Woolner Airborne Electromagnetic (AEM) Mapping Survey

Acquisition and Processing Report

for

Geoscience Australia

Prepared by : M. Lawrence

L. Stenning

Authorised for release by : …………………………..

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Survey flown: October 2008 – December 2008

by

Fugro Airborne Surveys
435 Scarborough Beach Road, Osborne Park. WA 6017, Australia
Tel: (61-8) 9273 6400 Fax: (61-8) 9273 6466

FAS PROJECT # 2017

GA PROJECT # 1196

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SURVEY OPERATIONS AND LOGISTICS

1.1 Introduction

Between the 19th of October 2008 and the 1st of December 2008, Fugro Airborne Surveys Pty. Ltd., (FAS) undertook an airborne TEMPEST electromagnetic and magnetic survey for Geoscience Australia, over the Woolner Project area in the Northern Territory. The survey was flown over one large block with a number of tighter line spaced infill areas. Total coverage of the Woolner survey amounted to 6862 line kilometres, flown in 32 flights. The survey was flown using a Casa C212-200 Turbo Prop aircraft, registration VH-TEM, owned and operated by FAS. This report summarises the procedures and equipment used by FAS in the acquisition, verification and processing of the airborne geophysical data.

1.2 Survey Base

The survey was based out of Bachelor, Northern Territory. The survey aircraft was operated from Bachelor airport, with the aircraft fuel available on site. A temporary office was set up at the Bachelor Resort, from where all survey operations were run and the post-flight data verification was performed.

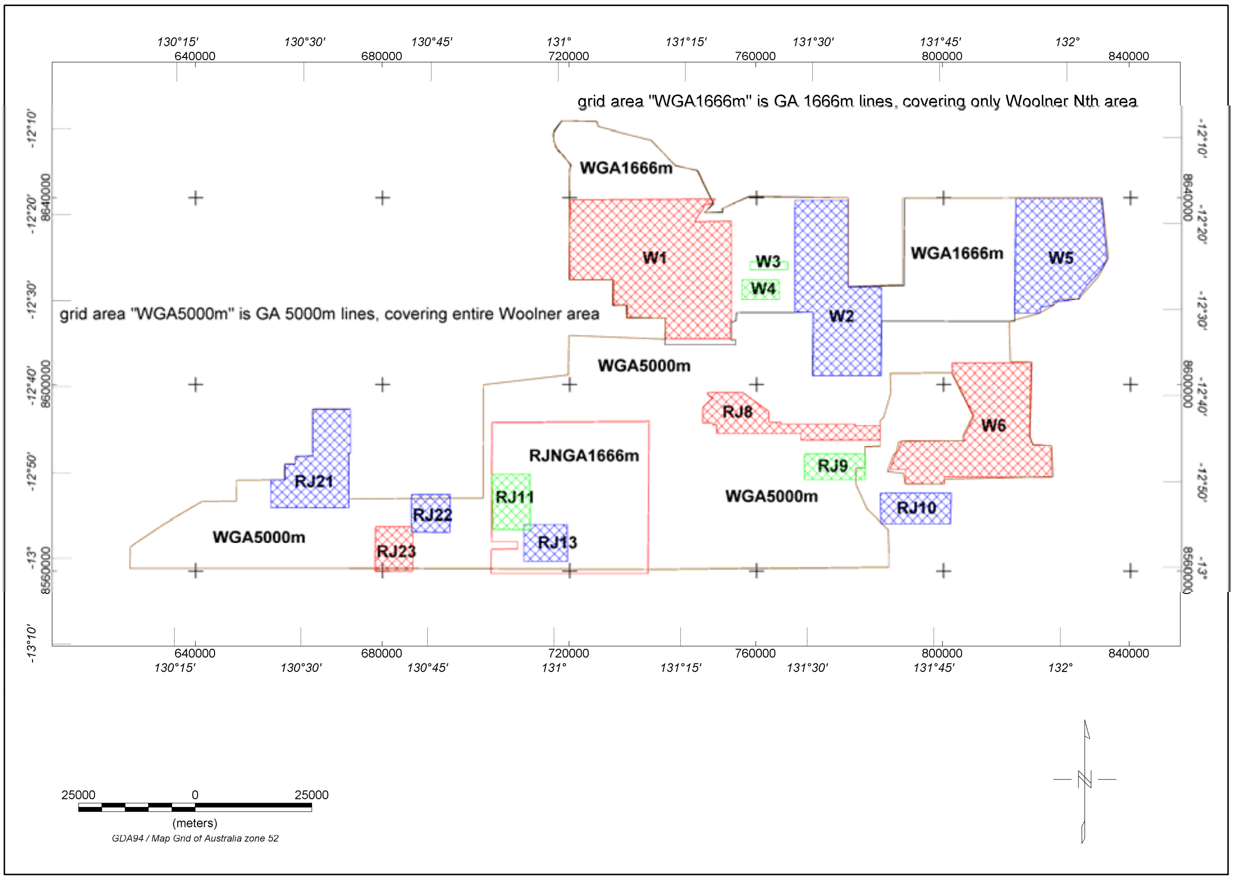
1.3 Survey Personnel

The following personnel were involved in this project:

Project Supervision	- Acquisition	Bart Anderson
	- Processing	Adam Shales
Pilot/s		Grant Hamilton
		Marcus Tapp
		Tymon Dyer
System Operator/s		Michael Wirski
		Michael Githinji
		Luke Kelly
		James Levarre
Aircraft Engineer/s		Richard Cardin
		Clint Hazelwood
Field Data Processing		Paul Evans, Kah Tho Lee
Office Data Processing		Matt Lawrence

1.4 Area Map

The following figure shows a breakdown of the areas flown, with the shaded regions being tighter line spaced infill areas. Note that some of the originally flight planned Rum Jungle areas (area names beginning with RJ) were subsequently included in the acquisition and delivery of this Woolner block.



SURVEY SPECIFICATIONS AND PARAMETERS

1.5 Area Co-ordinates

The survey area was located within Map Grid of Australia zones 52 and 53. All data was delivered in MGA zone 52.

As per the diagram above there are a number of areas infilling the larger 5000m spaced GA regional lines. The approximate co-ordinates of each of those areas (labelled as per the previous diagram) are as follows:

Coordinates of Woolner regional area **WGA5000** (5000m line spacing).

Vertex	Easting (m)	Northing (m)	Vertex	Easting (m)	Northing (m)
1	726952	8656683	21	657798	8580159
2	739092	8652564	22	657798	8582543
3	752749	8642158	23	663001	8585795
4	752966	8639557	24	663651	8594683
5	834693	8639991	25	674491	8594900
6	835560	8624165	26	674057	8575173
7	829490	8618529	27	700938	8574956
8	815616	8613760	28	700721	8599886
9	815399	8609207	29	719148	8602921
10	819735	8604221	30	718931	8609858
11	819951	8587312	31	739525	8609858
12	823854	8587312	32	739308	8613977
13	824070	8580159	33	728253	8613977
14	782015	8579942	34	728253	8622648
15	784399	8573655	35	718931	8622431
16	788735	8569320	36	718931	8639340
17	790252	8563250	37	718931	8645627
18	623764	8562599	38	714595	8652997
19	623764	8564550	39	717630	8656683
20	648693	8579725			

Coordinates of Woolner area **WGA1666** (1666m line spacing).
(Note: not all lines were flown in the southern portion of this block by the CASA, those lines will be completed and delivered with the Rum Jungle survey dataset to be flown by VH-WGT (Skyvan))

Vertex	Easting (m)	Northing (m)	Vertex	Easting (m)	Northing (m)
1	718244	8656524	22	767982	8615404
2	725744	8656392	23	755679	8615338
3	726139	8655274	24	755613	8613562
4	737455	8652379	25	754495	8613233
5	742587	8646852	26	754561	8609483
6	747389	8645800	27	755547	8609549
7	750810	8638694	28	755547	8608496
8	748771	8636786	29	740350	8608496
9	752718	8636918	30	740481	8614154
10	752587	8637642	31	732192	8614286
11	758376	8640339	32	732126	8617049
12	779561	8640010	33	729165	8616917
13	779627	8621062	34	729231	8622510
14	791535	8621194	35	719889	8622575
15	791667	8639944	36	719954	8645997
16	815483	8639944	37	720349	8646984
17	815220	8613430	38	717060	8650866
18	786732	8613496	39	716599	8652445
19	786601	8601917	40	716599	8654287
20	771929	8601917	41	718047	8656195
21	772127	8615470			

Coordinates of Woolner infill area **W1** (555m line spacing).

Vertex	Easting (m)	Northing (m)	Vertex	Easting (m)	Northing (m)
1	719100	8639798	19	729353	8616985
2	751182	8639760	20	729391	8622508
3	751523	8638890	21	720046	8622470
4	750388	8637301	22	719857	8624059
5	748496	8636582	23	720046	8624513
6	747853	8635069	24	719857	8625724
7	754739	8635031	25	720008	8626254
8	754587	8614412	26	719857	8627389
9	755609	8614374	27	719819	8629016
10	755609	8613731	28	719895	8630718
11	754625	8613693	29	719857	8632345
12	754587	8609759	30	719932	8633972
13	740438	8609759	31	719895	8635636
14	740551	8610704	32	719932	8637301
15	740513	8613466	33	719932	8638966
16	740438	8614147	34	719478	8639457
17	732266	8614147			
18	732379	8616947			

Coordinates of Woolner infill area **W2** (555m line spacing).

Vertex	Easting (m)	Northing (m)	Vertex	Easting (m)	Northing (m)
1	767999	8640024	7	771938	8601920
2	779625	8639976	8	771938	8605146
3	779720	8620996	9	772080	8615444
4	786648	8620901	10	768047	8615491
5	786743	8619952	11	768142	8639692
6	786648	8601920			

Coordinates of Woolner infill area **W3** (333m line spacing).

Vertex	Easting (m)	Northing (m)	Vertex	Easting (m)	Northing (m)
1	758545	8626336	4	758545	8624602
2	766657	8626364	5	758545	8626252
3	766685	8624518			

Coordinates of Woolner infill area **W4** (333m line spacing).

Vertex	Easting (m)	Northing (m)	Vertex	Easting (m)	Northing (m)
1	756811	8622588	4	756783	8618113
2	764923	8622588	5	756783	8622560
3	764979	8618085			

Coordinates of Woolner infill area **W5** (1666m line spacing).

Vertex	Easting (m)	Northing (m)	Vertex	Easting (m)	Northing (m)
1	815512	8639974	13	832796	8623504
2	833786	8639916	12	830876	8621642
3	833902	8638112	14	829828	8620012
4	834077	8636948	15	829246	8619314
5	834193	8635202	16	829014	8618266
6	834310	8633398	17	823427	8617684
7	834426	8631885	18	823485	8616986
8	834659	8630197	19	820633	8616462
9	834775	8628451	20	820691	8615240
10	834950	8626996	21	815163	8615240
11	833844	8624843	22	815454	8639683

Coordinates of Woolner infill area **W6** (1666m line spacing).

Vertex	Easting (m)	Northing (m)	Vertex	Easting (m)	Northing (m)
1	801585	8604862	11	788049	8581259
2	818935	8604819	12	789377	8584857
3	818464	8588798	13	789891	8585371
4	819149	8587170	14	790576	8587856
5	823304	8586828	15	804198	8588027
6	823347	8580231	16	804198	8589098
7	800386	8579674	17	805998	8592525
8	800386	8578603	18	806383	8593082
9	791818	8578560	19	801671	8602506
10	791604	8581002	20	801885	8604305

The following areas were originally planned as part of the Rum Jungle survey but since they ended up being flown by VH-TEM (CASA), it was requested the data be processed and delivered as part of the Woolner survey.

There were four additional survey lines – 11022, 11023, 32002 and 32003, that were flown by the CASA at the southern end of the Woolner areas, but for data continuity purposes these will be reflown and delivered as part of the Rum Jungle survey dataset.

Coordinates of Woolner infill area **RJNGA1666** (1666m line spacing).
(Note: not all lines were flown in the southern portion of this block by the CASA, those lines will be completed and delivered with the Rum Jungle survey dataset to be flown by VH-WGT (Skyvan)

Vertex	Easting (m)	Northing (m)	Vertex	Easting (m)	Northing (m)
1	704480	8591612	6	720680	8542095
2	737066	8591357	7	720667	8540496
3	736592	8536028	8	708892	8540589
4	727558	8536105	9	709042	8560228
5	727427	8542039	10	704250	8560264

Coordinates of Woolner infill area **RJ8** (333m line spacing).

Vertex	Easting (m)	Northing (m)	Vertex	Easting (m)	Northing (m)
1	751336	8597690	7	769572	8588422
2	756830	8597672	8	769550	8589313
3	761748	8594153	9	751506	8589634
4	761726	8591785	10	751613	8591478
5	785565	8591124	11	748629	8591873
6	785535	8588080	12	748656	8595009

Coordinates of Woolner infill area **RJ9** (333m line spacing).

Vertex	Easting (m)	Northing (m)	Vertex	Easting (m)	Northing (m)
1	770321	8584786	3	782221	8579688
2	782182	8584731	4	770274	8579867

Coordinates of Woolner infill area **RJ10** (333m line spacing).

Vertex	Easting (m)	Northing (m)	Vertex	Easting (m)	Northing (m)
1	800560	8570608	3	787436	8576344
2	787649	8570653	4	800711	8576204

Coordinates of Woolner infill area **RJ11** (333m line spacing).

Vertex	Easting (m)	Northing (m)	Vertex	Easting (m)	Northing (m)
1	704399	8580426	3	711578	8568662
2	711426	8580374	4	704313	8568717

Coordinates of Woolner infill area **RJ13** (238m line spacing).

Vertex	Easting (m)	Northing (m)	Vertex	Easting (m)	Northing (m)
1	710260	8569809	3	719550	8562760
2	719455	8569738	4	710264	8562401

Coordinates of Woolner infill area **RJ21** (1666m line spacing).

Vertex	Easting (m)	Northing (m)	Vertex	Easting (m)	Northing (m)
1	659210	8582840	6	669820	8577123
2	666298	8583106	7	669864	8574480
3	666371	8595397	8	656118	8574560
4	671862	8595426	9	656133	8577295
5	671751	8577265	10	659028	8577340

Coordinates of Woolner infill area **RJ22** (1666m line spacing).

Vertex	Easting (m)	Northing (m)	Vertex	Easting (m)	Northing (m)
1	686211	8575451	3	694302	8568235
2	695258	8575605	4	686162	8568076

Coordinates of Woolner infill area **RJ23** (1666m line spacing).

Vertex	Easting (m)	Northing (m)	Vertex	Easting (m)	Northing (m)
1	678986	8567724	3	686038	8559329
2	686159	8567615	4	678717	8558844

Repeat Line Coordinates

Line Number	Easting (m)	Northing (m)	End	Easting (m)	Northing (m)
910FFFFAA	758600	8625930	910	766600	8625930
911FFFFAA	749700	8568950	911	760000	8568950

(where FFFF is the 4 digit flight number and AA is the two digit attempt number)

1.6 Survey Area Parameters

Specifications for the Woolner AEM survey:

Line spacing:	
Regional lines WGA5000	5000 metres
Area WGA1666	1666 metres
Area W1	555 metres
Area W2	555 metres
Area W3	333 metres
Area W4	333 metres
Area W5	1666 metres
Area W6	1666 metres
Area RJNGA1666	1666 metres
Area RJ8	333 metres
Area RJ9	333 metres
Area RJ10	333 metres
Area RJ11	333 metres
Area RJ13	238 metres
Area RJ21	1666 metres
Area RJ22	1666 metres
Area RJ23	1666 metres

Tie line spacing	n/a
Line direction	090 – 270° grid (E-W)
Tie line direction	n/a
Terrain clearance	121.1m (transmitter terrain clearance)
Total line kilometres	6862 kilometres

FAS Job Number	-	2017
GA Job Number	-	1196
Survey Company	-	Fugro Airborne Surveys Pty Ltd
Date Flown	-	19th October 2008 – 1st December 2008
Client	-	Geoscience Australia
EM System	-	25 Hz TEMPEST
Navigation	-	Real-time differential GPS
Datum	-	GDA94 (MGA 52)
Nominal Terrain Clearance	-	121.1m (transmitter terrain clearance)

1.7 Job Safety Plan

A Job Safety Plan was prepared and implemented in accordance with the Fugro Airborne Surveys Occupational Safety & Health Management System.

1.8 General Disclaimer

It is Fugro Airborne Survey's understanding that the data and report provided to the client is to be used for the purpose agreed between the parties. That purpose was a significant factor in determining the scope and level of the Services being offered to the Client. Should the purpose for which the data and report is used change, the data and report may no longer be valid or appropriate and any further use of, or reliance upon, the data and report in those circumstances by the Client without Fugro Airborne Survey's review and advice shall be at the Client's own or sole risk.

The Services were performed by Fugro Airborne Survey exclusively for the purposes of the Client. Should the data and report be made available in whole or part to any third party, and such party relies thereon, that party does so wholly at its own and sole risk and Fugro Airborne Survey disclaims any liability to such party.

Where the Services have involved Fugro Airborne Survey's use of any information provided by the Client or third parties, upon which Fugro Airborne Survey was reasonably entitled to rely, then the Services are limited by the accuracy of such information. Fugro Airborne Survey is not liable for any inaccuracies (including any incompleteness) in the said information, save as otherwise provided in the terms of the contract between the Client and Fugro Airborne Survey.

2. AIRCRAFT EQUIPMENT AND SPECIFICATIONS

2.1 Aircraft

Manufacturer	-	CASA
Model	-	C212-200 Turbo Prop
Registration	-	VH-TEM
Ownership	-	Fugro Airborne Surveys Pty Ltd

2.2 TEMPEST System Specifications

Specifications of the TEMPEST Airborne EM System (Lane et al., 2000) are:

- Base frequency - 25 Hz
- Transmitter area - 221 m^2 (TEM)
- Transmitter turns - 1
- Waveform - Square
- Duty cycle - 50%
- Transmitter pulse width - 10 ms
- Transmitter off-time - 10 ms
- Peak current - 280 A (TEM)
- Peak moment - 61880 Am^2 (TEM)
- Average moment - 30940 Am^2 (TEM)
- Sample rate - 75 kHz on X and Z
- Sample interval - 13.333 microseconds
- Samples per half-cycle - 1500
- System bandwidth - 25 Hz to 37.5 kHz
- Tx Loop Flying height nominal - 121.1 m (subject to safety considerations)
- Tx Loop Flying height average - 124.3 m (TEM)
- EM sensor - Towed bird with 3 component dB/dt coils
- Tx-Rx horizontal separation average- -121.0 m (TEM)
- Tx-Rx vertical separation average - -33.9 m (TEM)
- Tx-Rx horizontal separation standard- -120.0 m (geometry corrected standard)
- Tx-Rx vertical separation standard - -35.0 m (geometry corrected standard)
- Stacked data output interval - 200 ms (~12 m)
- Number of output windows - 15
- Window centre times - 13 μs to 16.2 ms
- Magnetometer - Stinger-mounted caesium vapour
- Magnetometer compensation - Fully digital
- Magnetometer output interval - 200 ms (~12 m)
- Magnetometer resolution - 0.001 nT
- Typical noise level - 0.5 nT
- GPS cycle rate - 1 second

2.2.1 EM Receiver and Logging Computer

The EM receiver computer was an EMFASDAS. The EM receiver computer execute a proprietary program for system control, timing, data acquisition and recording. Control, triggering and timing is provided to the TEMPEST transmitter and Digital Signal Processing (DSP) boards by the timing card, which ensures that all waveform generation and sampling is accomplished with high accuracy. The timing card is synchronised to the Global Positioning System (GPS) through the use of the Pulse Per Second (PPS) output from the system GPS card. Synchronisation is also provided to the magnetometer processor card for the purpose of accurate magnetic sampling with respect to the EM transmitter waveform.

The EM receiver computer displays information on the main screen during system calibrations and survey line acquisition to enable the airborne operator to assess the data quality and performance of the system.

2.2.2 TEMPEST Transmitter

The transmitted waveform is a square wave of alternating polarity, which is triggered directly from the EM receiver computer. The nominal transmitter base frequency was 25 Hz with a pulse width of 10ms (50 % duty cycle). Loop current waveform monitoring is provided by a current transformer located directly in the loop current path to allow for full logging of the waveform shape and amplitude, which is sampled by the EM receiver.

2.2.3 TEMPEST 3-Axis Towed Bird Assembly

The TEMPEST 3-axis towed bird assembly provides accurate low noise sampling of the X (horizontal in line), Y (horizontal transverse) and Z (vertical) components of the electromagnetic field. Note that the Y component data were not processed or delivered in the dataset for this survey. The receiver coils measure the time rate of change of the magnetic field (dB/dt). Signals from each axis are transferred to the aircraft through a tow cable specifically designed for its electrical and mechanical properties.

2.3 FASDAS Survey Computer

The Survey computer executes a proprietary program for acquisition and recording of location, magnetic and ancillary data. Data are presented both numerically and graphically in real time on the Video Graphics Array (VGA) Liquid Crystal Display (LCD) display, which provides an on-line display capability. The operator may alter the sensitivity of the displays on-line to assist in quality control. Selected EM data are transferred from the EM receiver computer to the SURVEY computer for quality control (QC) display.

2.3.1 Caesium Vapour Magnetometer Sensor

A caesium vapour magnetometer sensor is utilised on the aircraft and consists of the sensor head, cable and the sensor electronics. The sensor head is housed at the end of a composite material tail stinger.

2.3.2 Magnetometer Processor Board

A FASDAS magnetometer processor board was used for de-coupling and processing the Larmor frequency output of the magnetometer sensor. The processor board interfaces with the survey computer, which initiates data sampling and transfer for precise sample intervals and also with the EM receiver computer to ensure that the magnetic samples remain synchronised with the EM system.

2.3.3 Fluxgate Magnetometer

A tail stinger mounted Bartington MAG-03MC three-axis fluxgate magnetometer is used to provide information on the attitude of the aircraft. This information is used for compensation of the measured magnetic total field.

2.3.4 GPS Receiver

A Novatel GPScard 951R is utilised for airborne positioning and navigation. Satellite range data are recorded for generating post processed differential solutions.

2.3.5 Differential GPS Demodulator

The OMNISTAR differential GPS service provides real time differential corrections.

2.4 Navigation System

A FASDAS Navigation Computer was used for real-time navigation. These computers load a pre-programmed flight plan from disk which contains boundary co-ordinates, line start and end co-ordinates, local co-ordinate system parameters, line spacing, and cross track definitions. The World Geodetic System 1984 (WGS84) latitude and longitude positional data received from the Novatel GPS card contained in the SURVEY computer is transformed to the local co-ordinate system for calculation of the cross track and distance to go values. This information, along with ground heading and ground speed, is displayed to the pilot numerically and graphically on a two line LCD display, and on an analogue Horizontal Strip Indicator (HSI). It is also presented on a LCD screen in conjunction with a pictorial representation of the survey area, survey lines, and ongoing flight path.

The Navigation computers are interlocked to the SURVEY computer for auto selection and verification of the line to be flown. The GPS information passed to the navigation computer is corrected using the received real time differential data from the OMNISTAR service, enabling the aircraft to fly as close to the intended track as possible.

2.5 Altimeter System

2.5.1 Radar Altimeter

Model:	Sperry Stars RT-220 radar altimeter system (VH-TEM)
Sample interval:	0.2 second
Accuracy:	± 1.5 % of indicated altitude

The radar altimeters fitted to the aircraft are high quality instruments whose output is factory calibrated. The aircraft radar altitude is recorded onto hard drive as well as displayed on the aircraft chart recorder. The recorded value is the average of the altimeter's output during the previous 0.2 seconds.

2.5.2 Laser Altimeter

Model:	Optech 501SB (TEM)
Sample interval:	0.2 second
Accuracy:	± 0.05m at survey altitude

2.5.3 Barometric Altimeter

Output of a Digiquartz 215A-101pressure transducer is used for calculating the barometric altitude of the aircraft. The atmospheric pressure is taken from a gimbal-mounted probe projecting 0.5 metres from the wing tip of the aircraft and fed to the transducer mounted in the aircraft wingtip.

2.6 Video Tracking System

The video file recorded by the digital video system is synchronised with the geophysical record by a digital fiducial display. It is also labelled with GPS latitude and longitude information and survey line number.

2.7 Data Recorded by the Airborne Acquisition Equipment

With the FASDAS acquisition system the raw EM data including fiducial, local time, X and Z axis sensor response, current monitor and bird auxiliary sensor output are recorded on the EM receiver computer as "*.raw" EM files. Logging to the files is continuous, however, a new *.raw EM file is created when the size of the previous one reaches 1Gb.

The FASDAS Survey computer records a continuous MSD file which contains all other ancillary data including magnetic, altimeter, GPS and analogue channels.

3. GROUND DATA ACQUISITION EQUIPMENT AND SPECIFICATIONS

3.1 Magnetic Base Station

A CF1 and a Scintrex ENVI magnetometer were used to measure the daily variations of the Earth's magnetic field. The base stations were established in an area of low gradient, away from cultural influences. The base stations were run continuously throughout the survey flying period with a sampling interval of 1 and 2 seconds respectively at a sensitivity of 0.1 nT. The magnetometer base stations were set up at Bachelor airstrip, in scrub, north of the graded taxiway.

3.2 GPS Base Station

A GPS base logging station integrated with the CF1 unit was used throughout the survey, setup at Bachelor airstrip.

The GPS base station position was calculated by logging data continuously at the base position over a period of approximately 24 hours. Data were then averaged to obtain the position of the base station using GrafNav software.

The calculated GPS base position was (in GDA94):

Lat: -13° 02' 29.04164" S
Long: 131° 01' 25.91224" E
Height: 159.114 m. (ellipsoidal height). Sensor approximately 2m above ground surface.

4. EM AND OTHER CALIBRATIONS AND MONITORING

At the beginning and end of each individual survey flight, the EM system is checked for background noise levels and performance. The airborne checks are conducted at a nominal terrain clearance of 1100 m (3600 ft) to eliminate ground response.

These checks include:-

4.1 Pre/Post-Flight GPS Repeat Point: Line 505FFFFAA

Where possible, the aircraft is parked in the same position after every flight and the GPS position recorded pre and post flight, to allow for checks on GPS quality and repeatability. *Note: FFFF is the flight number and AA is the attempt number*

4.2 Pre/Post-Flight Transmitter-off: Lines 900FFFFAA , 906FFFFAA

These lines are recorded in straight and level flight with the system in standard survey geometry, with the transmitter turned off and bird response turned on to observe ambient noise and to check for noise in the receiver system (bird/coils → tow cable → winch → computer). *Note: FFFF is the flight number and AA is the attempt number*

4.3 Pre/Post-Flight Noise Additive: Lines 901FFFFAA, 904FFFFAA

These lines are recorded in straight and level flight with the system in standard survey geometry, with the transmitter on and the bird response turned off at the tow cable winch. This is to check the noise contribution from the acquisition system and is used in deconvolution of survey line data. *Note: FFFF is the flight number and AA is the attempt number*

4.4 Pre/Post-Flight Zero: Line 902FFFFAA, 905FFFFAA

These lines are recorded in straight and level flight with the system in standard survey configuration with transmitter and receiver turned on. This is used to determine the system's response in the absence of ground signal and is used to determine a standard waveform for deconvolution of survey lines. *Note: FFFF is the flight number and AA is the attempt number*

Additionally, through all these calibrations the airborne operator can assess the system and ambient noise levels.

4.5 Pre-Flight Swoops: Line 903FFFFAA

This line is recorded immediately after the pre-flight zero. During this manoeuvre the pilot conducts a series of 'swoop' manoeuvres (pitch up/pitch down) over approximately 30-40 seconds to vary the position of the towed sensor relative to the aircraft. The EM data are monitored by the airborne operator to confirm correct operation of the system during the manoeuvre. This data is used to determine coefficients used in the processing to compensate for such variations in the survey data. *Note: FFFF is the flight number and AA is the attempt number*

4.6 Dynamic Magnetometer Compensation

To limit aircraft manoeuvre effects on the magnetic data that can be of the same spatial wavelength as the signals from geological sources, compensation calibration lines are flown as high as practical in a low magnetic gradient area close to the survey. This involves flying a series of tests at 2500m or higher on the survey line heading and approximately 15 degrees either side to accommodate small heading variations whilst flying survey lines. The data for each heading consists of a series of aircraft manoeuvres, including pitches, rolls and yaws. This is done to artificially create the most extreme possible attitude the aircraft may encounter whilst on survey. Data from these lines are used to derive compensation coefficients for removing magnetic noise induced by the aircraft's attitude in the naturally occurring magnetic field.

