



4th Field Survey Squadron

# Operation MIZMAZE 92

## *Operation Report*

A field completion and control survey operation  
conducted in  
the Kimberley region of Western Australia

May - June 1992



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### EXECUTIVE SUMMARY

Operation MIZMAZE 92 was a field completion and control survey operation conducted by Det 4 Fd Svy Sqn, in the Kimberley region of Western Australia between 13 May and 27 Jun 92. Aerial photography operations continued until 14 Jul 92. Personnel operated from two basecamps; one at the Wyndham racecourse for the period 18 May to 2 Jun 92, and the other at the Halls Creek Caravan Park from 3 Jun until 22 Jun 92.

The initial aim of the operation was to field complete 46 x 1 : 50 000 scale maps, establish ten new control points, and to acquire new mapping photography. Additional tasks assigned to the operation were the investigation in the use of a hand held, small format camera for identification photography, re-observation of four existing control stations in order to help determine Transformation Parameters for WGS84, and the re-checking of the cultural join between SE52-02 LISSADELL and SE52-03 WATERLOO.

All field completion and control operations were successfully completed. However, mapping photography operations were not successful.

Supporting agencies continue to provide problems, failing to:

1. acquire land clearances,
2. accept responsibility for bill payment, and
3. provide the required support for vehicles.

## OPERATION REPORT

### OPERATION MIZMAZE 92

- References:
- A. DGOP-A, 347/91 Tasking Directive 1/91 - Survey Operations FY 91/92 Forecast of Operations and Mapping and Charting Objectives dated 19 Aug 91
  - B. LHQAUST SIC Z2Y 2197/92 OPORD 9/92 dated 11 Mar 92
  - C. DSVY-A Operation MIZMAZE 92 Technical Directive to OC 4 Fd Svy Sqn dated 6 Mar 92
  - D. DSVY-A Sic Z2Y SVY 2186 Op MIZMAZE 92 - Tech Directive dated 6 Apr 92
  - E. 4 Fd Svy Sqn 851-92-1 Operation MIZMAZE 92 - OC Directive to Detachment Commander dated 7 May 92
  - F. 4 Fd Svy Sqn Op MIZMAZE 92 Concept of Operations dated 7 Feb 92
  - G. LHQAUST Op MIZMAZE 92 (Control / Field Completion) Mounting Instruction dated 16 Apr 92
  - H. Standing Orders for Vehicle Operation, 1991, Vol 2- B Vehicles

### INTRODUCTION

1. Operation MIZMAZE 92 was a field completion and control survey operation conducted in the Kimberley region of Western Australia. Reference A was the tasking authority, with LHQ being responsible for mounting the operation as per Reference B. The operation was conducted during the period 13 May to 27 Jun 92 and was supported from two main bases at Wyndham and Halls Creek respectively.

### MISSION

2. Det 4 Fd Svy Sqn was to field complete 46 x 1 : 50 000 line maps, establish ten horizontal control points using GPS equipment, and acquire mapping photography as per References A,C and D.

### AREA OF OPERATIONS

3. The Area of Operations (AO) was as follows:
  - a. Field Completion:
    - (1) SD52-10 MEDUSA BANKS,
    - (2) SD52-14 CAMBRIDGE GULF (part),
    - (3) SE52-06 DIXON RANGE (part), and
    - (4) SE52-10 GORDON DOWNS (part).

- b. Control and Mapping Photography:
- (1) SD52-13 ASHTON,
  - (2) SE51-13 MANDORA (part),
  - (3) SE51-14 MUNRO (part), and
  - (4) SE52-01 MOUNT ELIZABETH.

4. These areas are shown at Annex A.

### CONDUCT OF OPERATIONS

5. A detailed sequence of events is given in Annex B.

#### Deployment

6. The deployment of Det 4 Fd Svy Sqn was in four phases:

- a. Advanced Party. On 13 May 92 the advance road party of 14 personnel left Adelaide driving two LR 110 (each with a 1/2 ton trailer), two truck cargo 5 ton, two Unimogs and one Forward Recovery Vehicle (FRV). They arrived in Wyndham on 18 May 92 and established a base camp at the Wyndham Turf Club.
- b. Phase 2. On 19 May 92 the first of two RAAF C130 aircraft arrived at Kununurra Airport carrying five personnel and two LR 110 and a 1/2 ton trailer.
- c. Phase 3. The second RAAF C130 aircraft arrived at Kununurra Airport on 20 May 92 carrying two personnel and two LR 110.
- d. Phase 4. The Royal Australian Survey Corps Aerial Photography Team (RAPT) arrived in the AO on 12 Jun 92.

#### Operations

7. Wyndham. Operations commenced in the Wyndham AO on 20 May 92 and consisted of field completion tasks for Cambridge Gulf and Medusa Banks areas, and the establishment of control in the Ashton and Mount Elizabeth areas. Base camp was relocated to Halls Creek on 2 Jun 92.

8. Halls Creek / Sandfire Flat Operations. Main base camp was established at the Halls Creek Caravan Park on 2 Jun 92. Field completion tasks commenced on 4 Jun 92 in the Dixon Range and Gordon Downs areas. Control tasks in the Mandora and Munro areas were based out of the Sandfire Flat Roadhouse and commenced on 5 Jun 92. Aerial photography tasks commenced on 14 Jun 92. Field completion and control tasks were finalised on 20 Jun 92. Aerial photography tasks were completed on 14 Jul 92.

### Extraction

9. The extraction of the detachment was conducted in four phases:
- a. Phase One. A party of six personnel left Halls Creek for Darwin on 21 Jun 92 driving two LR 110 (with trailer), and a Unimog all of which were carrying stores that were required for Op NERVOSE 92. The two LR 110, trailers, and stores were secured at RAAF Base Darwin. The Unimog after unloading, departed Darwin to rendezvous with the main road party. The remaining personnel from this party returned to Adelaide via Richmond by RAAF courier on 25 Jun 92 arriving in Adelaide on 26 Jun 92.
  - b. Phase Two. The main road party departed Halls Creek on 21 Jun 92 and arrived in Adelaide on 27 Jun 92. The party consisted of 12 personnel driving two LR 110 (one with trailer), two truck cargo 5 ton, one Unimog and one FRV. One LR 110 and trailer were left at Kununurra with the RAPT for their use.
  - c. Phase Three. On 23 Jun 92 a RAAF C130, (after being delayed for one day due to engine trouble), arrived at Halls Creek Airport to load stores, five personnel, and two LR 110 and return to Adelaide.
  - d. Phase Four. One member of the RAPT departed Kununurra on 13 Jul 92 driving a LR 110 and trailer loaded with RAPT camera stores for Darwin, which were required for Op NERVOSE 92. The vehicle and stores were secured at RAAF Base Darwin. All members of the RAPT then returned to Adelaide on the RAPT aircraft.

### OPERATION RESULTS

10. Field Completion. The field completion of 46 x 1 : 50 000 scale line maps was successfully completed. A detailed report is at Annex C.
11. Control. The establishment of ten control points using the TI 4100 GPS receivers in point positioning mode, using the GESAR V1.5 operating system were completed successfully. A detailed report is at Annex D.
12. Aerial Photography. The identification, and supplementary photography tasks were successful, however 72% the mapping photography needs to be re flown<sup>1</sup>. A detailed report is at Annex E.
13. Photography Identification Guides(PIGs). Photographs for the production of PIGs were taken by all field parties whilst in the AO. At the conclusion of the operation, the PIGs were collated at 4 Fd Svy Sqn and on their completion they were forwarded to the Army Svy Regt.

### Additional Tasks

14. Small Format Photography. In accordance with Reference E, the feasibility of obtaining ident photography using a small format hand held camera was investigated. It was found that under the current specifications of TI 305, it is not feasible to obtain ident photography using this method. A report on the results is at Annex F.

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<sup>1</sup> This had been completed by 16 Sep 92

15. Field Check. The cultural join between SE52-02 LISSADELL and SE52-03 WATERLOO was re checked. This was tasked directly by the Army Svy Regt while the detachment was based in Wyndham. Lack of adequate source material supplied by the Army Svy Regt made this task extremely difficult, and it was fortunate that the detachment had sufficient air resources available to complete the task.

16. Control. Following tasking by the Army Svy Regt whilst the detachment was in the AO, four existing control stations were also re-observed to help determine the WGS84 Transformation Parameters. To complete this task a second GPS party was required. As it was originally planned to use one dedicated GPS party, this placed additional strain on the manpower for the field completion phase of the operation. All points were observed successfully. Details of this task are included in the Control Report at Annex D.

### ADMINISTRATION AND LOGISTICS

#### Personnel

17. The personnel involved on Op MIZMAZE 92 are shown in Annex G.

#### Finance

18. The expenditure for the operation was as follows:

- a. T & S : \$40 332.94;
- b. F & C : \$47.00;
- c. SPRA : \$10 199.93;
- d. Petty Cash : \$453.25; and
- e. Repairs : \$988.00.

19. Invoice Payment. Following the submission of 4 Fd Svy Sqn FAPE FY 91/92, finance was allocated to pay any invoices attained during the operation, and in accordance with LHQ Standing Orders, these invoices were to be paid by LCN. However the payment of invoices at the completion of the operation was far from satisfactory. Delays in the payment to civilian contractors reflects poorly on the army in general.

#### Land Clearances

20. HQ LCN was responsible for obtaining land clearances. Despite continual liaison with LCN to ensure land clearances had been completed, on arrival in the AO it was obvious that they had not been obtained. This created considerable inconvenience for detachment personnel and reflected very poorly in the eyes of the general public on the professionalism of Army. In the case of land controlled by the Ngoonjuwah Aboriginal Council in Halls Creek, a guide was required for any entry upon their land. In this instance, for example, the proper acquisition of land clearances could have negated the requirement for such a guide, or at least allowed forward planning for such a situation.

#### Air Support

21. LOH Support from 162 Recce Sqn. Although only two LOH were forecast, three different LOH were used during the operation. Only 163.1 hours were used from an allocation of 200 due to:

- a. A planning figure of two air hours per 1: 50 000 scale map sheet was forecast, however the lack of cultural detail in the Cambridge Gulf and Medusa Banks areas greatly reduced this figure. In the Dixon Range / Gordon Downs area, two hours per sheet was relatively accurate.
- b. Air hours used for the control tasks in the Mandora / Munro area fell short of that anticipated due to fuel being positioned as close as possible to where it would be required. During the planning stage air hour usage was based on the requirement to return to Sandfire Flat Roadhouse for refuelling. However, the air hours saved for the reasons previously mentioned, was offset by the fact that the hours planned for the deployment of a GPS party was assumed to be a two sortie lift, where in practice 162 Recce Sqn pilots stipulated that it was to be a three lift job at least. As the pilots became more familiar with the tasking, the party deployment was able to be achieved in two sorties.

22. C130 Support from 36 Sqn (RAAF). Three sorties (two for the deployment and one for the extraction) by C130 aircraft were used during the operation. A total of 35 hours were used from an allocation of 32.

