

OPERATION MIZMAZE 1990

OPERATION REPORT



CONTROL SURVEY
AND
FIELD COMPLETION OPERATION

EAST KIMBERLEY DISTRICT
WESTERN AUSTRALIA



4th FIELD SURVEY SQUADRON

OPERATION MIZMAZE 90

OPERATION REPORT

A CONTROL SURVEY

AND

FIELD COMPLETION OPERATION

CONDUCTED IN THE

EAST KIMBERLEY DISTRICT

WESTERN AUSTRALIA

SEP - OCT 1990

4 FIELD SURVEY SQUADRON

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OPERATION MIZMAZE 90

OPERATION REPORT

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OPERATION REPORT
OPERATION MIZMAZE 90
AUG - OCT 1990

- References:
- A. DGOP-A Tasking Directive 1/89 A86-575 dated 8 Sep 89
 - B. Op MIZMAZE 90 Concept of Operations- Amendment Two Dated 23 July 90
 - C. Op MIZMAZE 90 Mounting Instruction dated 23 Aug 90
 - D. DGOS-A SIC BAA of 310550 Z Jul 90 Op MIZMAZE 90 - Svy OP ORD 1/90
 - E. DSVY-A Technical Directive A474-5-65 dated 2 Aug 90
 - F. DSVY-A Z2Y/JQI SVY 5923 of 310500 AUG 90
 - G. Survey Adelaide Z2Y SVY 203 of 050503 Z JUL 90

Introduction.

1. Op MIZMAZE 90 was a field completion and control survey Op conducted in the East Kimberley Region of Western Australia from 5 Sep 90 to 8 Oct 90. An operational base was maintained at Halls Creek Caravan Park during the period 5 Sep - 8 Oct 90. Both the field completion phase and the GPS activities were supported from this base.

Mission.

2. Det 4 Fd Svy Sqn was to field complete 48 x 1:50 000 maps and establish 7 horizontal control points using GPS equipment.

Area of Operations.

3. The area of operations is as follows:

a. Field Completion:

(1) SD 52-14 Cambridge Gulf (4466 Pentecost),

(2) SE 52-2 Lissadell
(less 4665 Argyll Downs), and

(3) SE 52-9 Mount Ramsay.

b. GPS:

(1) SE 52-2 Lissadell,

(2) SE 52-5 Lansdowne,

(3) SE 52-6 Dixon Range, and

(4) SE 52-10 Gordon Downs.

These areas are shown in Annex A.

Operation Results.

4. The Det 4 Fd Svy Sqn achieved the aims of the Op as defined in Ref A. Full results of the Op are detailed at Annex B.

Conduct of Operations.

5. The Det advance party deployed from Adelaide by road on 31 Aug 90 and arrived in Halls Creek on 5 Sep 90 having covered approximately 3750 km. The remainder of personnel and equipment arrived by RAAF C130 on 5 and 6 Sep 90.

6. The Op base was located at Halls Creek caravan park. The Op commenced with four GPS parties being deployed. Concurrently, two field completion parties were deployed daily to the near areas. Two LOH aircraft were used to position GPS parties at each of three stations.

7. GPS operations concluded on 16 Sep 90 and three members of the Det departed by road for Adelaide. At this time the remaining GPS parties were regrouped. A total of six field completion parties were then deployed. The LOHs were then employed for field checking purposes.

8. The AAVN Pilatus Porter aircraft, fitted with an RC10 aerial camera, arrived 21 Sep 90 and commenced operations on 23 Sep 90. Identification photography of the new stations and supplementary photography of the areas being field checked were required.

9. Photography was also required to enable the compilation of Photograph Interpretation Guides (PIG) of future areas to be plotted. This was carried out using 35 mm photography from the LOH and RC10 from the Porter. The aerial photography report is attached as Annex C.

10. Drummed fuel for both the aircraft and vehicles was prepositioned at Margaret River Station and Turkey Creek Roadhouse prior to the start of the Op. Bulk fuel for aircraft and vehicles was available at Halls Creek. The aircraft returned to Halls Creek each night.

11. Assistance to 7MGI Sect. Prior to the start of the Op, 4 Fd Svy Sqn received a request from 7MGI Sect Darwin to assist them in compiling a data base of natural and artificial features and conditions in the AO. This was done by the field completion parties as they carried out their normal duties. Assistance was also given by CAPT Grealy and LT Addison who conducted surveys in specific areas. Details of the results achieved are given in Annex B.

12. The sequence of events is shown at Annex D.

Administration and Logistics.

13. Personnel. The personnel involved in OP MIZMAZE 90 are shown in Annex E.

14. Aircraft Support. The following aircraft support was required for the Op:

a.	LOH.	Hours
	(1) GPS	29.2
	(2) Field Completion	116.7
		Total 145.9 (150 hr alloc)
b.	Pilatus Porter	62.9 (70 hr alloc)

15. Vehicles. During the road move to the AO and subsequent operations a recurring problem with the L/R FFR batteries boiling was noticed. Investigation by the Veh Mech attached to the Det showed that the 100 Amp alternator had been incorrectly adjusted and several batteries had been rendered useless as a result. The Mech was able to make the necessary adjustments, and replacement batteries were obtained from Darwin. A full report on the vehicles is attached as Annex F.

16. Details of vehicles used on the Op are as follows:

- a. 7 x L/R FFR 110 from Unit resources and 1 x L/R FFR 110 on loan to the Det by HQ 7MD for the period 14 Sep - 22 Sep 90,

- b. 2 x truck cargo MC2,
- c. 1 x truck cargo MC4 with 1 x 150 cubic ft skid mounted refrigerator,
- d. 2 x 1/2 ton tlr, and
- e. 1 x wksp tlr.

17. POL. The usage of POL is as follows:

- a. Diesel: 16 000 ltr
- b. Avtur: 32 000 ltr

18. Stores and Equipment. Stores and equipment needed for the Op which were not available from unit resources were:

- a. 1 x truck cargo MC2,
- b. 1 x truck cargo MC4,
- c. 1 x 150 cubic ft skid mounted refrigerator, and
- d. 1 x RC10 Aerial Camera.

19. The RC10 was fitted by 1 Topo Svy Sqn prior to the Porter deploying to the A0. This proved to be successful. The chance of damage during transportation was negated and valuable space for stores and equipment was saved.

20. GPS equipment performed very well overall with no major problems encountered. It is becoming apparent that this may not be the case in the future. The GPS Mech expressed concerns about the increasing unreliability of the printers and the difficulty of obtaining spares. A full report and list of recommendations are attached as Annex G.

21. Throughout the Op the oven on the cooking range taken by the Det failed to operate. This was due to damage to the pilot light and the unavailability of a replacement part. This problem could have been avoided by checking the equipment prior to deploying to the A0.

22. Accommodation. The operations area, sleeping accommodation, cooking and eating areas were all in tentage erected in the Halls Creek Caravan Park. Two small airconditioned rooms were rented to house the computing and film drying equipment. The marking up of corrections was carried out in the dining tent.