Compensation data were acquired on the following dates:

Aircraft	Compensation Date	Flights Covered
VH-TEM	19/10/2008	All flights

Compensation data acquired the following statistics:
StdDev UnComp 2.189
StdDev Comp 0.089
Improvement Ratio 24.6

4.7 Parallax Checks

Due to the relative positions of the EM towed bird and the magnetometer instruments on the aircraft and to processing / recording time lags, raw readings from each vary in position. To correct for this and to align selected anomaly features on lines flown in opposite directions, magnetics, EM data and the altimeters are 'parallaxed' with respect to the position information. System parallax is checked by flying in opposing directions over known geophysical features. This is also monitored routinely during processing of jobs and specifically checked following any major changes in the aircraft system which are likely to affect the parallax values.

The last parallax check was performed in August 2008 to confirm GPS, Mag and altimeter parallax. Parallax values for the X and Z EM components were chosen to optimise the gridded display and for aligning, from line to line, the EM response amplitudes for horizontal or broad steeply dipping conductors, which account for the majority of responses in regolith-dominated terrains such as this.

Because of the change in acquisition system (from Picodas to EMFasdas) these values will vary from previous results.

Variable	Parallax Value
Magnetics	-1.0 s
GPS	0 s
Radar Altimeter	0 s
Laser Altimeter	0 s
EM – X	-1.6 s
EM – Z	-0.2 s

Note that a positive parallax value in the tables above indicates that samples in that data stream are moved to lower fiducial numbers.

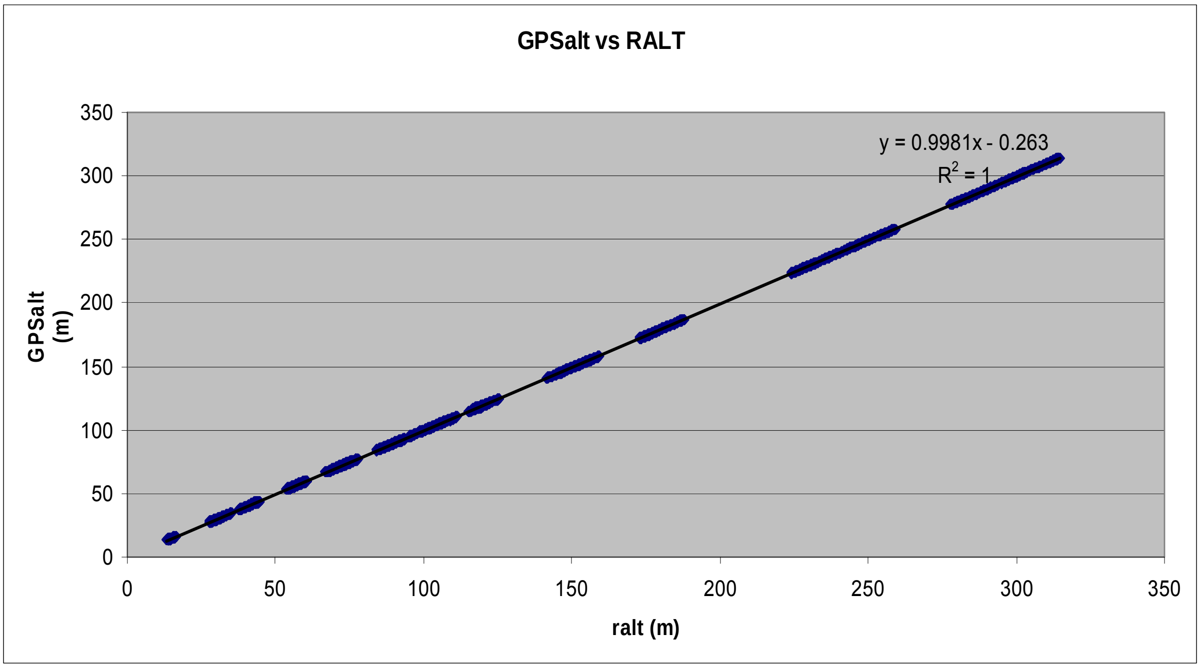
4.8 Radar Altimeter Calibration

The radar altimeter is checked for accuracy and linearity every 12 months or when any change in a key system component requires this procedure to be carried out. This calibration involves flying a number of lines at a range of constant altitudes to allow the radar altimeter data to be compared to and assessed with other height data (GPS and barometric) to confirm the accuracy of the radar altimeter over its operating range.

Absolute radar calibrations for VH-TEM were carried out over the ocean on the 2nd October 2008..

The graphs below show the results of these calibrations as Radar Altimeter output (m) versus the GPS height normalised to altitude above the ocean (based on average GPS along the lowest altitude pass). This chart shows the linear behaviour of the radar altimeter in each range.

Comparison of Radar Altimeter and GPSZ 2nd October 2008



Regression equation: GPSZ=0.9981*ralt + 0.263 R-squared = 1

4.9 Laser Altimeter Calibration

The Laser altimeter was checked based on the same process as that described above for the radar altimeters. The data used was from the same flights. The plots below show the laser altimeter heights compared to normalised GPS heights.

Pitch and roll manoeuvres were also conducted to determine coefficients to verify and/or correct for the laser's deviation from the vertical.

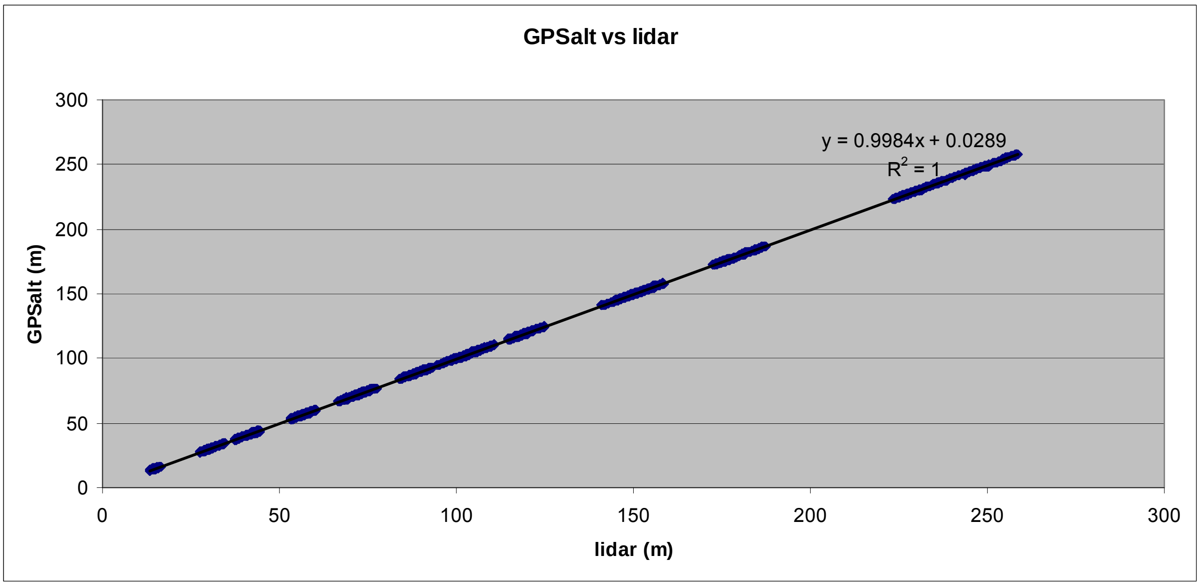
The following equation was used to correct the laser altimeter for changes in pointing direction:

$$l_c = l_m \cos(p_m + p_0)\cos(r_m + r_0) - h_l \sin(p_m + p_0)$$

Where l_c is the corrected altimeter value, l_m the raw measured altimeter value, p_m and r_m are the measured transmitter loop pitch and roll respectively, p_0 and r_0 are the laser altimeter pointing pitch and roll offsets relative to the transmitter loop orientation respectively, and h_0 is the horizontal offset between the laser altimeter and the aircraft's centre of rotation. Based on the data acquired during the calibration flights, the following values for p_0, r_0 and h_0 were used for corrections throughout the survey.

	p_0	r_0	h_0
VH-TEM	0.90	-0.10	0.42

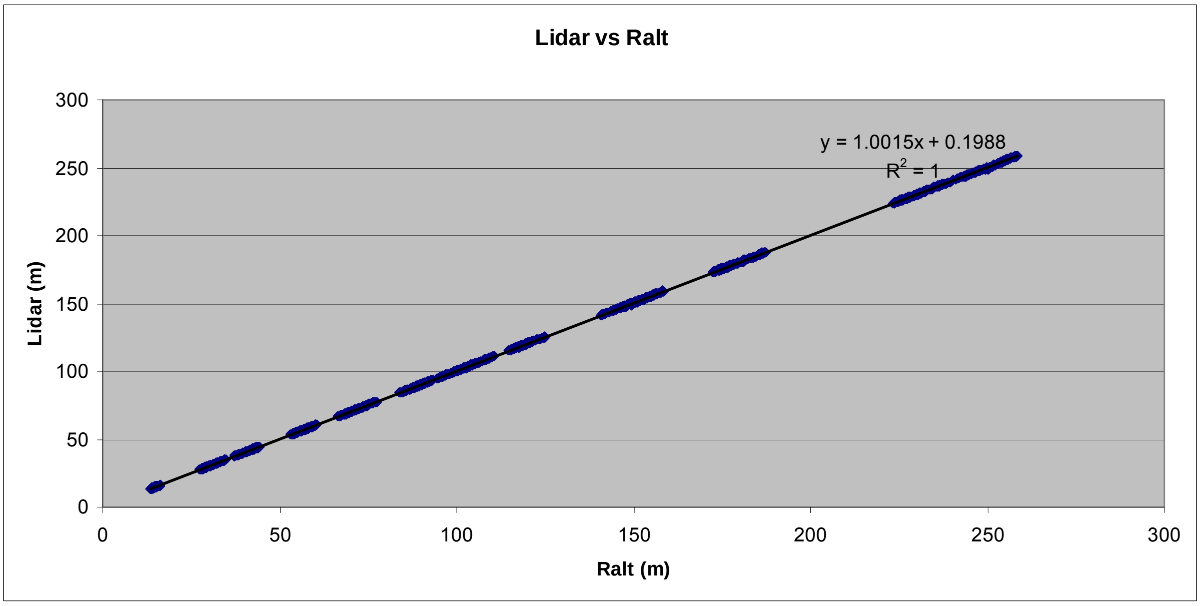
Comparison of Laser Altimeter and GPSZ – 2nd October 2008



Regression equation: GPSZ=0.9984*lidar + 0.0289 R-squared = 1

The following plot shows the radar altimeter compared to the laser altimeter, corrected for aircraft pitch and roll.

Comparison of Laser and Radar Altimeters – 2nd October 2008



Regression equation: lidar=1.0015*radalt + 0.1988 R-squared = 1

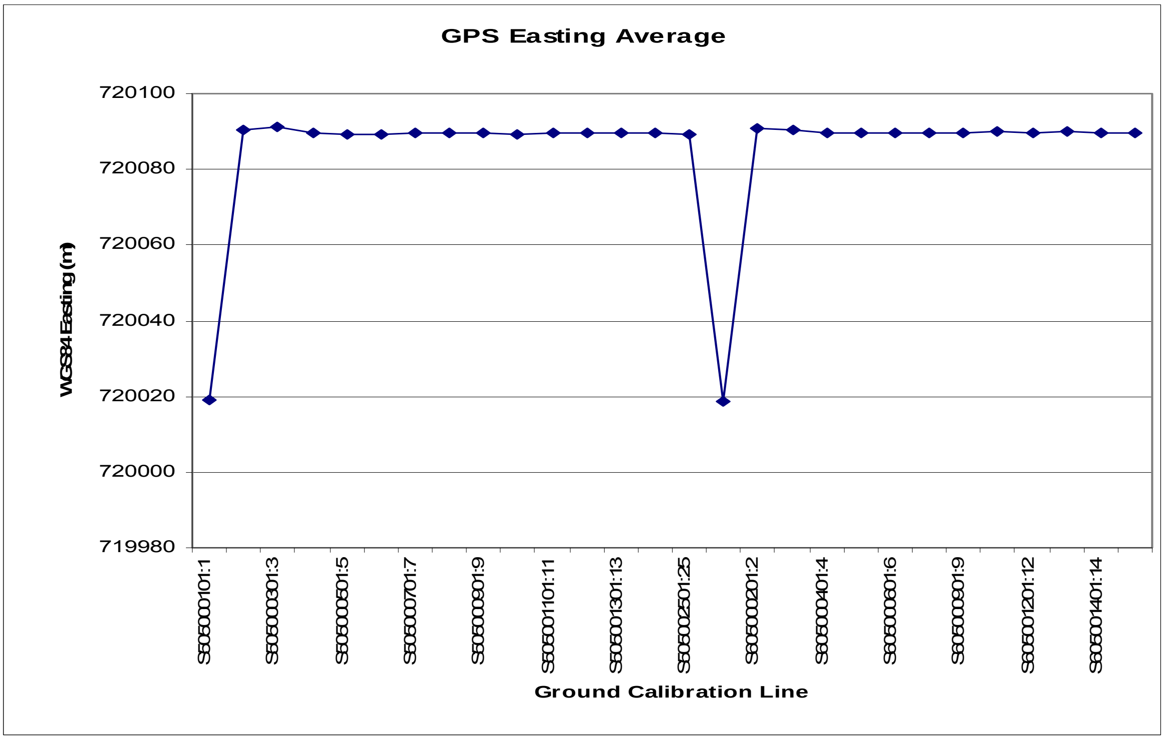
4.10 Heading Error Checks

Historically, heading error checks have been part of the aeromagnetic data acquisition procedure but they are no longer used. Fugro Airborne Surveys now calculates these effects using the aircraft magnetic compensation system and specially developed software. The precision to which these effects are now calculated and corrected for is far in excess of the manual methods used in the past.

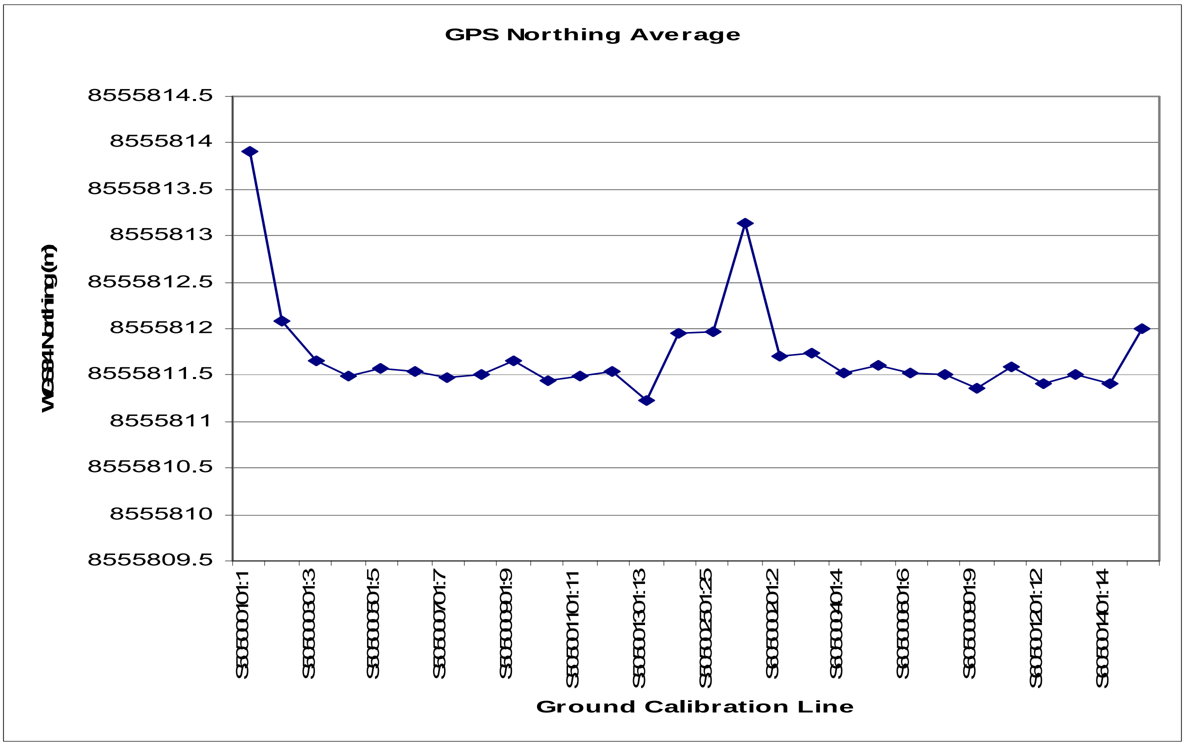
4.11 Repeat Point GPS Check

At the end of each flight the aircraft were parked as close to the same position as possible. Before and after the flight 90-120 seconds of data was recorded in this location to provide a check for consistency in navigation data. The following pages show plots of the average GPS height, northing and easting for each ground calibration during the survey.

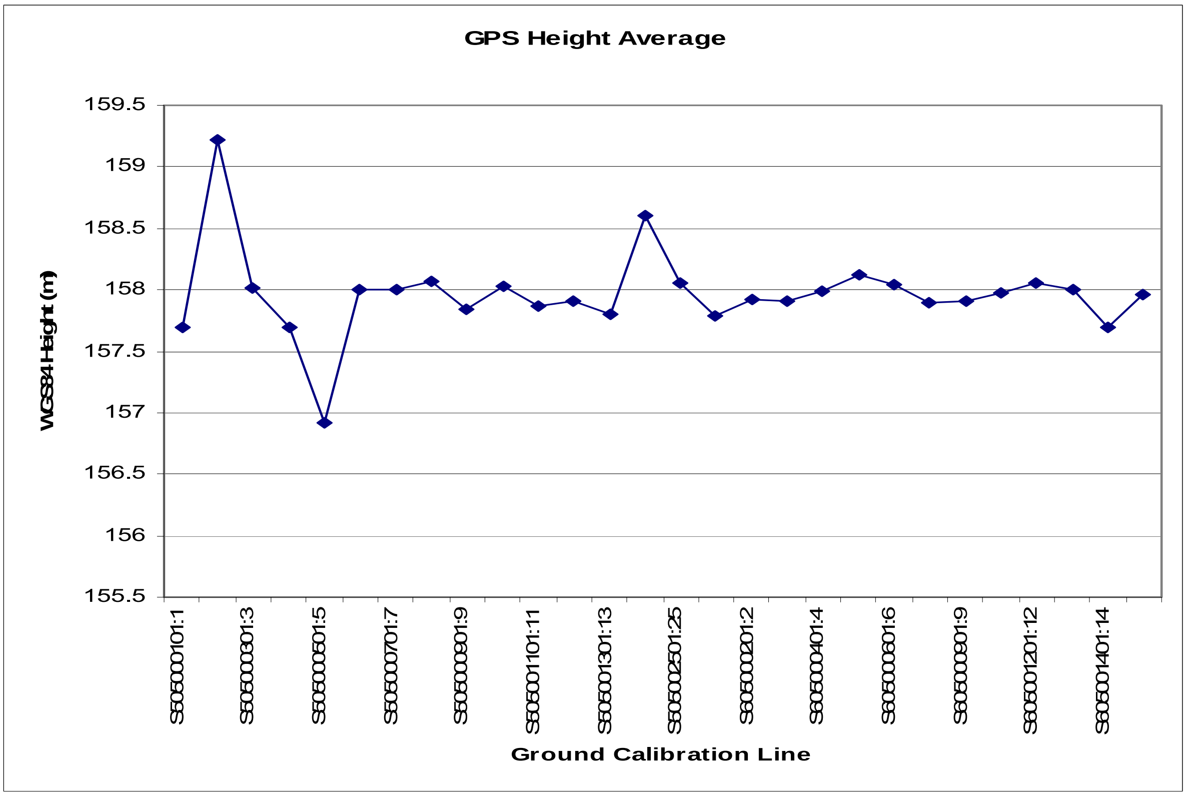
Woolner Flts 1-14



Note: the aircraft was required to be moved following flt 01

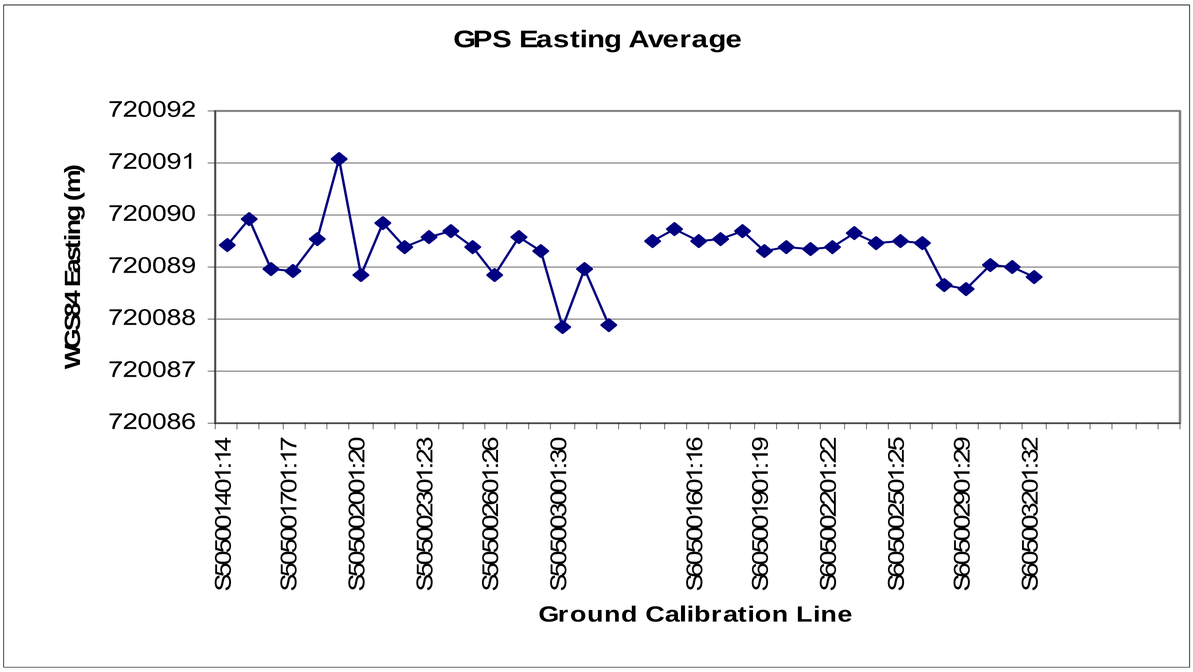


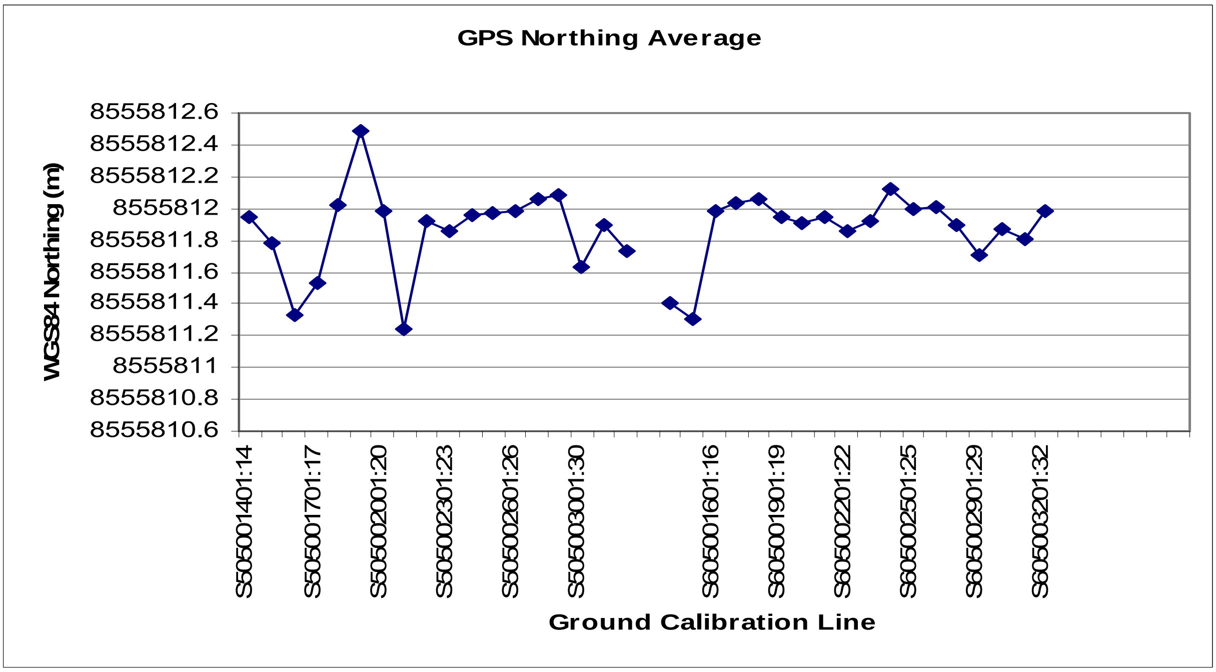
Note: the aircraft was required to be moved following flt 01

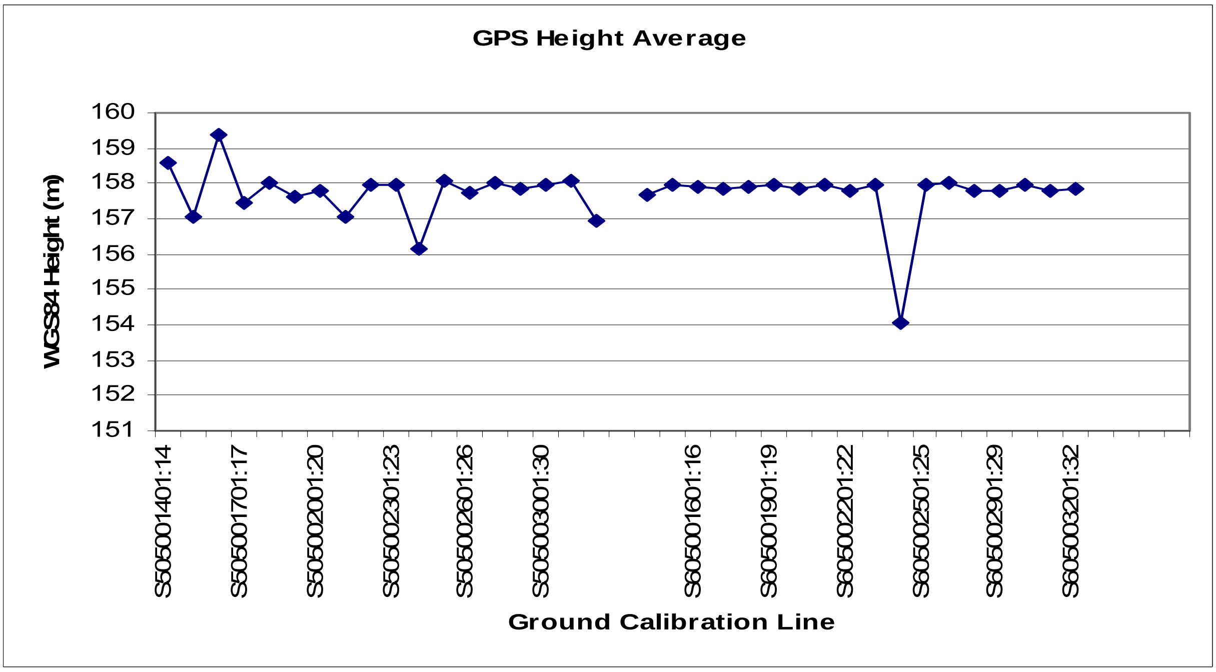


Note: the aircraft was required to be moved following flt 01

Woolner Flts 14-32




GPS Northing Average
WGS84 Northing (m)
8555812.6
8555812.4
8555812.2
8555812
8555811.8
8555811.6
8555811.4
8555811.2
8555811
8555810.8
8555810.6
S505001401:14
S505001701:17
S505002001:20
S505002301:23
S505002601:26
S505003001:30
S605001601:16
S605001901:19
S605002201:22
S605002501:25
S605002901:29
S605003201:32
Ground Calibration Line


GPS Height Average
WGS84 Height (m)
160
159
158
157
156
155
154
153
152
151
S505001401:14
S505001701:17
S505002001:20
S505002301:23
S505002601:26
S505003001:30
S605001601:16
S605001901:19
S605002201:22
S605002501:25
S605002901:29
S605003201:32
Ground Calibration Line

5. DATA PROCESSING

5.1 Field Data Processing

5.1.1 Quality Control Specifications

5.1.1.1 Navigation Tolerance

The re-flight specifications applied for the duration of the survey were:

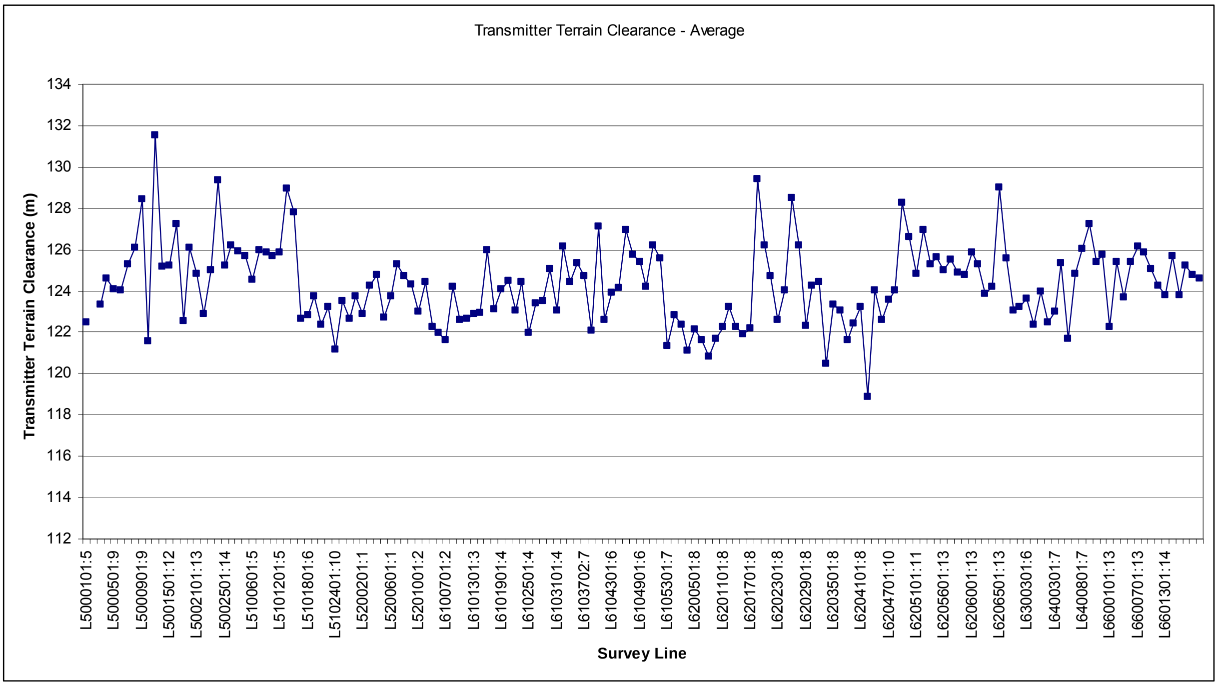
Electronic Navigation - absence of electronic navigation data (e.g. GPS base station fails).