23. Cessna 404 Titan Ambassador from Vee-H Aviation. A Cessna 404 Titan Ambassador was used as the aerial camera platform for the RAPT. A total of 109 hours were used during the operation.

#### Vehicles

24. Vehicles used during the operation were:

- a. six LR 110 Truck Survey Panel FFR,
- b. two truck cargo MC2 (Unimog);
- c. two truck cargo MC4;
- d. three 1/2 ton trailer; and
- e. one FRV.

25. Down time for the vehicles was minimal, with most faults being due to driver inexperience and/or the harsh environment of the AO. In all cases, the attached Veh Mech was able to maintain vehicle serviceability and therefore sustain vehicle operations. The RAEME (Veh Mech) Technical Report is at Annex H.

26. For the repair of detachment LR 110, spare parts were sought through 7 Log Coy. These parts could not be provided and were subsequently supplied and freighted by Adelaide Log Bn to the AO. This caused a considerable delay in the arrival of the parts, despite the fact that they were dispatched by the fastest possible means.

#### Drivers Licence

27. According to Reference G, the positioning of AVTUR fuel by vehicle, like all dangerous cargo, requires the driver to have at least a restricted licence and be qualified to move fuel. The detachment had only two drivers qualified to move dangerous cargo, and both were required for field completion tasks, therefore to adhere to Reference G, meant considerable alteration to the intended operation plan. To alleviate the problem the impromptu addition of a qualified driver from Adelaide Log Bn was required, and arrived in the AO after the operation had started. Due to the driving tasks associated with Survey operations, all personnel should hold as a minimum, an unrestricted B7 licence, and preferably an unrestricted B8 licence.

POL

28. Diesel. All diesel requirement for the operation vehicles was by purchase using a Shell or BP card or Order and Receipt for Supplies (SP 21). No problems were experienced with this method.

29. AVTUR. A quantity of AVTUR was pre-positioned for the operation by LCN. This was re-positioned, as required, using detachment resources.

30. Due to both the additional requirement of fuel for the GPS tasks, and a high rejection rate by the LOH pilots while operating out of Wyndham, additional fuel was needed. Liaison with 7 Log Coy authorised the purchase of an additional 15 drums of fuel from the BP Distributor in Kununurra (100 km away). Of these 15 drums, 12 were rejected by the pilots due to water and suspected 'algal' contamination. 7 Log Coy then authorised the urgent purchase of a further 15 drums of fuel from the MOBIL Distributor in Wyndham (5 km away). None of this fuel was rejected.

31. On relocation from Wyndham to Halls Creek, it was discovered that the AVTUR pre-positioned at Warmun (Turkey Creek) by LCN, was from the same batch supplied by the BP Distributor in Kununurra. Two of these drums were checked and both proved to be contaminated. Authorisation for the purchase of replacement fuel for all the pre-positioned fuel at Warmun (Turkey Creek) from the Wyndham MOBIL Distributor was approved by 7 Log Coy.

32. With the limited resources available while on operation, the option to travel five km to a Wyndham fuel distributor is considerably more economical than a 200 km round trip to Kununurra, and accordingly should negate the requirement to use standing fuel contracts.

33. While operating out of Wyndham, there was a requirement to position drummed AVTUR by vehicle. The drive to one of the desired fuel dumps was a two day return task that took considerable toll on the UNIMOG truck, FRV, and personnel. Had there not been the reduced amount of flying time required in the Cambridge Gulf and Medusa Banks areas, the amount of fuel positioned there by the detachment would not have been adequate. Failure to supply acceptable fuel by the preferred contractor could be seen as a breach of contract by the supplier and action should be taken to ensure that the quality of fuel is acceptable to military operations.

34. Where possible fuel drums were recovered to the supplier in accordance with Reference C.

Communications

35. Communications between the main bases and the field parties was by RAVEN HF radios. A reporting schedule was maintained as normal routine. HF communications varied markedly, but improved considerably as the field parties became more aware of the importance of antenna configuration. The attached RA Sigs member was tasked with the maintenance of communications and the Signal Report is at Annex 1.

36. Rear link communications were by telephone. The main base in Wyndham had the telephone connected, to which was added a phone/fax unit which proved very useful. In the Halls Creek and Sandfire Flat areas, public STD phones were used with Telephone Charge Cards provided by HQ 4MD.

### Accommodation

37. Main Base Wyndham. The Wyndham Turf Club was the site of the first main base. The amenities were acceptable with ample under-cover areas to separate the operation/technical area from the meals, kitchen, accommodation and social areas. Accommodation tentage was erected on a large hard standing area. The only limitation with this site was the lack of hot water. Due to the camp being two km from the Wyndham town centre, base security was good.

38. Main Base Halls Creek. The second main base was at the Halls Creek Caravan Park, and although lacking the undercover areas of the Wyndham base camp, all facilities were good. All main base facilities were under tentage. This proved adequate apart from some instances when the wind caused problems in the Tech area. The computer equipment was in an air conditioned room of an ATCO hut which was hired at the caravan park. The caravan park is located centrally in Halls Creek, this caused no security problems as a high fence surrounds the park.

39. RAPT Accommodation. Due to lack of suitable accommodation at the Norforce Depot in Kununurra (although it had been arranged by 4 Fd Svy Sqn) all personnel were initially accommodated in motels. After nine days when the accommodation conditions were rectified the RAPT personnel moved into the Norforce Depot, while Mr J. Medway (Pilot) remained in the motel in accordance with his contract.

### Catering and Resupply

40. Dry rations were purchased in Adelaide prior to departure for the AO using the Survey Party Ration Allowance (SPRA). Fresh rations were purchased in the AO from local suppliers. A total of \$10 200 was expended on SPRA for the operation, equating to \$14 per man per day.

41. The refrigerators mounted in the LR 110 enabled the field parties to operate independently with fresh rations for several days. Although the refrigerators reliability is questionable, they are a useful field item.

### Amenities

42. 4MD Amenities Fund provided a colour television and a video cassette recorder for the duration of the operation. This proved to be a valuable asset, as all members were able to keep abreast of current affairs, and sporting events, as well as providing an alternate social activity for those not wishing to partake of the limited social pastimes available in the AO.

43. Canteen. A limited canteen service was run by the 4 Fd Svy Sqn Social Club. This proved valuable as the cost of drinks in the AO was exorbitant.

### Medical

44. Wyndham, Kununurra and Halls Creek hospitals/medical centres were supposed to be advised of the operation by Medical Services 4MD prior to arrival of the detachment in the AO. This was not done. Although it did not create any major problems, the professionalism of the ADF in the eyes of the public was compromised.

45. Medical services required in the field were minor. The only problems being one detachment member requiring stitches to a cut, and another with a sprained ankle. Health of detachment personnel was good despite a severe gastro virus that affected most of the Halls Creek population.

#### Morale and Discipline

46. Morale of detachment personnel remained high. This was aided by several social functions and sporting activities with the local population. Conduct of all personnel was excellent.

#### Allowances

47. The following allowances were paid:

- a. Travel and Subsistence (T&S). Full TA was paid to the road party for the deployment and extraction. The meals element of TA and incidentals were paid to all detachment members when the kitchen could not operate due to the transfer of main bases from Wyndham to Halls Creek. The support team for the Mandora / Munro control phase received the full TA entitlement for the duration of their stay at the Sandfire Flat Roadhouse. The control team received the full TA entitlement when not on SPRA. Due to the late arrival of the RAPT, and delays associated with the weather, the control and support teams were required to stay at the Sandfire Flat Roadhouse until the ident photography could be proved. Each day delayed incurred a subsequent increase of approximately \$500.00 to the T&S expenditure.
- b. District Allowance. District allowance was paid in retrospect in accordance with INDMAN Vol 1, Chap 3 using grade D rates.
- c. Field Allowance. Field allowance was paid to all personnel in accordance with INDMAN Vol 1, Chap 2.
- d. Separation Allowance. Separation allowance was paid to all category M personnel after the qualifying period of 14 days.

#### Leave

48. A grant of 7/12 of a day for Remote Locality Leave was given to all detachment personnel.

#### Visits

49. Visits to the operation were made by the following:

- a. BRIG Bray (Comd 4MD), Mrs Bray, and WO1 Yates (RSM 4MD) from Fri 29 May - Mon 1 Jun 92;
- b. LTCOL McHenry (CO Army Svy Regt) and MAJ McLeod (OC 4 Fd Svy Sqn) from Fri 5 Jun - Mon 8 Jun 92; and
- c. WO2 Boyle (DSVY-A representative) on Fri 12 Jun 92.

#### Public Relations

50. Public relations (PR) while on the operation were important, following the recent completion in the area of the Exercise KANGAROO 92. An operation brief was prepared prior to the operation and a copy of this was given out freely to anyone and everyone interested. The brief was received favourably and proved valuable in informing the public as to the nature of the operation. A copy of the operation brief is included at Annex J.

51. The local Kimberley newspaper, "The Kimberley Echo", was contacted on arrival in the AO, and an article detailing the operation was subsequently printed in the following edition. The OC detachment was also interviewed about the operation on the Kimberley Radio (ABC) talkback program .

52. PR on the operation could have been better if land clearances had been obtained prior to the operation. Further, a copy of the operation brief should accompany requests for land clearances.

### CONCLUSION

53. Op MIZMAZE 92 control and field completion tasks were successfully completed. This success can be attributed to the professionalism and dedication of all personnel involved. However, the acquisition of mapping photography was not as successful as was planned.

54. Air hours. Air hours used during the operation fell short of that anticipated. This was mainly due to positioning fuel as close as possible to where it would be required, however, this was offset to an extent by the fact that the hours planned for the deployment of a GPS party was assumed to be a two sortie lift, where in practice pilots stipulated that it was a three lift job at least.

55. Fuel Useability. Poor quality drummed fuel greatly inhibited operation planning. Had there not been the reduced amount of flying time required in the Cambridge Gulf and Medusa Banks areas, the amount of fuel positioned there by the detachment would not have been adequate. Failure to supply acceptable fuel by the preferred contractor could be seen as a breach of contract by the supplier and action should be taken to ensure that the quality of fuel is acceptable to military operations.

56. Fuel Purchases. In the AO the BP Distributor in Kununurra was the authorised Defence contractor. When additional aviation fuel was required during the operation, a 100 km trip was necessary, whereas in fact the fuel could have been obtained from the MOBIL Distributor in Wyndham only five km away. With the limited resources available while on operation, the option to travel five km to a Wyndham fuel distributor is considerably more economical than a 200 km round trip to Kununurra, and accordingly should negate the requirement to use standing fuel contracts.

57. Land Clearances. Land clearances are a essential to all survey operations. It is the responsibility of the regional support unit in which the operation is conducted to ensure that the land clearances are attained, and in so doing, ensure complete civilian co-operation in the AO.