23. Catering and Resupply. Rations were purchased locally using the Survey Party Ration Allowance. A total of

\$10 180.30 was expended for the Op. Field parties were able to carry fresh rations in their portable Trailblazer refrigerators mounted in the rear of the landrovers. These items proved to be both efficient and useful, greatly improving living conditions in the field.

24. Base resupply was by local purchase and resupply runs to Kununurra and Broome for some foodstuffs. Field parties were equipped with portable refrigerators and were able to carry enough supplies to last for up to four days. Parties returned to main base for resupply.

25. Even allowing for the inflated prices asked for goods at Halls Creek, the Survey Party Ration Allowance rate of \$15 /head /day proved to be adequate. This may not always be the case in more remote locations. Care should be taken in the future to check on prices prior to deployment to ascertain if alternate arrangements should be made.

26. Canteen. A limited canteen service was provided through the 4 Fd Svy Sqn Social Club.

27. Medical. Medical services were provided by the Halls Creek Hospital. Health problems were minor in nature and ranged from dog bite to local water induced gastric problems.

28. Morale and Discipline. Morale remained high throughout the Op. This was aided by various sporting and social functions with the local population. Conduct of the individual members was good and there was no need to take any disciplinary action.

29. Finance. Expenditure for the operation was follows:

a. F & C:	Nil
b. T & S:	\$15 845.06
c. Rations:	\$10 180.30
d. Petty Cash:	\$206.99

30. Land Clearances. There exists the requirement to obtain land clearance for personnel wishing to enter upon lands owned by Aborigines and for any private enterprise or National Park. These clearances were sought through HQ 7 MD prior to deployment. Clearance for entry to Argyle Diamond Mine was, however, overlooked and was obtained directly by the Det.

31. Visits. Visits to the Op were as follows:

- a. CAPT M.Kaye DSVY-A 19 Sep - 21 Sep 90,
- b. WO1 R.George RSM 4 MD 4 Oct - 7 Oct 90,
- c. SSGT S.Capp 7MGI Sect 10 Sep - 12 Sep 90, and
- d. CPL Ratcliffe 7MGI Sect 10 Sep - 12 Sep 90.

32. Communications. Communications between main base and field parties was carried out by the use of AN/PRC F3 radios. A reporting schedule was kept as the normal routine with a listening watch maintained when circumstances dictated. The quality of communications was surprisingly good for the area and continued well into the evening. Previous operations in the area have been troubled by deteriorating communications from dusk to dawn.

33. Rear link to 4 Fd Svy Sqn was by STD telephone available at the caravan park.

34. Ref F tasked the Det with investigating the effects of operating communications equipment in close proximity to GPS equipment which is recording data. While the recording of data was clearly audible through the radios there was no apparent effect on the quality of communications and posed no problems. Distances tested ranged from one metre and greater. Results of the tests can be found in Reference G.

Conclusions.


35. Conclusions to be made from the conduct of the Op are as follows:

- a. deployment by air shortens the duration of an op and vastly reduces wear and tear on vehicles;
- b. TI PPC printers are totally unreliable. These, and possibly other TIPPC equipment need replacement (refer Annex G); and
- c. LOH aircraft are capable of deploying lightweight GPS parties (two sorties) to areas inaccessible by other means. This however is expensive in terms of air hours. The 29.2 hours used were to position parties on four stations only.

Recommendations.

36. Recommendations to be made from the conduct of the Op are as follows:


- a. Future operations should be conducted closer to the southern winter to avoid extremes of climate.
- b. The RC10 camera should be fitted to the dedicated aircraft prior to deployment from its base location.
- c. A prices check for the A0 should be conducted prior to deployment to ensure that Survey Party Ration Allowance is sufficient for the duration of the Op.
- d. Where possible, deployment to the A0 should be by RAAF MRT.
- e. UH-1H aircraft should be employed to lift GPS parties to stations where other means of transport are impractical.
- f. The accuracy requirements laid down in Op Technical Directives be written so as to be determinable in the field (see Annex B).
- g. Field completion packages prepared by Army Svy Regt contain four CDRV paper work sheets (see Annex B).
- h. Agencies requiring support during the conduct of survey ops (eg: 7 MGI Sect) should attempt to give maximum notification of their requirement so that appropriate planning is possible.
- i. The matters raised at Annex C re fitting of the RC10 camera and pilot-air camera op communications should be addressed prior to the next deployment.



