the ATCO hut at the airstrip.

8. The spare APR units were stored in an 11 x 11 tent at the Ngukurr and then at the Elliott police stations.

9. A list of APR faults is attached.

10. The RC10 camera incurred a minor number of faults. These were:

- a. Clutch,
- b. Driving mechanism on the camera and was repaired by installing a new drive unit,
- c. Jammed feed reel,
- d. Release on Camera not working and was repaired by replacement of Print board No 1.

11. MX1502 faults:

- a. Internal battery
- b. Code 10

Down Time

12. Twenty one days were lost due to break down of the Barometric Reference Units (BRU). Most of the time was due to having both BRU's at DRCS for repair at the same time.

13. Most of the other faults were able to be repaired once the aircraft had landed in the afternoon and the aircraft was able to fly again the next day.

14. Time lost due to gyro faults was due to not having a spare gyro, but this has since been rectified and on future operations a spare gyro will be carried.

Conclusion

15. The use of the ATCO hut was a good idea, but to have a container or Tels type set up with shelves and cupboards for spares and test equipment would be more beneficial. It would allow for easier transportation of APR equipment, less chance of any box(es) going astray and enable a work area relatively dust free to be set up near any airstrip.

16. It would be beneficial for the APR mechanics to be trained in the repair at least to field level of the RC10 camera so as to reduce down time.

SUMMARY OF APR REPAIR

<u>Date</u>	<u>Fault</u>	<u>Corrective Action</u>	<u>Date Avail</u>	<u>Remarks</u>
27 Jun	Chart recorder blown globe	Replaced chart recorder	27 Jun	
29 Jun	Laser dropout	Repaired power monitor	30 Jun	Ground power supply was repaired before laser could be operated on the ground
11 Jul	Laser power low	Repaired power monitor	12 Jul	
14 Jul	Start monitor. No height counter test	Replaced start monitor	14 Jul	
15 Jul	Gyroscope precession unstable	Replace gyroscope	21 Jul	Required acft return to Sydney
30 Jul	Incorrect gyroscope synchronization output	Replaced gyroscope	3 Aug	Brought to AO by Team no. 2
5 Aug	70mm camera cassette jammed	Cleaned	5 Aug	
8 Aug	B.R.U. (1) Error	Replaced with B.R.U. (2)	8 Aug	Sent B.R.U. (1) to DRCS for repair
9 Aug	B.R.U. (2) digital analogue outputs	Repaired +5, -15V converter, reset oscillator and A/D converter.	12 Aug	Parts sent from Sydney on 11 Aug
15 Aug	Data recorder no. 3 No seconds readout on digital display.	Repaired Timing Unit	15 Aug	
17 Aug	Data recorder no. 1 wont find calibration pulse on external mode when used with computer.	Re-tensioned & re-aligned tape by doing 11 MT Pack [®] routine	17 Aug	
27 Aug	B.R.U. (2) Pilot's B.R.U. meter decreased so pilot reduced altitude to compensate.	Fault found to be inside inner cavity	5 Sep	Sent units to D.R.C.S Had to await return
5 Sep	B.R.U. (1) roll on data recorder read 7.5	Replaced IC	5 Sep	
5 Sep	B.R.U. (2) roll deflection on chart not symmetrical.	Adjusted R8 for 10mm deflection/degree on recorder.	5 Sep	Found while doing roll test.
15 Sep	B.R.U. (1). Same as 27 Aug	Same as 27 Aug	22 Sep	Same as 27 Aug
30 Sep	Data recorder (1) ejected tape during profile run.	Replaced data recorder	30 Sep	

APPENDIX 2 TO
ANNEX D TO
PROJECT REPORT
OP NERVOSE 84
DATED 21 DEC 84

APR DAILY OCCURRENCE

<u>Serial</u>	<u>Month</u>	<u>Day</u>	<u>Occurrence</u>
1.	JUN	20	ACFT arrived from Sydney
2.		21	No flying - inclement weather
3.		22	1h 30m test flight only. Inclement weather. Acft HF radio faulty.
4.		23	3h 07m profiling - then cloud. 2 successful profiles.
5.		24	3h 46m profiling and photography - then cloud. 2 successful profiles.
6.		25	Inclement weather, flew to Darwin to repair HF radio.
7.		26	Ferry Darwin-Ngukurr, Ngukurr-Gove. Inclement weather.
8.		27	2h 55m profiling, UV Chart recorder lamps unservicable, replaced with spare UV Chart recorder. Weather turbulent. 2 unsuccessful profiles.
9.		28	7h 17m profiling, 1 profile lost due to turbulence, 2 unsuccessful profiles due to continual LASER dropout, 2 successful profiles. Ground power supply U/S.
10.		29	5h 35m photography, RC10 Camera take up clutch U/S. Power supply and clutch repaired.
11.		30	3h 35m profiling, Abort due to turbulence. One successful profile. Panelled and photographed NTS 020.
12.	JUL	01	1h 48m profiling. Aborted due to turbulence and UV chart recorder stopping for 30 sec. RAEME did ground test. Aircraft jack leaking oil.
13.		02	Pilot rest day. Aircraft jack repaired
14.		03	3h 31m profiling, RC10 drive unit unservicable. 2 successful profiles.
15.		04	Flew to Darwin to despatch unservicable Drive Unit and collect new unit, however due to TAA error it was sent to Melbourne and did not arrive in Darwin until the next day.
16.		05	Ferry Darwin to Ngukurr. 3h 42m profiling. Aborted due to cloud. 1 successful profile.
17.		06	Pilot ill.
18.		07	Pilot ill.
19.		08	4h 16m profiling. Acft returned with crack in water line to laser and one roll of UV chart paper did not develop (batch no 22405-23903HYD), 1 out of 2 profiles successful.
20.		09	2h 22m profiling and photography. 1 successful profile then cloud.