58. RAPT. Command and control problems with the RAPT continue.

59. Drivers Licence. The requirement for unit personnel to drive a variety of vehicle types on and off road, and to move dangerous cargo means that the Tech Carto trade should hold unrestricted B7 and B8 licences.

60. Vehicle Spare Parts. The availability of spare parts in the AO for the repair of detachment vehicles was poor. The parts required, had to be either purchased locally or obtained from Adelaide Log Bn, which caused a delay in vehicle repair despite the fact that they were dispatched by the fastest possible means.

61. SPRA. The SPRA proved adequate, but some flexibility in the allowance is needed, to cater for any price fluctuations of food in remote localities.

62. Invoice Payment. Invoices attained during the operation were to be paid by LCN in accordance with LHQ Standing Orders. Unfortunately the payment of these invoices was far from satisfactory, and any delay in such payments to civilian contractors reflects poorly on the army in general.

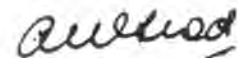
63. Lithium Batteries. The lithium batteries used for the Raven radios were a definite benefit as a primary power supply. Their endurance and reliability were a great asset, with the only problem being the dangerous cargo limitation they present on Service and Civil aircraft during bulk transportation.

#### RECOMMENDATIONS

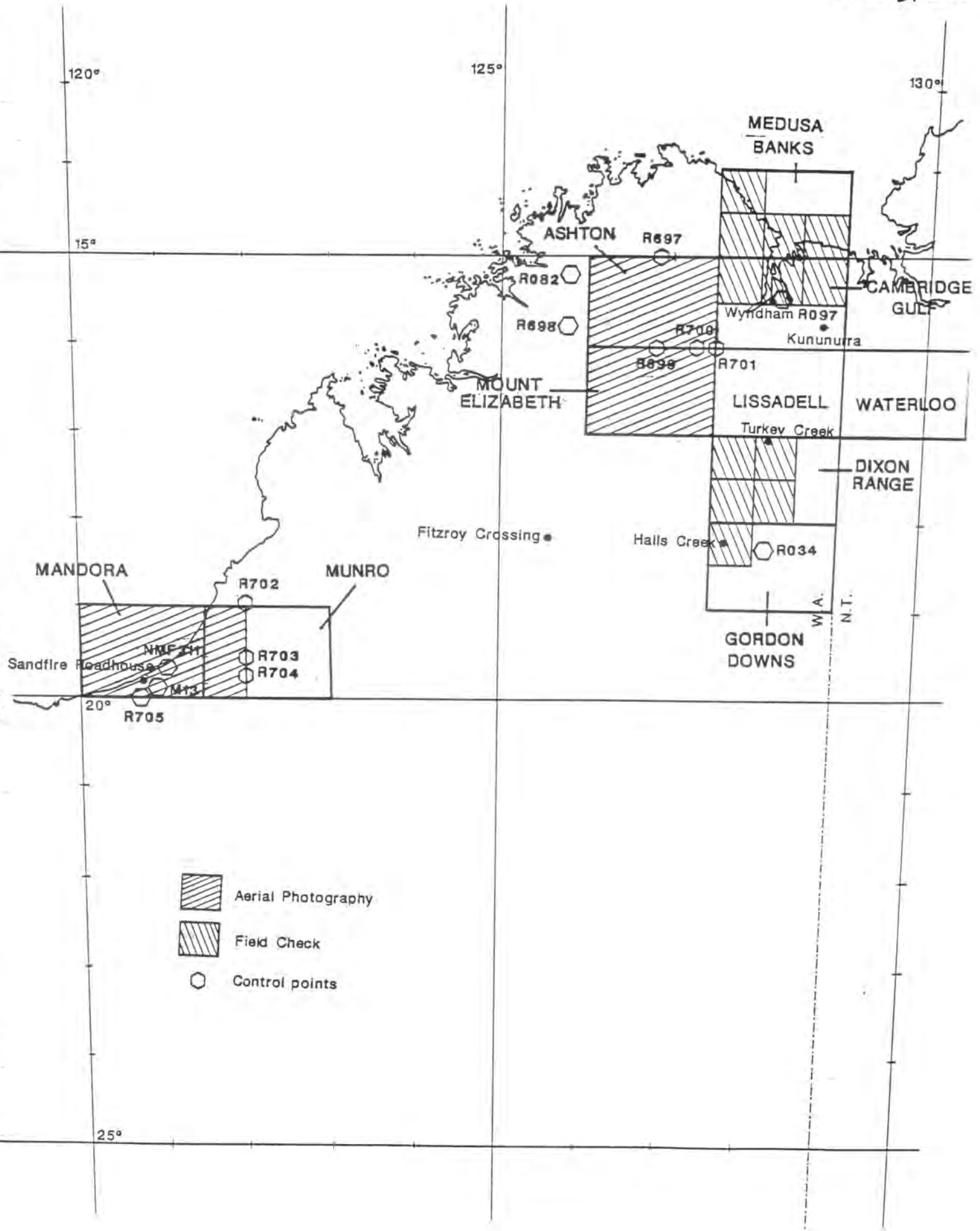
64. The following recommendations from Op MIZMAZE 92 are drawn both from previous sections of this report as well as the attached annexes. It is recommended that:




- a. Consideration be given to commercial acquisition of mapping photography.
- b. Closer liaison is required with supporting AA Avn units to enable accurate planning of operations.
- c. More flexibility is required for the purchase of aviation fuel. With the limited resources available on operation, it would be far more convenient to purchase POL from local suppliers.
- d. Action must be taken to ensure the quality of AVTUR supplied by local contractors.
- e. Responsibility must be accepted by regional support units and HQs for land clearances, bill payments, and vehicle spare parts holdings.
- f. Hand held photography should not be attempted other than on very small operations where it may not be cost effective to have a dedicated camera aircraft.
- g. NANUs must be made available to survey operations immediately.
- h. Personnel on survey operations should have an unrestricted B7 licence as a minimum, and preferably an unrestricted B8 licence. Such licences should be obtained either before or after the RASvy IET course.
- i. 7 Log Coy need to increase the number and variety of spare parts for all military vehicles. Alternatively, LR 110 should be replaced with a commercial 4WD.
- j. The command of RAPT be transferred to 4 Fd Svy Sqn.
- k. The RC10 camera, associated equipment and configuration should be tested prior to any tasking.
- l. Aerial film equipment should be deployed in the field to enable rapid RC10 camera function testing.

24 September 1992



A.B. McLEOD  
Major  
Officer Commanding



-  Aerial Photography
-  Field Check
-  Control points

SEQUENCE OF EVENTS

1. The following is a tabulated sequence of events for Op MIZMAZE 92:
- a. 27 Apr 92 Pre-Operation training commenced.
  - b. 08 May 92 Pre-Operation training completed.
  - c. 13 May 92 Road party departed Adelaide (four truck cargo, two LR 110, two ½ ton trailers, one FRV and 14 pers).
  - d. 18 May 92 Road party arrives Wyndham.
  - e. 19 May 92 First C130 arrives Kununurra (two LR 110, ½ ton trailer loaded with stores, five pers).
  - f. 20 May 92 Second C130 arrives Kununurra (two LR 110, two pers).
  - g. 21 May 92 AA Avn support arrive Wyndham.
  - h. 22 May 92 Commence field completion of Cambridge Gulf and Medusa Banks.  
Commence establishment of survey control Ashton and Mount Elizabeth.
  - i. 29 May 92 Comd 4 MD BRIG Bray, Mrs Bray and RSM 4MD, WO1 Yates visit detachment.
  - j. 01 Jun 92 Complete field completion of Cambridge Gulf and Medusa Banks.  
Complete survey control tasks of Ashton and Mount Elizabeth.  
BRIG Bray, Mrs Bray and WO1 Yates depart.
  - k. 02 Jun 92 Re-locate base camp from Wyndham to Halls Creek.  
Survey control team depart for Sandfire Flat Roadhouse.
  - l. 04 Jun 92 Commence field completion of Gordon Downs and Dixon Range.  
Commenced establishment survey control Mandora/Munro.
  - m. 05 Jun 92 CO Army Svy Regt LT COL Mc Henry and OC 4 Fd Svy Sqn MAJ McLeod visit detachment.
  - n. 08 Jun 92 LT COL Mc Henry and MAJ McLeod depart.
  - o. 09 Jun 92 RAPT depart Adelaide.
  - p. 12 Jun 92 RAPT arrive Kununurra.  
WO2 Boyle visit detachment.
  - q. 17 Jun 92 Survey control tasks conclude.
  - r. 18 Jun 92 Survey control team return to Halls Creek.

- s. 20 Jun 92 AA Avn support depart Halls Creek.
- t. 21 Jun 92 Complete field check of Gordon Downs and Dixon Range.  
Road party depart for Darwin to position stores for Op NERVOSE 92 (one Truck Cargo and two LR 110 and two ½ ton trailers ).  
Main road party depart Halls Creek for Adelaide (met with RAPT in Kununurra) (three trucks, two LR 110 , one FRV, and 10 pers).
- u. 22 Jun 92 Main road party depart Kununurra for RV with truck from Darwin.  
Road party arrives Darwin.
- v. 23 Jun 92 Main road party departs RV for Adelaide.  
C130 departs Halls Creek (five pers, two LR 110 and stores) and returns to Adelaide.
- w. 25 Jun 92 Four pers from Darwin RTU via RAAF courier.
- x. 26 Jun 92 Four pers arrive Adelaide by RAAF courier.
- y. 27 Jun 92 Main road party arrives Adelaide.
- z. 13 Jul 92 One RAPT personnel departed Kununurra for Darwin driving LR 110 with trailer.
- aa. 14 Jul 92 RAPT aircraft departed Kununurra for Darwin.  
One RAPT personnel driving LR 110 arrived Darwin.
- bb. 15 Jul 92 RAPT personnel departed Darwin and arrived Adelaide.
- cc. 16 Jul 92 RAPT aircraft departs Adelaide.  
RAPT member from Army Svy Regt RTU.

## FIELD COMPLETION REPORT

### Background

1. Army Svy Regt plotted and produced field completion packages for map sheets in the following 1: 250 000 areas :
  - a. SD52-10 MEDUSA BANKS - 14 x 1: 50 000;
  - b. SD52-14 CAMBRIDGE GULF - 12 x 1: 50 000;
  - c. SE52-06 DIXON RANGE - 16 x 1: 50 000; and
  - d. SE52-10 GORDON DOWNS - 4 x 1: 50 000.
2. A list of the 1: 50 000 scale map sheets involved is at Appendix 1.

### Source Data

3. Source data consisted of:
  - a. 1: 50 000 field completion packages;
  - b. 1: 100 000 existing/published topographic mapping;
  - c. 1: 250 000 coverage in NTMS, JOG format and RA Svy R502 Series; and
  - d. numerous miscellaneous town plans at various scales.