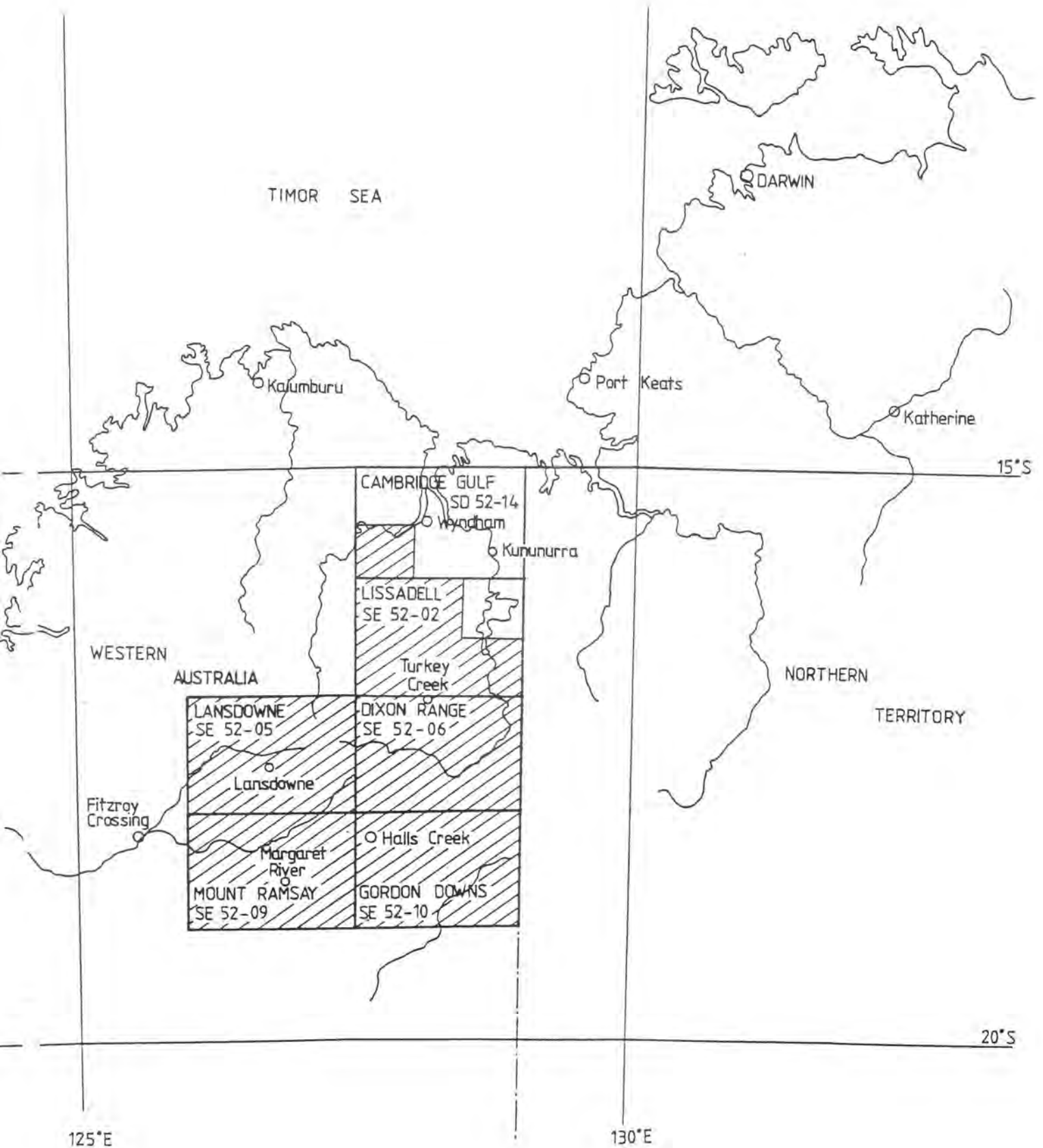
L A NEWTON
Major
Officer Commanding

13 December 1990

- Annexes:
- A. Area of Operation
 - B. Operational Results
 - C. Aerial Photography Report
 - D. Sequence of Events
 - E. Personnel
 - F. Vehicle Report
 - G. RAEME (GPS) Report

 AREA OF OPS

SCALE 1:5 000 000



OPERATION RESULTS AND TECHNICAL REPORT

References:

- A. DSvy-A Technical Instruction No 302
- B. DSvy-A Technical Instruction No 305

Introduction

1. Det 4 Fd Svy Sqn was tasked with the establishment/reoccupation of seven horizontal control stations utilizing GPS and field completion of 48 x 1:50 000 map sheets.
2. Positive photo identification of all control points occupied was required together with any supplementary photography resulting from field completion.
3. Additional tasks included acquisition of Photographic Interpretation Guide (PIG) photography and data collection for the 7 MGI Sect terrain intelligence program.

Control using GPS

4. Planning. The GPS network was planned in accordance with the Technical Directive and References A and B.
5. The final network design was slightly modified in the field as operational requirements necessitated. Four sessions were observed utilizing four receivers per session.
6. Execution. The GPS phase of the operation extended over the period 7-16 Sep and included:
 - a. reconnaissance of proposed stations and existing first order control stations,
 - b. GPS observations, and
 - c. computation, evaluation and acceptance of observations.
7. Movement of parties was by a combination of vehicle and LOH. Helicopters were used for insertion and extraction of field parties onto stations not accessible by vehicle. Two lifts per party were achieved by pruning any excess stores. Ground marking equipment was positioned prior to occupation during the reconnaissance stage. A total of 30 LOH hours was expended during the GPS phase.

8. Tracking sessions were conducted in the early evening thus enabling full use of daylight hours for movement to stations, station marking and relevant documentation.
9. For each session 35 min of data was recorded. In all sessions the initial scenario selected was successful with no re observations required.
10. Hard copies of SATPLAN were issued to field parties or alternately, relevant information on sessions was transmitted via radio. Communications throughout the Op were good and the allocated alternate frequency worked well.
11. Three first order control points were incorporated into the GPS network. Each station had been connected to the AHD by spirit levelling prior to the Op.
12. Stations were established by relative positioning using T: NAV III software. Only Block One satellites were tracked. Point positioning observations, using GESAR operating system were carried out at two existing control points in accordance with the Technical Directive. Observations were simultaneous.
13. Post processing was done in the field using a TIPPC and GEOMARK software. A report on the post processing stage is at Appendix 1.
14. Results. The following is a summary of observations:
 - a. total number of stations observed - 10.
 - b. number of new stations established - 6.
 - c. number of existing control stations connected to network - 3 (both horizontal and AHD height)
 - d. number of base lines observed - 24.
 - e. number of sessions - 4 (excluding GESAR observations).
15. Stations observed are shown at Appendix 2 to this Annex.
16. Results obtained appear to satisfy the specification requirements of the Technical Directive. Whether stations have been determined to one sigma circular error with reference to AGD 84 is not determinable in the field.
17. Absolute imagery of all control points occupied was obtained. Film was developed in the field and all idents proved. A detailed report on aerial photography aspects is enclosed at Annex C.
18. The control phase was successfully completed within the time frame initially planned. The original concept for GPS acquisition was adhered to with only minor adjustments. The GPS equipment functioned satisfactorily with no significant problems.

Field Completion

19. Background. Army Survey Regiment plotted and produced field check packages for map sheets in the 1:250 000 areas of:
- a. LISSADELL - 20 x 1:50 000, and
 - b. CAMBRIDGE GULF - 4 X 1:50 000.
20. 4 Fd Svy Sqn produced field check packages for 24 x 1:50 000 sheets in the 1:250 000 area of MT RAMSAY. Plotting and part compilation had been done by 5 Fd Svy Sqn.
21. Source Data. Source data consisted of:
- a. 1:50 000 field check packages,
 - b. 1:100 000 topographic mapping,
 - c. 1:250 000 coverage in NTMS and JOG format, and
 - d. 1:250 000 pastoral plans.
22. Field Check Packages. 4 Fd Svy Sqn screen printed preliminary maps in various combinations. Film positive composites and separations were produced for use as field check masters.
23. Army Svy Regt produced computer generated CDRV paper plots as preliminary maps. Unnecessary text was deleted during production to avoid confusion and present a better user product. CDRV composite films were used as field check masters.
24. Execution. At the commencement of Ops, most personnel were involved with the GPS phase. However it was possible to deploy two field check parties working in close proximity to main base. This provided an opportunity to train inexperienced personnel on field completion procedures. On completion of the control phase, six parties were initially deployed. This was later reduced to five when the camera aircraft arrived and supplementary photography commenced. Dates for the field completion phase were 16 Sep - 8 Oct 90.
25. Ground verification was undertaken by two man vehicle parties followed by an aerial inspection to resolve any queries and to check detail in inaccessible areas. At times parties remained in the field for three to four days before returning to base camp. Application of corrections was carried out in main base. Homesteads in the AO were visited and owners/managers provided advice on new development and nomenclature.
26. A listing of map sheets checked is shown at Appendix 3 to this Annex.
27. Comments. Many sheets to the far North of MT RAMSAY and to the West of LISSADELL had a large air check element. Mountainous terrain precluded vehicle access and, in most cases, cultural detail was sparse. A total of 110 LOH hours was expended over the 48 map sheets.

28. The plotting photography for MT RAMSAY was dated 1984. Since then the boundaries of many pastoral properties have been altered, resulting in additional cultural detail such as fence lines, roads and tracks. The vegetation portrayal, while consistent, was found to be generally under classified.

29. LISSADELL and CAMBRIDGE GULF sheets were produced from 1988 photography. Generally, the plotting was good though, in places, the portrayal of pinnacles was over done. Again, pastoral property boundary alterations resulted in additional cultural detail.