Flight Path – flight path deviates by more than 40 metres over a continuous distance of 1500 metres or more unless the deviation is required by civil aviation requirements.

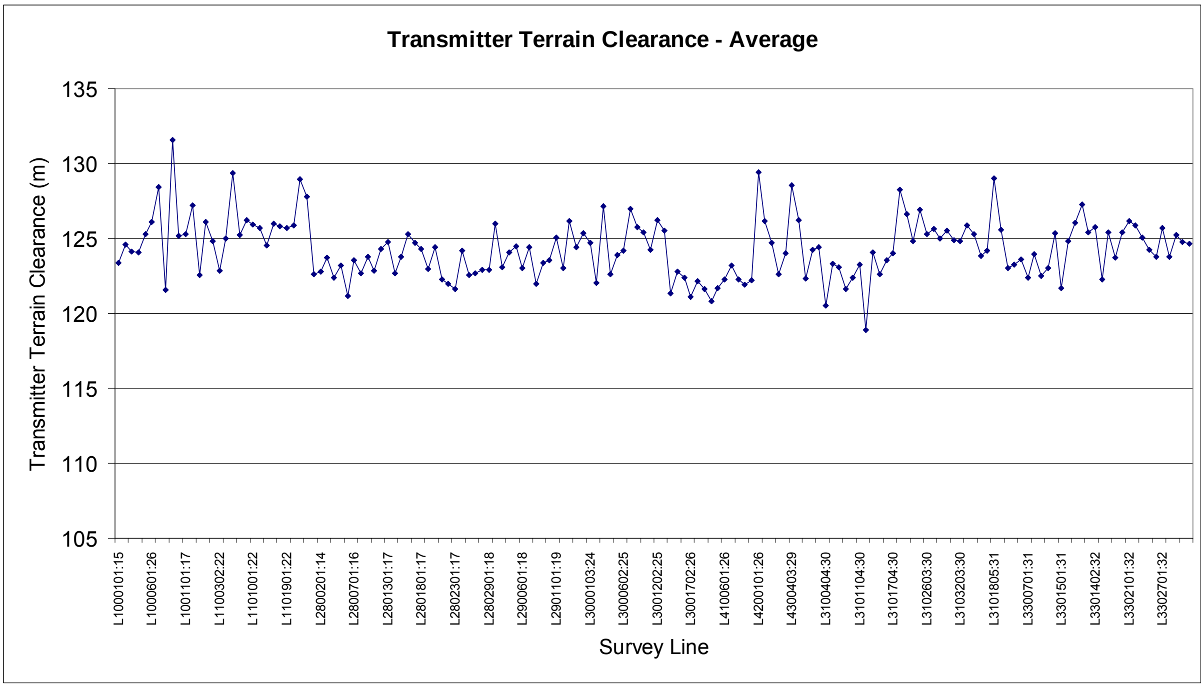
Altitude – the average terrain clearance for any one flight line shall be within ±5 metres of the nominal aircraft terrain clearance (121m). Portions of survey lines that are unable to be flown at the nominal survey height due to Australian Civil Aviation Safety Authority regulations of safety considerations shall be excluded from the average. Where the terrain clearance varies from that nominated by more than 20 metres over a continuous distance of two kilometres or more, a fill-in line will be flown at the Contractor's expense unless it can be reasonably demonstrated that such flying would put pilot and crew at risk.

The following plot show the average transmitter ground clearance for all survey lines. A number of lines appear to violate the above specification for average height. In all cases this was a result of rougher terrain.

Woolner Flts 1-14



Woolner Flts 14-32



5.1.1.2 Electromagnetic Data

Based on the high altitude reference (zero) line flown at the start and end of each flight, the quality control checks on the electromagnetic data were:

Noise – For any flight, if the standard deviation of the processed high altitude data for a window exceeds the corresponding Additive Noise specified in the Noise Characteristics table below, then that window will be deemed to be 'noisy'. If more than 25% of the windows are deemed to be noisy in either component, then that flight must be reflown at the Contractor's expense. See Appendix III for full record of zero-line standard deviation statistics.

Bias – For any flight, if the absolute value of the mean of the processed high altitude data for a window exceeds the corresponding Bias specified in the Noise Characteristics table below, then that window will be deemed to be 'biased'. If more than 25% of the windows are deemed to be biased in either component, then that flight must be reflown at the Contractor's expense. See Appendix III for full record of zero-line bias statistics.

Window	Additive Noise (standard deviation of high altitude data) (fT)		Bias (absolute value of mean of high altitude data) (fT)	
	X component	Z component	X component	Z component
1	0.0362	0.0267	0.0151	0.0145
2	0.0348	0.0160	0.0336	0.0248
3	0.0315	0.0140	0.0266	0.0195
4	0.0260	0.0134	0.0114	0.0081
5	0.0238	0.0122	0.0172	0.0132
6	0.0206	0.0123	0.0126	0.0096
7	0.0190	0.0117	0.0112	0.0093
8	0.0182	0.0118	0.0110	0.0090
9	0.0176	0.0110	0.0106	0.0087
10	0.0174	0.0102	0.0102	0.0087
11	0.0170	0.0099	0.0104	0.0081

12	0.0163	0.0084	0.0108	0.0078
13	0.0146	0.0075	0.0090	0.0066
14	0.0126	0.0070	0.0066	0.0054
15	0.0134	0.0087	0.0056	0.0051

Repeat lines – these were flown regularly to check system repeatability. Section 1.5 lists the co-ordinates for the test line used throughout the survey. The repeat line was flown once every day for the first four successful production days, and once every three production days after that. Comparison plots of derived conductivity for both repeat lines are included as an attachment (see Appendix VII).

5.1.2 In-Field Data Processing

Following acquisition, multiple copies of the EM data are made onto DVDs or CDs. The EM, location, magnetic and ancillary data are then processed at the field base to the point that the quality of the data from each flight can be fully assessed. Copies of the raw and processed data were then transferred to Perth for final data processing. A more comprehensive statement of EM data processing is given in section 5.2.3.

5.2 Final Data Processing

5.2.1 Flight Path Recovery

The GPS position of the aircraft at every point along the survey line was post-processed (differentially corrected) by applying the same X, Y and Z positional changes (deviations from averaged position) as seen at the base GPS unit (see 3.2 for a description of establishing the base GPS position).

The post-processed flight path (X and Y co-ordinates) and GPS height were then checked for spikes and level shifts, and if required, edited or improved by re-running the GPS post-processing. Section 4.12 describes the GPS repeat point test we conducted on every flight to confirm the repeatability of the GPS system. No other calibration procedures are performed for the GPS.

5.2.2 Magnetics

Magnetic data were compensated for aircraft manoeuvre noise using coefficients derived from the appropriate compensation flight (see 4.7). Base station data was edited so that all significant spikes, level shifts and null data were eliminated.

A diurnal base value was then added.

Area	Diurnal Base Value
All	47436 nT

A lag was applied to synchronise the magnetic data with the navigation data.

The International Geomagnetic Reference Field (IGRF) 2005 model (updated for secular variation 2008.8) was removed from the levelled total field magnetics. An IGRF base value, calculated at a central point within the survey area, was then added to the data.

Area	IGRF Base Value
All	46836 nT

Following this, microlevelling was applied in order to subtly level the data. The algorithm is a FAS proprietary operation used to remove the small across-line corrugations that may appear in any gridded data. The process attempts to de-corrugate the data without destroying the data's integrity. This is achieved by confining the changes to small values and applying them as a correction to the along-line data.

5.2.3 Altimeters

Radar altimeter data are recorded by the data acquisition system as a value in millivolts. This value is converted to metres using the relationships determined during the altimeter calibration flights. This data has a parallax applied followed by a short smoothing filter to eliminate short-wavelength system noise. Due to the dense vegetation in the survey area some false returns, due to reflection of the radar altimeter signal from the tree tops and not the ground, remain in the data. As this is not the primary altimeter used for the DEM and the EM terrain clearance corrections, manual correcting of these effects was only applied to the laser altimeter data.

The laser altimeter (lidar) data are recorded directly as a height in metres. As a first step all spurious values, and values of 0m (non-returns) were removed, followed by a routine that used local maxima and minima to remove small sharp steps & spikes, resulting from vegetation and other cultural features. Because of the particularly dense vegetation in the Woolner survey area, the automated spike removal routines could not remove all false returns, hence, further manual editing of spurious responses thought to be from tree tops and not the ground, was required for the laser altimeter data. There was also an instance on line 6103101 where, due to a tower on the ground, a large flight path deviation and associated aircraft roll was required. This resulted in the lidar returning spurious values for this section which had to be manually removed in final processing.

The resulting channel from this process was splined and filtered, then finally the expression defined in section 4.10 was applied to correct for the changing pointing angle of the altimeter due to aircraft pitch and roll.

5.2.4 Derived Ground Elevation

Aircraft navigation whilst in survey mode is via real time differential GPS, obtained by combining broadcast differential corrections with on-board GPS measurements. Terrain clearance is measured with a laser altimeter.

The ground elevation, relative to the WGS84 spheroid used by GPS receiver units, is obtained by finding the difference between the terrain clearance (from the final processed and edited laser altimeter) and the aircraft GPS antenna altitude above the ellipsoid (GPS height derived from post-processing of the DGPS data using the field base station data), and taking into account that the laser altimeter is mounted 2.3 metres below the GPS antenna.

The digital elevation model derived from this survey can be expected to have an absolute accuracy of +/- several metres in areas of low to moderate topographic relief. Sources of error include uncertainty in the height of the GPS base station, variations in the laser altimeter characteristics over ground of varying surface characteristics (ie. false and non-returns are more prevalent over dense vegetation and water, respectively), and the finite footprint of the laser altimeter.

Following this, microlevelling was applied in order to more subtly level the data. The algorithm is a FAS proprietary operation used to remove the small across-line corrugations that may appear in any gridded data. The process attempts to de-corrugate the data without destroying the data's integrity. This is achieved by confining the changes to very small values and applying them as a correction to the along-line data.

An N-Value is subtracted to correct the final data to the Australian Height Datum (AHD).

The final digital elevation model was then compared to the GEODATA 9 second DEM (DEM-9S) Version 3, which is a grid of ground elevation points covering the whole of Australia, with a grid spacing of 9 seconds in longitude and latitude (approximately 250m) in the GDA94 coordinate system. The DEM-9S grid is freely available through the Geophysical Archive Data Delivery System (GADDS). The following is a summary of the FASP final DEM relative to the DEM-9S data:

FASP DEM for Woolner:

Average value from final line data = 19.8m (relative to AHD)

DEM-9S for Woolner:

Average value from grid-sampled line data = 22.4m (relative to AHD)

Note:

The accuracy of the elevation calculation is directly dependent on the accuracy of the two input parameters, laser altitude and GPS altitude. The GPS altitude value is dependent on the number of available satellites, plus the accuracy of the averaged GPS base position. Although post-processing of GPS data will yield X and Y accuracies in the order of 0.5 metres, the accuracy of the altitude value is usually much less, but generally still within 1-2 metres. Further inaccuracies may be introduced during the interpolation and gridding process as only 1 out of every 5 points across-line is real data. Furthermore, along line obstructions may cause the pilot to veer laterally and so data interpolated between lines may vary significantly from real topography, and do not show artificial vertical obstructions.

Because of the inherent inaccuracies of this method, no guarantee is made or implied that the information displayed is a true representation of the height above sea level. Although this product may be of some use as a general reference, THIS PRODUCT MUST NOT BE USED FOR NAVIGATION PURPOSES.

5.2.5 Electromagnetic Data Processing

Details of the pre-processing applied to TEMPEST data can be found in Lane et al. (2000), and are summarised below.

Calibration

High altitude pre and post flight zero line data (Section 4.4) are used to characterise the system response in the absence of any ground response. These calibration lines were acquired pre and post flight and were linearly interpolated during processing for use at individual transients during the flight.

Cleaning and Stacking

Routines to suppress sferic noise, powerline noise, VLF noise and coil motion noise (collectively termed "cleaning") and to stack the data are applied to the survey line data. Output from the stacking filter is drawn at 0.2 second intervals. A cosine shaped filter making use of 152 transients (approximately 3 sec) is used in the stacking process.

Deconvolution

The survey height stacked data are deconvolved in the frequency domain using the interpolated high altitude reference waveform, to yield a quantity that is independent of system characteristics. This procedure accounts for slow variations in the transmitted current waveform's amplitude and shape during the flight. It also accounts for the effect of eddy currents induced in the transmitter loop and airframe. The output of the deconvolved data is the summed effect of the direct coupling between the transmitter loop and receiver coils (primary field) and the coupling between currents induced in the ground and the receiver (secondary field).

Primary Field Estimation

Since the receiver's orientation and position (relative to the transmitter) is not precisely known, the primary field cannot simply be theoretically computed and subtracted from the deconvolved data to yield the desired pure ground response. The primary field is instead estimated using knowledge of the asymptotic behaviour at the low frequency in-phase component of the deconvolved spectrum. The estimation of the primary field requires some assumptions to be made regarding the conductivity structure of the ground at depth. Once estimated the primary field is subtracted from the deconvolved data to yield the estimated pure ground response.

Transmitter-Receiver Separation Estimation

Once the primary field and coupling terms are estimated it is then possible to estimate the position of the receiver coils relative to the transmitter loop via basic dipole theory. Equations (1) and (2) define the coupling terms for an infinitesimal vertical magnetic dipole transmitter and an ideal receiver located at co-ordinates (*x,z*) with respect to the transmitter. The horizontal (or X) component coupling is defined by,

$$g_x = \frac{3xz}{\left(x^2 + z^2\right)^{5/2}}, \qquad (1)$$

and for the vertical (or Z) component data;

$$g_z = \frac{2z^2 - x^2}{\left(x^2 + z^2\right)^{5/2}} \quad . \tag{2}$$

The above equations are inverted to solve for the coil set position defined by the co-ordinates (x,z) as follows. From equations (1) and (2),

$$\frac{g_z}{g_x} = r = \frac{(2z^2 - x^2)}{3xz} \tag{3}$$

Therefore,

$$x^2 + 3rxz - 2z^2 = 0 \tag{4}$$

Therefore,

$$x = -(3rz \pm \sqrt{9r^2 z^2 + 8z^2})/2 = z(-3r \pm \sqrt{9r^2 + 8})/2 = zr_1 \tag{5}$$

Substituting back into the expression for g_x, we get

$$g_x = \frac{3r_1}{z^3 (r_1^2 + 1)^{5/2}} \tag{6}$$

and

$$z = \left\{ \frac{3r_1}{g_x (r_1^2 + 1)^{5/2}} \right\}^{1/3}, \quad and \quad x = r_1 \left\{ \frac{3r_1}{g_x (r_1^2 + 1)^{5/2}} \right\}^{1/3} \tag{7}$$

where

$$r_1 = \left\{ -3(g_z / g_x) + \sqrt{9(g_z / g_x)^2 + 8} \right\} / 2 \tag{8}$$

The +/- solutions collapse to a single solution due to a basic knowledge that the bird is always going to be below and behind the transmitter. Therefore equations (7) and (8) provide the necessary calculation to convert g_x and g_z values to x and z values which define the position of the receiver with respect to the transmitter.

An estimate of transmitter-receiver separation is made for every 0.2 second sample drawn from the stacking filter. Along with other system geometry variables (either measured or assumed) the survey wide averages of the system geometry is shown in the table following.

Geometry Variable		**VH-TEM**
Transmitter loop pitch	measured	1.03 deg
Transmitter loop roll	measured	0.59 deg
Transmitter loop yaw	assumed	0.00 deg
Transmitter loop terrain clearance	measured	124.3 m
Transmitter-receiver in-line horizontal separation	estimated	-121.0 m
Transmitter-receiver vertical separation	estimated	-33.9 m
Transmitter-receiver transverse horizontal separation	assumed	0.00 m
Receiver pitch	assumed	0.00 deg
Receiver roll	assumed	0.00 deg
Receiver yaw	assumed	0.00 deg

Transformation to B-field Response

The pure ground response data are transformed from dB/dt to B-field responses equivalent to that which would be observed for a perfect 100% duty cycle square wave waveform with a 1 A peak to peak step.

Windowing
Finally, the evenly spaced samples are binned into a number of windows.

Table of TEMPEST window information for 25Hz base frequency

Window #	Start sample	End sample	No of samples	start time (s)	End time (s)	centre time (s)	centre time (ms)
1	1	2	2	0.000007	0.000020	0.000013	0.013
2	3	4	2	0.000033	0.000047	0.000040	0.040
3	5	6	2	0.000060	0.000073	0.000067	0.067
4	7	10	4	0.000087	0.000127	0.000107	0.107
5	11	16	6	0.000140	0.000207	0.000173	0.173
6	17	26	10	0.000220	0.000340	0.000280	0.280
7	27	42	16	0.000353	0.000553	0.000453	0.453
8	43	66	24	0.000567	0.000873	0.000720	0.720
9	67	102	36	0.000887	0.001353	0.001120	1.120
10	103	158	56	0.001367	0.002100	0.001733	1.733
11	159	246	88	0.002113	0.003273	0.002693	2.693
12	247	384	138	0.003287	0.005113	0.004200	4.200
13	385	600	216	0.005127	0.007993	0.006560	6.560
14	601	930	330	0.008007	0.012393	0.010200	10.200
15	931	1500	570	0.012407	0.019993	0.016200	16.200

Geometry Corrections to EM Data
The final EM dataset includes both "non-geometry corrected" and geometry-corrected" located EM data. The non-geometry corrected EM amplitudes reflect, not only the variations in ground conductivity, but the variations in geometry of the various parts of the EM measurements (i.e. transmitter loop pitch, transmitter loop roll, transmitter loop terrain clearance, transmitter loop to receiver coil horizontal longitudinal separation, transmitter loop to receiver coil horizontal transverse separation, and transmitter loop to receiver coil vertical separation) during the survey. For example, the largest influence on the early time EM amplitude is the terrain clearance of the transmitter loop. The larger the terrain clearance, the smaller the amplitude. Later window times (larger window number) show diminished variations due to terrain clearance.

Geometry-corrected located data are produced for optimum presentation of the EM amplitude data in image format (e.g. window amplitude images, principal component analysis images derived from the window amplitudes (Green,1998b)). Between non-geometry and geometry corrected states, the ground response data undergo an approximate correction to produce data that would be measured if the system had always maintained a nominated standard (constant) geometry. A dipole-image method (Green, 1998a) is used to adjust the data to the response that would be expected at a standard terrain clearance (120m), standard transmitter loop pitch and roll (zero degrees), and a standard transmitter loop to receiver coil geometry (120m behind and 35 below the aircraft). These geometry variables have been set to their respective standard values in the geometry corrected located data. Zero parallax is applied to the transmitter loop pitch, roll, terrain clearance, X component EM and Z component EM data prior to geometry correction. Note that the final delivered non-geometry corrected EM data has had the parallax values, defined in section 5.2.7.1, applied.

Over extremely conductive ground (e.g. > 100 S conductance), the estimates for transmitter loop to receiver coil separation determined from the primary field coupling factors may be in error at the metre scale due to uncertainty in the estimation of the primary field. This will influence the accuracy of very early time window amplitude information in the geometry-corrected located data. Receiver coil pitch has a significant effect on early time Z component response and late time X component response (Green and Lin, 1996). Receiver coil roll impacts early time Z component response.

Values used to standardise transmitter height, pitch and roll and transmitter-receiver geometry

Geometry Variable	Standard Value
Transmitter loop pitch	0.0 deg
Transmitter loop roll	0.0 deg
Transmitter loop yaw	0.0 deg
Transmitter loop terrain clearance	120.0 m
Transmitter-receiver in-line horizontal separation	-120.0 m
Transmitter-receiver vertical separation	-35.0 m
Transmitter-receiver transverse horizontal separation	0.0 m
Receiver pitch	0.0 deg
Receiver roll	0.0 deg
Receiver yaw	0.0 deg

Levelling

Once the full dataset had been corrected to the same standard geometry, the following levelling procedure was applied:

- small amplitude DC shifts to the window data to remove base-level shifts related to slight imperfections in the deconvolution stage of the EM data processing. This type of levelling is termed 'noise-levelling', and it is designed to improve the presentation and remove the small amplitude 'block' shifts in the later EM windows that may occur from flight to flight.
- limited range micro-levelling was applied to all windows for presentation purposes and to ensure the input data for CDI processing was free of striping.

5.2.6 Conductivity Depth Images (CDI)

CDI conductivity sections for TEMPEST data were calculated using EMFlow and then modified to reflect the finite depth of investigation using an in-house routine, *Sigtime*.

The *Sigtime* routine removes many of the spurious conductive features that appear at depth as a result of fitting long time constant exponential decays to very small amplitude features in the late times. For each observation, the time when the response falls below a signal threshold amplitude is determined. This time is transformed into a diffusion depth with reference to the conductivity values determined for that observation. Anomalous conductivity values below this depth are replaced by background values or set to undefined, reflecting the uncertainty in their origin. The settings and options applied are indicated in the appropriate header files for *Sigtime* output. This procedure is different to that which would be obtained by filtering conductivity values using either a constant time or constant depth across the entire line.

The "final" X and Z EM data were simultaneously input into version 5.10 of EMFlow to calculate Conductivity Depth Images (CDI). Conductivity values were calculated at each point then run through *Sigtime.*

EMFlow was developed within the CRC-AMET through AMIRA research projects (Macnae et al, 1998, Stolz and Macnae, 1998). The software has been commercialised by Encom Technology Pty Ltd. Examples of TEMPEST conductivity data can be seen in Lane et al. (2000), Lane et al. (1999), and Lane and Pracillio (2000).

Conductivity values were calculated to a depth of 200m below surface at each point, using a depth increment of 5m and a conductivity range of 1-3000mS/m.

5.2.6.1 Factors and Corrections

Geometric Factor

The geometric factor gives the ratio of the strength of the primary field coupling between the transmitter loop and the receiver coil at each observation relative to the coupling observed at high altitude during acquisition of reference waveform data. Variations in this factor indicate a change in the attitude and/or relative separation of the transmitter loop and the receiver coil.

Transmitter-Receiver Geometry

Transmitter-to-receiver geometry values for each observation are derived from the high altitude reference waveforms and knowledge of the system characteristics. The exact derivation of the primary field values and transmitter-to-receiver separation are described in section 5.2.5 above. The transmitter-to-receiver geometry values are available in the located data (see section 5.2.5 for "standardised" values).

GPS Antenna, Laser Altimeter and Transmitter Loop Offset Corrections

The transmitter loop was mounted 0.1m above the GPS antenna. And the GPS antenna is 2.3m above the belly of the aircraft. The laser altimeter sensor is mounted in the belly. Therefore a total of 2.4m was added to the laser altimeter data to determine the transmitter loop height above the ground.

Transmitter Loop Pitch and Roll Correction

Measured vertical gyro aircraft pitch and roll attitude measurements are converted to transmitter loop pitch and roll by adding -0.9 degrees for pitch and 0.1 degrees for roll. Nose up is positive for pitch, and left wing up is positive for roll.

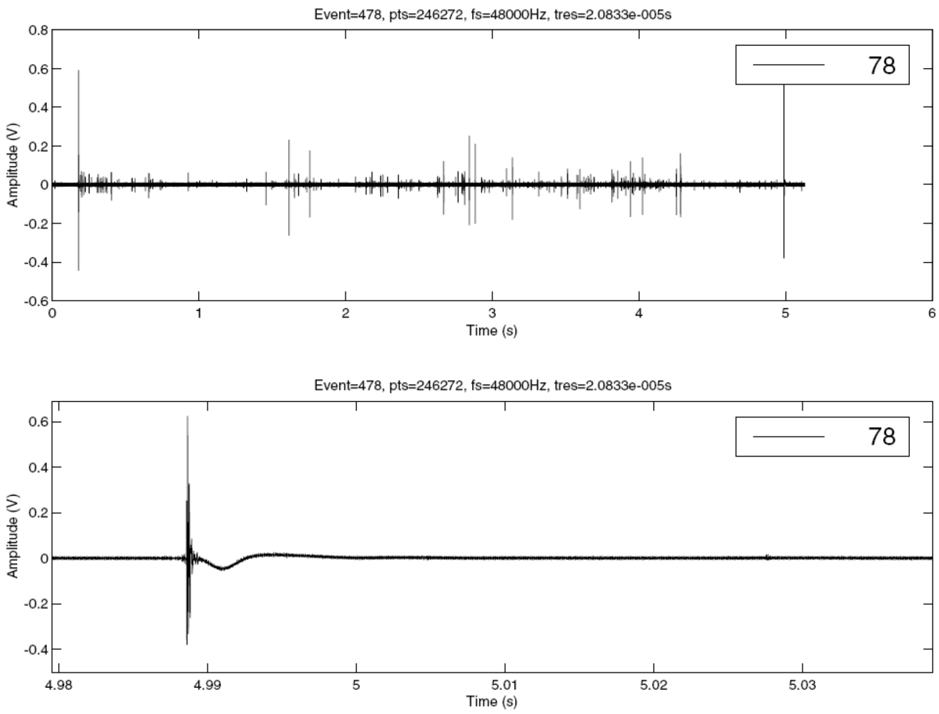
5.2.6.2 Primary Sources of EM Noise

A number of "monitor" values are calculated during processing to assist with interpretation. They generally represent quantities that have been removed as far as is practical from the data, but may still be present in trace amounts. These are more significant for interpretation of discrete conductors than for general mapping applications.

Sferic Monitor

Sferics are the electromagnetic signals associated with lightning activity. These signals travel large distances around the Earth. Background levels of sferics are present at all times from lightning activity in tropical areas of the world (eg tropical parts of Asia, South America and Africa). Additional higher amplitude signals are produced by "local" lightning activity (ie at distances of kilometres to hundreds of kilometres).

The sferic monitor is the sum of the absolute differences brought about by the sferic filter operations, summed over 0.2 second intervals, normalised by the receiver effective area. It is given in units of uV/sq.m/0.2s. Many sferics have a characteristic form that is well illustrated by figure 2 in Garner and Thiel (2000), shown below. The high frequency, initial part of a sferic event can be detected and filtered more easily than the later, low frequency portion. The sferic monitor indicates where at least the high frequency portion of a sferic has been successfully removed, but it is quite possible that lower frequency elements of the sferic event may have eluded detection, passing through to the window amplitude data. Thus, discrete anomalies coincident with sferic activity as indicated by the sferic monitor should be down-weighted relative to features clear of any sign of sferic activity.



An electric field time-series sampled at 48 kilo samples per second using MIMDAS. The top panel exhibits the entire event, while the lower panel depicts a close up view of an individual sferic from that event. The sample rate and resolution in time are denoted by fs and tres, respectively. (Garner & Thiel, 2000.)