Serial	Month	Day	Occurrence
21.		10	4h 04m profiling. 1 out of 3 successful profiles. Turbulence and cloud.
22.		11	1h 59m profiling. Cloud only photography. 3 points.
23.		12	2h 39m profiling. 1 unsuccessful profile due to cloud.
24.		13	Incident weather.
25.		14	Incident weather.
26.		15	RACME ground test found Rolli gyro precessing. Aircraft despatched to Sydney and Melbourne for new gyro and 10th service.
27.		16-22	Aircraft in Melbourne.
28.		23	Aircraft returned.
29.		24	Test flight. Incident weather.
30.		25	0h 46m. Incident weather.
31.		26	3h 15m. Incident weather.
32.		27	7h 51m. 4 out of 6 profiles successful. Problem with Trace Intensity on UV chart recorder and BRU occasionally stepping 2 to 3m. Aircraft flew to Katherine to have left hand wheel bush checked.
33.		28	Pilot rest day.
34.		29	6h 24m. 3 successful profiles. Some turbulence in the afternoon.
35.		30	RACME ground test found Rolli gyro precessing again. Replacement gyro arriving 2 Aug 84.
36.		31	6h 56m photography.
37.	AUG	01	3h 32m field completion photography of 4969 Movie.
38.		02	Pilot rest day awaiting gyro.
39.		03	RACME installed gyro. 1h 52m test flight and 1 successful profile, however problem with the 70mm film speed.
40.		04	Incident weather.
41.		05	4h 50m. 1 out of 3 profiles successful, due to cloud and 70mm camera jamming.
42.		06	3h 57m. 1 out of 2 profiles successful. Turbulence and 1 min of data lost on UV chart. RACME changed UV chart recorders.
43.		07	5h 54m. 2 out of 4 profiles successful. Turbulence and Rolli and BRU stopped. Aircraft flew to Katherine to have spinner back plate realigned on the right engine.
44.		08	0h 05m. BRU stuck on +2.0.
45.		09	BRU still unserviceable.
46.		10	BRU still unserviceable. SMC sent replacement part to Darwin.
47.		11	Aircraft flew to Darwin to get replacement parts.
48.		12	2h 25m test flight and profiling.
49.		13	7h 30m. 3 out of 5 profiles successful. Large BRU and Rolli rates of change.
50.		14	5h 16m. 3 successful profiles.
51.		15	2h 47m. 2 unsuccessful profiles. Timing unit faulty.
52.		16	4h 57m. 2 out of 3 profiles successful. Turbulence. Aircraft leaking a lot of oil.
53.		17	Aircraft grounded due to oil leak. Ferry Borroloola to Ngukurr, 1h 05m.

<u>Serial</u>	<u>Month</u>	<u>Day</u>	<u>Occurrence</u>
54.		18	Aircraft flew to Darwin for 100h service and to repair oil leak.
55.		19-22	Aircraft in Darwin.
56.		23	Aircraft returned to Ngukurr.
57.		24	3h 29m. Profiling unsuccessful due to inclement weather.
58.		25	1h 20m. Inclement weather.
59.		26	4h 30m. 1 out of 2 profiles successful. Height loss of aircraft not showing on BRU.
60.		27	4h 03m. Profiling unsuccessful due to aircraft losing height. Problem in BRU.
61.		28	3h 54m. Profiling unsuccessful due to height loss. Test flight showed everything OK.
62.		29	2h 34m. Profiling unsuccessful due to height loss. Drove to Katherine to send BRU parts to DRCS.
63.		30	Awaiting new BRU.
64.	SEP	04	New BRU arrived. Aircraft jack faulty.
65.		05	3h 22m. Test flight and profiling but unsuccessful due to turbulence. RAEME ground tested equipment.
66.		06	5h 00m. 4 successful profiles.
67.		07	3h 16m. Unsuccessful due to turbulence. Aircraft has low fuel pressure in right engine. Aircraft grounded.
68.		08-13	Awaiting replacement part for aircraft.
69.		14	Replacement part installed in aircraft. Test flight 0h 50m.
70.		15	4h 16m. Unsuccessful due to aircraft losing height, problem in BRU.
71.		16-20	Awaiting replacement BRU from DRCS. Moved from Ngukurr to Elliott.
72.		21	Replacement part arrived in Tennant Ck. Collected, installed and test flown 1h 45m.
73.		22	Profiling 5h 39m.
74.		23	Profiling 3h 53m.
75.		24	Worked on loop closures in Borroloola area.
76.		25	Reflew profiles 4h 00m.
77.		26	Reflew profiles 4h 03m.
78.		27	Reflew profiles 4h 01m. Accepted all unadjusted and uncorrected loop misclosures in Borroloola area.
79.		28	Flew level packages to Borroloola, 3h 42m.
80.		29	2h 05m. Aborted due to haze and turbulence.
81.		30	4h 02m. A lot of haze.
82.	OCT	01	Pilot rest day.
83.		02	2h 24m. Unsuccessful due to cloud.
84.		03	2h 15m. Unsuccessful due to cloud.
85.		04	Aircraft released with OC's permission.