30. Diamond and gold mining activities were prevalent around the LISSADELL region. Much of the related excavation work is surface orientated. Hence detail in those areas is subject to constant change.

31. Reports. Reports were compiled for each 1:50 000 map sheet by the field parties. Where it was possible, a party was given the 1:100 000 area to check. This ensured that LOH sorties were most productive with little transit time lost in moving from one map sheet to another.

32. Supplementary photography was acquired for detail that could not be positively positioned during field check. A full report on photography is at Annex C.

33. The field completion phase was successfully completed on schedule. Inexperienced personnel gained valuable on the job training in field completion procedures and familiarised themselves with 110 Land Rover driver techniques.

34. Generally, field completion parties were satisfied with the quality and composition of packages prepared for their use. Packages prepared by Bendigo contained only two CDRV paper work sheets. At times this presented difficulties, especially when parties working around the one area required join sheets.

Photographic Interpretation Guide (PIG) Photography

35. An additional task during the Op was the acquisition of PIG photography on future mapping areas adjacent to the A0.

36. Planning was done prior to departure for the A0 and source data such as 1:100 000 and 1:250 000 mapping was studied. Features such as unusual land forms, drainage patterns and distinctive vegetation were selected for photography. During the Op any other features worthy of note from a PIG aspect were photographed.

37. RC10 photography supplemented with 35mm colour film was taken. Interpretation guides are to be compiled for use by plotting agencies.

38. A full report on aerial photography aspects is enclosed at Annex C.

39. The PIG task was incorporated into supplementary photography acquisition (fixed wing) and air check verification (LOH). Hence flying time expended on this component was minimal.

40. Where future mapping areas are some distance from the AO, additional aircraft hours would have to be allowed for at the planning stage.

Terrain Intelligence Collection

41. 7 MGI Sect requested Det 4 Fd Svy Sqn assistance in data collection for a proposed data base on operational conditions. It is intended to eventually use the data base as an aid to planning and conducting military operations throughout the Northern regions of Australia.

42. Execution. The task was done in conjunction with normal field completion procedures. Two personnel from 7 MGI travelled to the AO and briefed field parties on the requirements.

43. The data collection process involved two phases:

- a. terrain intelligence acquisition, and
- b. application of attributes to cultural and hydrographic features.

44. Terrain Intelligence. Data was recorded for representative areas of different landscape types throughout the region. Characterisation plots in these representative areas were established, a plot consisting of approximately a square 20m x 20m. Information was collected on soil composition, vegetation types and density, visibility, vehicle access, water availability and aircraft access.

45. Application of Attributes. During field completion, as part of the standard operating procedure, cultural and hydrographic features were classified. Nomenclature was also collected. Much of this data was relevant to the application of attributes. More detailed information was required on such things as water quality, power sources, dimensions and construction of floodways, causeways and bridges.

46. Suitable booking forms were used to record information. Disposable cameras were supplied to photograph any unusual features or features that could be of interest from a terrain analysis aspect.

47. All results are to be collated in conjunction with the normal application of field check corrections and data sent to 7 MGI Sect on completion.

48. Although this task was a late inclusion in the Op, it was successfully achieved with only minor disruptions to the planned sequence of events. However, should support for MGI tasks become an ongoing requirement, there would be a need to allow additional time at the planning stage.

Conclusion

49. All technical requirements Det 4 Fd Svy Sqn were tasked with were successfully achieved.

Recommendations

50. GPS. The accuracy requirements laid down in Technical Directives be written so as to be determinable in the field.

51. Field Completion. Packages prepared by Army Svy Regt contain at least four CDRV paper work sheets. This should satisfy the requirement for parties needing join sheets when working around the same area.

52. Terrain Intelligence Collection. Agencies requiring MGI support should ensure advanced notification is given to the Unit so the tasks can be incorporated into the Operation at the planning stage.

Appendices:

1. GPS Computation Report
2. Observed Stations
3. Map Sheets Checked

GPS COMPUTATION REPORT

OPERATION MIZMAZE 90

Field Data Processing

1. General. Data processing was carried out at main base at Halls Creek. The processing section was housed in an ATCO airconditioned room hired for the duration of the Operation. This ensured a dust free environment and provided security for the equipment.

2. Manning. The section was manned by the Technical WO and a NCO. The responsibilities were:

- a. allocation of processing numbers,
- b. compilation and issue of predictions using SATPLAN,
- c. receipt and check GPS data and records,
- d. perform cassette translations and baseline determinations using GEOMARK,
- e. determine the precision of each session,
- f. compute provisional co-ordinates, and
- g. prepare data package for Army Svy Regt.

3. The NCO was initially unfamiliar with GPS and the post processing procedures. On the job training was undertaken and the member was soon proficient on the basic requirements of the task.

Results

4. All baselines were computed. Triple differencing was used as no lines were under 30km in length.

5. Precision checks were done for each session using the GEOMARK misclose assessment form. These checks produced acceptable misclose results, the maximum misclose calculated being 1.49 ppm.

6. Hard copies were obtained for record purposes of information input such as mets and antennae heights.

Equipment Performance.

7. The TI OMNI 800 printer continually broke down. The equipment was used in an air conditioned environment hence high temperature levels were not the cause of the problems.
8. A spare printer was taken on the Op and it was necessary to constantly alternate the printers to ensure post processing could continue.
9. It is obvious that the TI printers are well past their useful life and in need of replacement.

Adjustment Package

10. The following information has been prepared for forwarding to DSvy-A for adjustment by NUGAN:
 - a. GPS network diagram showing all successfully observed baselines. The lines are numbered sequentially.
 - b. Session diagrams showing all successful lines for the session. Numbered to agree with the Network Diagram.
 - c. Baseline computation reports numbered to agree with the network diagram have been supplied. Each baseline report is accompanied by printouts of:
 - (1) baseline determination status,
 - (2) weather data input, and
 - (3) antenna offset input.
 - d. Provisional co-ordinate listing.
 - e. Horizontal and vertical control co-ordinate listing.
 - f. Copies of field observation sheets.
 - g. Summary of precision checks.
 - h. GPS technical report.
 - i. Copies of station documentation.

Conclusion

11. Some difficulties were encountered with the computing equipment. This did not effect the results of the computations. All sessions were computed to the accuracy required.

Recommendations




12. It is recommended that a printer should be acquired which is more reliable than the one supplied with the TIPPC. In particular the printer should operate effectively in the 40 degree heat frequently encountered during RASvy field operations. Airconditioned work sites can not be guaranteed.