Low Frequency Monitor

The Low Frequency Monitor (LFM) makes use of amplitudes at frequencies below the base frequency which are present in the streamed data to estimate the amplitude of coil motion noise at the base frequency in log10(pV/sqrt(Hz)/sq.m). This noise is primarily induced by the coil's motion through the earth's magnetic field – a change in coupling between the receiver coil and the ambient magnetic field will induce a voltage in the receiver coil. This noise is referred to as coil motion or Earth field noise. Receiver coils in the towed bird are suspended in a fashion that attempts to keep this noise below the noise floor at frequencies equal to and above the base frequency of the system. Severe turbulence, however, can result in 'coil knock events' that introduce noise into the processed data. Note that the LFM will also respond to sferic events with an appreciable low frequency (sub-base frequency) component. This situation can be inferred when both the LFM and sferic monitors show a discrete kick.

The coil motion noise below the base frequency is rejected through the use of tapered stacking, but the coil motion noise at the base frequency itself is not easily removed.

Powerline Monitor

The powerline monitor gives the amplitude of the received signal at the powerline frequency (50 or 60 Hz) in log10(pV/sqrt(Hz)/sq.m). Careful selection of the base frequency (such that the powerline frequency is an even harmonic of the base frequency) and tapered stacking combine to strongly attenuate powerline signals. When passing directly over a powerline, the rapid lateral variations in the strength and direction of the magnetic fields associated with the powerline can result in imperfect cancellation of the powerline response during stacking. Some powerline-related interference can manifest itself in a form that is similar to the response of a discrete conductor. The exact form of the monitor profile over a powerline depends on the line direction, powerline direction, powerline current, and receiver component, but the monitor will show a general increase in amplitude approaching the powerline.

Grids (or images) of the powerline monitor reveal the location of the transmission lines. Note that the X component (horizontal receiver coil axis parallel with the flight line direction) does not register any response from powerlines parallel to the flight line direction since the magnetic fields associated with powerlines only vary in a direction perpendicular to the powerline. Note also that the Z component (vertical receiver coil axis) shows a narrow low directly over the powerline where the magnetic fields are purely horizontal.

Very Low Frequency Monitors

Wide area VLF communication signals in the 15 to 25 kHz frequency band are monitored by the TEMPEST system. In the Australian region, signals at 18.2 kHz, 19.8 kHz, 21.4 kHz and 22.2 kHz are monitored as the amplitude of the received signal at these frequencies in log10(pV/sqrt(Hz)/sq.m). The strongest signal comes from North West Cape (19.8 kHz). The signal at 18.2 kHz is often observed to pulse in a regular sequence. These strong narrow band signals have some impact on the high frequency response of the system, but they are strongly attenuated by selection of the base frequency and tapered stacking. The VLF transmissions are strongest in amplitude, in the horizontal direction at right angles to the direction to the VLF transmitter. This directional dependence enables the VLF monitors to be used to indicate the receiver coil attitude.

5.2.6.3 Other Sources of EM Noise

Man-made periodic discharges

If an image of the Z component sferic monitor shows the presence of spatially coherent events, then pulsed cultural interference would be strongly suspected. Since sferic signals are much stronger in the horizontal plane than in the vertical plane, few sferics of significant amplitude are recorded in Z component data. In contrast, evidence of cultural interference is generally swamped by true sferics in X component sferic monitor images.

Electric fences are the most common source of pulsed cultural interference. Periodic discharges (eg every second or so) into a large wire loop (fence) produce very large spikes in raw data. These are attenuated to a large degree by the sferic filter, but a residual artefact can still be present in the processed data.

Grounded metal objects

Grounded extensive metal objects such as pipelines and rail lines can qualify as conductors and may produce a response that is visible in processed data. Grounded metal objects produce a response similar to shallow, highly conductive, steeply dipping conductors. These objects can sometimes be identified from good quality topographic maps, from aerial photographs, by viewing the tracking video, from their unusual spatial distribution (ie often a series of linear segments) and in some circumstances from their effect on the powerline monitor. A powerline running close to a long metal object will induce a 50 Hz response in the object.

5.2.7 System Specifications for Modelling TEMPEST Data

Differences between the specifications for the acquisition system, and those of the virtual system for which processed results are given, must be kept in mind when forward modelling, transforming or inverting TEMPEST data.

Acquisition is carried out with a 50% duty cycle square transmitter current waveform and dB/dt sensors.

During processing, TEMPEST EM data are transformed to the response that would be obtained with a B-field sensor for a 100% duty cycle square waveform at the base frequency, involving a 1A change in current (from -0.5A to +0.5A to -0.5A) in a 1sq.m transmitter. Data are given in units of femtoTesla (fT = 10^{-15} Tesla). It is this configuration, rather than the actual acquisition configuration, which must be specified when modelling fully pre-processed TEMPEST data.

Window timing information is given above (see section 5.2.5).

The geometry-corrected EM data have been standardised through an approximate transformation to a standard transmitter loop terrain clearance, transmitter loop pitch and roll of zero degrees, and a fixed transmitter loop to receiver coil geometry (roughly equal to the average estimated geometry values). Transmitter loop pitch, transmitter loop roll and transmitter loop terrain clearance values for each observation have been modified to reflect the standard values. Hence, the standardised geometry values should be used if modelling with the geometry corrected X and Z-component amplitude data (see table in section 5.2.5).

5.2.7.1 Parallax

The located data files utilise the following parallax values :-

- magnetics = -1.0 fiducials (5 observations from the zero parallax position),
- radar altimeter = 0 fiducials
- laser altimeter = 0 fiducials
- GPS co-ordinates = 0 fiducials
- EM X-component = -1.6 fiducials (8 observation from the zero parallax position),
- EM Z-component = -0.2 fiducials (1 observations from the zero parallax position),

For the Tempest Airborne EM system, due to the asymmetry in the transmitter loop-receiver coil geometry with respect to flight direction, there is no single EM parallax value which will align the peak response for all conductivity distributions for lines flown in opposite directions.

The choice of EM parallax value depends on the intended usage, but with the predominance of broad, shallowly dipping conductors, and the client's desire to grid the data, parallax has been applied so that data are optimised for gridding. The 'optimum' depends on the conductor depth, the acquisition geometry and the delay time, and hence, the selected value will be a compromise.

(NB negative parallax values are defined in this case as shifting the indicated quantity forward along line to larger fiducial values. Location information remains in the zero parallax state)

5.2.8 CDI Depth Slicing

Following calculation of CDI data as described in section 5.2.6, conductivity depth slices were derived by averaging conductivity data over the following depth intervals:

0 – 5m
5 – 10m
10 – 15m
15 – 20m
20 – 30m
30 – 40m
40 – 60m
60 – 100m
100 – 150m
150 – 200m

The conductivity depth slice data were gridded for each of the regional and infill areas using a grid cell size of 1/5th of the line spacing. The areas were gridded using a bi-directional spline interpolation (with no anti-aliasing) algorithm with a square cell size.

Finally, a 5-cell median filter and a 5-cell mean filter were applied to the conductivity depth slice grids to improve their appearance and smooth the blocky nature of the raw grids, which is a result of using 20 discretely defined conductivities in the CDI calculation.

5.2.9 Delivered Products

Appendix VI contains a complete list of all data supplied digitally.

Digital located data in ASCII format was produced containing the non-geometry corrected and geometry corrected X and Z EM data as well as magnetics, digital elevation and derived conductivity data. The header file can be found in Appendix III.

Grids (in ER Mapper format) of selected conductivity slices, total magnetic field and digital elevation were also produced. Acquisition and processing report in hardcopy and digital format.

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APPENDIX I – Weekly Acquisition Reports VH-TEM

System: Tempest
Aircraft: VH-TEM

18220.3 Hrs - Progressive M/R Hrs at the start of job, prior to mobilisation

18344.2 Hrs - The hours the Periodic Inspection is actally due at start of the job

Total Job kms: 6936.000 Kms
Plan Kms Remain: 6773.613 Kms
% Complete: 2.341 %

Job Number: 2017
Contract Number: 1196
Job Name: Pine Creek
Area Names: Woolner, Rum jungler
Client: Geoscience Australia

Date	Flt	Pilot initials	On board Oper initials	Production inc. Reflights Exc. Scrubs	FAS Scrub	Time Start	Time End	Engine Hours on M/R	Hours to Periodic Inspectio	Job Hrs to Date	Prod. to Date	FAS Scrubs to Date	Stdby Days	Activity Contribution	Activity	COMMENTS Weather, Data delivery Aircraft movement, etc
13-October-2008																
Julian Day 287																
Monday																
									123.9							
Date 14-Oct																
Julian Day 288																
Tuesday																
									123.9							
Date 15-Oct																
Julian Day 289																
Wednesday																
									123.9							
Date 16-Oct																
Julian Day 290																
Thursday																
									123.9							
Date 17-Oct		GH/TD				6:13:00	8:42:00	2.5						0.50	MO	Mobilisation from Port Hedland to Derby
Julian Day 291						9:38:00	11:56:00	2.3						0.50	MO	Mobilisation from Derby to Kununrra
Friday															Comment	MG and MW left Perth for Batchelor
									119.1	4.8						
Date 18-Oct		GH/TD				6:06:00	7:49:00	1.7						0.20	MO	Mobilisation from Kununrra to Batchelor NT
Julian Day 292														0.80	SETUP	MG spent rest of the day seting up the base
Saturday															Comment	PE arrived Batchelor from Perth
									117.4	6.5						
Date 19-Oct	1	GH/TD	MG/MW	162.387		7:21:00	10:39:00	3.3						1.00	P	Rec, comp box and first flight, data ok
Julian Day 293																
Sunday																
									114.1	9.8	162.387					
		Totals This Week: ►		**162.387**		Week Hours:►		**9.8**	▲: A/C Hrs to Next Service					**3.00**		

System: Tempest
Aircraft: VH-TEM

18220.3 Hrs - Progressive M/R Hrs at the start of job, prior to mobilisation

Job Number: 2017
Contract Number: 1196
Job Name: Pine Creek
Area Names: Woolner, Rum jungler
Client: Geoscience Australia

Total Job kms: 6936.000 Kms

18344.2 Hrs - The hours the Periodic Inspection is actally due at start of the job

Plan Kms Remain: 4992.077 Kms
% Complete: 28.027 %

Date	Flt	Pilot initials	On board Oper initials	Production inc. Reflights Exc. Scrubs	FAS Scrub	Time Start	Time End	Engine Hours on M/R	Hours to Periodic Inspectio	Job Hrs to Date	Prod. to Date	FAS Scrubs to Date	Stdby Days	Activity Contribution	Activity	COMMENTS Weather, Data delivery Aircraft movement, etc
20-October-2008	2	GH / TD	MG/MW	170.000		6:38:00	9:24:00	2.8						1.00	P	all lines ok flight aborted early due to sferics
Julian Day 294																
Monday																
									111.3	12.6	332.387					
Date 21-Oct	3	GH / TD	MG/MW	172.000		6:25:00	8:52:00	2.4						1.00	P	Flight aborted due coil knocks
Julian Day 295																
Tuesday																
									108.9	15.0	504.387					
Date 22-Oct													1.00	1.00	A	Problem with aircraft left engine
Julian Day 296															Comment	due aircraft problem, day used as a PDO
Wednesday																
									108.9	15.0	504.387					
Date 23-Oct	4	GH / TD	MG/MW	369.236	25.000	6:18:00	9:45:00	3.5						1.00	P & S	weather fine, one line scrubbed due coil knock
Julian Day 297																
Thursday																
									105.4	18.5	873.623	25.000				
Date 24-Oct	5	GH / TD	MG/MW	440.100		6:39:00	10:03:00	3.4						1.00	P	weather ok, most of regional lines flown.
Julian Day 298																
Friday																
									102.0	21.9	1313.723	25.000				
Date 25-Oct	6	GH / TD	MG/MW	397.300	25.000	6:18:00	9:58:00	3.7						1.00	P & S	flight went ok, one line scrubbed due coil knock
Julian Day 299																
Saturday																
									98.4	25.5	1711.023	50.000				
Date 26-Oct	7	GH / TD	MG/MW	232.900		6:09:00	9:25:00	3.3						1.00	P & R	Weather ok early turning poor.
Julian Day 300															Comment	Prod levels low due short & regional lines
Sunday															Comment	Blocks W1,3,4,7 top regional & infills all
									95.1	28.8	1943.923	50.000				
			Totals This Week: ►	**1781.536**	**50.000**		Week Hours:►	**19.0**	▲: A/C Hrs to Next Service				**1.00**	**7.00**		

System:	Tempest	Job Number:	2017
Aircraft:	VH-TEM	Contract Number:	1196
		Job Name:	Pine Creek
Total Job kms:	6936.000 Kms	Area Names:	Woolner, Rum jungler
		Client:	Geoscience Australia
Plan Kms Remain:	3148.277 Kms		
% Complete:	54.610 %		

18220.3 Hrs - Progressive M/R Hrs at the start of job, prior to mobilisation

18344.2 Hrs - The hours the Periodic Inspection is actally due at start of the job

Date	Flt	Pilot initials	On board Oper initials	Production inc. Reflights Exc. Scrubs	FAS Scrub	Time Start	Time End	Engine Hours on M/R	Hours to Periodic Inspectio	Job Hrs to Date	Prod. to Date	FAS Scrubs to Date	Stdby Days	Activity Contribution	Activity	COMMENTS Weather, Data delivery Aircraft movement, etc
27-October-2008	8	GH / TD	MG	341.800		6:20:00	9:44:00	3.4						1.00	P	All lines ok and no scrubs, started area W_2
Julian Day 301																
Monday									91.7	32.2	2285.723	50.000				
Date 28-Oct	9	GH / TD	MG	381.500	42.400	6:14:00	9:50:00	3.6						1.00	P & S	East regional & infills complete. 51019 scrubbed
Julian Day 302																
Tuesday									88.1	35.8	2667.223	92.400				
Date 29-Oct														1.00	PDO	pilots day off of the week
Julian Day 303																
Wednesday									88.1	35.8	2667.223	92.400				
Date 30-Oct	10	GH / TD	MW	365.200		6:13:00	9:22:00	3.2						1.00	P & R	line 51019 reflown from flight 9 rest of data ok
Julian Day 304																
Thursday									84.9	39.0	3032.423	92.400				
Date 31-Oct	11	GH / TD	MG	332.800	39.900	6:28:00	9:35:00	3.1						1.00	P & S	line 51023 scrubbed due sferics
Julian Day 305																
Friday									81.8	42.1	3365.223	132.300				
Date 1-Nov	12	GH / TD	MW	77.500		6:14:00	8:00:00	1.8						1.00	P	only two lines flown , poor spherics.
Julian Day 306																
Saturday									80.1	43.8	3442.723	132.300				
Date 2-Nov	13	GH / TD	MG	345.000		6:15:00	9:25:00	3.2						1.00	P	weather fine with a bit of sferics due scattered
Julian Day 307																
Sunday									76.9	47.0	3787.723	132.300				
		Totals This Week: ►		**1843.800**	**82.300**	Week Hours:►		**18.2**	▲: A/C Hrs to Next Service					**7.00**		

System:	Tempest		
Aircraft:	VH-TEM	18220.3	Hrs - Progressive M/R Hrs at the start of job, prior to mobilisation
Total Job kms:	6936.000 Kms	18344.2	Hrs - The hours the Periodic Inspection is actally due at start of the job
Plan Kms Remain:	1630.877 Kms		
% Complete:	76.487 %		

Job Number:	2017
Contract Number:	2017
Job Name:	Pine Creek
Area Names:	Woolner, Rum jungler
Client:	Geoscience Australia

Date	Flt	Pilot initials	On board Oper initials	Production inc. Reflights Exc. Scrubs	FAS Scrub	Time Start	Time End	Engine Hours on M/R	Hours to Periodic Inspectio	Job Hrs to Date	Prod. to Date	FAS Scrubs to Date	Stdby Days	Activity Contribution	Activity	COMMENTS Weather, Data delivery Aircraft movement, etc
03-November-2008	14	GH / TD	MG	238.900		6:30:00	9:30:00	3.0						1.00	P	data ok though too much sferics , hence flight
Julian Day 308															Comment	woolner area copleted moved to rum jungle block
															Comment	JL arrived atg batchelor for EM fasdas training
Monday																
									120.9	3.0	238.900					
Date 4-Nov	15	GH / TD	MW/ JL	115.100		6:25:00	8:02:00	1.6						0.20	P	No post cals done due aircraft problems
Julian Day 309														0.80	A	Problem with left engine generator not working
Tuesday																
									119.3	4.6	354.000					
Date 5-Nov														1.00	PDO	pilots day off
Julian Day 310															Comment	CH (LAME) arrived from kathelene to replace DC
															Comment	MW training JL on EM fasdas operation ongoing
Wednesday																
									119.3	4.6	354.000					
Date 6-Nov	16	GH / TD	MW/ JL	289.900		6:11:00	9:00:00	2.8						1.00	P	
Julian Day 311															Comment	Flt shortened due left generator mulfunction.
Thursday																
									116.5	7.4	643.900					
Date 7-Nov	17	GH / TD	MW/ JL	365.200		6:01:00	9:05:00	3.1						1.00	P	all data ok no problems with left engine generator
Julian Day 312															Comment	CH left batchelor for katheline to work on WGT
Friday																
									113.4	10.5	1009.100					
Date 8-Nov	18	GH / TD	MW/ JL	417.900		5:56:00	9:22:00	3.4						1.00	P	data ok
Julian Day 313																
Saturday																
									110.0	13.9	1427.000					
Date 9-Nov	19	GH / TD	MW/ JL	90.400	25.900	6:00:00	7:52:00	1.9						1.00	P & S	very short flight due sferics and lightening
Julian Day 314															Comment	two lines scrubbed due sferics
Sunday																
									108.1	15.8	1517.400	25.900				
		Totals This Week: ►		**1517.400**	**25.900**	Week Hours:►		**15.8**	▲: A/C Hrs to Next Service					**7.00**		

System:	Tempest		
Aircraft:	VH-TEM	18220.3	Hrs - Progressive M/R Hrs at the start of job, prior to mobilisation
Total Job kms:	6936.000 Kms	18344.2	Hrs - The hours the Periodic Inspection is actally due at start of the job
Plan Kms Remain:	1103.577 Kms		
% Complete:	84.089 %		

Job Number:	2017
Contract Number:	2017
Job Name:	Pine Creek
Area Names:	Woolner, Rum jungler
Client:	Geoscience Australia

Date	Flt	Pilot initials	On board Oper initials	Production inc. Reflights Exc. Scrubs	FAS Scrub	Time Start	Time End	Engine Hours on M/R	Hours to Periodic Inspectio	Job Hrs to Date	Prod. to Date	FAS Scrubs to Date	Stdby Days	Activity Contribution	Activity	COMMENTS Weather, Data delivery Aircraft movement, etc
10-November-2008	20	GH / TD	JL		254.500	6:00:00	9:19:00	3.3						1.00	S	whole flight scrubbed due large sferics in active
Julian Day 315															Comment	TD left for field break, MT and LK arrived
Monday																
									104.8	19.1	1517.400	280.400				
Date 11-Nov	21	GH / MT	MW/LK		100.700	6:07:00	7:42:00	1.6						1.00	S	whole flight scrubbed due large sferics in active
Julian Day 316															Comment	RC (LAME) left batchelor for a short break
Tuesday																
									103.2	20.7	1517.400	381.100				
Date 12-Nov														1.00	PDO	pilots day off
Julian Day 317																
Wednesday																
									103.2	20.7	1517.400	381.100				
Date 13-Nov														1.00	W	Sferics to high flight suspended
Julian Day 318																
Thursday																
									103.2	20.7	1517.400	381.100				
Date 14-Nov	22	GH / MT	MW/LK	420.800	33.600	6:00:00	9:16:00	3.3						1.00	P & R & S	Reflights 11003-11006, Production flew 11007-
Julian Day 319																
Friday																
									99.9	24.0	1938.200	414.700				
Date 15-Nov	23	GH / MT	LK		30.500	6:09:00	7:25:00	1.3						1.00	S	Reflights 30001,30002 high sferics flight ended early
Julian Day 320																
Saturday																
									98.7	25.2	1938.200	445.200				
Date 16-Nov	24	GH / MT	LK	106.500	90.800	7:13:00	9:29:00	2.3						1.00	P & S	Reflights and production low cloud and high sferics
Julian Day 321																
Sunday																
									96.4	27.5	2044.700	536.000				
			Totals This Week: ►	**527.300**	**510.100**		Week Hours:►	**11.7**	▲: A/C Hrs to Next Service					**7.00**		

System:	Tempest		
Aircraft:	VH-TEM	18220.3	Hrs - Progressive M/R Hrs at the start of job, prior to mobilisation
Total Job kms:	6936.000 Kms	18344.2	Hrs - The hours the Periodic Inspection is actally due at start of the job
Plan Kms Remain:	630.877 Kms		
% Complete:	90.904 %		

Job Number:	2017
Contract Number:	2017
Job Name:	Pine Creek
Area Names:	Woolner, Rum jungler
Client:	Geoscience Australia

Date	Flt	Pilot initials	On board Oper initials	Production inc. Reflights Exc. Scrubs	FAS Scrub	Time Start	Time End	Engine Hours on M/R	Hours to Periodic Inspectio	Job Hrs to Date	Prod. to Date	FAS Scrubs to Date	Stdby Days	Activity Contribution	Activity	COMMENTS Weather, Data delivery Aircraft movement, etc
17-November-2008														1.00	W	Sferics too high flight suspended
Julian Day 322																
Monday																
									96.4	27.5	2044.700	536.000				
Date 18-Nov														1.00	W	Sferics too high flight suspended
Julian Day 323																
Tuesday																
									96.4	27.5	2044.700	536.000				
Date 19-Nov	25	GH / MT	LK	266.400	29.900	6:37:00	10:15:00	3.6						1.00	P & R & S	Reflights and production
Julian Day 324																
Wednesday																
									92.8	31.1	2311.100	565.900				
Date 20-Nov	26	GH / MT	LK/JL	206.300		6:37:00	9:34:00	3.0						1.00	P & R	Reflights and production
Julian Day 325																
Thursday																
									89.8	34.1	2517.400	565.900				
Date 21-Nov	27	GH / MT	LK/JL		176.000	6:41:00	9:32:00	2.9						1.00	S	sferics in data all scrubbed
Julian Day 326																
Friday																
									87.0	36.9	2517.400	741.900				
Date 22-Nov	28	GH / MT	LK		248.000	6:29:00	9:38:00	3.2						1.00	S	Reflights
Julian Day 327															Comment	Computer software problems with HTEM timing
Saturday																
									83.8	40.1	2517.400	989.900				
Date 23-Nov														1.00	W	Sferics very very high flight suspended
Julian Day 328																
Sunday																
									83.8	40.1	2517.400	989.900				
			Totals This Week: ►	**472.700**	**453.900**		Week Hours:►	**12.6**	▲: A/C Hrs to Next Service					**7.00**		

System:	Tempest		
Aircraft:	VH-TEM	18220.3	Hrs - Progressive M/R Hrs at the start of job, prior to mobilisation
Total Job kms:	6936.000 Kms	18344.2	Hrs - The hours the Periodic Inspection is actally due at start of the job
Plan Kms Remain:	256.277 Kms		
% Complete:	96.305 %		

Job Number:	2017
Contract Number:	2017
Job Name:	Pine Creek
Area Names:	Woolner, Rum jungler
Client:	Geoscience Australia

Date	Flt	Pilot initials	On board Oper initials	Production inc. Reflights Exc. Scrubs	FAS Scrub	Time Start	Time End	Engine Hours on M/R	Hours to Periodic Inspectio	Job Hrs to Date	Prod. to Date	FAS Scrubs to Date	Stdby Days	Activity Contribution	Activity	COMMENTS Weather, Data delivery Aircraft movement, etc
24-November-2008														1.00	W	Sferics very high and wind quite strong flight suspended
Julian Day 329																
Monday																
									83.8	40.1	2517.400	989.900				
Date 25-Nov														1.00	W	Sferics very very high flight suspended
Julian Day 330																
Tuesday																
									83.8	40.1	2517.400	989.900				
Date 26-Nov	29	PH / MT	LK	24.000		7:15:00	8:25:00	1.2						1.00	R	Reflew lines 40002-40004, high spherics cut flight short
Julian Day 331																
Wednesday																
									82.7	41.3	2541.400	989.900				
Date 27-Nov	30	PH / MT	LK	251.800	25.200	6:37:00	9:57:00	3.3						1.00	P & R & S	Morning flight reflew all of area RJ11 and prod 32001-
Julian Day 332																
Thursday																
									79.3	44.6	2793.200	1015.100				
Date 28-Nov														1.00	W	High spherics, low cloud and rain flight suspended
Julian Day 333																
Friday																
									79.3	44.6	2793.200	1015.100				
Date 29-Nov	31	PH / MT	LK	98.800	18.200	6:34:00	9:01:00	2.5						1.00	P & R & S	reflew 31018,31019, 32003 and production 33001-33014
Julian Day 334																
Saturday																
									76.9	47.0	2892.000	1033.300				
Date 30-Nov														1.00	W	High spherics low dark cloud thunderstorms
Julian Day 335																
Sunday																
									76.9	47.0	2892.000	1033.300				
		Totals This Week: ►		**374.600**	**43.400**		Week Hours:►	**7.0**	▲: A/C Hrs to Next Service					**7.00**		

System: Tempest
Aircraft: VH-TEM

18220.3 Hrs - Progressive M/R Hrs at the start of job, prior to mobilisation

Total Job kms: 6936.000 Kms

18344.2 Hrs - The hours the Periodic Inspection is actally due at start of the job

Plan Kms Remain: 0.000 Kms
% Complete: 100.000 %

Job Number: 2017
Contract Number: 2017
Job Name: Pine Creek
Area Names: Woolner, Rum jungler
Client: Geoscience Australia

Date	Flt	Pilot initials	On board Oper initials	Production inc. Reflights Exc. Scrubs	FAS Scrub	Time Start	Time End	Engine Hours on M/R	Hours to Periodic Inspectio	Job Hrs to Date	Prod. to Date	FAS Scrubs to Date	Stdby Days	Activity Contribution	Activity	COMMENTS Weather, Data delivery Aircraft movement, etc
01-December-2008	32	PH / MT	LK	379.000		6:34:00	10:21:01	3.8						1.00	P	Sferics bit lower
Julian Day 336																
Monday																
									73.1	50.8	3271.000	1033.300				
Date 2-Dec																
Julian Day 337																
Tuesday																
									73.1	50.8	3271.000	1033.300				
Date 3-Dec																
Julian Day 338																
Wednesday																
									73.1	50.8	3271.000	1033.300				
Date 4-Dec																
Julian Day 339																
Thursday																
									73.1	50.8	3271.000	1033.300				
Date 5-Dec																
Julian Day 340																
Friday																
									73.1	50.8	3271.000	1033.300				
Date 6-Dec																
Julian Day 341																
Saturday																
									73.1	50.8	3271.000	1033.300				
Date 7-Dec																
Julian Day 342																
Sunday																
									73.1	50.8	3271.000	1033.300				
			Totals This Week: ►	**379.000**			Week Hours:►	**3.8**	▲: A/C Hrs to Next Service					**1.00**		

APPENDIX II – Flight Summary (Survey Line Listing)

Notes on line numbers included below:

505FFFFPP – pre-flight barometer calibration for flight FFFF and part PP
605FFFFPP -- post=-flight barometer calibration for flight FFFF and part PP
902FFFFPP – pre-flight 'zero' calibration line for flight FFFF and part PP
905FFFFPP – post-flight 'zero' calibration line for flight FFFF and part PP
900FFFFPP-906FFFFPP – other pre/post flight EM calibrations (See Chapter 4)
810FFFFPP – 814FFFFPP – magnetic compensation lines
910FFFFPP-911FFFFPP – repeat line from flight FFFF and part PP