### Field Completion Packages

4. Army Svy Regt produced computer generated cultural, drainage, relief and vegetation (CDRV) composite colour paper plots as preliminary maps and various other sheets in assorted colour combinations which were used in the production of the guides and to assist in checking specific detail. CDRV composite film positives were also produced and used in the field to mark corrections onto (field completion masters). Due to the late completion date of plotting at Army Svy Regt, all but three field completion packages were available prior to departure to the AO. The remaining packages were delivered to Halls Creek on 5 Jun 92.

### Field Completion Colour Guides

5. 4 Fd Svy Sqn produced the various colour guides for all available 1: 50 000 map sheets prior to departure to the AO. The remaining sheets were produced in the field on their arrival.

### Execution

6. Initially in the Medusa Banks - Cambridge Gulf area four field completion parties were deployed. This was later reduced to three when another GPS party was needed to meet the additional GPS requirement allocated to the operation.

7. In the Gordon Downs - Dixon Range area four field completion parties were deployed, with an additional party, comprised of suitable base camp personnel, being used during the later stages of the operation to maintain the required schedule.

### Ground Verification

8. Ground verification was undertaken by two man field parties who remained in the field for up to four days. On their return to main base applications of the corrections were then completed. Homestead owners/managers within the AO were visited and provided valuable assistance on new development, positioning of detail and also placement and verification of nomenclature.

### Air Verification

9. At the completion of the ground verification, an aerial inspection was completed to resolve any outstanding queries and to verify any detail inaccessible by road. The air check was completed by the same personnel that did the ground verification. Map sheets in the west of the Medusa Banks - Cambridge Gulf area required an extensive air check, this was due to the mountainous terrain and numerous eroded creek crossings which precluded vehicle access. Apart from Oombulgarrie Community (Forrest River Mission), cultural detail in this area was sparse. A total of 58 air hours was expended over the 46 map sheets.

### Comments

10. The plotting photography for Medusa Banks - Cambridge Gulf area was dated 1988, since then there has been minimal changes to the topography. The portrayal of the drainage, relief and vegetation was generally very good. The general drainage classification of the area was interpreted as mainly dry by Army Svy Regt where in fact as per SYMBAS 88 the area is classified as intermittent.

11. Dixon Range - Gordon Downs sheets were plotted from photography dated 1989. Once again the plotting and classification of the vegetation was very good. Plotting of the drainage was generally good but in some instances especially in the 4562 DIXON 1: 100 000 area, drainage was extensively overplotted. The overplotting was not consistent either, as on some maps model boundaries could be distinguished by the drainage pattern. The relief was generally very good, but in some instances pinnacles were overplotted. In respect to cultural detail, since 1989 a lot of development has taken place. This was especially evident in the Purnululu (Bungle Bungle) National Park (mainly vehicle tracks), and the 4462 McINTOSH 1 :100 000 map sheet where the Springvale Homestead has had extensive work carried out on fence construction.

12. Extensive cultural changes were prevalent around the mining areas on the 4461 HALLS CREEK 1 :100 000 map sheet. These areas were overplotted, with numerous very small roads, and when added to the new development in the area, an extensive check was required .

### Joins

13. All internal joins were completed, some problems were encountered with the external joins especially to the south of the Cambridge Gulf / Medusa Banks area. All corrections/mis-joins have been noted in the appropriate PD folders and also if applicable on a Map Correction form.

14. Internal joins on the stream lineweight guides, especially in the Dixon Range / Gordon Downs area, were extremely poor, and it was quite obvious that they had never been checked at any stage of production. The corrections to these mis-joins have been applied where possible and highlighted on the appropriate map sheets involved.

#### Nomenclature

15. Nomenclature listings have been completed and will be forwarded to the appropriate authority. Included in the listings are recommendations to change the names of four map sheets.

#### Field Completion Reports

16. Field parties compiled individual Field Completion Reports for their areas of concern, this was generally in 1: 100 000 areas but in some instances this was not practical.

#### Supplementary Photography

17. Supplementary photography was acquired for detail that could not be positioned accurately during the field completion. A full report on the aerial photography is at Annex D.

#### Photo Interpretation Guide (PIGs)

18. Photographs for the production of PIGs were taken by all field completion parties and GPS parties whilst in the AO, as stipulated in Reference D.

#### Additional Task

19. Whilst in the AO an additional task completed was the re-checking of the cultural join between SE52-02 LISSADELL and SE52-03 WATERLOO. Due to the inadequate nature of the package, cultural detail had to first be transferred to 1: 100 000 maps to enable navigation and the placement of detail to any degree of accuracy.

#### General

20. The field completion phase of the operation was successfully completed on schedule. All personnel involved in the field completion, especially the inexperienced members, gained valuable on the job training in field completion procedures and also familiarised themselves with driving techniques.

21. Generally, field completion parties were satisfied with the quality and quantity of the field completion packages prepared for their use. Some problems were encountered with the ink smudging when it came into contact with any form of water, especially perspiration. A recommended package for future field completion operations in areas of sparse cultural development, as was the case in Op Mizmaze 92 is at Appendix 2. For other operational areas, close liaison between the field squadron involved in the field completion and Army Svy Regt, to ensure that the appropriate package is produced.

1: 50 000 SCALE MAPPING

The following 1: 50 000 scale maps were field completed during Op MIZMAZE 92:

SD52-10 MEDUSA BANKS 1 : 250 000:

4468 1	DELANCOURT RIVER
4468 2	VIOTTI PEAK
4468 3	MOUNT NICHOLLS
4468 4	BERKELEY
4469 2	BUCKLE HEAD
4469 3	CASUARINA
4469 4	CAPE WHISKEY
4568 1	MEDUSA
4568 2	CAPE DOMETT
4568 3	VANCOUVER
4568 4	THURBURN
4668 2	PELICAN ISLAND
4668 3	KNOB PEAK
4668 4	ROCKY ISLAND

SD52-14 CAMBRIDGE GULF 1 : 250 000:

4467 1	FORREST RIVER
4467 2	MILLIGAN
4467 3	RUST *
4467 4	ULLALA
4567 1	MOUNT CONNECTION
4567 2	ONSLOW HILLS
4567 3	WYNDHAM
4567 4	ADOLPHUS ISLAND
4667 1	MOOGAROOGA
4667 2	WEABER RANGE
4667 3	CARLTON HILL
4667 4	ELEPHANT HILL

SE52-06 DIXON RANGE 1 : 250 000:

4462 1	McKENZIE *
4462 2	ALICE DOWNS
4462 3	SPRINGVALE
4462 4	BILLYMAC *

4463 1 GREENVALE  
4463 2 SURVEY CREEK  
4463 3 FOAL CREEK  
4463 4 MOUNT REMARKABLE

4562 1 DIXON RANGE  
4562 2 PANTON  
4562 3 MOUNT FORSTER  
4562 4 FRANK RIVER

4563 1 TEXAS DOWNS  
4563 2 BUNGLER BUNGLER  
4563 3 FLETCHER CREEK  
4563 4 TURKEY CREEK

SE52-10 GORDON DOWNS 1 : 250 000:

4461 1 SOPHIE DOWNS  
4461 2 PALM SPRINGS \*  
4461 3 KOONGIE  
4461 4 HALLS CREEK

\* recommendation for name change

FIELD COMPLETION PACKAGE

Component / Colour	Medium	Qty	Use / Remarks
Grid and cultural	Film	1	Joins and possible correction overlay
CDRV	Paper	5	2 x Field master 1 x Air master 1 x Supp Photography 1 x Adjoining map access
CDRV	Film	2	1 x Field corrections 1 x Retained at unit for possible later use
CDV	Film	1	Used to produce dyeline or photocopies for guides
Relief related	Film	1	Used to produce dyeline or photocopies for guides
Stream line-weight Guide	Paper	1	1 x Field/Office Copy
Road Guide (CDV)	Paper	2	1 x Field copy 1 x Office copy
Drainage Guide (CDV)	Paper	2	1 x Field copy 1 x Office copy
Vegetation Guide (CDV)	Paper	2	1 x Field copy 1 x Office copy
Nomenclature Guide (CDRV)	Paper	2	1 x Field copy 1 x Office copy
Relief Guides (Relief related)	Paper	2	1 x Field copy 1 x Office copy
BUA Guide (CDV)	Paper	2	1 x Field copy 1 x Office copy

Notes:

1. All guides are requested to be produced by the plan printer, as the dyeline method is proving unsatisfactory.
2. Corrections could still be colour separated, if required, by duplicating the film copy of the CDRV or CDV that remains within the unit.

CONTROL REPORT

Introduction

1. 4 Fd Svy Sqn was tasked to establish in accordance with DSVY-A TIs 309 and 314, survey control points using TI 4100 GPS receivers in the point positioning mode, using the GESAR V1.5 operating system.

GPS Observations

2. GPS observations were undertaken in two geographical areas as shown in Annex A:

- a. East Kimberley (21 May -30 May 92) ; and
- b. Mandora - Munro (4 Jun -15 Jun 92).

3. Additional Task. An additional four existing stations in the AO were re-occupied / observed to help ascertain the WGS84 Transformation Parameters:

- a. R082,
- b. R097,
- c. M13, and
- d. R034.

4. Manning. Personnel involved with the GPS observations were:

- a. 5104899 LT R. Gray;
- b. 328915 LT R. Carpenter;
- c. 46710 SGT E. Jacobs;
- d. 454117 CPL P. Tran; and
- e. 454310 CPL A. Jackson.

5. Movement. Movement of GPS parties was by LOH and LR 110. In the East Kimberley region, fuel was pre-positioned at Drysdale River Homestead. Positioning of fuel in the Mandora - Munro area was completed by the support personnel to a position as close as possible to the control points.

6. Initially, three sorties per field party were used for deployment / extraction, although by the end of the operation this had been reduced to two. A total of 59 LOH air hours were used for GPS observations.

7. Observations. Computation and issue of satellite predictions using Texas Instruments SATPLAN Software were completed on arrival in the AO. New almanac data was collected two weeks into the operation

and an update was computed for mid operation observations.

8. Observations commenced in the East Kimberley AO on 22 May and were completed on 1 Jun 92. Initially only one GPS party was deployed but due to the additional GPS requirements another party was assembled from the personnel initially detailed for the field completion using available spare GPS equipment.

9. In the Mandora - Munro AO, observations commenced on the 4 Jun and were completed on 17 Jun 92. Two personnel were based at the Sandfire Flat Roadhouse to support the GPS party and also to pre-position fuel. Due to a few sessions having to be re-observed, changes to the initial planning required that these personnel also act as GPS party members, this increased the work load on the party ICs as these personnel were not GPS trained.

10. Tracking sessions were conducted in the early morning which allowed for travel in the daylight hours. The difficult terrain and excessive distances between points made it impossible to obtain observations on consecutive evenings.

11. Each observation session was for a period greater than the required four hours. This allowed for:

- a. the criteria of having approx 1900 data points in an observation session;
- b. any loss of observation time through loss of an Satellite Vehicle(SV) during scenario(s);
- c. the insertion of further SVs during scenarios after any loss of a particular SVs; and
- d. the loss of data by tracking with only three SVs for any lengthy period of time.