APR DATA PROCESSING REPORT NERVOSE 84

Data Extraction

1. All data was extracted and checked in the field in accordance with the SOP's. Data was computed in accordance with SOPs using the data cassette and Telectronics or extracted from UV charts.
2. SL heights were calculated on the Telectronic using Aust Nat Tide Tables 1984 and standard ports existing in the area.
3. On return from the field, the final package was collated by the APR manager, leaving (puportedly) only the flight line diagrams to be finalized. However, with reference to the SOP's and Army Survey Regt and subsequent advice received from the APR Manager, the requirement to produce input for the Primary Adjustment was determined. This task was undertaken by unit personnel.

Loop Closure Determination

4. Loop closure information (i.e. diff hts) were extracted directly from profile computation forms. When excessive loop closures existed, the 10 sec plots were re-examined and frequently new values were derived in an attempt to reduce loop misclosure. In some instances diff hts were computed several times as checking was made difficult due to copies of previous computations not being kept. An amendment to SOP's requiring all copies of profile computation forms etc, to be maintained on the line folders would appear necessary.
5. Loop closures were re-determined or checked on a number of occasions resulting in a confusing selection of values which made the final check more difficult and time consuming than should be necessary. This became particularly apparent when input for the Primary Adjustment was being collated. Clear and precise procedures outlining the methods of determining and recording these results need to be included in the SOP.

Problems Encountered During Data Computation

6. CP 07. Levelling connections were not made to this point as established vertical control was not found. An IP with existing BRASS KEY APR was determined to be unsuitable. This line will need to be controlled in the adjustment, i.e. isoline terminating at an IP.

7. CP 57. The planned control U485 was found to introduce error in RI011. The actual source of the error cannot be precisely determined, being either the extraction of the profile value or in the ground identification of the point on the APR line from which the diff ht was levelled. Consequently the point was dropped from the line. This increases the profile line length to 220km (optimum/ideal length 100km).

8. IP 116 (Benmara Block). It was not discovered by unit personnel until RTU that this point, critical to the adjustment, had not been identified due to excessively dark 70mm strip film (RT079). No action can be taken to resolve this situation. Its exclusion will weaken the adjustment in this area. If future APR is flown on the block to the south, this line should be re-flown.

9. CP 12 and CP 43 (RI003 and RI036). Both CPs are at sea level. The SL heights were not determined in the field. The non-inclusion of these points would introduce excessive line length. The values of both stations are to be determined by Army Svy Regt for inclusion in the Primary Adjustment.

10. Lack of RC 10 Coverage. Due to camera unservicability RI078 and RI079 were flown without RC10 support. This has no significant effect on the network.

Changes Applied To The Recommended Network

11. There were numerous amendments to the network recommended by Army Svy Regt in Nov 83. Some of these changes were those approved by DSVY-A prior to the commencement of the operation, others were applied during the progress of the operation. The main amendments were:

- a. the extension of profiles outside the adjustment area to gain control to the east and south of the Benmara Block, and
- b. the establishment of geociever stations U814, U729, U485 and U121 to gain higher accuracy in vertical control for profiles and shorter distances between existing control.

Primary Adjustment Input

12. The primary adjustment was split into 3 blocks to meet the criteria for input. The blocks were named N.E. ARNHEM, NATHAN RIVER and BENMARA. The resultant blocks are approximately equal in magnitude and the 3 adjustment packages have been completed.

13. A considerable amount of time and effort was expended attempting to join Op NERVOSE 84 heights to those of OP BRASS KEY 76 without success. After consultation with Army Svy Regt, it was decided, where possible, not to include Brass Key data in the Nervose adjustment.

14. Army Svy Regt also advised that it is less than optimum to have 2 or more successive lines terminating at IPs. This occurs at the SW corner of the Benmara Block and may result in a weakening of the adjustment in this area. This will be determined by Army Svy Regt.

15. Format for the Primary Adjustment input is in accordance with instructions received from Army Svy Regt, not the SOP's which, it would appear, require amendment.

N. E. ARNHEM



ADJT PT NO	TRANS NO
1	11/76
2	10/46
3	5/76
4	4/76
5	3/76
6	2/76
7	E5/54
8	11/37
9	8/46
10	5/37
11	NTS 500
12	4/37
13	3/37
14	2/37
15	U 706
16	ES/45
17	ES/42
18	25/52
19	11/25
20	25/46
21	5/25
22	4/25
23	3/25
24	U 674
25	ES/76
26	DK/55/76
27	20/39
28	39/52
29	11/39
30	39/46
31	5/39
32	4/39
33	ET/27
34	19/25
35	20/25
36	36/52
37	E/1/21
38	36/46
39	5/35
40	U 721
41	U 720
42	E/07
43	145
44	ET/13
45	14/45

LEGEND
 AND CONTROL
 COASTAL CONTROL
 ISOLINE NUMBER
 ADJT PT NO
 DIRECTION OF +ve DIFF HT

COMPILED BY: [Signature] RW JONES SGT

GROUND CONTROL

1. Introduction. The requirement was for all the APR profiles that were flown to be connected to AHD benchmarks by third order spirit levelling. The serviceability of the APR equipment was very poor which resulted in actual levelling not commencing until 6 Jul 84 and the last connection being done on 3 Oct 84. The levelling parties initially worked out of Ngukurr until the EAST ARNHEM block was finished, then moved to Borroloola to complete the BARKLY block.