Casa 212-200 – VH-TEM

Flight	Date (yyyymmdd)	Line	Direction	Start Fid	End Fid	Start Time (UTC)	End Time (UTC)
1	20081019	505000101		456	578	21:46:11	21:48:13
1	20081019	900000101		1429	1550	22:02:24	22:04:25
1	20081019	901000101		1578	1702	22:04:53	22:06:57
1	20081019	902000101		1719	1832	22:07:14	22:09:07
1	20081019	903000101		1848	1948	22:09:23	22:11:03
1	20081019	910000101		3381	3533	22:34:56	22:37:28
1	20081019	5200101	W	4280	4418	22:49:55	22:52:13
1	20081019	5200201	E	4504	4735	22:53:39	22:57:30
1	20081019	5200301	W	4908	5202	23:00:23	23:05:17
1	20081019	5200401	E	5313	5655	23:07:08	23:12:50
1	20081019	5200501	W	5785	6109	23:15:00	23:20:24
1	20081019	5200601	E	6230	6589	23:22:25	23:28:24
1	20081019	5200701	W	6763	7166	23:31:18	23:38:01
1	20081019	5200801	E	7280	7708	23:39:55	23:47:03
1	20081019	904000101		9075	9200	00:09:50	00:11:55
1	20081019	905000101		9220	9347	00:12:15	00:14:22
1	20081019	906000101		9376	9497	00:14:51	00:16:52
1	20081019	810000101		10199	10952	00:28:34	00:41:07
1	20081019	811000101		11001	11144	00:41:56	00:44:19
1	20081019	812000101		11185	11325	00:45:00	00:47:20
1	20081019	813000101		11367	11498	00:48:02	00:50:13
1	20081019	814000101		11552	11682	00:51:07	00:53:17
1	20081019	605000101		12855	12974	01:12:50	01:14:49
2	20081020	505000201		108	231	20:54:34	20:56:37
2	20081020	900000201		1358	1480	21:15:24	21:17:26
2	20081020	901000201		1520	1642	21:18:06	21:20:08
2	20081020	902000201		1670	1801	21:20:36	21:22:47
2	20081020	903000201		1986	2058	21:25:52	21:27:04
2	20081020	910000201		3376	3529	21:49:02	21:51:35
2	20081020	5200901	W	3996	4434	21:59:22	22:06:40
2	20081020	5201001	E	4546	5020	22:08:32	22:16:26
2	20081020	6100301	E	5828	6320	22:29:54	22:38:06
2	20081020	6100401	W	5258	5668	22:20:24	22:27:14
2	20081020	6100601	W	6423	6840	22:39:49	22:46:46
2	20081020	6100701	E	6990	7450	22:49:16	22:56:56
2	20081020	904000201		9149	9273	23:25:15	23:27:19
2	20081020	905000201		9297	9420	23:27:43	23:29:46
2	20081020	906000201		9442	9565	23:30:08	23:32:11
2	20081020	605000201		10627	10749	23:49:53	23:51:55
3	20081021	505000301		177	321	20:44:50	20:47:14

3	20081021	900000301		1060	1183	20:59:33	21:01:36
3	20081021	901000301		1221	1346	21:02:14	21:04:19
3	20081021	902000301		1372	1495	21:04:45	21:06:48
3	20081021	903000301		1510	1557	21:07:03	21:07:50
3	20081021	910000301		2964	3100	21:31:17	21:33:33
3	20081021	6101001	W	3364	3826	21:37:57	21:45:39
3	20081021	6101301	E	4395	4956	21:55:08	22:04:29
3	20081021	6101201	W	5120	5588	22:07:13	22:15:01
3	20081021	6101501	E	5710	6259	22:17:03	22:26:12
3	20081021	6101601	W	6417	6889	22:28:50	22:36:42
3	20081021	904000301		8095	8217	22:56:48	22:58:50
3	20081021	905000301		8243	8366	22:59:16	23:01:19
3	20081021	906000301		8390	8512	23:01:43	23:03:45
3	20081021	605000301		9567	9693	23:21:20	23:23:26
4	20081023	505000401		104	259	20:37:08	20:39:43
4	20081023	900000401		1019	1142	20:52:23	20:54:26
4	20081023	901000401		1164	1290	20:54:48	20:56:54
4	20081023	902000401		1309	1432	20:57:13	20:59:16
4	20081023	903000401		1447	1503	20:59:31	21:00:27
4	20081023	910000401		2621	2746	21:19:05	21:21:10
4	20081023	6101801	W	3010	3508	21:25:34	21:33:52
4	20081023	6101901	E	4307	4823	21:47:11	21:55:47
4	20081023	6102201	W	5055	5570	21:59:39	22:08:14
4	20081023	6102101	E	5662	6174	22:09:46	22:18:18
4	20081023	6102401	W	6293	6810	22:20:17	22:28:54
4	20081023	6102501	E	6893	7400	22:30:17	22:38:44
4	20081023	6102801	W	7520	8037	22:40:44	22:49:21
4	20081023	6102701	E	8112	8620	22:50:36	22:59:04
4	20081023	6103001	W	8748	9259	23:01:12	23:09:43
4	20081023	6103101	E	9346	9858	23:11:10	23:19:42
4	20081023	6103401	W	9991	10363	23:21:55	23:28:07
4	20081023	6103301	E	10448	10825	23:29:32	23:35:49
4	20081023	904000401		11211	11344	23:42:15	23:44:28
4	20081023	905000401		11358	11483	23:44:42	23:46:47
4	20081023	906000401		11515	11638	23:47:19	23:49:22
4	20081023	605000401		13086	13209	00:13:30	00:15:33
5	20081024	900000501		111	235	21:18:38	21:20:42
5	20081024	901000501		253	380	21:21:00	21:23:07
5	20081024	902000501		406	536	21:23:33	21:25:43
5	20081024	903000501		541	591	21:25:48	21:26:38
5	20081024	5000101	W	1972	2412	21:49:39	21:56:59
5	20081024	5000401	E	6687	7574	23:08:14	23:23:01
5	20081024	5000601	W	5723	6577	22:52:10	23:06:24
5	20081024	5000801	E	8766	9665	23:42:53	23:57:52
5	20081024	5100401	E	3199	3607	22:10:06	22:16:54
5	20081024	5100601	W	7679	8519	23:24:46	23:38:46
5	20081024	5101001	W	3825	4686	22:20:32	22:34:53
5	20081024	5101201	E	4734	5610	22:35:41	22:50:17
5	20081024	6100901	E	2519	2919	21:58:46	22:05:26
5	20081024	904000501		10255	10387	00:07:42	00:09:54
5	20081024	905000501		10395	10519	00:10:02	00:12:06
5	20081024	906000501		10588	10713	00:13:15	00:15:20
5	20081024	605000501		11937	12059	00:35:44	00:37:46
6	20081025	5101601	E	3643	4510	21:41:00	21:55:27
6	20081025	5101801	W	2698	3562	21:25:15	21:39:39

6	20081025	6103302	E	6602	6981	22:30:19	22:36:38
6	20081025	6103601	W	6159	6537	22:22:56	22:29:14
6	20081025	6103701	W	7574	7951	22:46:31	22:52:48
6	20081025	6103901	E	8475	8856	23:01:32	23:07:53
6	20081025	6104001	W	7101	7480	22:38:38	22:44:57
6	20081025	6104201	W	8045	8385	22:54:22	23:00:02
6	20081025	6104301	E	9371	9707	23:16:28	23:22:04
6	20081025	6104501	E	10188	10526	23:30:05	23:35:43
6	20081025	6104601	W	8965	9300	23:09:42	23:15:17
6	20081025	6104801	W	9783	9997	23:23:20	23:26:54
6	20081025	6104901	E	10939	11154	23:42:36	23:46:11
6	20081025	6105001	W	10616	10828	23:37:13	23:40:45
6	20081025	6105201	W	11290	11503	23:48:27	23:52:00
6	20081025	6202701	W	4650	4822	21:57:47	22:00:39
6	20081025	6300101	E	5730	5860	22:15:47	22:17:57
6	20081025	6300301	E	5321	5449	22:08:58	22:11:06
6	20081025	6300401	W	5065	5192	22:04:42	22:06:49
7	20081026	505000701		123	265	20:30:23	20:32:45
7	20081026	900000701		1049	1174	20:45:49	20:47:54
7	20081026	901000701		1191	1314	20:48:11	20:50:14
7	20081026	902000701		1321	1433	20:50:21	20:52:13
7	20081026	903000701		1468	1523	20:52:48	20:53:43
7	20081026	5000201	W	9036	9388	22:58:56	23:04:48
7	20081026	5100301	E	8034	8467	22:42:14	22:49:27
7	20081026	6103702	E	4405	4780	21:41:45	21:48:00
7	20081026	6105101	E	3509	3719	21:26:49	21:30:19
7	20081026	6105301	E	2901	3112	21:16:41	21:20:12
7	20081026	6105401	W	2504	2727	21:10:04	21:13:47
7	20081026	6200201	E	8733	8912	22:53:53	22:56:52
7	20081026	6200301	W	9991	10164	23:14:51	23:17:44
7	20081026	6200601	E	9676	9854	23:09:36	23:12:34
7	20081026	6400101	E	6864	6993	22:22:44	22:24:53
7	20081026	6400201	W	7120	7252	22:27:00	22:29:12
7	20081026	6400301	E	6400	6528	22:15:00	22:17:08
7	20081026	6400401	W	6620	6751	22:18:40	22:20:51
7	20081026	6400601	W	6176	6307	22:11:16	22:13:27
7	20081026	6400701	E	5935	6063	22:07:15	22:09:23
7	20081026	6400801	W	5702	5836	22:03:22	22:05:36
7	20081026	6400901	E	5458	5587	21:59:18	22:01:27
7	20081026	6401101	E	4936	5064	21:50:36	21:52:44
7	20081026	6401201	W	5201	5335	21:55:01	21:57:15
7	20081026	904000701		10553	10557	23:24:13	23:24:17
7	20081026	904000702		10566	10709	23:24:26	23:26:49
7	20081026	905000701		10724	10850	23:27:04	23:29:10
7	20081026	906000701		10907	11037	23:30:07	23:32:17
7	20081026	605000701		12559	12680	23:57:39	23:59:40
8	20081027	505000801		123	247	20:32:42	20:34:46
8	20081027	900000801		1525	1649	20:56:04	20:58:08
8	20081027	901000801		1669	1793	20:58:28	21:00:32
8	20081027	902000801		1805	1929	21:00:44	21:02:48
8	20081027	903000801		1936	2005	21:02:55	21:04:04
8	20081027	6200501	W	3539	3705	21:29:38	21:32:24
8	20081027	6200801	E	3821	4006	21:34:20	21:37:25
8	20081027	6200901	W	4116	4281	21:39:15	21:42:00
8	20081027	6201101	W	4666	4831	21:48:25	21:51:10

8	20081027	6201201	E	4383	4570	21:43:42	21:46:49
8	20081027	6201401	E	4918	5104	21:52:37	21:55:43
8	20081027	6201501	W	5215	5379	21:57:34	22:00:18
8	20081027	6201701	W	5781	5952	22:07:00	22:09:51
8	20081027	6201801	E	5479	5664	22:01:58	22:05:03
8	20081027	6202001	E	6052	6242	22:11:31	22:14:41
8	20081027	6202101	W	6359	6528	22:16:38	22:19:27
8	20081027	6202301	W	6933	7104	22:26:12	22:29:03
8	20081027	6202401	E	6627	6817	22:21:06	22:24:16
8	20081027	6202601	E	7198	7390	22:30:37	22:33:49
8	20081027	6202901	W	7481	7651	22:35:20	22:38:10
8	20081027	6203001	E	7775	7963	22:40:14	22:43:22
8	20081027	6203201	E	8338	8523	22:49:37	22:52:43
8	20081027	6203301	W	8061	8231	22:45:00	22:47:50
8	20081027	6203501	W	8721	8992	22:56;00	23:00:31
8	20081027	6203601	E	9103	8400	23:02:22	23:07:19
8	20081027	6203801	E	9882	10175	23:15:21	23:20:14
8	20081027	6203901	W	9510	9780	23:09:09	23:13:39
8	20081027	6204101	W	10268	10540	23:21:47	23:26:19
8	20081027	6204201	E	10665	10960	23:28:24	23:33:19
8	20081027	6204401	E	11393	11626	23:40:32	23:44:25
8	20081027	6204501	W	11046	11260	23:34:45	23:38:19
8	20081027	904000801		12037	12159	23:51:16	23:53:18
8	20081027	905000801		12228	12352	23:54:27	23:56:31
8	20081027	906000801		12368	12494	23:56:47	23:58:53
9	20081028	505000901		114	258	20:36:52	20:39:16
9	20081028	900000901		1047	1171	20:52:25	20:54:29
9	20081028	901000901		1195	1326	20:54:53	20:57:04
9	20081028	902000901		1349	1471	20:57:27	20:59:29
9	20081028	903000901		1484	1549	20:59:42	21:00:47
9	20081028	910000901		2784	2908	21:21:22	21:23:26
9	20081028	5000301	W	4178	4774	21:44:36	21:54:32
9	20081028	5000501	E	8303	8950	22:53:21	23:04:08
9	20081028	5000701	W	9082	9698	23:06:20	23:16:36
9	20081028	5000901	E	9876	10525	23:19:34	23:30:23
9	20081028	5100501	E	3345	4017	21:30:43	21:41:55
9	20081028	5100701	W	5901	6504	22:13:19	22:23:22
9	20081028	5101101	W	7479	8094	22:39:37	22:49:52
9	20081028	5101301	E	5085	5758	21:59:43	22:10:56
9	20081028	5101701	E	6695	7359	22:26:33	22:37:37
9	20081028	5101901	W	10605	11215	23:31:43	23:41:53
9	20081028	904000901		11815	11952	23:51:53	23:54:10
9	20081028	905000901		11961	12095	23:54:19	23:56:33
9	20081028	906000901		12147	12274	23:57:25	23:59:32
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10	20081030	902001001		1377	1501	20:55:46	20:57:50
10	20081030	903001001		1509	1576	20:57:58	20:59:05
10	20081030	5001101	W	3232	4723	21:26:41	21:51:32
10	20081030	5001301	E	8290	8516	22:50:59	22:54:45
10	20081030	5101902	W	6454	7082	22:20:23	22:30:51
10	20081030	5102201	W	7268	8021	22:33:57	22:46:30
10	20081030	5102401	E	4817	6263	21:53:06	22:17:12

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10	20081030	6204901	W	9803	10027	23:16:12	23:19:56
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10	20081030	605001001		10585	10708	23:29:14	23:31:17
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11	20081031	505001101		120	258	20:51:00	20:53:18
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11	20081031	901001101		1165	1295	21:08:25	21:10:35
11	20081031	902001101		1317	1446	21:10:57	21:13:06
11	20081031	903001101		1452	1501	21:13:12	21:14:01
11	20081031	5001401	E	6315	6973	22:34:15	22:45:13
11	20081031	5001701	E	5501	6018	22:20:10	22:29:18
11	20081031	5102601	E	2374	3729	21:28:34	21:51:09
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11	20081031	5102701	W	3871	5177	21:53:31	22:15:17
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11	20081031	6205201	E	8619	8845	23:12:39	23:16:25
11	20081031	6205301	W	8984	9204	23:18:44	23:22:24
11	20081031	6205401	E	9344	9571	23:24:44	23:28:31
11	20081031	6205701	W	9682	9902	23:30:22	23:34:02
11	20081031	904001101		10261	10404	23:40:01	23:42:24
11	20081031	905001101		10412	10534	23:42:32	23:44:34
11	20081031	906001101		10637	10760	23:46:17	23:48:20
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12	20081101	5001501	W	4443	4998	21:48:46	21:58:01
12	20081101	5001601	W	3555	4201	21:33:58	21:44:44
13	20081102	5001801	E	3854	4542	22:18:55	22:30:23
13	20081102	5002101	W	5314	5542	22:43:15	22:47:03
13	20081102	5002201	E	6262	6455	22:59:03	23:02:16
13	20081102	5002301	W	7146	7358	23:13:47	23:17:19
13	20081102	6205601	E	317	532	21:19:58	21:23:33
13	20081102	6205801	E	1071	1289	21:32:32	21:36:10
13	20081102	6205901	W	722	954	21:26:43	21:30:35
13	20081102	6206001	E	1759	1977	21:44:00	21:47:38
13	20081102	6206101	W	1386	1615	21:37:47	21:41:36
13	20081102	6206201	E	2486	2707	21:56:07	21:59:48
13	20081102	6206301	W	2100	2330	21:49:41	21:53:31
13	20081102	6206501	W	2805	3032	22:01:26	22:05:13
13	20081102	6206601	E	3190	3411	22:07:51	22:11:32
13	20081102	6206701	W	3526	3752	22:13:27	22:17:13
13	20081102	6600101	W	4642	4893	22:32:03	22:36:14
13	20081102	6600201	E	4993	5236	22:37:54	22:41:57
13	20081102	6600401	E	5644	5862	22:48:45	22:52:23
13	20081102	6600501	W	5963	6164	22:54:04	22:57:25
13	20081102	6600701	W	6550	6745	23:03:51	23:07:06
13	20081102	6600801	E	6835	7043	23:08:36	23:12:04
13	20081102	6601001	E	7608	8038	23:21:29	23:28:39
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14	20081103	1000201	W	7622	7871	23:02:50	23:06:59

14	20081103	2800101	W	8071	8198	23:10:19	23:12:26
14	20081103	2800201	E	8304	8436	23:14:12	23:16:24
14	20081103	2800301	W	8517	8647	23:17:45	23:19:55
14	20081103	2800401	E	8741	8889	23:21:29	23:23:57
14	20081103	2800501	W	8965	9116	23:25:13	23:27:44
14	20081103	5002401	E	2076	2599	21:30:24	21:39:07
14	20081103	5002501	W	5021	5150	22:19:29	22:21:38
14	20081103	5102302	W	6266	6844	22:40:14	22:49:52
14	20081103	6601101	W	2686	3169	21:40:34	21:48:37
14	20081103	6601301	W	3983	4483	22:02:11	22:10:31
14	20081103	6601401	E	3379	3863	21:52:07	22:00:11
14	20081103	904001401		9768	9901	23:38:36	23:40:49
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15	20081104	911001501		2058	2206	21:21:59	21:24:27
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15	20081104	1000401	E	4031	4896	21:54:52	22:09:17
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16	20081106	2802101	W	6171	6692	22:13:39	22:22:20
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17	20081107	2801301	W	4982	5201	21:45:24	21:49:03
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17	20081107	2802001	E	6743	7186	22:14:45	22:22:08
17	20081107	2802301	W	7422	7944	22:26:04	22:34:46
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22	20081114	1100402	W	2391	2887	20:59:16	21:07:32
22	20081114	1100302	E	3170	3675	21:12:15	21:20:40
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22	20081114	1101001	W	5167	5665	21:45:32	21:53:50
22	20081114	1100901	E	5767	6281	21:55:32	22:04:06
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22	20081114	1101301	E	7059	7569	22:17:04	22:25:34
22	20081114	1101701	W	7689	8107	22:27:34	22:34:32
22	20081114	1101501	E	8264	8773	22:37:09	22:45:38
22	20081114	1101901	W	8896	9392	22:47:41	22:55:57
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22	20081114	1102301	W	10151	10582	23:08:36	23:15:47
22	20081114	1102201	E	10689	11124	23:17:34	23:24:49
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25	20081119	90302501		1561	1628	21:22:19	21:23:26
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25	20081119	6600803	E	2613	2817	21:39:51	21:43:15
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25	20081119	3000902	W	4112	4336	22:04:50	22:08:34
25	20081119	3000602	E	4458	4698	22:10:36	22:14:36
25	20081119	3001102	W	4766	4991	22:15:44	22:19:29
25	20081119	3001201	E	5113	5350	22:21:31	22:25:28
25	20081119	3001301	W	5456	5683	22:27:14	22:31:01
25	20081119	3001401	E	5886	6122	22:34:24	22:38:20
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25	20081119	1100702	E	11734	12231	00:11:52	00:20:09
25	20081119	90402501		12448	12580	00:23:46	00:25:58
25	20081119	90502501		12739	12862	00:28:37	00:30:40
25	20081119	90602501		12885	13008	00:31:03	00:33:06
25	20081119	60502501		13829	13952	00:46:37	00:48:49
26	20081120	50502601		172	296	21:00:31	21:02:35
26	20081120	90002601		939	1065	21:13:18	21:15:24
26	20081120	90102601		1107	1232	21:16:06	21:18:11
26	20081120	90202601		1267	1388	21:18:46	21:20:47
26	20081120	90302601		1404	1478	21:21:03	21:22:17
26	20081120	3001802	E	2052	2279	21:31:51	21:35:38
26	20081120	3001702	W	2378	2613	21:37:17	21:41:12
26	20081120	1000601	W	4414	4544	22:11:13	22:13:23
26	20081120	1000301	E	4666	4797	22:15:25	22:17:36
26	20081120	1001001	W	5085	5448	22:22:24	22:28:27
26	20081120	1000801	E	5702	5882	22:32:41	22:35:41
26	20081120	4100201	W	6077	6205	22:38:56	22:41:04
26	20081120	4100301	E	6295	6426	22:42:34	22:44:45
26	20081120	4100601	W	6546	6676	22:46:45	22:48:55
26	20081120	4100501	E	6777	6907	22:50:36	22:52:46

26	20081120	4100801	W	7027	7235	22:54:46	22:58:14
26	20081120	4100901	E	7361	7571	23:00:20	23:03:50
26	20081120	4101201	W	7687	7936	23:05:46	23:09:55
26	20081120	4101101	E	8025	8277	23:11:24	23:15:36
26	20081120	4200101	W	8822	8957	23:24:41	23:26:56
26	20081120	4200401	E	9209	9338	23:31:08	23:33:17
26	20081120	4200301	W	9479	9613	23:35:38	23:37:52
26	20081120	4300101	E	9847	9976	23:41:46	23:43:55
26	20081120	90402601		10250	10372	23:48:29	23:50:31
26	20081120	90502601		10408	10532	23:51:07	23:53:11
26	20081120	90602601		10559	10683	23:53:38	23:55:42
26	20081120	60502601		11473	11597	00:08:52	00:10:56
27	20081121	50502701		191	318	20:57:15	20:59:22
27	20081121	90002701		1052	1177	21:11:36	21:13:41
27	20081121	90102701		1245	1374	21:14:49	21:16:58
27	20081121	90202701		1393	1515	21:17:17	21:19:19
27	20081121	90302701		1552	1629	21:19:56	21:21:13
27	20081121	91102701		2213	2362	21:30:57	21:33:26
27	20081121	90402701		9716	9716	23:36:00	23:38:03
27	20081121	90502701		9858	9858	23:38:22	23:40:25
27	20081121	90602701		10022	10022	23:41:06	23:43:14
27	20081121	60502701		11198	11198	00:00:42	00:02:45
28	20081122	50502801		293	415	00:03:28	00:05:30
28	20081122	90002801		1046	1179	00:16:01	00:18:14
28	20081122	90102801		1228	1353	00:19:03	00:21:08
28	20081122	90202801		1377	1502	00:21:32	00:23:37
28	20081122	90302801		1556	1635	00:24:31	00:25:50
28	20081122	90402801		10890	11011	03:00:25	03:02:06
28	20081122	90502801		11099	11229	03:03:34	03:05:44
28	20081122	90602801		11269	11398	03:06:24	03:08:33
28	20081122	60502801		12395	12516	03:25:10	03:27:11
29	20081126	50502901		322	443	21:45:14	21:47:15
29	20081126	90002901		1248	1371	22:00:40	22:02:43
29	20081126	90102901		1444	1565	22:03:56	22:05:57
29	20081126	90202901		1830	1950	22:10:22	22:12:22
29	20081126	90302901		2097	2154	22:14:49	22:15:46
29	20081126	4300203	W	2759	2887	22:25:51	22:27:59
29	20081126	4300503	E	3253	3390	22:34:05	22:36:22
29	20081126	4300403	W	3496	3624	22:38:08	22:40:16
29	20081126	90402901		3878	4000	22:44:30	22:46:32
29	20081126	90502901		4038	4161	22:47:10	22:49:13
29	20081126	90602901		4195	4318	22:49:47	22:51:50
29	20081126	60502901		5277	5399	23:07:49	23:09:51
30	20081127	50503001		241	366	21:06:28	21:08:33
30	20081127	90003001		1114	1235	21:21:01	21:23:02
30	20081127	90103001		1267	1389	21:23:34	21:25:36
30	20081127	90203001		1413	1534	21:26:00	21:28:01
30	20081127	90303001		1545	1406	21:28:12	21:29:11
30	20081127	91103001		1968	2121	21:35:15	21:37:48
30	20081127	3100104	W	3133	3263	21:54:40	21:56:50
30	20081127	3100204	E	3354	3485	21:58:21	22:00:32
30	20081127	3100304	W	3607	3736	22:02:34	22:04:43

30	20081127	3100404	E	3878	4008	22:07:05	22:09:15
30	20081127	3100704	W	4152	4280	22:11:39	22:13:47
30	20081127	3100604	E	4392	4523	22:15:39	22:17:50
30	20081127	3100904	W	4688	4817	22:20:35	22:22:44
30	20081127	3100804	E	4966	5097	22:25:13	22:27:24
30	20081127	3101104	W	5250	5381	22:29:57	22:32:08
30	20081127	3101204	E	5561	5693	22:35:08	22:37:20
30	20081127	3101304	W	5854	5985	22:40:01	22:42:12
30	20081127	3101404	E	6150	6280	22:44:57	22:47:07
30	20081127	3101704	W	6403	6534	22:49:10	22:51:21
30	20081127	3101604	E	6692	6822	22:53:59	22:56:09
30	20081127	3102104	W	7412	7544	23:05:59	23:08:11
30	20081127	3102204	E	7708	7836	23:10:55	23:13:03
30	20081127	3102303	W	7978	8111	23:15:25	23:17:38
30	20081127	3102403	E	8228	8356	23:19:35	23:21:43
30	20081127	3102703	W	8489	8625	23:23:56	23:26:12
30	20081127	3102603	E	8759	8887	23:28:26	23:30:34
30	20081127	3102903	W	9015	9148	23:32:42	23:34:55
30	20081127	3102803	E	9298	9426	23:37:25	23:39:33
30	20081127	3103103	W	9556	9689	23:41:43	23:43:56
30	20081127	3103203	E	9835	9963	23:46:22	23:48:30
30	20081127	3103303	W	10091	10223	23:50:38	23:52:50
30	20081127	3103403	E	10362	10489	23:55:09	23:57:16
30	20081127	3300101	E	10684	10829	00:00:31	00:02:56
30	20081127	3300201	W	10944	11095	00:04:51	00:07:22
30	20081127	90403001		11658	11781	00:16:45	00:18:48
30	20081127	90503001		11801	11925	00:19:08	00:21:12
30	20081127	90603001		11947	12069	00:21:34	00:23:36
30	20081127	60503001		13042	13168	00:39:49	00:41:55
31	20081129	50503101		288	411	20:58:12	21:00:15
31	20081129	90003101		964	1093	21:09:28	21:11:37
31	20081129	90103101		1287	1411	21:14:51	21:16:55
31	20081129	90203101		1440	1562	21:17:24	21:19:26
31	20081129	90303101		1577	1629	21:19:41	21:20:33
31	20081129	3101805	E	3896	4021	21:58:20	22:00:25
31	20081129	3101905	W	4158	4294	22:02:42	22:04:58
31	20081129	3300302	E	4742	4890	22:12:26	22:14:54
31	20081129	3300601	W	5057	5210	22:17:41	22:20:14
31	20081129	3300501	E	5320	5468	22:22:04	22:24:32
31	20081129	3300801	W	5617	5768	22:27:01	22:29:32
31	20081129	3300701	E	5920	6070	22:32:04	22:34:34
31	20081129	3301001	W	6184	6334	22:36:28	22:38:58
31	20081129	3300901	E	6449	6596	22:40:53	22:43:20
31	20081129	3301301	W	6961	7107	22:49:25	22:51:51
31	20081129	3301501	E	7522	7667	22:58:46	23:01:11
31	20081129	90403101		8201	8323	23:10:05	23:12:07
31	20081129	90503101		8396	8518	23:13:20	23:15:22
31	20081129	90603101		8550	8671	23:15:54	23:17:55
31	20081129	60503101		9569	9695	23:32:53	23:34:59
32	20081201	50503201		169	291	20:45:36	20:47:38
32	20081201	90003201		993	1116	20:59:20	21:01:23
32	20081201	90103201		1166	1290	21:02:13	21:04:17

32	20081201	90203201		1317	1439	21:04:44	21:06:46
32	20081201	90303201		1468	1523	21:07:15	21:08:10
32	20081201	1001501	E	2048	4386	21:16:55	21:55:53
32	20081201	3301202	W	5489	5675	22:14:16	22:17:22
32	20081201	3301402	W	5959	6142	22:22:06	22:25:09
32	20081201	3301701	E	6229	6405	22:26:36	22:29:32
32	20081201	3301601	W	6531	6716	22:31:38	22:34:43
32	20081201	3301901	E	6811	6989	22:36:18	22:39:16
32	20081201	3302001	W	7080	7264	22:40:47	22:43:51
32	20081201	3302101	E	7365	7543	22:45:32	22:48:30
32	20081201	3302201	W	7627	7810	22:49:54	22:52:57
32	20081201	3302301	E	7932	8104	22:54:59	22:57:51
32	20081201	3302401	W	8196	8376	22:59:23	23:02:23
32	20081201	3302701	E	8477	8646	23:04:04	23:06:53
32	20081201	3302601	W	8741	8919	23:08:28	23:11:26
32	20081201	3302901	E	9022	9193	23:13:09	23:16:00
32	20081201	3302801	W	9294	9472	23:17:41	23:20:39
32	20081201	3303101	E	9575	9747	23:22:22	23:25:14
32	20081201	3303001	W	9833	10013	23:26:40	23:29:40
32	20081201	3200301	E	10400	10552	23:36:07	23:38:39
32	20081201	3200201	W	10677	10831	23:40:44	23:43:18
32	20081201	90403201		11091	11216	23:47:38	23:49:43
32	20081201	90503201		11243	11366	23:50:10	23:52:13
32	20081201	90603201		11454	11577	23:53:41	23:55:44
32	20081201	60503201		12293	12414	00:07:40	00:09:41

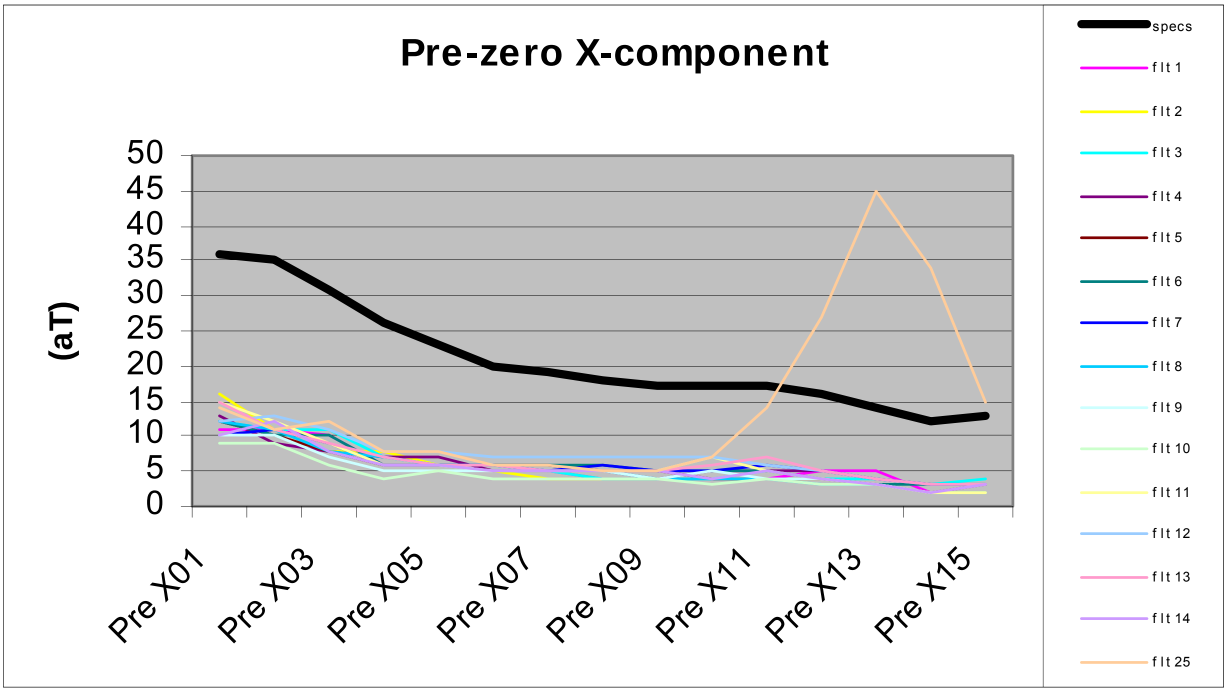
Note: Lines 1102201, 1102301, 3200201 and 3200301 were not delivered as part of the Woolner final dataset, but will be reflown and delivered with the Rum Jungle final data.