12. Re-observations. Re-observations were required on four control points, due to:

- a. inability during post processing to access data from the data cassette,
- b. shift in observed geographical co-ordinates while monitoring the solution during the tracking phase,
- c. masking by geographical feature (Carson Escarpment), and
- d. tracking stopped mid way through a session.

13. Difficulties. Difficulties were encountered with SVs 14, 15, 16, and 19. As there was no 'Notice Adviser to Navstar User' (NANU) available before the operation the following resulted:

- a. having to edit scenarios during the tracking period;
- b. tracking of only three SVs during a scenario(s); and
- c. tracking for a period greater than the prescribed four hours.

### Targeting

14. Positive identification of all control points established/occupied was obtained by both RC 10 aerial camera, and Hasselblad 500 small format camera.

15. A report on using the Hasselblad 500 small format camera to identify control points is at Annex F.

### GPS Post Processing

16. Data Translation and Verification. Data cassette translation and verification was carried out at the main bases. The computations were completed by the detachment Tech WO, who was also the detachment Tech WO for the field completion, this caused difficulties especially in the Mandora - Munro AO. The excessive distances between GPS operations and base camp resulted in a delay of up to 11 hours before having the data cassettes verified. Transportation of the data cassettes was by civilian means (Greyhound bus) which provided little or no security.

17. Process Numbers were allocated by records section 4 Fd Svy Sqn prior to the commencement of the operation.

18. Equipment Used. The following computer equipment was used in the translation/verification of the GPS data cassette tapes:

- a. 1 x TIPPC, c/w CES;
- b. 1 x power conditioner;
- c. 1 x transformer (240v to 120v);
- d. 3 x Memtecs;
- e. 1 x IBM PS2 XT;
- f. 1 x Toshiba T3200SX laptop; and
- g. 1 x Epson printer.

19. All control points established / re-occupied were verified. All points had a minimum of a four hour observation period which resulted in achieving a minimum 1900 data points, however, the PDOP value at the end of some the sessions were higher than the stated accuracy. The additional four existing stations that were observed to help ascertain the WGS84 Transformation Parameters were also computed.

20. All data was transferred to 3½ inch floppy disk using the MFERD.EXE program.

21. Results. The following is a summary of the results of the GPS observations:

- a. total number of stations observed - 14;
- b. number of new stations established - 9;
- c. number of existing control stations re-occupied - 1; and
- d. stations occupied for WGS84 Transformation Parameters - 4.

### Equipment Performance

22. Generally the GPS equipment performed well, but the following problems were encountered:

- a. GESAR software copied at 4 Fd Svy Sqn, prior to the operation, failed after minimum use.
- b. Recorder No 02 developed tape drive errors continually, and with a second GPS party in the field, it afforded no back up equipment.

- c. The CDU's on all GPS equipment used on the operation did not allow for the insertion of required SV's in edit mode, even though the display showed that SV had been correctly entered during the initialisation check.

23. Whilst at Halls Creek a problem with the power unit of the IBM PS2 occurred. The computer had to be sent to a computer store in Kununurra (approx 400 kms away) for repair. A replacement part had to come from Perth, delaying the verification of the data cassettes.

24. No problems were encountered with the TIPPC or the MEMTECS during the operation.

#### GPS Package

25. The following information has been forwarded to Army Svy Regt:

- a. a diagram showing points established/re-occupied;
- b. copies of field observation sheets;
- c. GPS observation log sheet;
- d. copies of station documentation; and
- e. 3½ inch floppy disks.

#### Conclusions

26. The control phase of the operation was completed successfully in the time frame available although some alterations were required to the initial planning concepts. The GPS and associated computer equipment functioned satisfactorily, with only minor problems.

#### Recommendations

27. The following is recommended:

- a. A dedicated GPS manager be assigned on any operation that incorporate both field completion and control aspects. Support personnel assigned to GPS parties must include the GPS manager and required equipment, and should be located in close proximity to the GPS operations to expedite the validation of the data.
- b. More information be made available to GPS managers and party ICs on the effects of non-continuous observation time on GPS observations.
- c. NANUs are a primary requirement for field control operations, and should be made available immediately.
- d. Aviation support (ARMY) be conversant with the requirement of GPS operations.

## AERIAL PHOTOGRAPHY REPORT

### General

1. Royal Australian Survey Corps Aerial Photography Team (RAPT) was tasked vide Reference E to fly aerial photography during Op MIZMAZE 92.
2. WILD RC10 camera number 2611 was used during the operation. The camera was fitted with SAG II lens number 2043 of focal length 88.79mm (supplied from camera service data).
3. The camera was mounted in a Cessna 404 Titan-Ambassador VH-CSV owned by Vee-H Aviation who are based out of Canberra. Engineers at Vee-H Aviation fitted the NF2 sights and PAV10 (number 2611) to the aircraft whilst in Canberra, the remainder of the camera equipment was fitted by RAPT personnel prior to the aircraft departure from Adelaide for the AO.
4. Film exposed for ident and supplementary photography tasks were developed in the X-ray Department of the Kununurra Base Hospital using B5 developing outfit and DK 50 developer. No problems were encountered with either the film or the chemicals. Staff of the hospital were extremely helpful and tolerant of the after hours use of their facilities. Film exposed for mapping photography tasks was sent to the Central Photographic Establishment (CPE) at RAAF Williams, Laverton using Ansett Air Freight.

### Task

5. Tasking involved:
  - a. obtaining identification photography of control points visited by ground parties during the operation;
  - b. development of 2¼ inch B/W film of control points taken by the ground parties using the Hasselblad camera;
  - c. obtaining supplementary photography to aid in the positioning of new and updated information obtained during the field verification; and
  - d. obtaining mapping photography for the MANDORA / MUNRO and MOUNT ELIZABETH / ASHTON 1: 250 000 blocks.

### Identification Photography

6. Point assessment was carried out in the field and no problems were encountered as all points were identified. A list of the control points photographed during the operation is at Appendix 1.

### 2 ¼ Inch Film

7. 24 exposures of 2¼ inch B/W film taken by the field parties using the Hasselblad camera, were developed by RAPT personnel and dispatched to 4 Fd Svy Sqn by Australia Post.

### Supplementary Photography

8. Supplementary photography was flown in accordance with written and pictorial requests of field completion parties. A check of the area coverage and detail was carried out by the RAPT personnel to ensure the quality of photography acquired was suitable for later use. A total of 554.5 line kilometres of photography was flown, diagrams of the flight lines are at Appendix 2.

### Print Production

9. Bromide prints of the identification and supplementary photography were produced by the Lithographic Section at 4 Fd Svy Sqn using the KG30 contact printer and was finalised prior to the negatives being forwarded to CPE for duplication/storage. This provided minimum time delay between the operation and the use of the photography for the application of field check corrections.

### Mapping Photography

10. A total of 22 runs of mapping photography were flown during the operation. The undeveloped film was dispatched to CPE using Ansett Air Freight, A36s and flight line diagrams have also been forwarded. After the film was developed it was collected by Army Svy Regt for assessment. Only seven runs were considered acceptable in accordance with Tl 201.

### Problems

11. Camera. Some problems were encountered with the feeding of the film, although "blank transports" were carried out as part of the pre-flight check, on occasion the camera failed to "blank transport" during flight.

12. Some problems also occurred when the camera shutters failed to operate during a run of photography. The camera continued to display a normal countdown sequence but failed to activate the shutters at the required time.

13. The use of the Differential Height and Elevation Logging System (DHELS) was delayed initially when it was discovered on arriving in the AO that its cable was missing. A subsequent cable was delivered by courier two weeks later.

14. Command. The RAPT were under command of Det 4 Fd Svy Sqn however the detachment Comd had no involvement in the preparation, planning and execution of the mapping photography task.

### Personnel

15. The following personnel were involved in aerial photography acquisition:

- a. MR J. Medway Vee-H Aviation (Pilot),
- b. SGT N. Houston Army Svy Regt, and
- c. SGT T. Purdey 4 Fd Svy Sqn.

#### Accommodation

16. Due to lack of suitable accommodation at the Norforce Depot in Kununurra (although it had been arranged by 4 Fd Svy Sqn) all personnel were initially accommodated in motels. After nine days when the accommodation conditions were rectified the RAPT personnel moved into the Norforce Depot, while Mr J. Medway (Pilot) remained in the motel in accordance with his contract. The unexpected motel accommodation resulted in the increase of T&S expenditure.

#### Transport

17. Transportation in Kununurra during the field phase of the operation was by taxi. At the end of the field completion a Landrover 110 was left for RAPT use by departing operational personnel.

18. At the completion of the photography phase of Op MIZMAZE 92 the LR 110 was driven to, and secured at RAAF Base Darwin for use during Op NERVOSE 92.

#### Rations

19. Apart from the nine days when the RAPT personnel were accommodated in hotels and in receipt of full TA, only the meals element of TA was paid.

#### Communication

20. Communication was by telephone using a Telcom Credit Card supplied by 4MD.

#### Movement

21. Movement to and from the AO was by the photography aircraft.

#### Post Operation Remarks

22. Light lines found on the negatives suggest "light creep" in the film magazine.

23. The camera was used to fly the Bourke Test Range prior to arrival in the AO, as the results were not available it was presumed that the camera calibration (88.79mm) was correct and was used on all photographic labelling. The results will never be known due to the film being incorrectly exposed at CPE.

24. Technical problems encountered during the operation are currently being investigated by the Army Svy Regt.

#### Recommendations

25. The following is recommended:

- a. A test run of photography should be flown and developed in the AO in order to periodically (certainly initially) check on the camera, and also to assess the photography.
- b. The RC10 camera equipment and configuration should be tested prior to any tasking. This would enable the repair of any problems noted in paras 13, 14 and 23.