2. Office Preparation. Prior to the commencement of the operation, levelling packages were made for each control point (CP) requiring connection to AHD. The packages contained:

- a. 1:100 000 strip map,
- b. 1:250 000 strip map,
- c. printout of AHD value for the benchmark (BM) nearest the CP,
- d. copy of Dept of Interior level traverse diagrams for the EAST ARNHEM Block if applicable, and
- e. any other information considered relevant.

3. Timings. The following timings applied:

- a. 22 Jun - 25 Aug 84 operating from Ngukurr.
- b. 26 Aug - 5 Oct 84 operating from Borroloola.
- c. 28 Sep - 2 Oct 84 operating from Calvert Hills.

4. Control Points. A total of 200km of levelling was carried out during the operation and 48 CP were connected to AHD BM by 3rd order levelling. Where a N-S and E-W profile intersected at a CP (12 such cases), both profiles were connected to the nearest BM. A N-S profile from DP BRASS KEY 76 which was reflown was connected to three CPs in the MT EVELYN area. A total of 3 CP were not connected to AHD because suitable BM could not be located. The omitted CP are Nos 7, 91 and 109. Refer to Appendix 3 to Annex D.

5. Execution. Two man parties complete with levelling packages, RC10 photography and enlargements of 70mm strip film were tasked to acquire the CP connections. Parties were increased to three personnel toward the completion of the operation to reduce acquisition time.

6. Doppler Stations. Insufficient vertical control in the AD required that existing horizontal control be strengthened in height and one new station had to be established. This was achieved with Magnavox MX1502 Georeceiver in the translocation mode. Five satellites were used although initially only 4 were operational. The following stations were occupied and observed:

<u>Serial</u>	<u>Stn No and Name</u>	<u>Proc No</u>	<u>Occupation</u>	<u>Mode</u>	<u>Remarks</u>
1.	U121 MOORE	11883	26/7-29/7	Master	1st order trig
2.	U485 KENNEDIE	11884	26/7-29/7	Remote	Aerodist
3.	U121 MOORE	11886	12/8-14/8	Master	1st order trig
4.	U814	11885	12/8-14/8	Remote	New station
5.	U130 TRIG HILL	11887	24/9-26/9	Master	1st order trig
6.	U729	11918	24/9-26/9	Remote	Existing Doppler Station

Note: Serials 1-4 were based at Ngukurr, serials 5-6 based at Borroloola.

7. Level Traverses. Initially road travel in the EAST ARNHAM Block was restricted due to flooding of the Wilton River. Difficulty was had throughout in locating BMs. The main reason for this was the fact that the level traverse routes were no longer in juxtaposition with roads due to the extensive realignment and new road construction which has occurred in the area. Some packages contained only enlargements of 70mm strip film and no RC10 prints. In some instances, orientation of overlays proved difficult and if no cultural or other identifiable features existed would have proved impossible. The problem was compounded by distortion due to aircraft roll in some enlargements. The connection at U120 Mt Roper (CP420) required a cross-section 200m in length with levels at 20m intervals at right angles to the APR profile to allow determination of the connection height.

8. Contacts The following people were of assistance:

<u>Serial</u>	<u>Name</u>	<u>Position</u>	<u>Employer</u>	<u>Location</u>	<u>Telephone</u>
1.	Mr John Veal	Chief Surveyor	NT Lands	Darwin	(089) 895511
2.	Mr P Hockman	Chief Surveyor	Dept of Tpt and Works	Darwin	(089) 351263
3.	Mr Phil Maynard	Surveyor	Dept of Tpt and Works	Katherine	(089) 720217
4.	Mr Col McKenzie	Engineering Surveyor	Dept of Tpt and Works	Tennant Ck	(089) 622004
5.	Mr Vance Ingham		BMR	Canberra	(062) 525989

9. Premarking BM. Due to the number of breakdowns with the APR equipment, time was spent finding and premarking benchmarks. This reduced the AHD connection time when the level package was finally released to the field. Further, temporary BM were established every 2 to 3km from the AHD BM towards the proposed CP. This ensured that irrespective of where the APR profile was flown, only a short connection would result.

Stores

10. The levelling parties were issued stores at Ngukurr and these remained with them for the duration of the operation. Each team was self contained, having one Landrover complete with stores, requiring rations only to become operational.

11. Prior to departure from Adelaide, the following special stores were purchased:

- a. collapsible tripod legs - qty 2, and
- b. qty of PVC tubular piping for storage of tripod legs and staves.

These stores proved invaluable for providing protection to stores carried in Landrovers and for portability of tripod legs in LOH fitted with auxiliary tanks.

FIELD COMPLETION REPORT
OF LONG WALKABOUT

Introduction

1. This task, authorized by reference B to the main report to be carried out as Op LONG WALKABOUT, required the field completion of 23 x 1:50 000 preliminary maps prior to their cartographic completion and subsequent printing. It was carried out concurrently with Op NERVOSE 84.

Execution

2. Field completion was carried out in the period 7 - 19 Jun 84, based out of Daly River and Port Keats using Catholic Mission accommodation at both locations. A total of 53 LOH hrs were used for the air inspection.

Field Completion Packages

3. On receipt, the AUTOMAP packages were checked and all accumulated source data amalgamated. A composite positive master sheet was then produced. The following ozafilm overlays were produced for each package:

- a. composite drainage/cultural colour guide to be used as a field worksheet,
- b. vegetation color guide to be used as a field worksheet,
- c. master correction overlay, and
- d. three overlays to be used as the final drainage, vegetation and road colour guides.