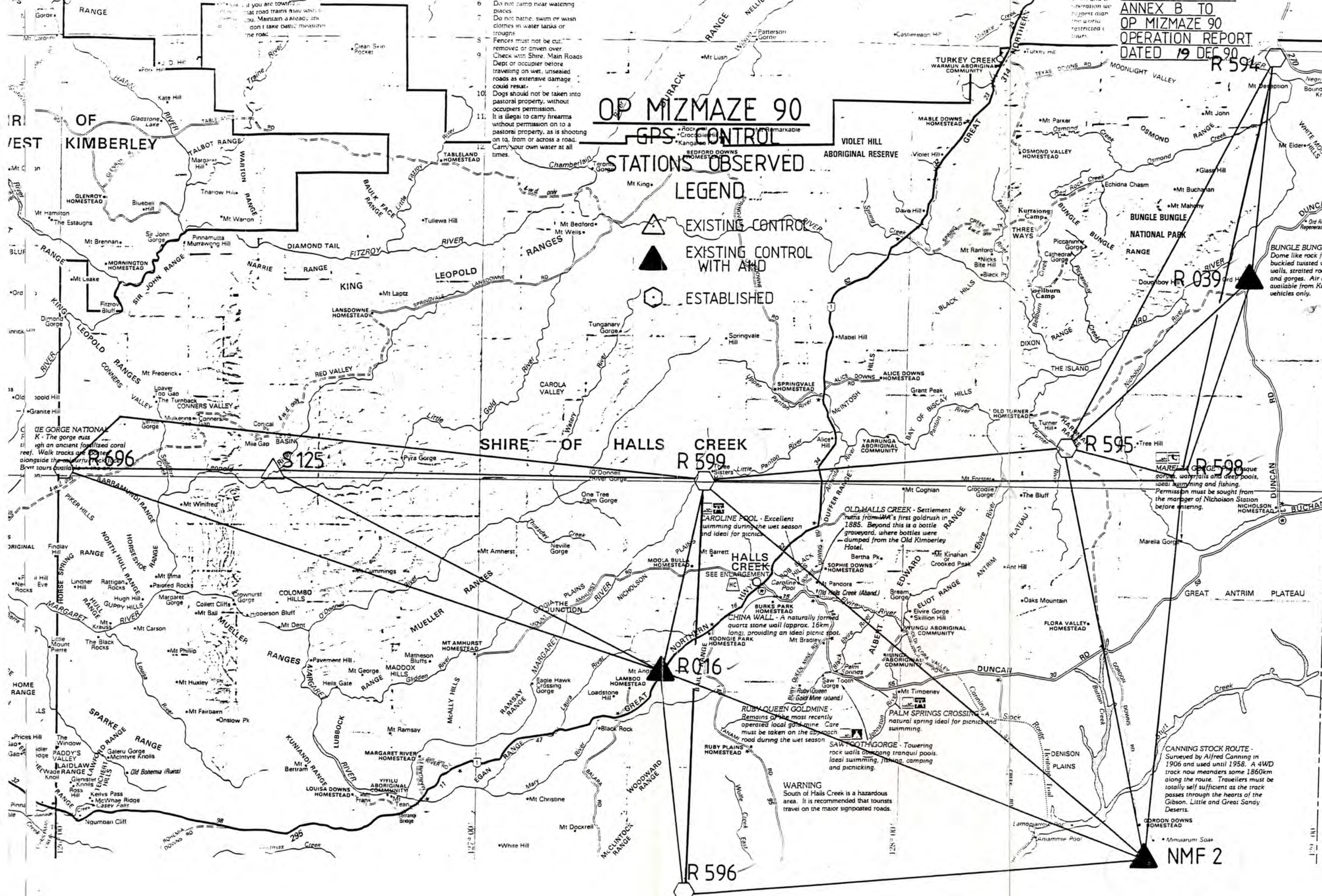
5. Do not chase or upset livestock
6. Do not camp near watering places
7. Do not bathe, swim or wash clothes in water tanks or troughs
8. Fences must not be cut, removed or driven over. Check with Shire, Main Roads Dept or occupier before travelling on wet, unsealed roads as extensive damage could result.
9. Dogs should not be taken into pastoral property, without occupiers permission.
10. It is illegal to carry firearms without permission on to a pastoral property, as is shooting on to, from or across a road. Carry your own water at all times.
- 11.

OP MIZMAZE 90

GPS CONTROL STATIONS OBSERVED

LEGEND

-  EXISTING CONTROL
-  EXISTING CONTROL WITH AWD
-  ESTABLISHED



WARNING
South of Halls Creek is a hazardous area. It is recommended that tourists travel on the major signposted roads.

CANNING STOCK ROUTE - Surveyed by Alfred Canning in 1906 and used until 1958. A 4WD track now meanders some 1860km along the route. Travellers must be totally self sufficient as the track passes through the hearts of the Gibson, Little and Great Sandy Deserts.

CHINA WALL - A naturally formed quartz stone wall (approx. 16km long), providing an ideal picnic spot.

RUBY QUEEN GOLDMINE - Remains of the most recently operated local gold mine. Care must be taken on the approach road during the wet season.

OLD HALLS CREEK - Settlement built from 1885's first goldrush in 1885. Beyond this is a bottle graveyard, where bottles were dumped from the Old Kimberley Hotel.

SAW TOOTH GORGE - Towering rock walls overlooking tranquil pools. Ideal swimming, fishing, camping and picnicking.

MARELA GORGE - A picturesque gorge, waterfalls and deep pools, ideal swimming and fishing. Permission must be sought from the manager of Nicholson Station before entering.

BUNGLE BUNGLE - Dome like rock formations, twisted walls, stratified rocks and gorges. Air chos available from Kun. vehicles only.

THE GORGE NATIONAL PARK - The gorge cuts through an ancient fossilized coral reef. Walk tracks are located alongside the gorge. Bvnt tours available.

WATERING PLACES - Be aware that you are towing a road train. Maintain a lead, and don't take drastic measures on the road.

R 594

R 599

R 595

R 598

R 016

R 596

NMF 2

LISTING OF SHEETS FIELD COMPLETED

1. SD 52-14 CAMBRIDGE GULF

4466-1 to 4.

2. SE 52-02 LISSADELL

4464-1 to 4.

4465-1 to 4.

4564-1 to 4.

4565-1 to 4.

4664-1 to 4.

3. SE 52-09 MOUNT RAMSAY

4160-1 to 4.

4161-1 to 4.

4260-1 to 4.

4261-1 to 4.

4360-1 to 4.

4361-1 to 4.

ANNEX C TO
OP MIZMAZE 90
OP REPORT
DATED 19 DEC 90

OP MIZMAZE 90
AERIAL PHOTOGRAPHY REPORT

General

1. WILD RC 10 camera number 1270 was used during the OP. The camera was fitted with a S A G II lens, of focal length 88.26mm, and was mounted in PILATUS PORTER A17-705 from 173 Gen Spt Sqn. 1 Topo Svy Sqn pers fitted the camera prior to its departure from Oakey to the A0.
2. Film was developed in the X-Ray room of the Halls Creek Hospital using a B5 developing outfit and DK 50 developer. No problems were encountered with either the film or the chemicals. Staff were extremely helpful and tolerant of the after hours use of the facilities.
3. Camera problems are detailed later in the report.
4. A total of 70 task hours were allocated for the operation, of which 62.9 were used.

Task

5. The camera tasking involved the obtaining of:
 - a. Identification photography for new and established control points visited by ground parties during the control acquisition phase of the Op.
 - b. Supplementary photography to aid in the positioning of new and updated information obtained during the field verification phase.
 - c. Photography Interpretation Guide (PIG) photography, to be used as an aid in photogrammetric plotting.