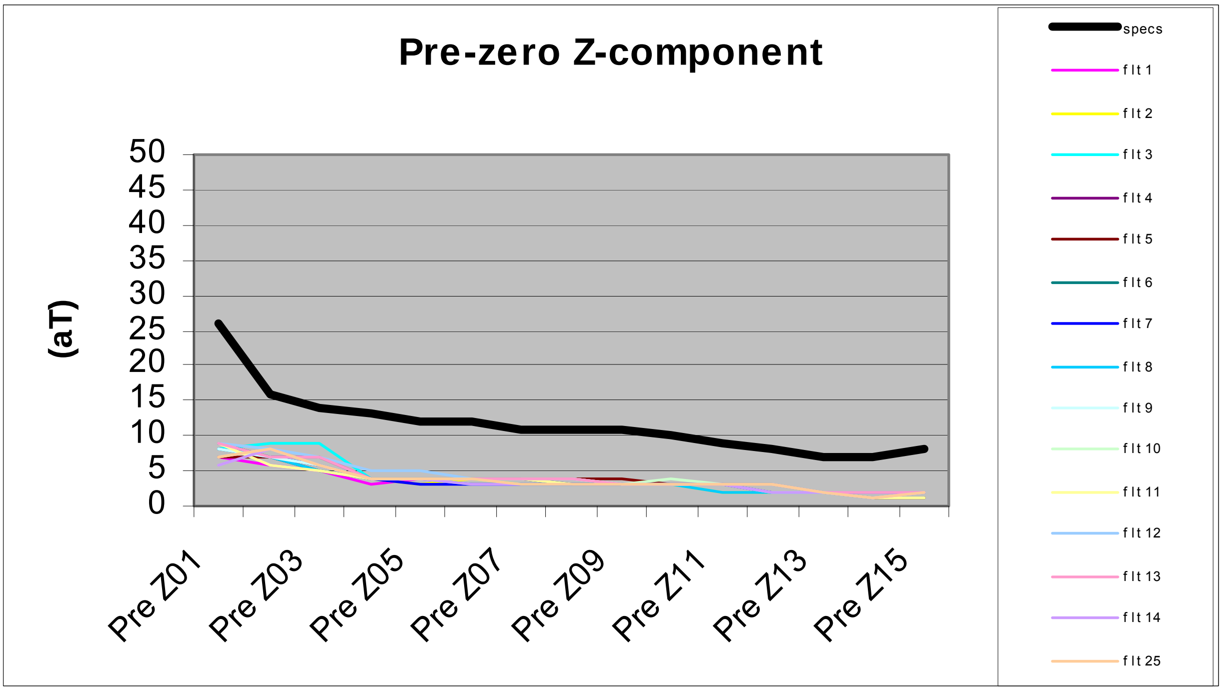
APPENDIX III – Pre and Post-flight Zero Statistics

Pre-zero Additive Noise

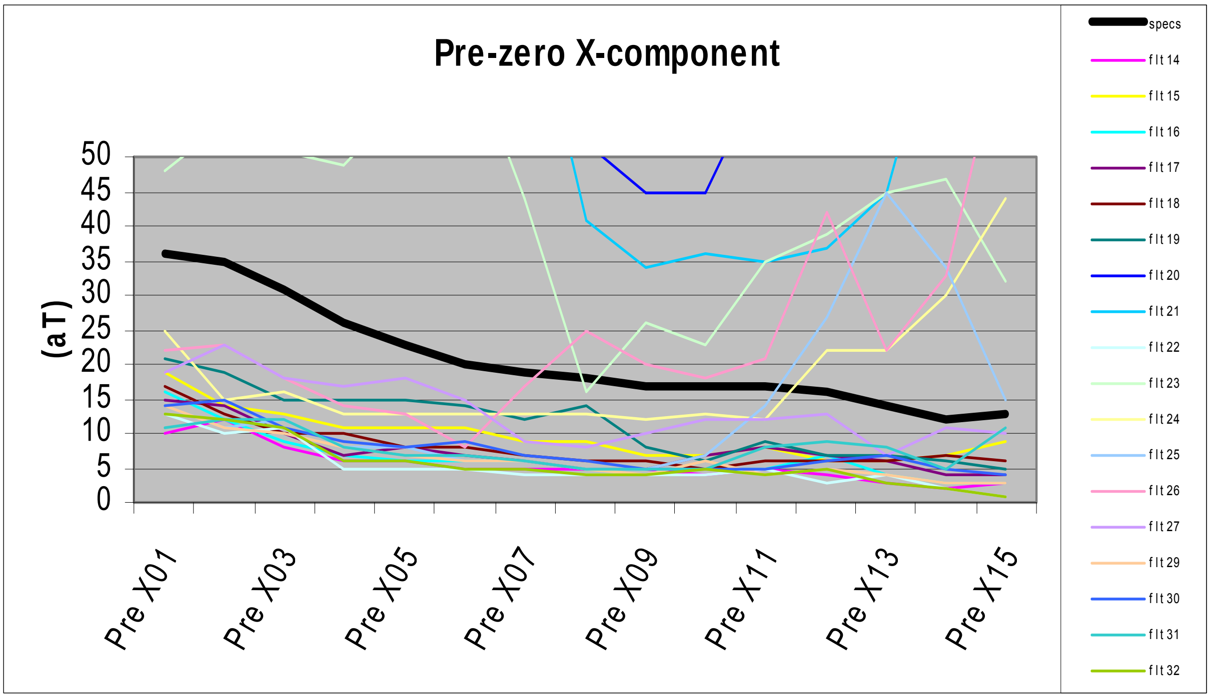
- black trace represents the contract maximum standard deviation
- coloured traces represent the standard deviation of individual lines from all production flights

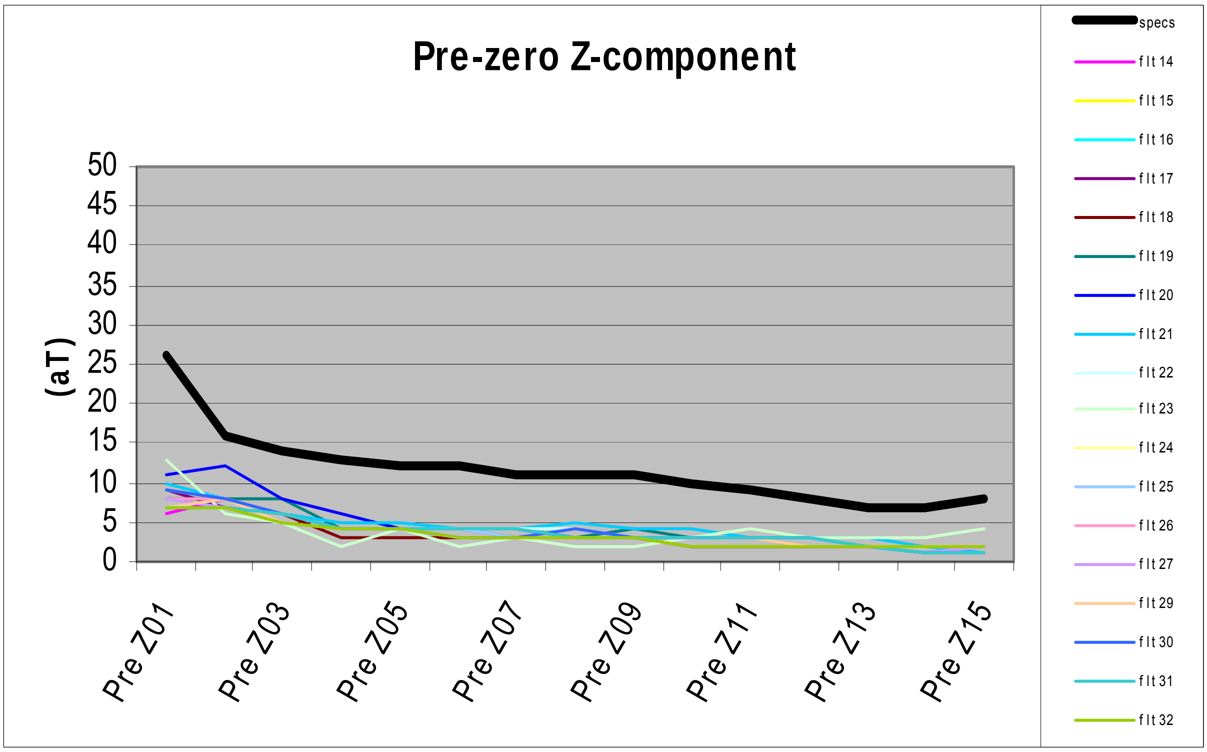
Woolner Flts 1-14





Woolner Flts 14-32

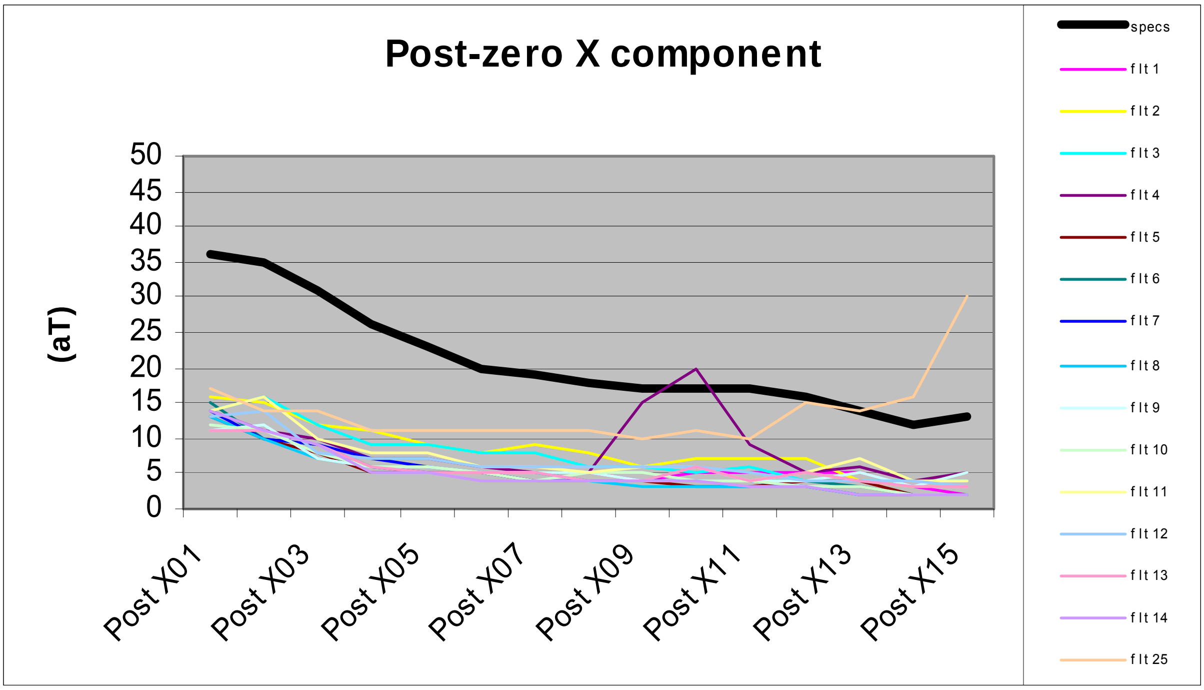


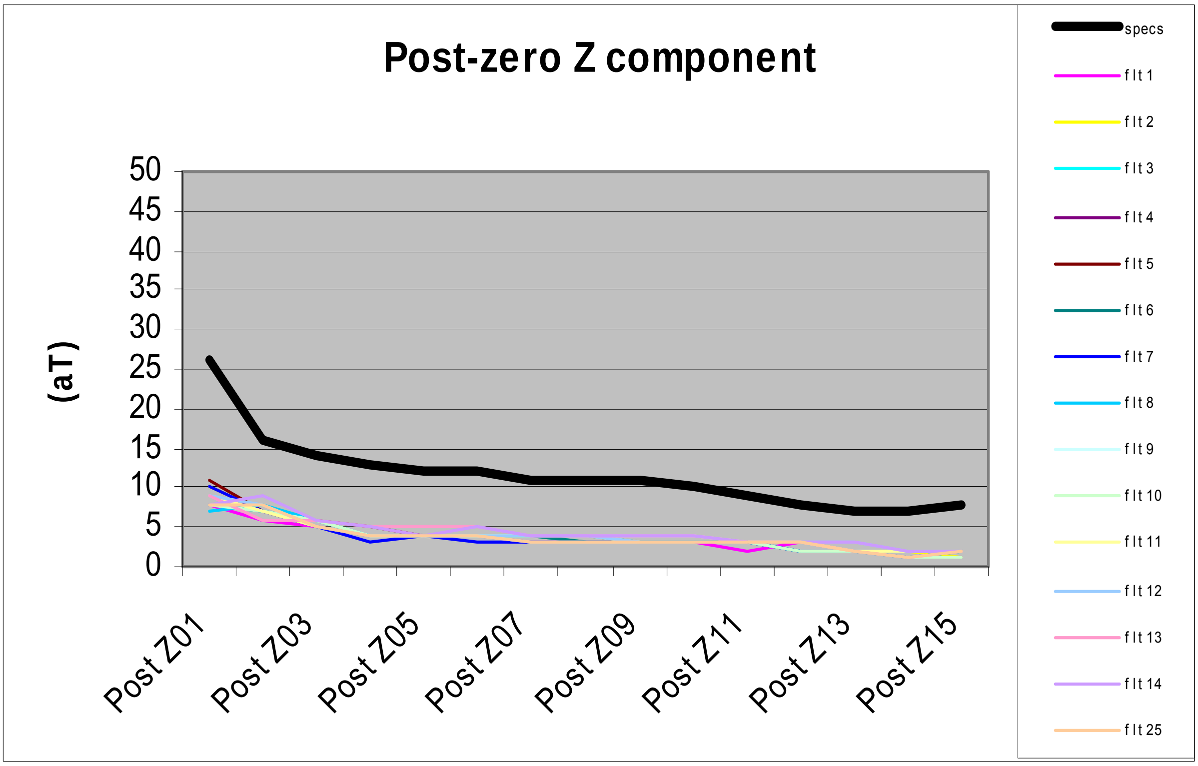


Post-zero Additive Noise

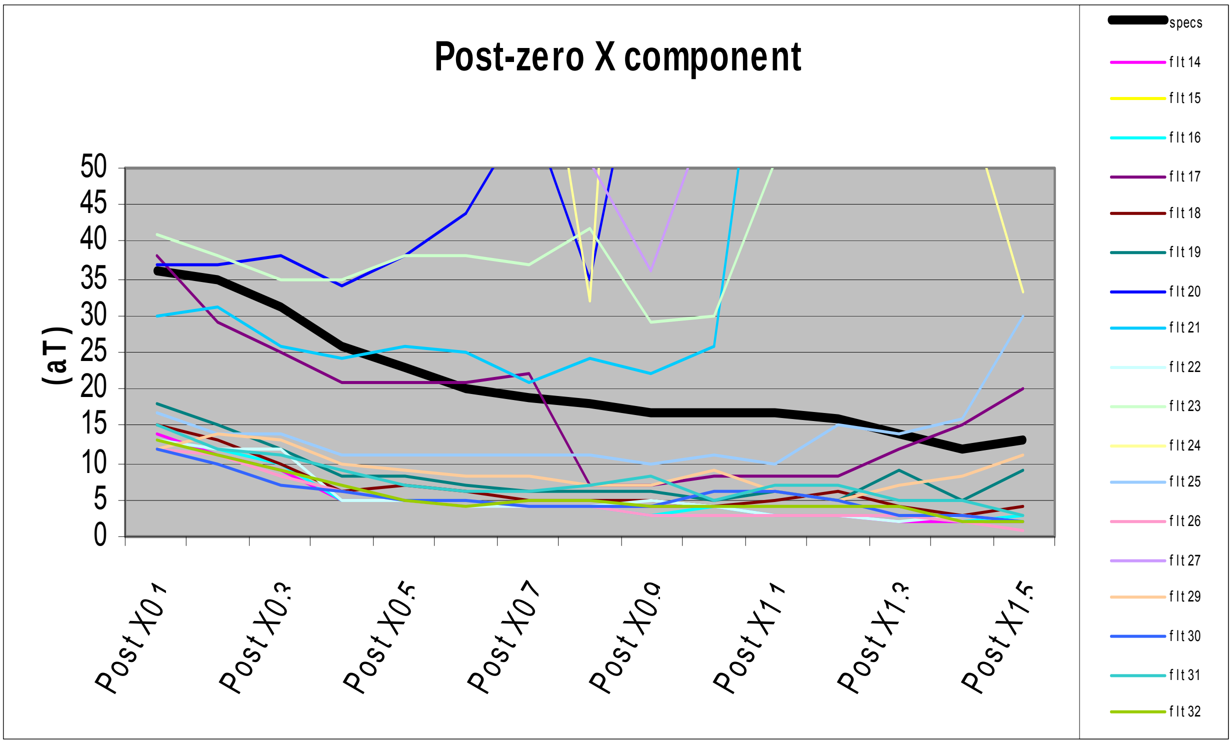
- black trace represents the contract maximum standard deviation
- coloured traces represent the standard deviation of individual lines from all production flights

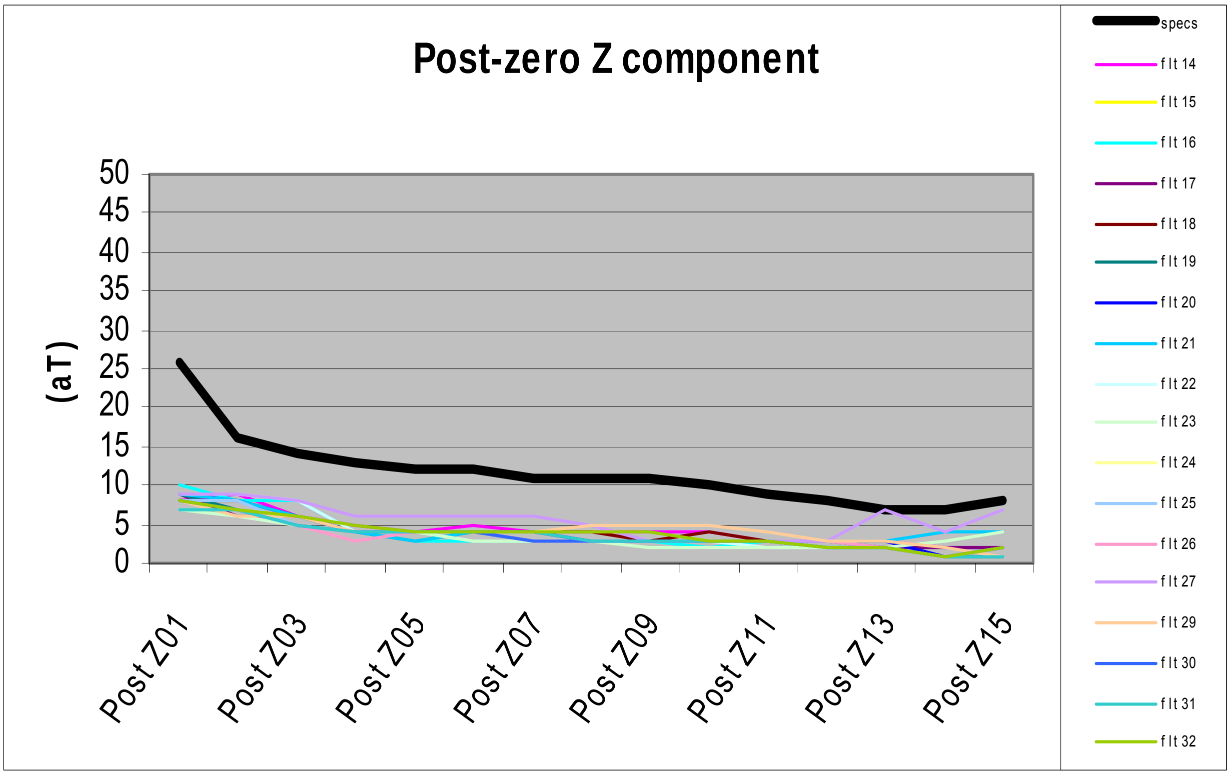
Woolner Flts 1-14





Woolner Flts 14-32

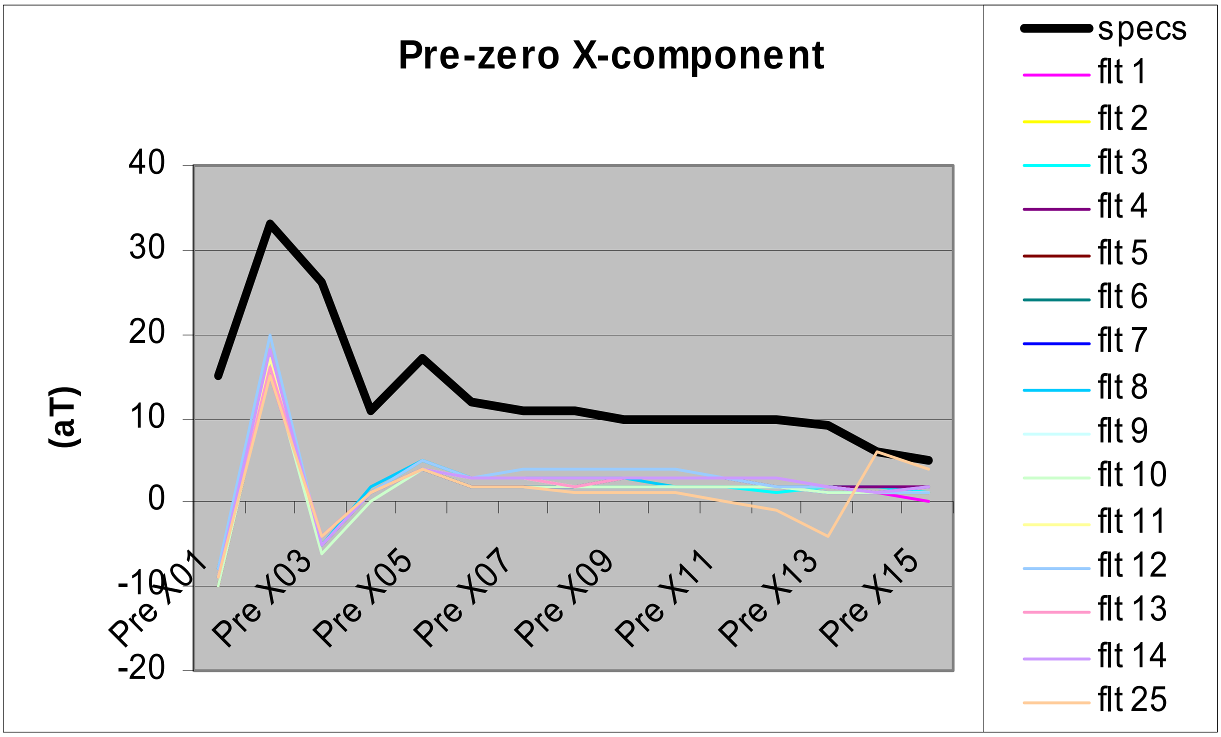


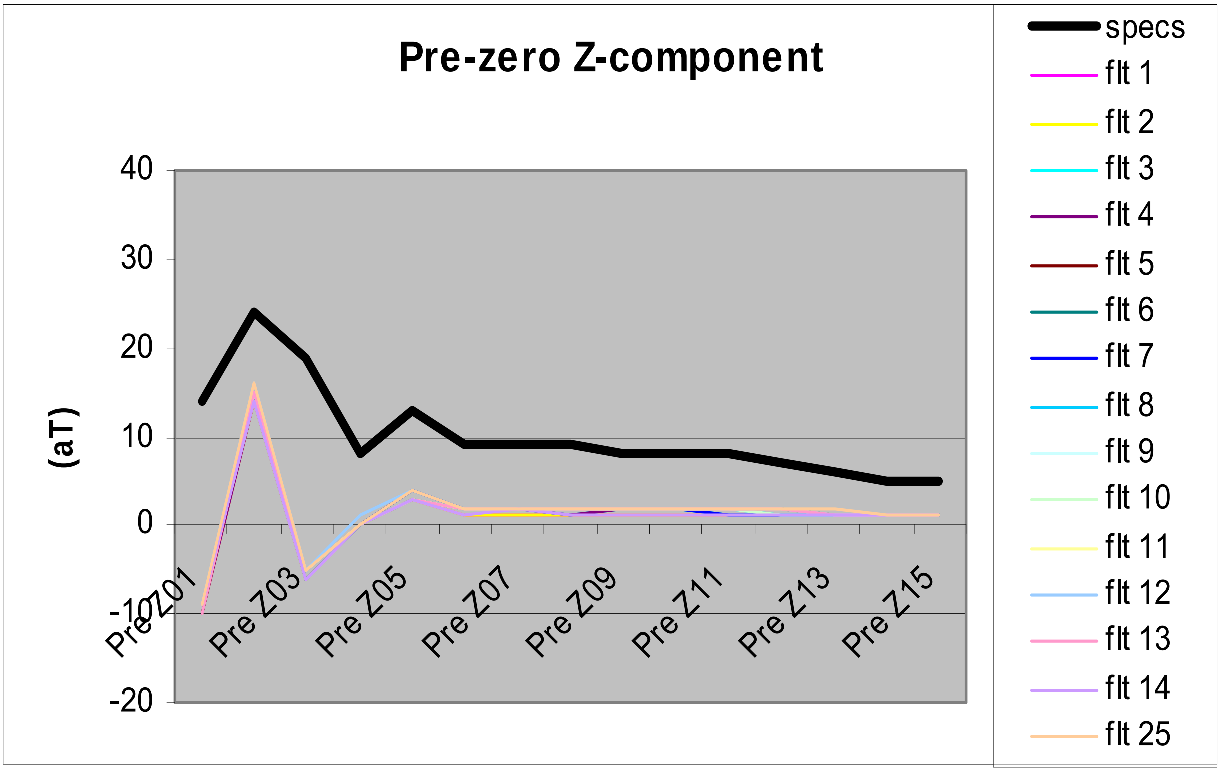


Pre-zero Window Bias

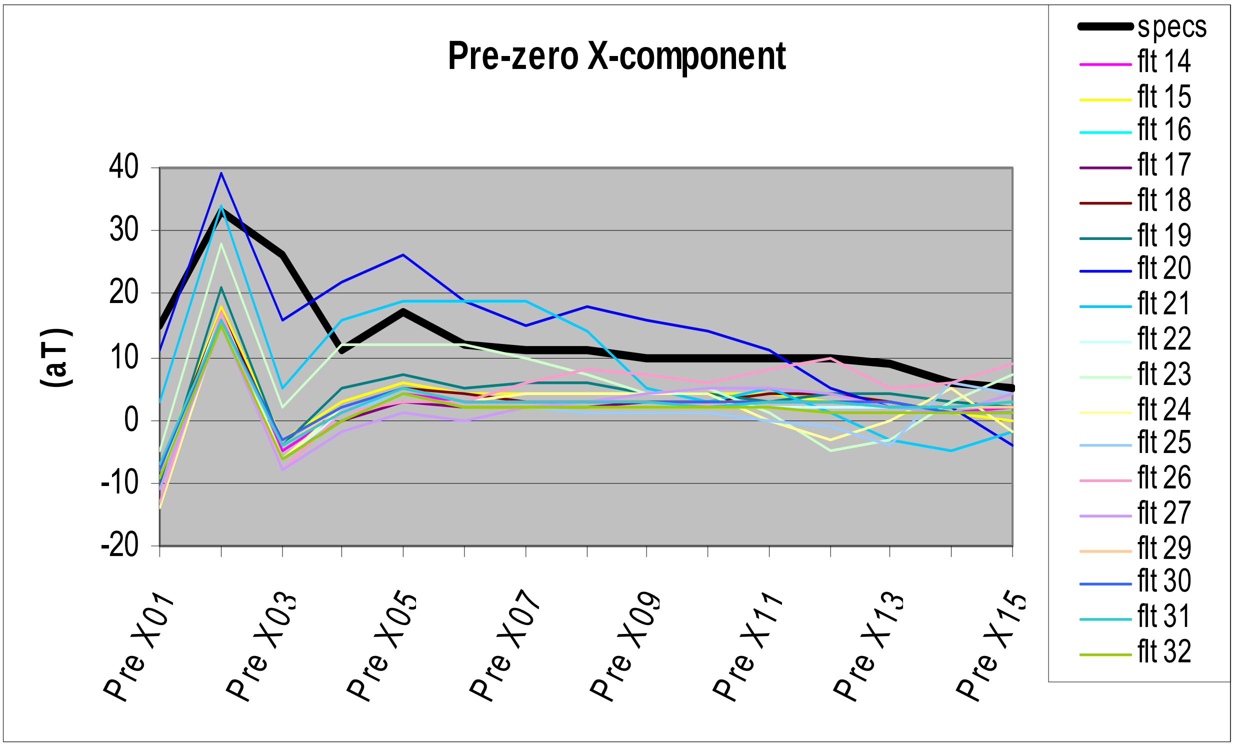
- black trace represents the contract maximum mean for each line
- coloured traces represent the mean of individual lines from all production flights