4. Mapping photo coverage of the area and additional large scale photography flown by NT Lands Dept in 1982 was obtained, evaluated and used to check compilations prior to deployment to the field.

Field Completion Method

5. Prior to commencement of aerial field check, party ICs conducted a familiarization flight in the AD to ensure consistency in interpretation and classification.

6. Two by two man parties conducted aerial field checks, rotating on a daily basis. Subsequently master correction overlays, colour guides and reports were prepared. Areas with extensive new development were identified as requiring supplementary photography; this was subsequently flown with the APR aircraft.

Comments

7. Using the method outlined, difficulty was encountered in discerning small vegetation and drainage areas.

8. An uncontrolled mosaic was prepared with the supplementary photography acquired and used to field complete new development in sheet areas 4969 1 and 4969 4.

9. The intertidal area was inspected at low tide to ascertain its extent and shape. However, the combination of a very high fresh water run off from the recent heavy "wet", a measured tidal interval of 6.8h and a consequent tide variation of 1m per hour made this check inconclusive.

Conclusion

10. Overall plotting and depiction of the area was good although spoiled at times to some extent by seemingly low standards of quality control, particularly with respect to boundary completeness and classification.

11. Intertidal zone in areas experiencing a large tidal change need to be plotted in conjunction with high and low tide photography.

Recommendations

12. Future AUTOMAP packages are presented for field completion as offset printed preliminary maps.

13. Intertidal area depiction be checked against LANDSAT imagery in the relevant bands taken at high and low tide.

STATION IDENT PHOTOGRAPHY REPORT
OF NERVESE B4

1. Panelling was conducted in four phases during the operation as follows:
 - a. Phase 1 - 33 points visited from Gove.
 - b. Phase 2 - 8 points visited from Ngukurr, including 4 revisits.
 - c. Phase 3 - 11 points visited from Borroloola.
 - d. Phase 4 - 3 points visited from Ngukurr.
2. Personnel involved were:
 - a. Phase 1
 - (1) LT A. Griffiths, AAVN.
 - (2) SGT N. Jones, RASVY.
 - (3) LCPL G. Browning, RAEME.
 - b. Phase 2
 - (1) LT B. Bartetzko, AAVN.
 - (2) LT A. Griffiths, AAVN.
 - (3) SGT N. Jones, RASVY.
 - (4) CPL R. Marsing, RASVY.
 - (5) LCPL G. Browning, RAEME.
 - c. Phase 3
 - (1) LT C. Evans, AAVN.
 - (2) SGT W. Tewson, RASVY.
 - (3) SPR R. Beavis, RASVY.
 - (4) CFN A. Singh, RAEME.

d. Phase 4

- (1) LT B. Heathwood, AAVN.
- (2) SS6T B. Lutwyche, RASVY.
- (3) CPL D. Longbottom, RASVY.
- (4) CPL S. Dobb, RASVY.

Movements

3. Phase 1. A Cessna 206 light aircraft on civil charter was used for the movement of paneling stores and one member from Ngukurr to Gove. LOH was used for insertion/extraction of personnel and was employed for the movement involved in the paneling task. LOH hours used, 28.2hr. NORFORCE supplied 1 x Toyota Landcruiser for administrative movements in the Gove area. The vehicle was also employed to panel two local stations that were accessible by road.
4. Phase 2. LOH was used for insertion/extraction of members to stations visited and panelled. LOH hours used, 18.7hr.
5. Phase 3. LOH was used for insertion/extraction of 2 members and for movement to stations panelled. LOH hours used 16.1hr. Landrover was used to move 2 members and stores to the project area.
6. Phase 4. LOH was used for movement to stations. LOH hours used 5.5hr.
7. Expenditure. Total LOH hours used, 68.8hr. Cost of civil charter, 3.5hr at \$185-00 per hour, total cost \$651-00.

Rations and Quarters

8. Phase 1. Accommodation and rations at Gove was supplied by NABALCO at an all inclusive charge of \$30-00 per day per member, total cost \$630-00.
9. Phase 2. The only cost incurred during this phase was due to revisiting stations U700 and U464, necessitating an overnight stay at Gove. Total expenditure \$90-00 being 3 members for 1 night.
10. Phase 3. A small quantity of rations were taken from main base, the remainder were purchased locally at a total cost of \$154-21. Quarters were provided at the police station at no cost.
11. Phase 4. No additional costs were incurred for rations and quarters.

Communications

12. Phase 1. Radio telephone link from Gove was found to be unsuitable due to unreliability and delays. NT Police radio net (VKY) was used as a backup on an 'at call' basis and was found to be suitable.
13. Phase 2. Nil communications required.

14. Phase 3. Unit radio net employed on a schedule basis. Problems with communications were encountered in early morning and late afternoon.

15. Phase 4. Nil communications required.

POL

16. Phase 1. Bulk AVTUR was purchased at Gove (B.P. Gove) and on Groote Eylandt (Mobil). Total AVTUR purchased was 1 426li at an estimated cost of \$1200-00. After hours refuelling at Gove incurred at call-out fee of \$133 and on Groote Eylandt a fee of \$25-00. Due to operational requirements, costs of \$266-00 and \$25-00 respectively were incurred. Four (4) x 200li drums of AVTUR were prepositioned at ELCHO ISLAND. 400li only were used.