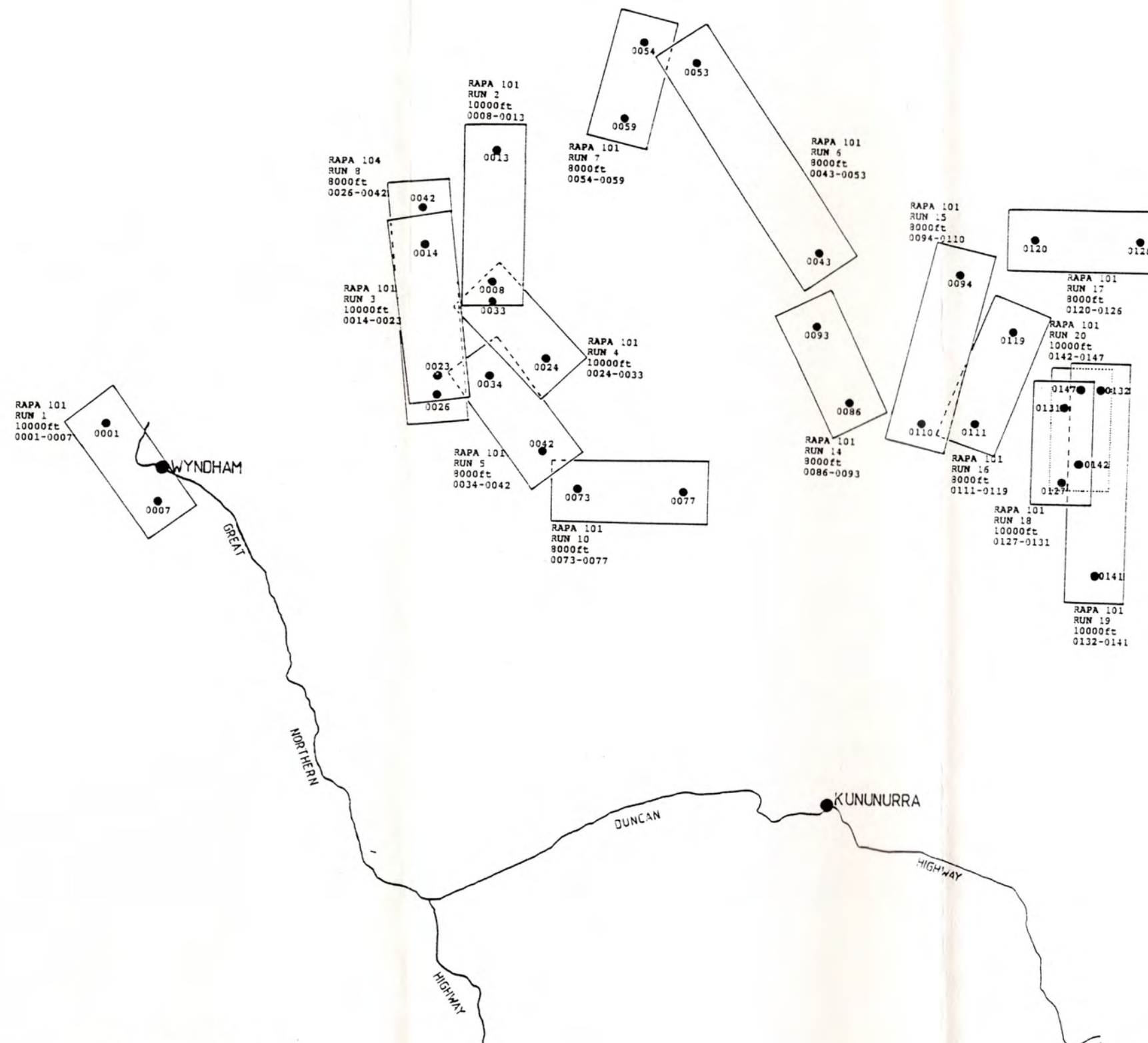
- c. All camera and associated equipment should be thoroughly checked for completeness prior to departure to the AO.
- d. Film magazines need to be tested for serviceability.
- e. The control of all photography operations be transferred to 4 Fd Svy Sqn.
- f. Consideration be given to commercial acquisition of mapping photography.

APPENDIX 1 TO  
ANNEX E TO  
OPERATION MIZMAZE 92  
OPERATION REPORT  
DATED 24 SEP 92

CONTROL POINTS

<u>Point</u>	<u>Date</u>	<u>Mission No</u>	<u>Run</u>	<u>Time(Z)</u>	<u>Altitude (ft)</u>	<u>Shape</u>
R081	14 Jun 92	RAPA 100	4	0524	10 000	+
R802	14 Jun 92	RAPA 100	5	0533	10 000	+
R697	14 Jun 92	RAPA 100	7	0607	10 000	+
R688	14 Jun 92	RAPA 100	3	0509	10 000	+
R699	14 Jun 92	RAPA 100	8	0628	10 000	+
R700	14 Jun 92	RAPA 100	9	0644	10 000	+
R701	14 Jun 92	RAPA 100	10	0647	10 000	+
R705	14 Jun 92	RAPA 100	1	0244	10 000	+
NMF311	17 Jun 92	RAPA 102	6	0313	10 000	+
R702	17 Jun 92	RAPA 102	7	0330	10 000	+
R703	17 Jun 92	RAPA 102	2	0217	10 000	+
R704	17 Jun 92	RAPA 102	3	0222	10 000	+

OP MIZMAZE 92 SUPPLEMENTARY PHOTOGRAPHY



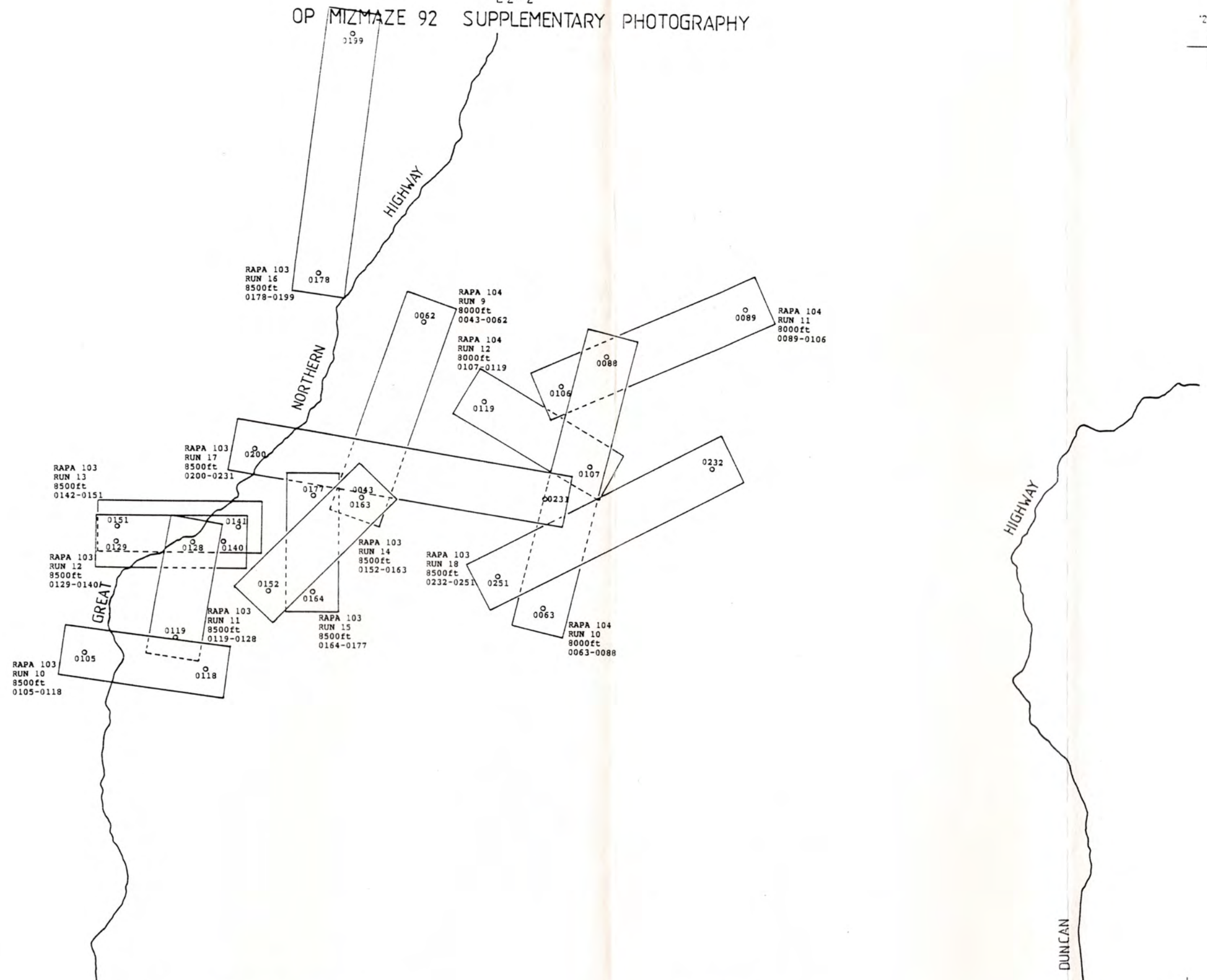
16° 00' 127° 30'  
Compiled [Signature] Sep Purong 26 Aug 92  
Checked [Signature]  
Date [Signature]

181km LINE COVERAGE

RAPA 101	RUN 1	10000ft	0001-0007
RAPA 101	RUN 2	10000ft	0008-0013
RAPA 101	RUN 3	10000ft	0014-0023
RAPA 101	RUN 4	10000ft	0024-0033
RAPA 101	RUN 5	8000ft	0034-0042
RAPA 101	RUN 6	8000ft	0043-0053
RAPA 101	RUN 7	8000ft	0054-0059
RAPA 101	RUN 10	8000ft	0073-0077
RAPA 101	RUN 14	8000ft	0086-0093
RAPA 101	RUN 15	8000ft	0094-0110
RAPA 101	RUN 16	8000ft	0111-0119
RAPA 101	RUN 17	8000ft	0120-0126
RAPA 101	RUN 18	10000ft	0127-0131
RAPA 101	RUN 19	10000ft	0132-0141
RAPA 101	RUN 20	10000ft	0142-0147
RAPA 104	RUN 8	8000ft	0026-0042

1:250 000  
SD 52-14  
CAMBRIDGE GULF

OP MIZMAZE 92 SUPPLEMENTARY PHOTOGRAPHY

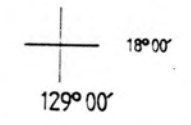
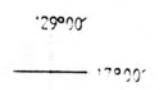
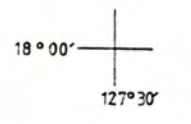
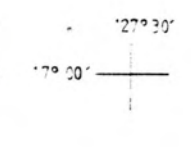


Compiled ... *Monday 26 Aug 52 Sgt Perry*  
 Checked ... *OP MIZMAZE 27 Aug 52*

254 km LINE COVERAGE

RAPA 103	RUN 10	8500ft	0105-0118
RAPA 103	RUN 11	8500ft	0119-0128
RAPA 103	RUN 12	8500ft	0129-0140
RAPA 103	RUN 13	8500ft	0141-0151
RAPA 103	RUN 14	8500ft	0152-0163
RAPA 103	RUN 15	8500ft	0164-0177
RAPA 103	RUN 16	8500ft	0178-0199
RAPA 103	RUN 17	8500ft	0200-0231
RAPA 103	RUN 18	8500ft	0232-0251
RAPA 103	RUN 19	8500ft	0252-0271
RAPA 104	RUN 9	8000ft	0043-0062
RAPA 104	RUN 10	8000ft	0063-0088
RAPA 104	RUN 11	8000ft	0089-0106
RAPA 104	RUN 12	8000ft	0107-0119