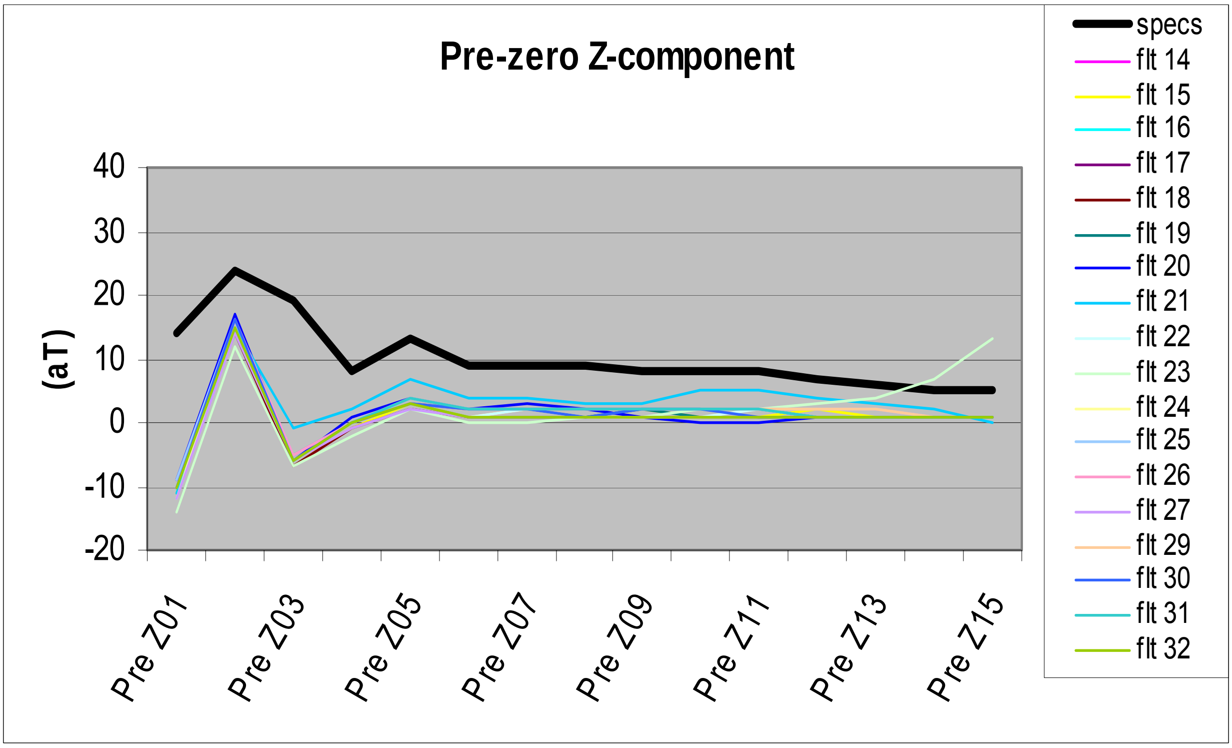
Woolner Flts 1-14





Woolner Flts 14-32

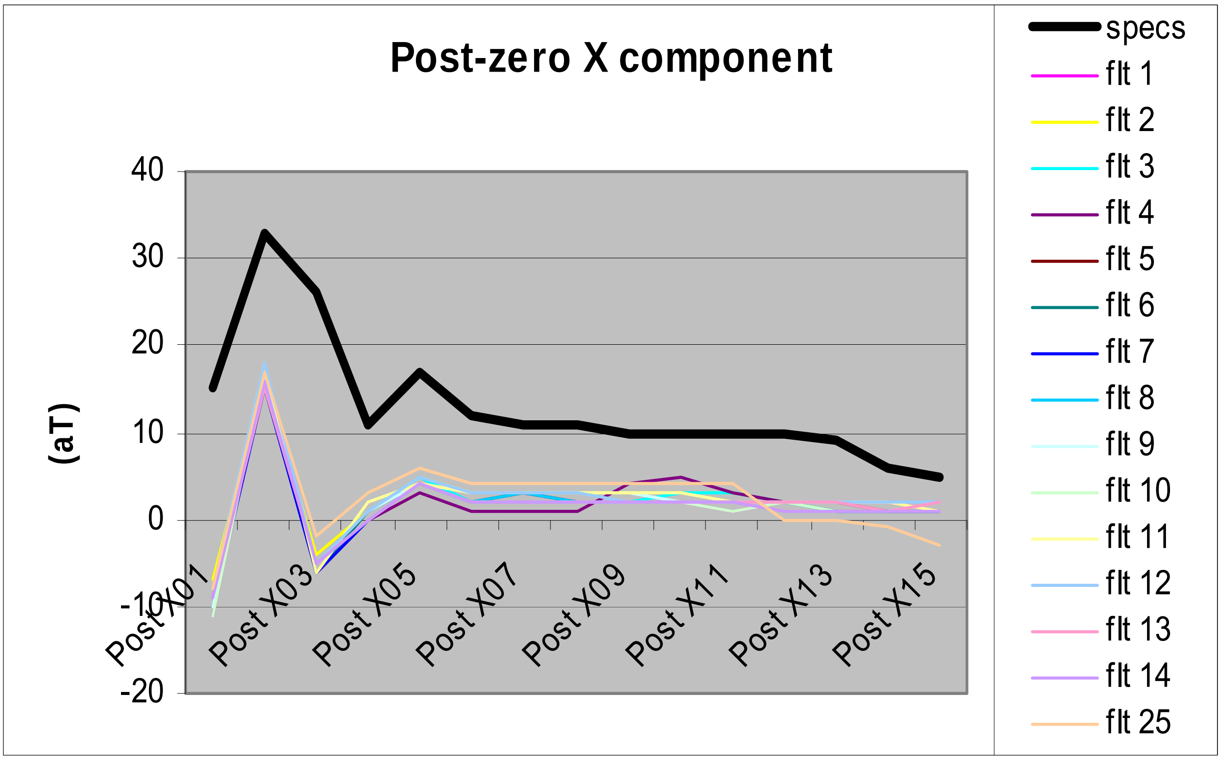


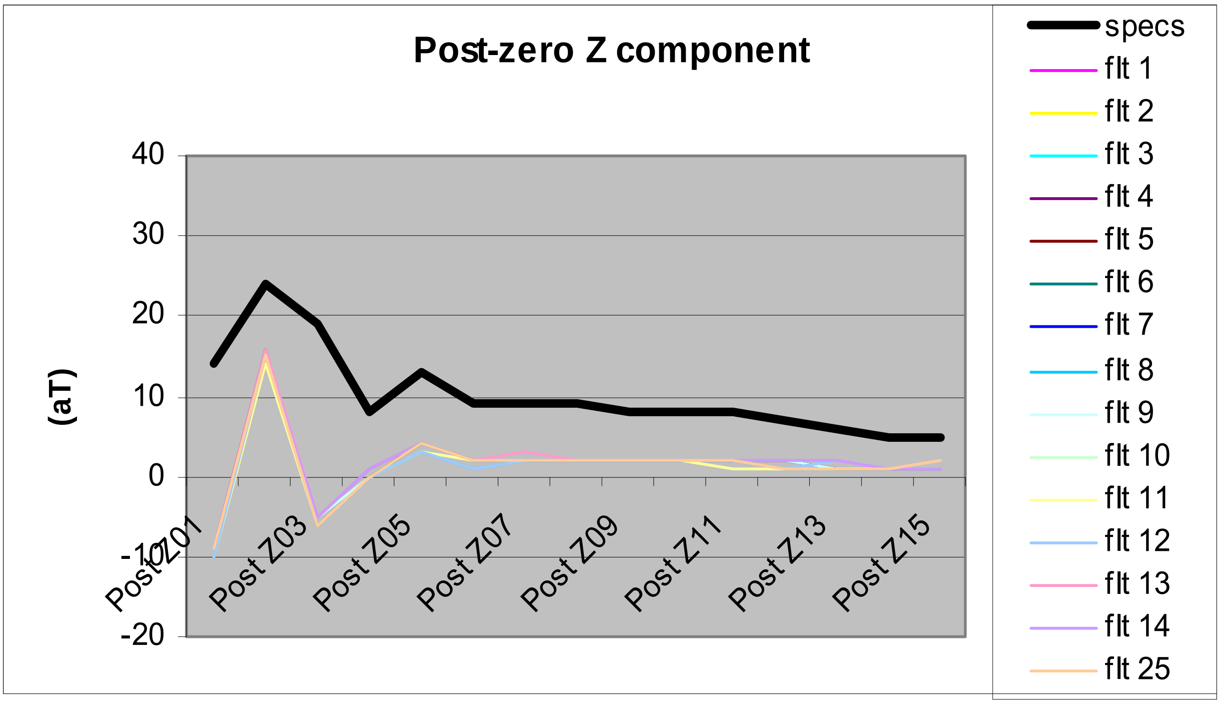


Post-zero Window Bias

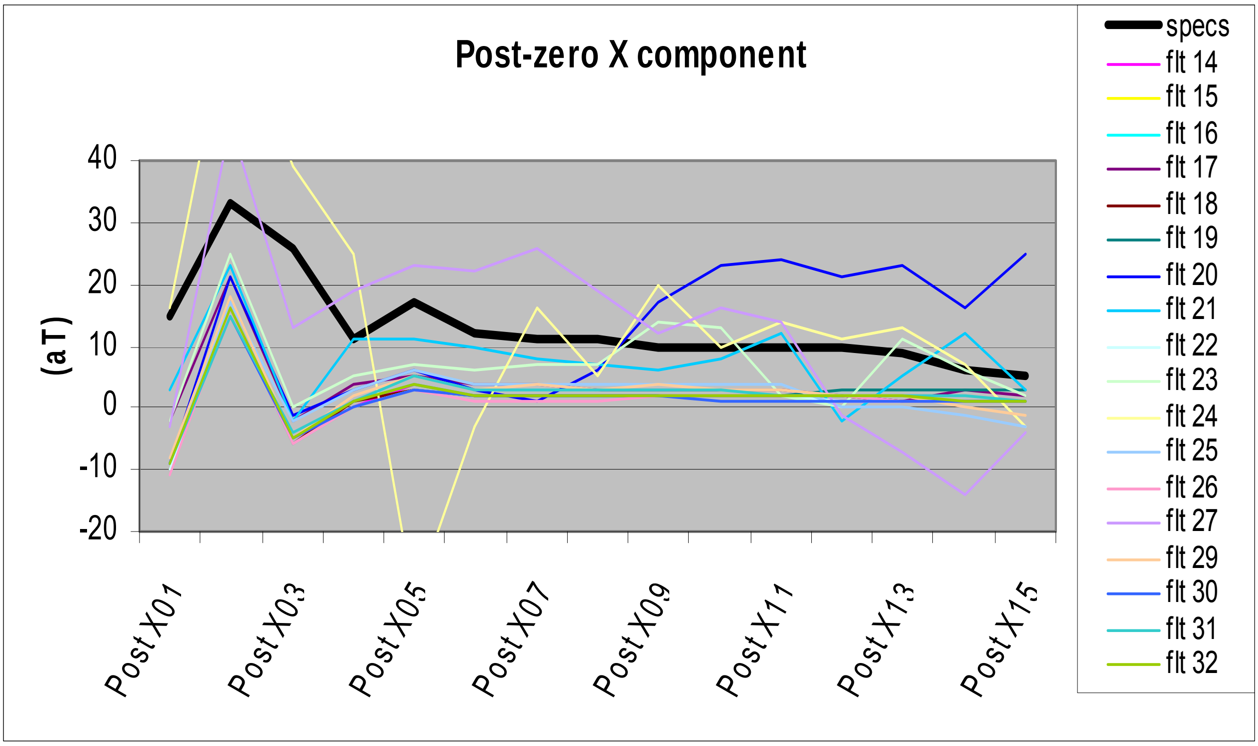
- black trace represents the contract maximum mean for each line
- coloured traces represent the mean of individual lines from all production flights

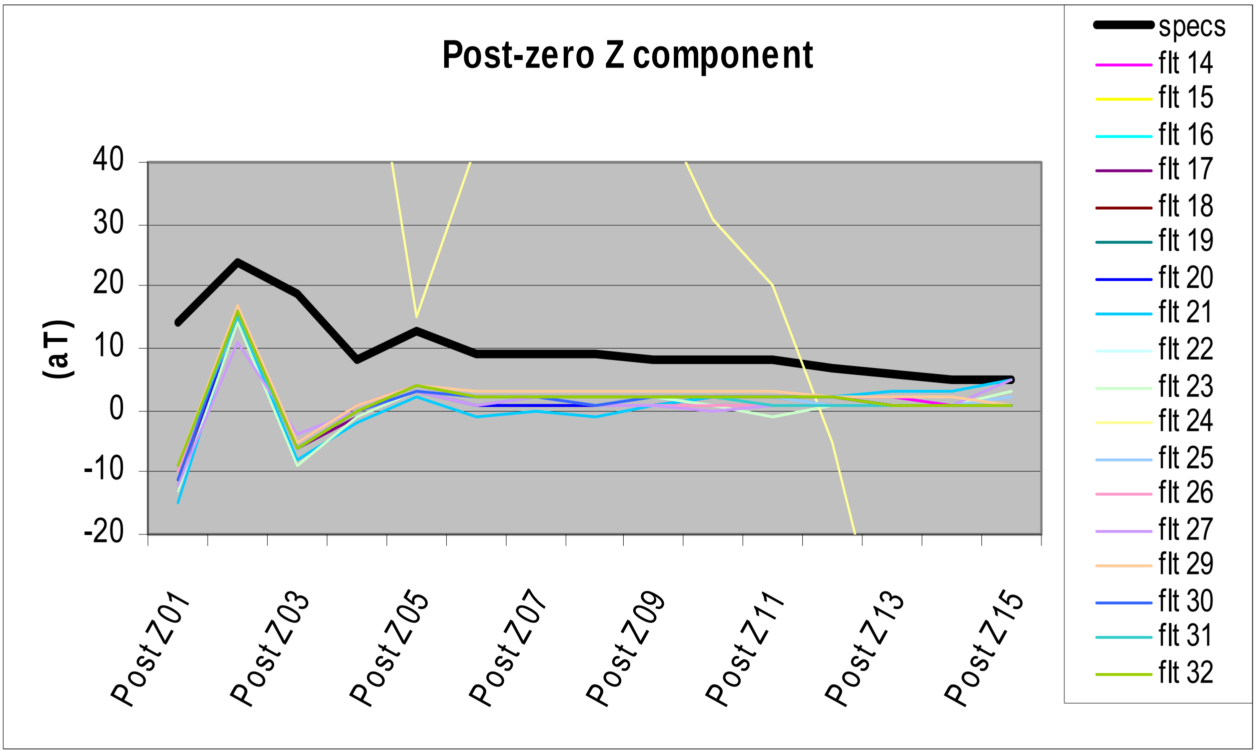
Woolner Flts 1-14





Woolner Flts 14-32





APPENDIX IV – Located Data Format

EM Window data – survey lines

```
COMM GA PROJECT NUMBER                                                 1196
COMM FAS PROJECT NUMBER                                                2017
COMM AREA NUMBER:                                                         1
COMM SURVEY COMPANY:                                 Fugro Airborne Surveys
COMM CLIENT:                                          Geoscience Australia
COMM SURVEY TYPE:                                       25Hz TEMPEST Survey
COMM AREA NAME:                                                     Woolner
COMM STATE:                                                              NT
COMM COUNTRY:                                                     Australia
COMM SURVEY FLOWN:                                October to November 2008
COMM LOCATED DATA CREATED:                                       April 2009
COMM
COMM DATUM:                                                           GDA94
COMM PROJECTION:                                                        MGA
COMM ZONE:                                                               52
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM TRAVERSE LINE SPACING:                                      238-5000 m
COMM TRAVERSE LINE DIRECTION:                                   090-270 deg
COMM NOMINAL TERRAIN CLEARANCE:                                       120 m
COMM FINAL LINE KILOMETRES:                                         6862 km
COMM
COMM LINE NUMBERING
COMM
COMM TRAVERSE LINE NUMBERS:                             1000101 - 1102301
COMM                                                    2800101 - 2802901
COMM                                                    2900101 - 2901502
COMM                                                    3000103 - 3303101
COMM                                                    4100201 - 4300503
COMM                                                    5000101 - 5200101
COMM                                                    6100301 - 6601401
COMM
COMM SURVEY EQUIPMENT
COMM
COMM AIRCRAFT:                                 CASA C212 Turbo Prop, VH-TEM
COMM
COMM MAGNETOMETER:                               Scintrex Cs-2 Cesium Vapour
COMM INSTALLATION:                                            stinger mount
COMM RESOLUTION:                                                  0.001 nT
COMM RECORDING INTERVAL:                                              0.2 s
COMM
COMM ELECTROMAGNETIC SYSTEM:                                   25Hz TEMPEST
COMM INSTALLATION:                  Transmitter loop mounted on the aircraft
COMM                                          Receiver coils in a towed bird
COMM COIL ORIENTATION:                                                  X,Z
COMM RECORDING INTERVAL:                                              0.2 s
COMM SYSTEM GEOMETRY:
COMM RECEIVER DISTANCE BEHIND THE TRANSMITTER:                       -120 m
COMM RECEIVER DISTANCE BELOW THE TRANSMITTER:                         -35 m
COMM
COMM RADAR ALTIMETER:                                         Sperry RT-220
COMM RECORDING INTERVAL:                                              0.2 s
COMM
COMM LASER ALTIMETER:                                     Optech 501SB (TEM)
COMM RECORDING INTERVAL:                                              0.2 s
COMM
COMM NAVIGATION:                                  real-time differential GPS
```

```
COMM RECORDING INTERVAL:                                                  1.0 s
COMM
COMM ACQUISITION SYSTEM:                                                 FASDAS
COMM
COMM DATA PROCESSING
COMM
COMM MAGNETIC DATA
COMM DIURNAL BASE VALUE APPLIED                                        47436 nT
COMM PARALLAX CORRECTION APPLIED (during final processing)               1.0 s
COMM IGRF BASE VALUE APPLIED                                           46836 nT
COMM IGRF MODEL 2005 EXTRAPOLATED TO                                     2008.8
COMM DATA HAVE BEEN MICROLEVELLED
COMM
COMM ELECTROMAGNETIC DATA
COMM SYSTEM PARALLAX REMOVED, AS FOLLOWS
COMM X-COMPONENT EM DATA                                                  1.6 s
COMM Z-COMPONENT EM DATA                                                  0.2 s
COMM DATA CORRECTED FOR TRANSMITTER HEIGHT, PITCH AND ROLL
COMM DATA CORRECTED FOR TRANSMITTER-RECEIVER GEOMETRY VARIATIONS
COMM DATA HAVE BEEN MICROLEVELLED
COMM CONDUCTIVITY DEPTH INVERSION CALCULATED                       EMFlow V5.10
COMM CONDUCTIVITIES CALCULATED USING HPRG CORRECTED EMX & EMZ DATA
COMM
COMM DIGITAL TERRAIN DATA
COMM PARALLAX CORRECTION APPLIED TO LIDAR ALIMETER DATA                   0.0 s
COMM PARALLAX CORRECTION APPLIED TO GPS ALIMETER DATA                     0.0 s
COMM DTM CALCULATED [DTM = GPS ALTITUDE - LIDAR ALTITUDE - GPS/LIDAR DIST]
COMM N-VALUE APPLIED TO CORRECT DTM TO AUSTRALIAN HEIGHT DATUM (AHD)
COMM DATA HAVE BEEN MICROLEVELLED
COMM
COMM ----------------------------------------------------------------------
COMM DISCLAIMER
COMM ----------------------------------------------------------------------
COMM It is Fugro Airborne Survey’s understanding that the data provided to
COMM the client is to be used for the purpose agreed between the parties.
COMM That purpose was a significant factor in determining the scope and
COMM level of the Services being offered to the Client. Should the purpose
COMM for which the data is used change, the data may no longer be valid or
COMM appropriate and any further use of, or reliance upon, the data in
COMM those circumstances by the Client without Fugro Airborne Survey's
COMM review and advice shall be at the Client's own or sole risk.
COMM
COMM The Services were performed by Fugro Airborne Survey exclusively for
COMM the purposes of the Client. Should the data be made available in whole
COMM or part to any third party, and such party relies thereon, that party
COMM does so wholly at its own and sole risk and Fugro Airborne Survey
COMM disclaims any liability to such party.
COMM
COMM Where the Services have involved Fugro Airborne Survey's use of any
COMM information provided by the Client or third parties, upon which
COMM Fugro Airborne Survey was reasonably entitled to rely, then the
COMM Services are limited by the accuracy of such information. Fugro
COMM Airborne Survey is not liable for any inaccuracies (including any
COMM incompleteness) in the said information, save as otherwise provided
COMM in the terms of the contract between the Client and Fugro Airborne
COMM Survey.
COMM
COMM With regard to DIGITAL TERRAIN DATA, the accuracy of the elevation
COMM calculation is directly dependent on the accuracy of the two input
COMM parameters lidar altitude and GPS altitude. The radar altitude value may
be
COMM erroneous in areas of heavy tree cover, where the altimeter reflects the
COMM distance to the tree canopy rather than the ground. The GPS altitude
value
```

```
COMM is primarily dependent on the number of available satellites. Although
COMM post-processing of GPS data will yield X and Y accuracies in the
COMM order of 1-2 metres, the accuracy of the altitude value is usually
COMM much less, sometimes in the ±5 metre range.  Further inaccuracies
COMM may be introduced during the interpolation and gridding process.
COMM Because of the inherent inaccuracies of this method, no guarantee is
COMM made or implied that the information displayed is a true
COMM representation of the height above sea level.  Although this product
COMM may be of some use as a general reference,
COMM THIS PRODUCT MUST NOT BE USED FOR NAVIGATION PURPOSES.
COMM ----------------------------------------------------------------------
COMM
COMM ELECTROMAGNETIC SYSTEM
COMM
COMM TEMPEST IS A TIME-DOMAIN SQUARE-WAVE SYSTEM,
COMM TRANSMITTING AT A BASE FREQUENCY OF 25Hz,
COMM WITH 2 ORTHOGONAL-AXIS RECEIVER COILS IN A TOWED BIRD.
COMM FINAL EM OUTPUT IS RECORDED 5 TIMES PER SECOND.
COMM THE TIMES (IN MILLISECONDS) FOR THE 15 WINDOWS ARE:
COMM
COMM WINDOW      START       END      CENTRE
COMM    1        0.007      0.020      0.013
COMM    2        0.033      0.047      0.040
COMM    3        0.060      0.073      0.067
COMM    4        0.087      0.127      0.107
COMM    5        0.140      0.207      0.173
COMM    6        0.220      0.340      0.280
COMM    7        0.353      0.553      0.453
COMM    8        0.567      0.873      0.720
COMM    9        0.887      1.353      1.120
COMM   10        1.367      2.100      1.733
COMM   11        2.113      3.273      2.693
COMM   12        3.287      5.113      4.200
COMM   13        5.127      7.993      6.560
COMM   14        8.007     12.393     10.200
COMM   15       12.407     19.993     16.200
COMM
COMM PULSE WIDTH: 10 ms
COMM
COMM TEMPEST EM data are transformed to the response that would be
COMM obtained with a B-field sensor for a 100% duty cycle square
COMM waveform at the base frequency, involving a 1A change in
COMM current (from -0.5A to +0.5A to -0.5A) in a 1sq.m transmitter.
COMM It is this configuration, rather than the actual acquisition
COMM configuration, which must be specified when modelling TEMPEST data.
COMM
COMM
COMM
COMM LOCATED DATA FORMAT
COMM
COMM  Output field format : DOS  - Flat ascii
COMM  Number of fields    : 102
COMM
COMM Field  Channel         Description                        Units  Undefined    Format
COMM -----  -------         -----------                        -----  ---------    ------
COMM
COMM     1  LINE            Line                                       -99999999      i10
COMM     2  FLIGHT          Flight                                     -99             i4
COMM     3  FID             Fiducial                             (s)   -999999.9     f8.1
COMM     4  PROJECT_FAS     FAS Project Number                         -9999           i6
COMM     5  PROJECT_GA      GA Project Number                          -9999           i6
COMM     6  AIRCRAFT        System Number                              -9              i3
COMM     7  DATE            Date                            ddmmyyyy   -9999999        i9
COMM     8  TIME            Time - local midnight                (s)   -9999.9       f8.1
COMM     9  BEARING         Line Bearing                       (deg)   -99             i4
COMM    10  LATITUDE        Latitude  GDA94                    (deg)   -99.9999999  f12.7
COMM    11  LONGITUDE       Longitude GDA94                    (deg)   -999.9999999 f13.7
```