Identification Photography

6. Appendix 1 shows the control points photographed during the Op.

7. Point assessment was carried out in the field. Some points were reflighted due to damaged panels or time of day (solar angle) requirements.

8. The following points were photographed during the Op:

Point	Date	Mission No	Time (Z)	Altitude	Shape
R016	24 Sep	376	0110	10 000 ft	- -
R594	25 Sep	377	0120	10 000 ft	- -
R039	25 Sep	377	0158	10 000 ft	- -
R595	25 Sep	377	0230	10 000 ft	- -
R598	25 Sep	377	0248	10 000 ft	- -
R016	25 Sep	377	0424	10 000 ft	- -
S125	25 Sep	377	0448	10 000 ft	- -
R696	25 Sep	377	0510	10 000 ft	- -
R596	25 Sep	377	0700	10 000 ft	- -
R599	26 Sep	378	0136	10 000 ft	- -
NMF2	26 Sep	378	0230	10 000 ft	- -
R596	26 Sep	378	0317	10 000 ft	- -
R598	04 Oct	383	0040	10 000 ft	- -
S125	06 Oct	385	0236	10 000 ft	- -

Supplementary Photography

9. Supplementary photography was flown as requested by the field completion parties. A check of area coverage and detail was carried out by the camera operators and party ICs in the field to ensure the photography acquired was suitable for later use.

10. A total of 1500 line kilometres were flown.

11. Flight lines are shown in Appendices 2 (MOUNT RAMSAY), 3 (LISSADELL) and 4 (CAMBRIDGE GULF).

PIG Photography

12. PIG photography was obtained from LOH using a 35mm camera with colour film, and from the Porter using the RC 10 camera with monochrome film.

13. The photography obtained is to be used in conjunction with available printed maps to form a guide for plotting detail at 1:50 000 scale. The photographic coverage is mainly of the Fitzroy Crossing area of SE 51-12 NOONKANBAH and along the Great Northern Highway on SE 52-06 DIXON RANGE.

14. The guides are being compiled in 4 Fd Svy Sqn and will be forwarded to the plotting agency when completed.

Print Production

15. Bromide prints were produced at 4 Fd Svy Sqn using the KG30 contact printer. This was done prior to the negatives being forwarded to CPE for processing. This provided a minimum time delay between the Op and use of the photography for the application of field check corrections.

Dispatch

16. A36s and film were dispatched to CPE on 10 Dec 90.

Personnel

17. The following personnel were involved in aerial photo acquisition:

LT	P.	Wallace	173 Gen Spt Sqn,
CPL	K.	Hopwood	173 Gen Spt Sqn,
CPL	N.	Houston	Army Survey Regiment, and
CPL	P.	Tuddenham	4 Fd Svy Sqn.

Camera Problems

18. Some minor problems were encountered with the feeding of the film. Although "blank transfers" were carried out as part of the pre-flight check, little if any clear film was left at the start of some films for labelling purposes.

19. The navigation sight appears in many frames even though the bubble used for levelling indicated that the sight was correctly positioned.

20. No hoses were fitted to outlet pipes on the aircraft when the camera was fitted. Although the main outlet was extended in the field, attempts to block the engine breather pipes were unsuccessful, resulting in poor or no forward visibility through the sight.

Post Operation Remarks

21. Light lines on the negatives at the beginning and end of most films seem to suggest possible 'light creep' in the magazines. These should be checked for serviceability.

22. As the camera has only recently been returned from Wild after servicing it was presumed that the camera calibration (88.26) was correct and has been indicated as such on all photographic labelling.

23. Communication between the camera operator and pilot was often nonexistent or carried out by signals due to problems with headset leads and aircraft wiring, this led to difficulties in staying on track or changing direction, although most of the photographs are usable the problem should not have occurred.

24. The appearance of the navigation sight may have been caused by the attitude of the aircraft ie slightly tail down. An inspection of the photography shows varying amounts and positions of the aircraft wheels which should be uniform in all frames.

Conclusions / Recommendations

25. Hoses must be fitted to the aircraft's oil outlet pipes etc at the time of fitting the camera.

26. The navigation sight should be checked for correct mounting and levelling bubble serviceability at the earliest opportunity.

27. Lines of communications between the camera operator and the pilot should be thoroughly checked for serviceability and reliability prior to the aircraft departing for the A0.

28. Nominated problems should be addressed prior to the next operation.

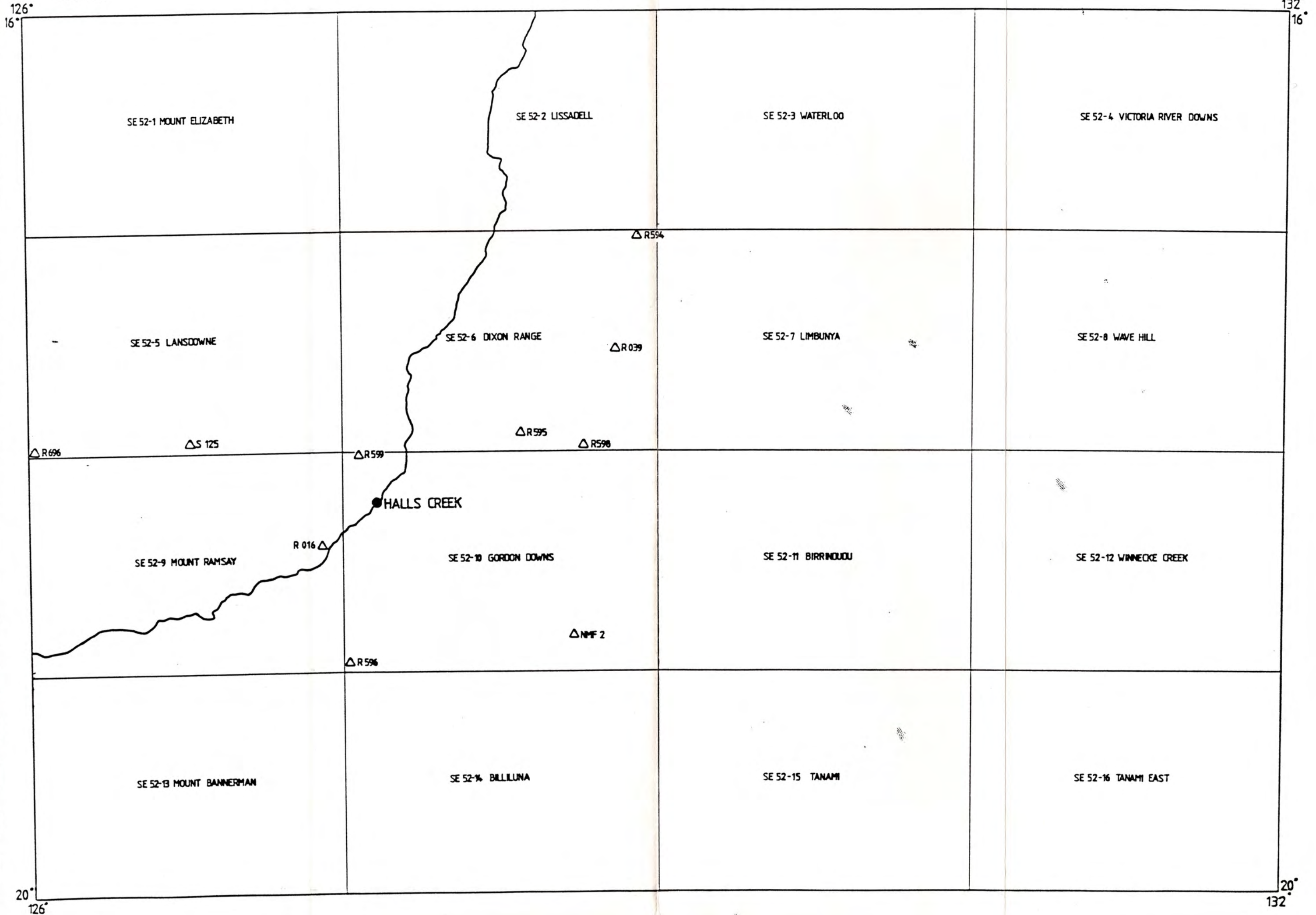
Appendices:

1. Identification Photography
2. Supplementary Photography - Mount Ramsay
3. Supplementary Photography - Lissadell
4. Supplementary Photography - Cambridge Gulf

HALLS CREEK
IDENT. PHOTOGRAPHY

ANNEX C to
MIZMAZE 90 OP REPORT
Dated 19 Dec 90

1:1 000 000



SUPPLEMENTARY PHOTOGRAPHY
MOUNT RAMSAY

ANNEX C to
MIZMAZE 90 OP REPORT
Dated 19 Dec 90

1:250 000

126°00'

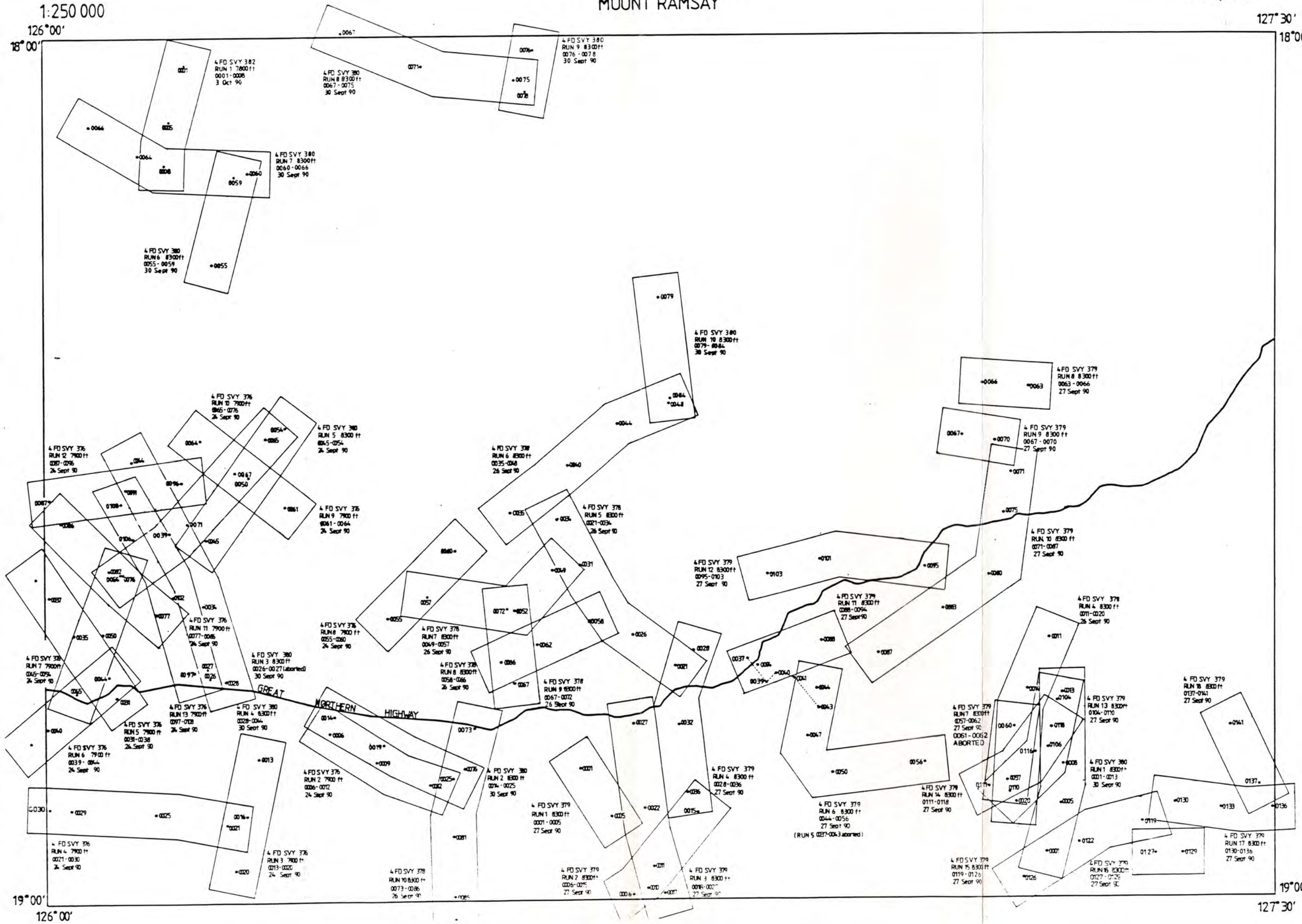
127°30'

18°00'

126°00'

18°00'

127°30'



SUPPLEMENTARY PHOTOGRAPHY
CAMBRIDGE GULF

ANNEX C to
MIZMAZE 90 OP REPORT
Dated 19 Dec 90

1:250 000

127° 30'

129° 00'

15° 00'

15° 00'

16° 00'

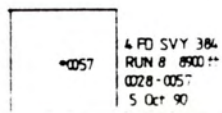
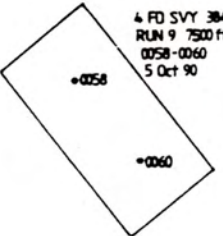
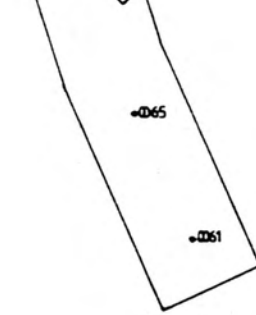
127° 30'

16° 00'

129° 00'