17. Phase 2. Bulk AVTUR supplied by B.P. Gove and Mobil Groote Eylandt. Total supplied approx 400li. 200li bulk AVTUR supplied at Tindal with an after hours call-out fee of \$25-00. Drummed stocks used at Ngukurr.

18. Phase 3. All fuel used during this phase was from drummed supplies prepositioned at Ngukurr, Borrloola and Calvert Hills.

19. Phase 4. All fuel used during this phase was from drummed supplies at Ngukurr.

Timings

20. Phase 1. Conducted from 6 Jun to 15 Jun 84.

21. Phase 2. Conducted from 16 Jun to 1 Jul 84.

22. Phase 3. Conducted from 6 Jul to 14 Jul 84.

23. Phase 4. Conducted from 25 Aug to 26 Aug 84.

Stations Panelled

24. Phase 1. The following stations were panelled or visited during this phase:

a. U465 Flat Rock.

b. U335 GRM.

c. U217 Mallison.

d. U462 Veronica Island. Due to panels being laid over boulders, the effective length of panels is only 4 - 4 1/2m. A marine navigation beacon has been erected 5m to the south of the station on a bearing of 165° mag. Beacon is 0.13m in diameter and 3.2m high.

e. U333 Blowhole.

f. U455 Bradshaw.

- g. U215 Cape Wilberforce. Only three panel arms laid due to proximity of cliff and rocks.
- h. U703. Damp underfoot, grass 1.8m high surrounds the station. The station cannot be occupied during the wet season.
- i. U453. Not panelled due to inaccessibility. No suitable landing areas found. Panels laid in Aug 82 appear to be intact and in good condition.
- j. U691.
- k. U473 South.
- l. U357 Tip.
- m. U470 Eugarl.
- n. W. RAN.
- o. U491 Nicol Is North.
- p. U489 Woodah Is North.
- q. U289 Shield.
- r. U501 Bustard Is North. Due to station being situated on isolated rocks, the panel arms were draped over the rocks. The effective length of the east and west panel arms was reduced to 4 m.
- s. U502 Bustard Is South.
- t. U734. Height of statin from station summary 16.13m. This height is considered dubious as station appears no more than 5 - 6m above sea level.
- u. U500 Hawknest Is South.
- v. U705.
- w. NTS 417 Twin Hills.
- x. U479 Dudley Is.
- y. U213 Alexander.
- z. NTS 195 Drimmie Head. Due to rocks and mounting of station only two (2) panel arms were laid.
- aa. U477 Three Hummocks.
- bb. Stations also visited during this phase U210 Arrowsmith, U212 Grey, U464 Dingo and U700. These stations were not panelled during this phase.

25. Phase 2. The following stations were panelled during Phase 2:

- a. U210 Arrowsmith. Station mark not found on original visit. Ground mark recovered on revisit. Cause of problem was incorrect information on Station Summary. The station was panelled.
- b. U212 Grey. Station was found to be destroyed on original visit. During revisit an intersection was carried out using remnants of panels laid in Aug 82 as a reference. The point was then panelled. It is believed that using the old panels and the nature of the terrain that the point is within 2m of its original position.
- c. U464 Dingo. Landing zones not located on first visit. On a subsequent visit pad was cleared for access. Limited clearing performed. Station requires extensive clearing.
- d. U700. Station was inundated by 0.3m of water on original visit. On revisit water was only 0.1m deep. Panels were laid between wire to ensure stability. Station is unusable during wet season.
- e. U114 Mt Day. Station summary is incorrect. Witness post as per summary is on a bearing of 225° magnetic, however the witness post is actually on a bearing of 281° magnetic.
- f. U121 Mt Moore. Recovery information to be updated and corrected by subsequent visit of Geociever party.
- g. U124 Mt Young. Only three panels laid due to escarpment adjacent to GM.
- h. U513 Sandy Island. Station markings not found. Island has been awash so presumable GM etc have been either washed out or covered by sand. The island by its nature changes shape and dimension. Photography is to all intents and purposes useless. A panel was laid and mag bearings taken to assist in azimuth positioning.

*Station Destroyed
This Site
6 APR 87.*

is approx. position.

26. Phase 3. The following were panelled:

- a. A694
- b. NMG 225
- c. NMG 224
- d. NMG 184
- e. NMG 221
- f. U132
- g. U135
- h. U139
- i. A600