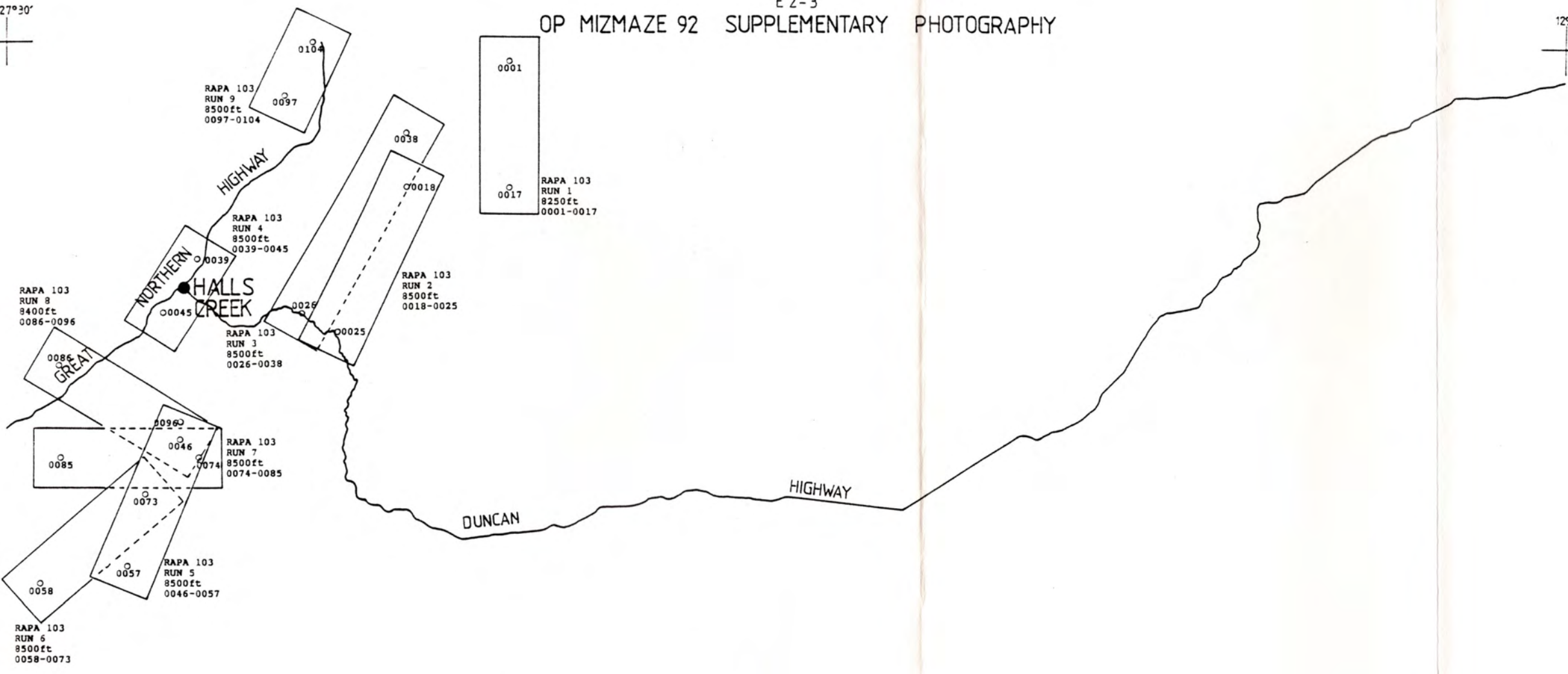
1:250 000  
 SE 52-6  
 DIXON RANGE



E 2-3  
OP MIZMAZE 92 SUPPLEMENTARY PHOTOGRAPHY

127°30'  
18°00'

129°00'  
18°00'



19°00'  
127°30'

19°00'  
129°00'

Compiled .....  
Checked .....

119.5km LINE COVERAGE

RAPA 103	RUN 1	8250ft	0001-0017
RAPA 103	RUN 2	8500ft	0018-0025
RAPA 103	RUN 3	8500ft	0026-0038
RAPA 103	RUN 4	8500ft	0039-0045
RAPA 103	RUN 5	8500ft	0046-0057
RAPA 103	RUN 6	8500ft	0058-0073
RAPA 103	RUN 7	8500ft	0074-0085
RAPA 103	RUN 8	8400ft	0086-0096
RAPA 103	RUN 9	8500ft	0097-0104

1:250 000  
SE 52-10  
GORDON DOWNS

## SMALL FORMAT PHOTOGRAPHY REPORT

### Introduction

1. Det 4 Fd Svy Sqn was tasked to investigate and report on the feasibility of using a small format hand held camera, from a helicopter, for identification photography. It was hoped that identification photography could be successfully taken on departure from a survey station, thereby eliminating the need for an additional dedicated photography aircraft.

### General

2. The camera used for this task was a Hasselblad 500 EL/M with a 40mm lens and black and white film. The camera was provided by AUSLIG.

### Identification Photography

3. The camera was operated from the observers seat of a LOH, between 1000 and 1400 hours, at a flying height of approximately 5 900 feet above sea level. Processing and assessment were undertaken by the RAPT. Bromide prints were produced at 4 Fd Svy Sqn. Annex A shows the location of control points photographed during the operation.

### Personnel

4. The personnel involved in the acquisition of the identification photography were SGT E. Jacobs and CPL A. Jackson.

### Problems

5. Due to the flying limitations of the LOH and the manner in which the camera was operated the following problems were encountered:

- a. inability in obtaining a truly vertical photo,
- b. inability to provide three consecutive photographs orientated to the same azimuth,
- c. inability to obtain three consecutive ident photographs in the same aspect of the photo frame,
- d. inability to eliminate the aircraft skid from appearing in the third photo frame,
- e. inability to align the LOH when passing directly over the point,
- f. inability to obtain 60% forward overlap between consecutive photos. This was due to the automatic wind facility of the Hasselblad camera creating an indeterminable time instant between consecutive photos.

6. Due to the aforementioned problems, it was not possible to meet the requirements of DSVY-A TI 305.

Conclusions/ Recommendations

7. Under the current specifications of TI 305 it is not feasible to obtain ident photography using a small format hand held camera from a helicopter.
8. Continued use of RC 10 photography for identification photography is recommended. However, hand held photography could be used on small control operations where it may not be cost effective to have a dedicated camera aircraft. If used, careful placement of control adjacent to unique ground detail would be vital.

OP MIZMAZE 92 MANNING

1. 4 Fd Svy Sqn:

a.	555409	LT	G.C. Addison	Det OC,
b.	315292	WO2	P.W. Hammer	Det 2IC, Tech/Ops WO,
c.	45941	WO2	I.D. Thiselton	SSM Admin WO,
d.	211893	WO2	V. Applebee	QMS,
e.	F312220	SSGT	L.M. Johnson	FC Party,
f.	227127	SGT	P.G. Baker	FC Party,
g.	180179	SGT	F.L. Downie	FC Party IC,
h.	46710	SGT	E.L. Jacobs	Control Party IC,
i.	4401748	SGT	T.M. Purdey	Air Camera Operator (RAPT),
j.	454310	CPL	A.E. Jackson	Control Party,
k.	181748	CPL	J.A. Mathieson	Cook,
l.	454117	CPL	T.P. Tran	FC Party,
m.	323320	CPL	G.T. Weatherell	FC Party IC,
n.	455133	LCPL	S.G. Adrain	FC Party IC,

2. Army Svy Regt:

a.	328915	LT	R. Carpenter	Attached pers,
b.	5104899	LT	R. Gray	Attached pers,
c.	322696	SGT	S. Drummond	FC Party IC,
d.	4400413	SGT	N. Houston	Air Camera Operator (RAPT),
e.	455592	SPR	N. Pedler	FC Party,

3. 162 Recce Sqn:

a.	324526	CAPT	P.	Hogan	LOH Pilot,
b.	3205671	LT	A.	Jones	LOH Pilot,
c.	557246	LT	D.	Percy	LOH Pilot,
d.	326107	LT	P.	Keys	LOH Pilot,
e.	179113	CPL	L.	Einam	RAEME All Trades,
f.	237993	CFN	M.	Fathers	RAEME Mech.

4. 104 Sig Sqn:

a.	2308758	LCPL	J.R.	McLennan	OP RAD
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5. Adelaide Log Bn:

a.	453083	CFN	S.	Fisher	Veh Mech,
b.	F455819	PTE	T.	Smyth	Driver,

6. DSU Adelaide:

a.	328843	PTE	H.	Arthur	Cook,
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7. Vee-H Aviation:

a.	Mr	J.	Medway	Pilot (RAPT)
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RAEME (VEH MECH) TECHNICAL REPORT

Deployment

1. The road party consisted of:
  - a. two L/R 110 FFR,
  - b. two Truck Cargo MC 2,
  - c. two Truck Cargo MC 4,
  - d. two 1/2 ton tlr, and
  - e. one L/R 6x6 110 FRV.
2. Air movement of vehicles consisted of:
  - a. four L/R 110 FFR, and
  - b. one 1/2 ton tlr.
3. All vehicles were classified task-worthy prior to leaving Adelaide.

Technical Inspections

4. All vehicles had first and last parade checks completed on each day of use. In addition, regular checks of fluid levels in gearbox, differentials etc was carried out, as was the cleaning of air filters and exterior of radiator cores.

Specific Repairs

5. Details of the specific repairs to the vehicles are listed in Appendix 1. All documentation (TGM 146 and TGI 41) for inspection and/or repairs to vehicles by Adelaide Logistics Battalion (ALB) have been raised and submitted.

Parts Availability

6. Most vehicle parts were carried by RAEME support as per Forward Repair Team (FRT) requirements. Parts not held were sought through 7 Log Coy, and when these parts could not be provided from Darwin they were subsequently supplied and freighted by Adelaide Log Bn to the AO. This caused a considerable delay in the arrival of the parts, despite the fact that they were dispatched by the fastest possible means. Parts were also available in the AO at inflated costs.

Comments and Recommendations

7. Several consistent faults were experienced in the AO, these were as follows:
  - a. door locks failure due to ingress of dust,
  - b. rear differential control arm rubbers collapsing, and
  - c. shock absorber collapse (one instance).
8. Most faults were related to the harsh natural conditions in the area and driver inexperience.
9. Future operations of this nature should carry more than the standard number of shock absorbers and control arm rubbers etc to alleviate the problems of obtaining the parts and /or to overcome purchases in the AO.
10. Personnel should have gained more four wheel drive experience prior to departing for the AO.