● WYNHAM

● KUNUNURRA



SEQUENCE OF EVENTS

Serial	Date	Event
(a)	(b)	(c)
1	!31 Aug 90!	Road party departed
2	!05 Sep 90!	Road party arrives Halls Creek
3	!05 Sep 90!	First C130 arrives Halls Creek
4	!06 Sep 90!	Second C130 arrives Halls Creek
5	!07 Sep 90!	GPS Phase begins. Two parties begin ground F/C
6	!10 Sep 90!	2 x pers from 7 MGI Sect arrive Halls Creek
7	!12 Sep 90!	2 x LOH arrive Halls Creek
8	!14 Sep 90!	GPS obs complete
9	!16 Sep 90!	GPS comps finalised. F/C parties deployed
10	!18 Sep 90!	OC RTU
11	!21 Sep 90!	Pilatus Porter arrives
12	! 7 Oct 90!	Pilatus Porter departs
13	! 8 Oct 90!	Field Completion Phase complete LOH depart
14	! 9 Oct 90!	C130 arrives Halls Ck. First air party departs for Adelaide
15	!10 Oct 90!	C130 arrives Halls Ck. Second air party departs for Adelaide
16	!11 Oct 90!	Road party departs for Adelaide
17	!16 Oct 90!	Road party RTU

OP MIZMAZE PERSONNEL

1. Members who participated in OP MIZMAZE 90 are as follows:

Regt No	Rank	Name
4 FD SVY SQN		
225759	MAJ	L A Newton
48418	CAPT	B P MC Donald
211893	WO2	V A Applebee
45941	WO2	I D Thiselton
157511	WO2	A B Van Leeuwen
1203980	SSGT	D Stanmore
45823	SSGT	K G Talbot-Smith
46710	SGT	E L Jacobs
319893	SGT	H J MC Rae
313841	SGT	S P Symonds
234859	CPL	P J Austine
321828	CPL	T S Clarke
453993	CPL	S A Ellis
181748	CPL	J A Mathieson
321355	CPL	S A Nokes
416476	CPL	P R Tuddenham
ARMY SVY REGT		
521530V	CAPT	V M Grealy RE (EX LONGLOOK)
555409	LT	G C Addison
4400413	CPL	N J Houston
455113	SPR	S G Adrain
FIIOS136	SPR	M M Fisher
329094	SPR	D J Percival
162 RECCE SQN		
321823	CAPT	K Jorgensen
149200	CAPT	R Emmett
183254	LT	A MC Nab
553100	CPL	D Bainbridge
554483	LCPL	P Gibson
173 GEN SPT SQN		
	LT	P Wallace
	CPL	K Hopwood
SYD WKSP COY		
453779	CPL	S Nitschke

E - 2

ADELAIDE LOG BN

453069 LCPL S GRIGG

OP MIZMAZE 90

RAEME (VEH MECH) TECHNICAL REPORT

Deployment

1. The road party consisted of:
 - a. 3 x L/R FFR 110,
 - b. 2 x truck cargo MC2,
 - b. 1 x truck cargo MC4,
 - c. 2 x 1/2 ton tlr, and
 - d. 1 x wksp tlr.
2. All vehicles were classified taskworthy before leaving Adelaide.

Specific Repairs

3. Details of specific repairs are listed in Appendix 1 to this Annex.

Parts Availability

4. All parts have been available within the local area, or a local service centre has been able to provide them within 48 hrs. However the cost of these items is greatly inflated.

Comments

5. Several consistent faults occurred in the 110 L/ROVER as follows:
 - a. steering box incorrectly adjusted,
 - b. steering box cover plate securing bolts vibrating loose, and
 - c. 100 amp alternator incorrectly set.
 - d. door locks filling with dust .

6. Vehicles that deployed by air sustained no damage.

Appendix: 1. Specific Repairs

SPECIFIC REPAIRS

49-169 L/R 110.

Repair RHF parking light	PARTS HELD.
Inspect and Mod 100 amp alternator	NO PARTS REQUIRED
Replace RH cv seal	PARTS PURCHASED.
Adjust steering box.	NO PARTS REQUIRED.
Inspect loose torque reaction rods	GROUNDED

49-170 L/R 110.

Inspect and mod 100 amp alternator	NO PARTS REQUIRED.
Adjust steering box	
Inspect diff, crossmember for damage	GROUNDED
Alternator idler pulley siezed	PARTS NOT REQUIRED

49-171 L/R 110.

Inspect and replace battery	PARTS HELD.
Adjust steering box	NO PARTS REQUIRED
Inspect brake warning light circuit	NO PARTS REQUIRED
Tighten steering box cover	

49-172 L/R 110.

Adjust steering box	NO PARTS REQUIRED
Inspect 100 amp alternator.	
Tighten steering box cover	

49-173 L/R 110.

Bleed fuel system	NO PARTS REQUIRED.
Inspect and mod 100 amp alternator	
Secure LHR mudguard.	
Inspect and clean radiator core.	
Replace alternator belts	PARTS PURCHASED.
Inspect broken rear window	PARTS NOT REQUIRED

49-174 L/R 110.

Inspect and mod 100 amp alternator.	NO PARTS REQUIRED
Tighten steering box cover	

49-190 L/R 110.

Inspect and mod 100 amp alternator. NO PARTS REQUIRED.
Adjust steering box.

49-198 L/R 110.

Inspect 100 amp alternator NO PARTS REQUIRED.
Replace shock absorber mounts PARTS PURCHASED

38-898 UNIMOG.

Replace air assist gear selector mounting bush PARTS HELD
Inspect damage from blown tyre.
Replace RHR tail light assy PARTS HELD
Drill hole in exhaust to release excessive back pressure

46-370 UNIMOG.

35-528 FORD D913.

Replace fuel line PARTS HELD

RAEME (GPS TECH) REPORT

Deployment

1. Initial insertion was by C130 to Halls Creek. This proved to be a good method as it was the least detrimental to the equipment and spares. It would have been better however if some maintenance time had been allowed before deployment as there was a number of unservicable items which had to be repaired at short notice.

Equipment Performance

2. Specific faults and repairs during the conduct of the Op are as follows:

<u>GPS/PPC ID #</u>	<u>Date</u>	<u>Repairs/Comments</u>
4	4 SEP 90	Drive 2 on Recorder U/S. Repaired from spares.
C	4 SEP 90	Both Memtec Data Loggers U/S. One repaired, one replaced. U/S item requires Base repair.
C	6 SEP 90	TI printer had first of many problems. Printer approaching end of life.
A	8 SEP 90	TI printer had first of many problems. Printer approaching end of life.

3. In general the equipments are in a good state of repair and all operator maintenance is being conducted effectively. However, some base repair is required on most equipment. This will be done when the equipment is next sent to Sydney Workshop Company.

4. Overall, the equipment worked very well with no major problems encountered during the control phase. There were some minor cable problems which were rectified.

Conclusions.

5. There are no shortcomings in the spares kits, but it has become apparent that the printers are becoming increasingly unreliable. In addition, the computers are no longer being manufactured. It will not be long before these equipments are not maintainable.

Recommendations.

6. The following recommendations are made:

- a. That replacement printers are purchased as soon as possible. Repairs to these printers is impracticable as they would be beyond economic repair,
- b. The entire equipment be sent to Sydney Workshop Company for repair and maintenance, and
- c. Replacement computers for the PPCs be investigated as future TI repair and support for these models will be minimal.

S. Nitschke
CPL
RAEME