j. NMB 16

k. U724

27. Phase 4. The following were panelled.

a. NTS 288, U115 Mt Sir James

b. U516 Swamp

c. U520 Marok

OPERATION NERVOSE 84
=====IDENT PHOTOGRAPHY SUMMARY
=====

NUMBER	STATION NAME	DATE	SHAPE	DATE	FLYING	ACCEPT	MISSION	FRAME NO
		PANELLED		PHOTO	HEIGHT		NO	
	W RAN ✓	10JUN84	+	29JUN84	3 300M	YES	156	0019-0021
A600 ✓		12JUL84	+	31JUL84	3 300M	YES	167	0099-0101
A654 ✓		09JUL84	+	31JUL84	3 300M	YES	167	0095-0097
NMB16 ✓		09JUL84	+	31JUL84	3 300M	YES	167	0091-0093
NMG184 ✓		11JUL84	^	31JUL84	3 300M	YES	167	0119-0121
NME221 ✓		08JUL84	+	31JUL84	3 300M	YES	167	0115-0117
NME224 ✓		11JUL84	+	31JUL84	3 300M	YES	167	0123-0125
NMS225 ✓		11JUL84	Y	31JUL84	3 300M	YES	167	0127-0129
NTS020 ✓	ARBULOK	30JUN84	^	30JUN84	3 300M	YES	157	0088-0090
NTS195 ✓	DRIMMIE HEAD	14JUN84	<	31JUL84	3 300M	?	167	0082-0084
NTS288 ✓	MOUNT SIR JAMES	25AUG84	✓	17SEP84	3 300M	YES	179	0122-0124
NTS417 ✓	TWIN HILLS	13JUN84	+	29JUL84	3 300M	YES	166	0163-0165
U114 ✓	MOUNT DAY	17JUN84	+	29JUN84	3 300M	YES	156	0001-0003
U115 ✓	(SEE NTS288)							
U121 ✓	MOUNT MOORE	18JUN84	+	29JUN84	3 300M	YES	154	0039-0044
U124 ✓	MOUNT YOUNG	18JUN84	✓	00JUL84	3 300M	YES	160	0001-0005
U132 ✓		08JUL84	+	31JUL84	3 300M	YES	167	0111-0113
U135 ✓		08JUL84	+	31JUL84	3 300M	YES	167	0107-0109
U139 ✓		09JUL84	+	31JUL84	3 300M	YES	167	0103-0105
U209 ✓	SHIELD	11JUN84	+	29JUN84	3 300M	YES	156	0043-0045
U210 ✓	ARROWSMITH	16JUN84	+	29JUN84	3 300M	YES	156	0038-0042
U212 ✓	GREY	16JUN84	+	11JUL84	3 300M	YES	162	0001-0003
U213 ✓	ALEXANDER	13JUN84	+	10JUL84	3 300M	YES	161	0228-0230
U215 ✓	CAPE WILBERFORCE	09JUN84	✓	10JUL84	3 300M	YES	161	0028-0030
U217 ✓	MALLISON	09JUN84	+	24JUN84	3 300M	YES	153	0120-0122
U333 ✓	BLOWHOLE	09JUN84	+	10JUL84	3 300M	YES	161	0036-0038
U335 ✓	GRIM	09JUN84	+	23JUN84	3 300M	YES	152	0096-0098
U357 ✓	TIP	10JUN84	+	29JUN84	3 300M	YES	156	0025-0027
U453 ✓		1982		31JUL84	3 300M	YES	167	0078-0080
U455 ✓	BRADSHAW	09JUN84	+	10JUL84	3 300M	YES	161	0232-0234
U452 ✓	VERONICA ISLAND	09JUN84	+	10JUL84	3 300M	YES	161	0032-0034
U464 ✓	DINGO	20JUN84	×	11JUL84	3 300M	YES	162	0004-0006
U465 ✓	FLAT ROCK	08JUN84	+	23JUN84	3 300M	YES	152	0092-0094
U470 ✓		10JUN84	+	29JUN84	3 300M	YES	156	0022-0024
U473 ✓	SOUTH	10JUN84	✓	24JUN84	3 300M	YES	153	0116-0118
U477 ✓	THREE HUMMOCKS	15JUN84	+	10JUL84	3 300M	YES	161	0224-0226
U479 ✓	DUDLY ISLAND	13JUN84	+	10JUL84	3 300M	YES	161	0220-0222
U489 ✓	WOODAH I. NORTH	11JUN84	+	10JUL84	3 300M	YES	161	0075-0077
U491 ✓	NICOL I. NORTH	11JUN84	+	29JUN84	3 300M	?	156	0018
U491 ✓	NICOL I. NORTH	11JUN84	+	09JUL84	3 300M	YES	161	0080-0082
U500 ✓	HARKNEST I. STH.	11JUN84	✓	29JUN84	3 300M	YES	156	0010-0012
U501 ✓	BUSTARD I. NORTH	11JUN84	+	29JUN84	3 300M	YES	156	0013-0017
U502 ✓	BUSTARD I. SOUTH	11JUN84	+	29JUN84	3 300M	YES	156	0013-0017
U513 ✓	SANDY ISLAND	19JUN84	+	29JUN84	3 300M	?	156	0004-0006
U515 ✓	SWAMP	25AUG84	+	17SEP84	3 300M	YES	179	0130-0132
U520 ✓	MAROK	26AUG84	+	17SEP84	3 300M	YES	179	0114-0116
U651 ✓		10JUN84	+	29JUN84	3 300M	YES	156	0028-0030
U700 ✓		21JUN84	+	29JUN84	3 300M	YES	156	0031-0033
U703 ✓		09JUN84	+	31JUL84	3 300M	YES	167	0074-0076
U703 ✓		12JUN84	+	11JUL84	3 300M	YES	162	0007-0009
U724 ✓		09JUL84	+	31JUL84	3 300M	YES	167	0086-0089
U734 ✓		11JUN84	+	29JUN84	3 300M	YES	156	0007-0009
U814 ✓		12AUG84	+	12AUG84	3 300M	YES	172	0001-0003



LEGEND

- ▲ - PANELLED / PHOTOGRAPHED
- △ - NOT PANNELLED / NOT PHOTOGRAPHED

SCALE - 1:2,500,000

COMPILED - *BDJ*: Oct 84 (Cpl)
 CHECKED - *WJ*: 29 Oct 84 (Sgt)