SPECIFIC REPAIRS

49-170 LR 110 FFR

Replace rear prop shaft  
Replace L\H\R shock absorber  
Replaced steering drag link  
Replace front differential  
Wheel alignment  
Replace R\H engine mount

Parts supplied by ALB  
Parts purchased  
Parts purchased  
Req Base Wksp for repair  
Req Base Wksp for repair  
Req Base Wksp for repair

49-171 LR 110 FFR

Wheel balance  
Repair windscreen wiper control arm  
Repaired wheel rim  
Re-wired fridge to vehicle battery, disconnected 24 volt system  
Re-wired tail lights

Local repair  
No parts required  
No parts required  
Parts carried  
Parts carried

49-172 LR 110 FFR

Replace L\H\F shock absorber tower  
Replace 100 amp alternator belts  
Freed up accelerator  
Replace headlight globe  
Panel beat brush guard  
Repaired rear door latch  
Repaired sticking bonnet cable

Parts supplied by ALB  
Parts carried  
No parts required  
Parts carried  
No parts required  
No parts required  
No parts required

49-173 LR 110 FFR

Replace Transfer case rear output seal  
Cleaned radiator  
Tightened rear differential control arms  
Weld front differential housing

Parts carried  
No parts required  
No parts required  
Local repair

49-174 LR 110 FFR

Replace battery  
Inspect electrical circuit

Parts carried  
No parts required

49-198 LR 110 FFR

Inspected gearbox (2nd gear U/S)

Req Base Wksp for repair

38-989 UNIMOG

Replaced gear box oil  
 Repair 100 amp alternator  
 Inspected oil transfer between rear hubs  
 Remounted spot light  
 Repaired hand throttle  
 Repaired brush guard  
 Tightened cab mounting bolts  
 Replaced front torque tube seals  
 Modified radiator fan shroud  
 Replaced 2 tyres and tubes

Oil carried  
 No parts required  
 No parts required  
 No parts required  
 No parts required  
 No parts required  
 No parts required  
 Parts carried  
 No parts required  
 Parts carried

46-571 UNIMOG

Adjust hand throttle

No parts required

91 1244 MITSUBISHI

Nil Repairs

91 1243 MITSUBISHI

Repair flat tyre

Local purchase

51-854 L/R 110 6x6

Drained bell housing  
 Replace clutch  
 Repair gear box front input seal

No parts required  
 Req Base Wksp for repair  
 Req Base Wksp for repair

## RA SIGS REPORT

### Situation

1. The role of the RA Sigs signaller attached to the operation was to provide instruction in the HF man-pack and establish a communications base station at each main base (Wyndham and Halls Creek).
2. Communications within the AO were run on a pre-arranged schedule timing between 0630-0700 hours and 1700-1815 hours daily. A listening watch was maintained inclusive of these times.
3. The base station consisted of a Raven Medium Power Set with a High Current Power Supply Unit. The base station antenna consisted of a Full Wave Delta pre-cut to multiple frequencies using antenna expedient kit.

### Communications Procedures

4. RATEL throughout Op MIZMAZE 92 was of a high standard, and ensured the effective passage of SITREPs and tasking orders. The operational personnel assimilated instruction well and showed a good working knowledge of Raven HF Man-pack communications, considering they were only recently familiarised with the equipment.

### Suitability of Frequencies

5. Difficulties were experienced in the following areas for the following reasons:
  - a. Wyndham 22-29 May 92. Problems of medium interference occurred on all four frequencies throughout this period. Most interference was due to local Army transmissions from suspected Norforce/Pilbara elements. Heavy aboriginal dialect on 10 MHz made the 7 MHz the only useable alternative during daytime schedules. The 7 MHz was used as the primary frequency, and after the field parties became accustomed to background noise, traffic was passed with relative ease. As a result frequency allocation must be looked at closely (recon) in the Wyndham area due to proximity of Norforce and Maritime Shipping.
  - b. Halls Creek 03-22 Jun 92. Communications conditions became quite adverse at the Halls Creek AO, and once again 7 MHz was our only Primary frequency, pre-arranged testing during a 24 hour period found 10, 4 and 3 MHz too noisy with heavy interference. These frequencies also clashed with others in use, making it impossible to work through unknown voice and continuous wave. Communications were erratic for the first three days in the Halls Creek AO. On debriefing the field parties it was found that all parties were using a Man-pack Whip or 10 metre expedient wire, and not attempting to improve communications with a directional antenna such as an inverted "V". Once the field parties were briefed and re-deployed, they put the suggestion of an inverted "V" to use and communications improved dramatically. As a result Svy personnel must overcome the syndrome of "HF communications equals no communications", and constantly try to work through and improve antenna sighting and selection. This will come with more practical application of HF antenna theory.

### Equipment

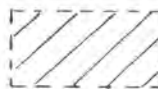
6. The Raven Radio Transmitters proved quite robust and reliable considering the harsh climate and treatment they received. The only faults with the equipment were those found by the Raven built in test equipment (B.I.T.E.) prior to the operation. The only damage sustained during the operation was a broken handset connection. This was caused by the set being allowed to move freely in the back of a land rover causing the connected handset to bump repeatedly against the cabin.

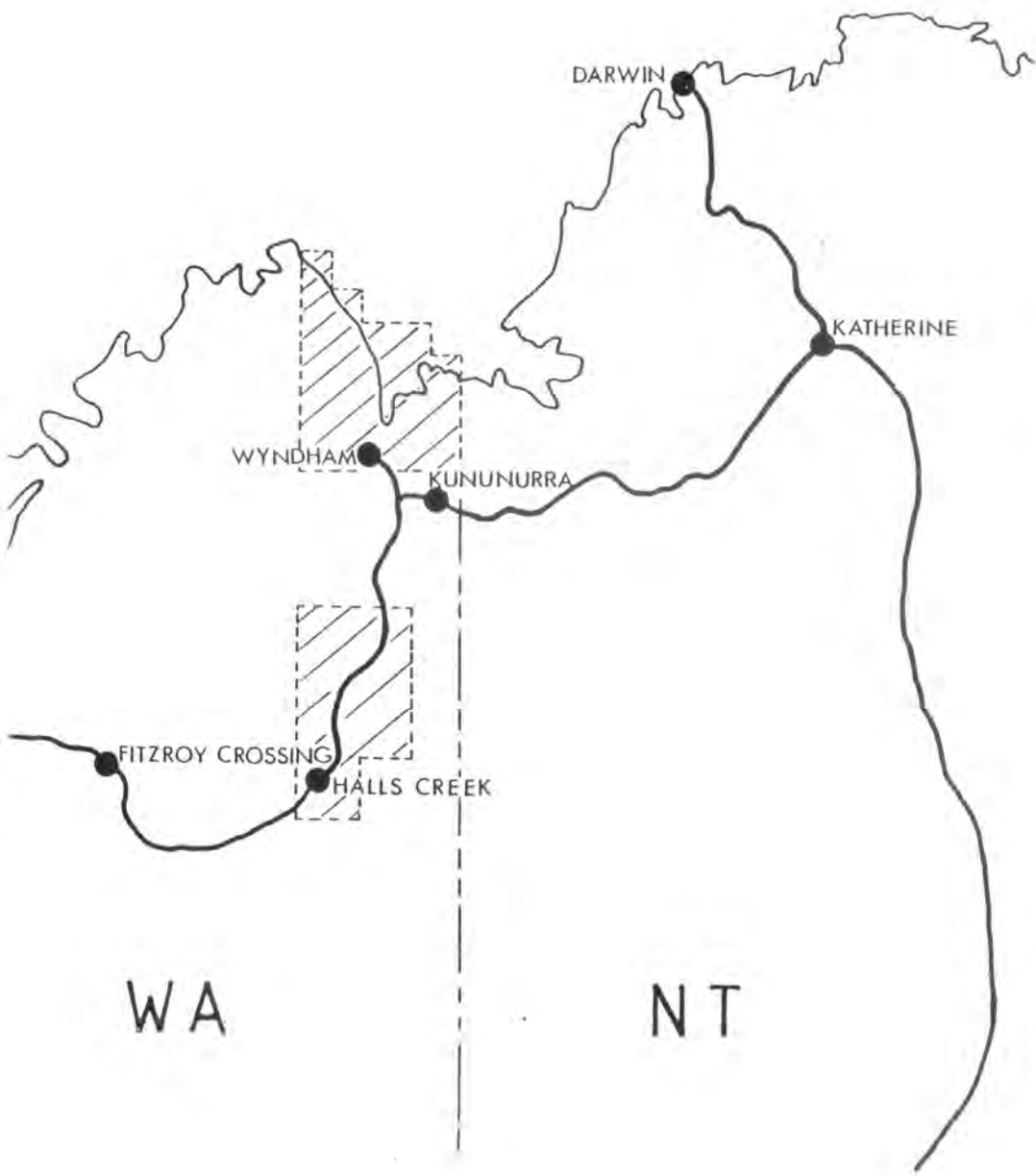
7. The lithium batteries were a definite benefit as a primary power supply. Their endurance and reliability were a great asset. The only down side of the lithium battery is the dangerous cargo limitation they present on Service and Civil aircraft during bulk transportation.

### Summary

8. Overall, the Raven set was definitely preferred by its users as a replacement to the F1. The main factors for future Svy operations that must be looked at are:

- a. better frequency allocation;
- b. ensure secure storage of RT's in transit; and
- c. more application of HF theory during Pre operation training.

LEGEND  
 AREA OF OPERATION



  
**OPERATION MIZMAZE 92**  
**OPERATION BRIEF**

CAMBRIDGE GULF  
 and  
 KIMBERLEY REGION



4th Field Survey Squadron

ANNEX J TO  
 OPERATION MIZMAZE 92  
 OPERATION REPORT  
 DATED 24 SEP 92

#### 4th Field Survey Squadron

The 4th Field Survey Squadron is an Australian Army unit responsible for all field survey operations undertaken by the Australian Defence Force as part of the defence mapping programme. Current priority areas in the programme include the Kimberley Region, the northern regions of the Northern Territory and Cape York. The Squadron uses sophisticated satellite surveying techniques to establish survey control points which form the basis of the mapping task. Other field tasks undertaken by the Squadron include verifying the accuracy and content of preliminary maps prior to their publication.

Vital to the success of these operations is the aviation, engineering, communications, transport, medical and catering support provided by other Army units and the Royal Australian Air Force. The understanding and cooperation of civilian organisations and individuals will also continue to be a key factor in the accomplishment of this essential Defence task.

4th Field Survey Squadron  
Keswick Barracks  
KESWICK SA 5035

Ph (08) 293 9274  
Fax (08) 293 9361

#### Operation MIZMAZE 92

Operation MIZMAZE 92 will be conducted in the the Kimberley region of Western Australia between 19 May and 22 July 1992 in the area shown overleaf. Four, two-man survey teams, will use four wheel drive vehicles and Army helicopters in the area checking preliminary maps. A fifth team will occupy widely dispersed and often remote survey sites for periods of up to two days. The teams will be supported from base camps which will be established first at Wyndham and then Halls Creek. RAAF Hercules aircraft will transport Squadron personnel and stores to and from Adelaide.

A total of 46 maps at a scale of 1:50 000 are to be checked, and five new survey stations will be established during the operation. The information obtained will provide soldiers at the Army Survey Regiment in Bendigo, Victoria with the fundamental information required to complete the map making process.

Thank you for your assistance and please call me if you have any questions or concerns regarding Operation MIZMAZE 92 or the Squadron.

Major Andrew McLeod  
Officer Commanding