APPENDIX 2 to ANNEX G
 TO PROJECT REPORT
 OP NERVEUSE 84

OPERATION NERVOSE 84 - NOMINAL ROLL
=====

REG'TL NO	RANK	NAME	UNIT	EMPLOYMENT	PERIOD
322069	CAPT	DEMAINE P.C.	2 FD SVY SQN	OIC/APR MANAGER	01JUN-12OCT84
231963	LT	KENTSCHER M.J.	4 FD SVY SQN	CONTROL SURVEYS	20AUG-12OCT84
41896	WO1	MUNRO W.A.	4 FD SVY SQN	ADMIN/LOG OFFR	01JUN-12OCT84
45423	WO2	HINIC S.	4 FD SVY SQN	OPS OFFR	01JUN-10OCT84
6708956	SSGT	LUTWYCHE B.J.	4 FD SVY SQN	CONTROL SVY	20AUG-09OCT84
313339	SSGT	TIMMINS G.E.	4 FD SVY SQN	CONTROL SVY	20AUG-12OCT84
222877	SGT	JONES N.W.	4 FD SVY SQN	APR OP & PANEL	01JUN-10OCT84
314445	SGT	REES R.J.	4 FD SVY SQN	APR OP	01JUN-12OCT84
61800	SGT	TEWSON W.M.	4 FD SVY SQN	CONTROL SVY	01JUN-24AUG84
221728	SGT	WALLIS D.J.	SYD WKSP COY	APR TECH ELEC	01AUG-27SEP84
226435	CPL	CAPP S.C.	2 FD SVY SQN	APR OP	01AUG-27SEP84
225599	CPL	CHOY K.B.	4 FD SVY SQN	APR OP	20AUG-12OCT84
226435	CPL	GEORGE K.M.	2 FD SVY SQN	APR OP	18JUN-02AUG84
22178	CPL	GOURLAY R.P.	ADL WKSP COY	VEH MECH	01JUN-24AUG84
3176518	CPL	HAWKINS A.R.	4 FD SVY SQN	CONTROL SVY	01JUN-12OCT84
323139	CPL	HILL S.	2 FD SVY SQN	AIR CAMERA OP	18JUN-02AUG84
58086	CPL	JORDAN B.N.	DSU ADL	COOK	20AUG-10OCT84
317462	CPL	LAZZARI V.	4 FD SVY SQN	COOK	01JUN-24AUG84
49654	CPL	LONGBOTTOM P.D.	4 FD SVY SQN	AIR CAMERA OP	01AUG-12OCT84
56139	CPL	RATCLIFFE J.A.	4 FD SVY SQN	CONTROL SVY	01JUN-24AUG84
1204969	CPL	VAN COOTEN A.L.	SYD WKSP COY	APR TECH ELEC	18JUN-09AUG84
63195	CPL	WAREING R.W.	4 FD SVY SQN	AIR CAMERA OP	01JUN-24AUG84
511970	LCPL	BROWN C.	4 FD SVY SQN	CONTROL SVY	01JUN-24AUG84
180949	SPR	BEAVIS R.P.	4 FD SVY SQN	CONTROL SVY	01JUN-12OCT84
319967	CFN	BURRELL P.C.	ADL WKSP COY	VEH MECH	20AUG-12OCT84
324772	CFN	GOULD S.J.	SYD WKSP COY	APR TECH ELEC	18JUN-02AUG84
3143401	SPR	GRAHAM B.A.	4 FD SVY SQN	CONTROL SVY	01JUN-12OCT84
3104368	CFN	LIEDERS M.A.	SYD WKSP COY	APR TECH ELEC	01AUG-05OCT84
179265	CAPT	MCDUGALL G.A.	162 RECCE SQN	LOH PILOT	18-22JUN84
1203596	CAPT	SOUTH D.P.	162 RECCE SQN	LOH PILOT	07-19JUN84
4401096	LT	BARTETZKO R.B.	162 RECCE SQN	LOH PILOT	18JUN-06JUL84
226772	LT	EVANS C.I.	162 RECCE SQN	LOH PILOT	07-30JUL84
416631	LT	GRIFFITH A.J.	162 RECCE SQN	LOH PILOT	07-19JUN84
1206358	LCPL	BROWNING G.	162 RECCE SQN	ACFT MAINT	07-19JUN84
1202486	LCPL	PETTIT C.G.	162 RECCE SQN	ACFT MAINT	07-19JUN84
225348	CFN	DALEY G.	162 RECCE SQN	ACFT MAINT	18JUN-06JUL84
314020	CFN	HICKCOX K.W.	162 RECCE SQN	ACFT MAINT	18-22JUN84
318569	CFN	SINGH A.A.	162 RECCE SQN	ACFT MAINT	07-30JUL84
1204636	LT	HEATHWOOD B.R.	171 COMD&LIAISON	LOH PILOT	22AUG-13SEP84
3143049	LT	JAMESON C.G.	171 COMD&LIAISON	LOH PILOT	13SEP-04OCT84
360821	LT	TAVDAR M.A.	171 COMD&LIAISON	LOH PILOT	06-25AUG84
552681	CPL	TILBY S.N.	171 COMD&LIAISON	ACFT MAINT	13SEP-04OCT84
1205099	LCPL	HICKEY N.J.	171 COMD&LIAISON	ACFT MAINT	30JUL-26AUG84
58483	CFN	BANNISTER M.A.	171 COMD&LIAISON	ACFT MAINT	22AUG-13SEP84
	MR	WARD J.F.	AIRSEARCH P/L	QUEENAIR PILOT	20-25JUN84
	MR	MEGGS K.R.	AIRSEARCH P/L	QUEENAIR PILOT	26JUN-04OCT84