COMM	12	EASTING	Easting MGA51	(m)	-99999.99	f10.2
COMM	13	NORTHING	Northing MGA51	(m)	-999999.99	f11.2
COMM	14	LIDAR	Final Lidar altimeter	(m)	-999.99	f8.2
COMM	15	RADALT	Final Radar altimeter	(m)	-999.99	f8.2
COMM	16	TX_ELEVATION	Final Transmitter Elevation - AHD	(m)	-999.99	f8.2
COMM	17	DTM	Final Ground Elevation - AHD	(m)	-999.99	f8.2
COMM	18	MAG	Final TMI	(nT)	-99999.999	f11.3
COMM	19	TX_PITCH	Transmitter loop pitch	(deg)	-999.99	f8.2
COMM	20	TX_ROLL	Transmitter loop roll	(deg)	-999.99	f8.2
COMM	21	TX_HEIGHT	Transmitter terrain clearance	(m)	-999.99	f8.2
COMM	22	HSep_Raw	Tx-Rx horizontal separation	(m)	-999.99	f8.2
COMM	23	VSep_Raw	Tx-Rx vertical separation	(m)	-999.99	f8.2
COMM	24	TX_HEIGHT_std	Tx HPRG terrain clearance	(m)	-999.99	f8.2
COMM	25	HSep_std	Tx-Rx HPRG horizontal separation	(m)	-999.99	f8.2
COMM	26	VSep_std	Tx-Rx HPRG vertical separation	(m)	-999.99	f8.2
COMM	27	EMX_nonhprg[1]	Raw (non-HPRG) EMX01 Window	(fT)	-999.999999	f12.6
COMM	28	EMX_nonhprg[2]	Raw (non-HPRG) EMX02 Window	(fT)	-999.999999	f12.6
COMM	29	EMX_nonhprg[3]	Raw (non-HPRG) EMX03 Window	(fT)	-999.999999	f12.6
COMM	30	EMX_nonhprg[4]	Raw (non-HPRG) EMX04 Window	(fT)	-999.999999	f12.6
COMM	31	EMX_nonhprg[5]	Raw (non-HPRG) EMX05 Window	(fT)	-999.999999	f12.6
COMM	32	EMX_nonhprg[6]	Raw (non-HPRG) EMX06 Window	(fT)	-999.999999	f12.6
COMM	33	EMX_nonhprg[7]	Raw (non-HPRG) EMX07 Window	(fT)	-999.999999	f12.6
COMM	34	EMX_nonhprg[8]	Raw (non-HPRG) EMX08 Window	(fT)	-999.999999	f12.6
COMM	35	EMX_nonhprg[9]	Raw (non-HPRG) EMX09 Window	(fT)	-999.999999	f12.6
COMM	36	EMX_nonhprg[10]	Raw (non-HPRG) EMX10 Window	(fT)	-999.999999	f12.6
COMM	37	EMX_nonhprg[11]	Raw (non-HPRG) EMX11 Window	(fT)	-999.999999	f12.6
COMM	38	EMX_nonhprg[12]	Raw (non-HPRG) EMX12 Window	(fT)	-999.999999	f12.6
COMM	39	EMX_nonhprg[13]	Raw (non-HPRG) EMX13 Window	(fT)	-999.999999	f12.6
COMM	40	EMX_nonhprg[14]	Raw (non-HPRG) EMX14 Window	(fT)	-999.999999	f12.6
COMM	41	EMX_nonhprg[15]	Raw (non-HPRG) EMX15 Window	(fT)	-999.999999	f12.6
COMM	42	EMX_hprg[1]	Final HPRG EMX01 Window	(fT)	-999.999999	f12.6
COMM	43	EMX_hprg[2]	Final HPRG EMX02 Window	(fT)	-999.999999	f12.6
COMM	44	EMX_hprg[3]	Final HPRG EMX03 Window	(fT)	-999.999999	f12.6
COMM	45	EMX_hprg[4]	Final HPRG EMX04 Window	(fT)	-999.999999	f12.6
COMM	46	EMX_hprg[5]	Final HPRG EMX05 Window	(fT)	-999.999999	f12.6
COMM	47	EMX_hprg[6]	Final HPRG EMX06 Window	(fT)	-999.999999	f12.6
COMM	48	EMX_hprg[7]	Final HPRG EMX07 Window	(fT)	-999.999999	f12.6
COMM	49	EMX_hprg[8]	Final HPRG EMX08 Window	(fT)	-999.999999	f12.6
COMM	50	EMX_hprg[9]	Final HPRG EMX09 Window	(fT)	-999.999999	f12.6
COMM	51	EMX_hprg[10]	Final HPRG EMX10 Window	(fT)	-999.999999	f12.6
COMM	52	EMX_hprg[11]	Final HPRG EMX11 Window	(fT)	-999.999999	f12.6
COMM	53	EMX_hprg[12]	Final HPRG EMX12 Window	(fT)	-999.999999	f12.6
COMM	54	EMX_hprg[13]	Final HPRG EMX13 Window	(fT)	-999.999999	f12.6
COMM	55	EMX_hprg[14]	Final HPRG EMX14 Window	(fT)	-999.999999	f12.6
COMM	56	EMX_hprg[15]	Final HPRG EMX15 Window	(fT)	-999.999999	f12.6
COMM	57	X_Sferics	X_Sferics		-9999.999	f10.3
COMM	58	X_Lowfreq	X_Lowfreq		-9999.999	f10.3
COMM	59	X_Powerline	X_Powerline		-9999.999	f10.3
COMM	60	X_VLF1	X_18.2kHz		-9999.999	f10.3
COMM	61	X_VLF2	X_19.8kHz		-9999.999	f10.3
COMM	62	X_VLF3	X_21.4kHz		-9999.999	f10.3
COMM	63	X_VLF4	X_22.2kHz		-9999.999	f10.3
COMM	64	X_Geofact	X_Geometric factor		-9999.999	f10.3
COMM	65	EMZ_nonhprg[1]	Raw (non-HPRG) EMZ01 Window	(fT)	-999.999999	f12.6
COMM	66	EMZ_nonhprg[2]	Raw (non-HPRG) EMZ02 Window	(fT)	-999.999999	f12.6
COMM	67	EMZ_nonhprg[3]	Raw (non-HPRG) EMZ03 Window	(fT)	-999.999999	f12.6
COMM	68	EMZ_nonhprg[4]	Raw (non-HPRG) EMZ04 Window	(fT)	-999.999999	f12.6
COMM	69	EMZ_nonhprg[5]	Raw (non-HPRG) EMZ05 Window	(fT)	-999.999999	f12.6
COMM	70	EMZ_nonhprg[6]	Raw (non-HPRG) EMZ06 Window	(fT)	-999.999999	f12.6
COMM	71	EMZ_nonhprg[7]	Raw (non-HPRG) EMZ07 Window	(fT)	-999.999999	f12.6
COMM	72	EMZ_nonhprg[8]	Raw (non-HPRG) EMZ08 Window	(fT)	-999.999999	f12.6
COMM	73	EMZ_nonhprg[9]	Raw (non-HPRG) EMZ09 Window	(fT)	-999.999999	f12.6
COMM	74	EMZ_nonhprg[10]	Raw (non-HPRG) EMZ10 Window	(fT)	-999.999999	f12.6
COMM	75	EMZ_nonhprg[11]	Raw (non-HPRG) EMZ11 Window	(fT)	-999.999999	f12.6
COMM	76	EMZ_nonhprg[12]	Raw (non-HPRG) EMZ12 Window	(fT)	-999.999999	f12.6
COMM	77	EMZ_nonhprg[13]	Raw (non-HPRG) EMZ13 Window	(fT)	-999.999999	f12.6
COMM	78	EMZ_nonhprg[14]	Raw (non-HPRG) EMZ14 Window	(fT)	-999.999999	f12.6
COMM	79	EMZ_nonhprg[15]	Raw (non-HPRG) EMZ15 Window	(fT)	-999.999999	f12.6
COMM	80	EMZ_hprg[1]	Final HPRG EMZ01 Window	(fT)	-999.999999	f12.6
COMM	81	EMZ_hprg[2]	Final HPRG EMZ02 Window	(fT)	-999.999999	f12.6
COMM	82	EMZ_hprg[3]	Final HPRG EMZ03 Window	(fT)	-999.999999	f12.6
COMM	83	EMZ_hprg[4]	Final HPRG EMZ04 Window	(fT)	-999.999999	f12.6
COMM	84	EMZ_hprg[5]	Final HPRG EMZ05 Window	(fT)	-999.999999	f12.6
COMM	85	EMZ_hprg[6]	Final HPRG EMZ06 Window	(fT)	-999.999999	f12.6
COMM	86	EMZ_hprg[7]	Final HPRG EMZ07 Window	(fT)	-999.999999	f12.6
COMM	87	EMZ_hprg[8]	Final HPRG EMZ08 Window	(fT)	-999.999999	f12.6
COMM	88	EMZ_hprg[9]	Final HPRG EMZ09 Window	(fT)	-999.999999	f12.6
COMM	89	EMZ_hprg[10]	Final HPRG EMZ10 Window	(fT)	-999.999999	f12.6
COMM	90	EMZ_hprg[11]	Final HPRG EMZ11 Window	(fT)	-999.999999	f12.6
COMM	91	EMZ_hprg[12]	Final HPRG EMZ12 Window	(fT)	-999.999999	f12.6

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COMM    92  EMZ_hprg[13]    Final HPRG EMZ13 Window           (fT)   -999.999999  f12.6
COMM    93  EMZ_hprg[14]    Final HPRG EMZ14 Window           (fT)   -999.999999  f12.6
COMM    94  EMZ_hprg[15]    Final HPRG EMZ15 Window           (fT)   -999.999999  f12.6
COMM    95  Z_Sferics       Z_Sferics                                -9999.999    f10.3
COMM    96  Z_Lowfreq       Z_Lowfreq                                -9999.999    f10.3
COMM    97  Z_Powerline     Z_Powerline                              -9999.999    f10.3
COMM    98  Z_VLF1          Z_18.2kHz                                -9999.999    f10.3
COMM    99  Z_VLF2          Z_19.8kHz                                -9999.999    f10.3
COMM   100  Z_VLF3          Z_21.4kHz                                -9999.999    f10.3
COMM   101  Z_VLF4          Z_22.2kHz                                -9999.999    f10.3
COMM   102  Z_Geofact       Z_Geometric factor                       -9999.999    f10.3
COMM
COMM Line Number     X-minimum       X-maximum       Y-minimum       Y-maximum       # of points Total distance
COMM -----------     ---------       ---------       ---------       --------        ----------- --------------
COMM L1000101:15     701699.649      755735.871      8598930.412     8598968.032     4067        54039.886185
COMM L1000201:14     772068.207      788661.980      8598929.413     8598948.284     1187        16594.68325671
COMM L1000301:26     665068.950      673106.890      8593932.710     8593951.015     587         8038.312239841
COMM L1000401:15     701668.710      762773.967      8593915.687     8593969.139     4255        61112.24761159
COMM L1000501:16     771902.492      787461.491      8593926.073     8593956.247     1082        15560.01208714
COMM L1000601:26     665028.782      673114.007      8588929.863     8588946.515     581         8085.413592158
COMM L1000701:16     701630.042      786326.716      8588753.658     8589014.670     6250        84750.80188417
COMM L1000801:26     661356.010      672870.726      8583927.396     8583954.635     834         11515.68305178
COMM L1000901:16     701604.008      783214.729      8583888.921     8583974.947     5812        81630.50498423
COMM L1001001:26     648784.908      672810.212      8578927.246     8578943.893     1744        24025.86922623
COMM L1001101:17     701573.665      781185.843      8578796.729     8579045.528     5934        79649.63924522
COMM L1001201:18     640131.229      783179.249      8573894.275     8574072.448     10225       143077.5668749
COMM L1001301:25     786265.992      801716.058      8573912.754     8573960.395     1114        15455.56091809
COMM L1001401:18     632030.903      787862.563      8568924.538     8568980.949     11527       155839.3222702
COMM L1001501:32     626097.562      787965.201      8563895.226     8563966.772     11471       161891.7224076
COMM L1100101:17     703412.927      737089.658      8590392.827     8590679.382     2396        33730.55523818
COMM L1100302:22     703425.988      737010.183      8587191.670     8587440.317     2455        33619.86523188
COMM L1100402:22     703426.527      736983.536      8585595.994     8585735.860     2411        33569.35971734
COMM L1100602:22     703368.660      736954.479      8582250.991     8582310.062     2416        33592.61775769
COMM L1100702:25     703367.811      736950.876      8580582.247     8580735.818     2410        33600.81996603
COMM L1100901:22     703402.699      736886.226      8577251.793     8577296.300     2494        33487.54320863
COMM L1101001:22     703336.282      736887.723      8575599.871     8575631.461     2415        33553.13927627
COMM L1101201:22     703307.540      736910.005      8572269.610     8572292.654     2422        33603.76590959
COMM L1101301:22     703307.635      736880.380      8570576.829     8570642.146     2479        33579.25229863
COMM L1101501:22     703289.497      736817.273      8567221.157     8567292.258     2455        33535.03962871
COMM L1101701:22     708971.133      736823.359      8565592.437     8565629.569     2009        27854.76621012
COMM L1101901:22     703249.975      736789.062      8562269.461     8562307.967     2408        33542.60500707
COMM L1102001:22     703258.349      736782.540      8560587.675     8560630.890     2445        33527.65579076
COMM L2800101:14     749660.766      757720.612      8597589.903     8597608.604     567         8060.349044366
COMM L2800201:14     750100.598      758179.274      8597265.369     8597293.321     593         8079.132004985
COMM L2800301:14     750545.428      758635.236      8596921.488     8596951.180     573         8091.400555112
COMM L2800401:14     750219.062      759115.658      8596606.353     8596617.980     647         8896.842526245
COMM L2800501:14     749889.823      759575.187      8596254.182     8596283.871     686         9687.397935591
COMM L2800601:16     749550.744      760049.664      8595914.663     8595950.719     752         10501.32977696
COMM L2800701:16     749214.182      760580.571      8595566.481     8595612.925     817         11367.48935581
COMM L2800801:16     748882.338      760983.338      8595255.627     8595283.130     862         12101.51327241
COMM L2800901:16     748620.047      761486.339      8594919.224     8594948.157     924         12867.46105177
COMM L2801001:16     748610.876      761909.183      8594586.586     8594620.862     948         13299.45075511
COMM L2801101:16     748622.235      762511.806      8594203.325     8594282.189     985         13894.35570009
COMM L2801301:17     748597.525      762491.196      8593595.484     8593620.179     1018        13894.94865052
COMM L2801401:17     748602.015      762487.953      8593257.247     8593284.763     1002        13886.89549317
COMM L2801501:17     748603.596      762499.052      8592917.288     8592950.280     1013        13896.69468186
COMM L2801601:17     748606.005      762506.208      8592590.852     8592614.001     1003        13900.83671288
COMM L2801701:17     748613.290      762514.983      8592237.433     8592288.741     1005        13903.98846913
COMM L2801801:17     748618.723      762524.356      8591926.917     8591947.651     1007        13906.7287543
COMM L2801901:18     750610.439      765090.777      8591595.852     8591663.129     1028        14484.80912762
COMM L2802001:17     751533.885      780986.610      8591252.400     8591289.853     2129        29455.95804262
COMM L2802101:16     751515.189      786339.274      8590901.082     8590974.524     2540        34833.64237222
COMM L2802201:17     751491.663      786348.064      8590515.327     8590683.986     2500        34878.81511054
COMM L2802301:17     751468.119      786339.912      8590154.695     8590364.768     2536        34891.41084106
COMM L2802401:17     751438.656      786326.017      8589885.824     8589971.175     2468        34899.06015242
COMM L2802501:17     751460.799      786325.177      8589487.824     8589754.662     2556        34928.2904017
COMM L2802601:18     769553.537      786318.467      8589263.139     8589281.188     1202        16765.98970967
COMM L2802801:18     769499.129      786315.673      8588562.346     8588621.292     1193        16819.46377093
COMM L2802901:18     769494.754      786315.928      8588247.895     8588419.128     1213        16843.79103514
COMM L2900101:18     770261.157      783209.886      8584595.863     8584619.326     911         12949.6503976
COMM L2900201:18     770248.364      783209.653      8584253.371     8584284.195     948         12962.48091359
COMM L2900401:18     770239.851      783216.150      8583599.599     8583627.844     951         12977.34186883
COMM L2900501:18     770248.500      783220.493      8583260.572     8583287.920     906         12972.96892787
COMM L2900601:18     770244.726      783212.026      8582926.479     8582970.154     959         12970.86049936
COMM L2900702:25     770245.835      783219.791      8582588.940     8582620.408     934         12974.61457866
COMM L2900801:19     770248.626      783228.780      8582259.971     8582282.029     929         12981.1348468
COMM L2900901:19     770252.414      783225.772      8581930.006     8581954.285     939         12974.93311861
COMM L2901001:19     770248.482      783228.792      8581583.802     8581635.602     923         12983.81744507
COMM L2901101:19     770243.960      783226.859      8581261.430     8581287.458     943         12983.44570371
COMM L2901201:19     770250.908      783238.731      8580931.425     8580956.444     920         12988.51390562
COMM L2901302:25     770242.716      783237.467      8580585.419     8580616.428     935         12996.45135201
COMM L2901401:19     770251.143      783231.018      8580267.231     8580293.535     918         12980.81610607
COMM L2901502:25     770247.703      783240.074      8579927.863     8579945.300     928         12993.10191638
COMM L3000103:24     786408.450      801684.850      8576234.665     8576279.519     1084        15278.16275695
COMM L3000203:24     786421.824      801697.732      8575916.200     8575949.711     1128        15277.66903479
COMM L3000301:24     786430.176      801700.961      8575587.958     8575613.207     1068        15271.81633116
COMM L3000402:25     786445.815      801696.705      8575265.584     8575280.212     1154        15251.62425591
COMM L3000502:25     786449.578      801701.169      8574932.701     8574945.292     1060        15251.95929669
COMM L3000602:25     786464.388      801715.930      8574594.771     8574627.003     1134        15253.30556705
COMM L3000701:24     786469.302      801713.745      8574262.995     8574307.416     1081        15246.54643568
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COMM L3000902:25	786519.508	801711.613	8573595.864	8573625.082	1057	15193.45883508
COMM L3001001:24	786527.079	801692.705	8573266.941	8573281.925	1105	15166.2016407
COMM L3001102:25	786538.073	801674.460	8572927.942	8572951.859	1062	15137.59722351
COMM L3001202:25	786540.063	801659.030	8572592.781	8572627.351	1119	15120.98332133
COMM L3001301:25	786550.665	801643.771	8572260.253	8572280.334	1066	15094.11340808
COMM L3001401:25	786563.375	801619.361	8571928.547	8571949.563	1112	15057.41724108
COMM L3001501:25	786567.828	801601.628	8571447.308	8571615.362	1080	15058.03627977
COMM L3001601:25	786585.932	801588.716	8571260.580	8571286.453	1102	15004.04478285
COMM L3001702:26	786586.543	801570.547	8570933.117	8571025.129	1105	14993.39843432
COMM L3001802:26	786591.991	801548.383	8570582.757	8570614.399	1062	14956.89633035
COMM L3100104:30	703383.520	711436.565	8580244.636	8580304.395	583	8058.28046207
COMM L3100204:30	703382.487	711444.624	8579938.376	8580011.075	584	8066.646199768
COMM L3100304:30	703385.863	711454.785	8579596.434	8579627.490	580	8070.732445964
COMM L3100404:30	703396.590	711450.836	8579244.820	8579353.629	580	8062.040269139
COMM L3100604:30	703358.083	711460.894	8578593.113	8578631.216	589	8103.901442525
COMM L3100704:30	703371.465	711461.260	8578266.648	8578284.670	576	8090.413566565
COMM L3100804:30	703383.207	711479.035	8577928.982	8577960.639	588	8096.68820777
COMM L3100904:30	703387.829	711474.691	8577564.961	8577615.182	577	8089.805879697
COMM L3101104:30	703408.664	711458.673	8576925.527	8576961.352	583	8051.577068533
COMM L3101204:30	703422.494	711466.310	8576596.499	8576620.684	589	8044.707766341
COMM L3101304:30	703438.997	711475.924	8576269.517	8576285.492	582	8037.38240057
COMM L3101404:30	703442.543	711478.985	8575932.158	8575965.130	578	8036.989174333
COMM L3101604:30	703470.368	711509.821	8575260.708	8575305.479	581	8040.433109175
COMM L3101704:30	703468.205	711507.061	8574926.816	8574952.562	585	8039.482734948
COMM L3101805:31	703465.101	711505.002	8574599.809	8574622.763	557	8040.638211187
COMM L3101905:31	703457.958	711514.064	8574264.192	8574287.318	610	8056.599354282
COMM L3102104:30	703484.058	711539.229	8573592.011	8573620.267	591	8056.039267879
COMM L3102204:30	703485.558	711548.135	8573262.859	8573279.923	574	8062.94885347
COMM L3102303:30	703504.153	711547.545	8572926.164	8572955.694	595	8044.784314324
COMM L3102403:30	703507.084	711557.529	8572602.002	8572615.347	574	8050.734155665
COMM L3102603:30	703473.794	711557.499	8571932.007	8571950.003	576	8084.185212064
COMM L3102703:30	703488.245	711561.476	8571595.320	8571617.024	602	8074.584270376
COMM L3102803:30	703510.580	711569.518	8571269.304	8571281.265	573	8059.388638711
COMM L3102903:30	703536.742	711579.866	8570934.549	8570948.045	594	8043.488985628
COMM L3103103:30	703523.968	711581.637	8570267.455	8570285.557	596	8058.429525366
COMM L3103203:30	703523.008	711576.313	8569933.250	8569949.418	571	8053.658415056
COMM L3103303:30	703552.952	711592.147	8569597.776	8569617.024	592	8039.851255946
COMM L3103403:30	703520.806	711567.077	8569262.352	8569282.747	568	8046.765768756
COMM L3300101:30	710253.621	719476.592	8569648.489	8569665.264	652	9223.239090885
COMM L3300201:30	710216.955	719480.191	8569415.736	8569436.432	688	9263.767953628
COMM L3300302:31	710199.132	719475.026	8569158.713	8569192.967	669	9277.200142738
COMM L3300501:31	710192.515	719469.237	8568689.204	8568717.348	675	9278.140372028
COMM L3300601:31	710207.317	719480.081	8568458.646	8568488.249	694	9274.450506544
COMM L3300701:31	710206.350	719480.591	8568196.508	8568243.332	681	9277.582894599
COMM L3300801:31	710204.106	719484.809	8567992.630	8568006.886	686	9281.265661583
COMM L3300901:31	710209.255	719483.064	8567738.591	8567767.556	666	9275.144666803
COMM L3301001:31	710211.505	719490.194	8567494.747	8567554.793	680	9287.646861308
COMM L3301202:32	710200.554	719509.662	8567037.265	8567049.900	710	9309.408894302
COMM L3301301:31	710199.409	719511.619	8566793.806	8566818.609	663	9313.464914218
COMM L3301402:32	710200.977	719515.314	8566554.073	8566576.514	704	9315.013903744
COMM L3301501:31	710206.628	719521.471	8566301.878	8566341.170	659	9318.06965651
COMM L3301601:32	710207.393	719531.450	8566080.027	8566100.197	710	9325.391505681
COMM L3301701:32	710214.342	719524.676	8565800.461	8565858.551	680	9313.560372921
COMM L3301901:32	710238.705	719522.521	8565359.176	8565394.139	685	9287.6503423
COMM L3302001:32	710240.805	719527.625	8565114.105	8565162.477	708	9292.89185908
COMM L3302101:32	710239.602	719527.331	8564875.959	8564932.100	684	9292.620581261
COMM L3302201:32	710243.016	719525.035	8564641.891	8564687.077	705	9287.240271192
COMM L3302301:32	710241.894	719531.790	8564416.477	8564431.334	671	9290.400903946
COMM L3302401:32	710248.399	719535.236	8564174.254	8564274.823	699	9297.606722386
COMM L3302601:32	710216.609	719545.363	8563703.105	8563720.186	702	9329.235370491
COMM L3302701:32	710210.803	719537.240	8563458.180	8563480.504	668	9327.575365182
COMM L3302801:32	710220.765	719551.865	8563229.039	8563245.707	701	9331.444380319
COMM L3302901:32	710222.787	719550.933	8562980.561	8563006.904	668	9329.076758445
COMM L3303001:32	710237.528	719554.336	8562747.284	8562770.027	702	9317.174645236
COMM L3303101:32	710235.463	719557.479	8562341.062	8562534.013	673	9353.149132624
COMM L4100201:26	665061.537	673115.507	8592264.147	8592298.725	575	8055.053220691
COMM L4100301:26	665041.411	673108.959	8590595.564	8590612.075	583	8067.856868137
COMM L4100501:26	665012.377	673113.954	8587267.276	8587287.716	585	8102.13035629
COMM L4100601:26	664997.331	673117.098	8585599.998	8585618.176	586	8120.179530468
COMM L4100801:26	659158.244	672773.542	8582254.955	8582301.002	970	13618.02155689
COMM L4100901:26	659100.918	672715.167	8580598.642	8580615.757	977	13614.83625323
COMM L4101101:26	656096.824	672763.232	8577251.107	8577303.359	1188	16670.23551805
COMM L4101201:26	656106.587	672716.142	8575599.038	8575616.724	1175	16610.23961642
COMM L4200101:26	686161.426	694399.351	8575587.208	8575619.457	604	8239.101499004
COMM L4200301:26	686145.346	694332.832	8572266.100	8572285.846	602	8187.982072498
COMM L4200401:26	686151.207	694337.005	8570589.299	8570613.415	576	8186.256864921
COMM L4300101:26	678499.733	686572.543	8567264.762	8567281.550	575	8073.132143029
COMM L4300203:29	678491.786	686552.846	8565592.971	8565618.822	571	8062.054728129
COMM L4300403:29	678386.909	686438.624	8562259.765	8562288.817	572	8052.609519281
COMM L4300503:29	678372.874	686427.787	8560592.700	8560628.299	617	8056.621934125
COMM L5000101:5	720107.187	750477.663	8638932.608	8638949.648	2131	30371.22105519
COMM L5000201:7	755595.385	779510.480	8638921.919	8638959.683	1689	23916.92980451
COMM L5000301:9	791801.502	833794.852	8638923.696	8638952.174	2911	41994.4787011
COMM L5000401:5	720088.298	779522.655	8633916.259	8633960.822	4366	59441.02660505
COMM L5000501:9	791765.519	834201.055	8633924.623	8633954.300	3160	42438.39642382
COMM L5000601:5	720038.993	779521.084	8628923.242	8628955.397	4202	59485.34164304
COMM L5000701:9	791705.967	834643.276	8628926.523	8628950.669	3012	42939.40164633
COMM L5000801:5	720004.158	779507.946	8623925.114	8623961.219	4425	59509.58544055
COMM L5000901:9	791654.121	833103.237	8623915.325	8623966.872	3079	41455.81916757
COMM L5001101:10	729468.284	829159.243	8618926.246	8618984.176	7388	99696.36127847
COMM L5001301:10	740523.693	755463.667	8613929.191	8613950.585	1061	14941.07570926

COMM L5001401:11	772159.893	815392.936	8613931.109	8613958.167	3224	43234.81794223
COMM L5001501:12	719861.814	755424.710	8608735.868	8609007.057	2707	35614.71717722
COMM L5001601:12	772119.377	814175.053	8608927.256	8608965.415	3163	42057.69236334
COMM L5001701:11	719867.177	755462.339	8603922.281	8604001.521	2519	35601.39600482
COMM L5001801:13	772018.891	818692.749	8603926.062	8603962.928	3376	46676.76210147
COMM L5002101:13	803599.282	818581.398	8598927.877	8598950.520	1071	14983.39539932
COMM L5002201:13	806150.179	818477.940	8593930.020	8593951.468	894	12328.6441434
COMM L5002303:25	804445.656	818369.080	8588933.546	8588949.537	970	13923.84854111
COMM L5002401:14	789366.529	823049.215	8583901.490	8583955.008	2542	33687.29354654
COMM L5002501:14	791966.769	799955.332	8578930.868	8578957.091	573	7989.772704591
COMM L5100301:7	720125.566	749173.845	8637242.447	8637291.555	2093	29051.01544539
COMM L5100401:5	752835.464	779510.211	8637260.142	8637298.920	1966	26677.57650386
COMM L5100501:9	791795.274	833917.906	8637252.353	8637295.886	3286	42125.56832445
COMM L5100601:5	720086.641	779518.249	8635594.839	8635627.971	4129	59435.83723522
COMM L5100701:9	791772.463	834059.573	8635589.055	8635633.797	2945	42290.9510729
COMM L5101001:5	720068.133	779513.032	8632250.496	8632290.023	4235	59447.87420924
COMM L5101101:9	791741.717	834257.563	8632256.762	8632280.647	3002	42517.37932542
COMM L5101201:5	720035.029	779517.853	8630590.028	8630691.648	4315	59491.79376936
COMM L5101301:9	791730.192	834530.292	8630585.077	8630624.858	3288	42803.22504307
COMM L5101601:6	720024.825	779517.102	8627256.988	8627292.417	4266	59494.48030395
COMM L5101701:9	791695.928	834809.037	8627249.468	8627301.377	3251	43119.68969402
COMM L5101801:6	720012.841	779510.268	8625591.981	8625617.957	4253	59499.27419609
COMM L5101902:10	791671.101	834124.861	8625585.858	8625618.330	3072	42456.63823381
COMM L5102201:10	729472.928	779489.198	8622258.655	8622288.773	3694	50018.78634031
COMM L5102302:14	791638.151	831535.254	8622251.213	8622293.165	2822	39899.94576484
COMM L5102401:10	729470.484	830226.489	8620577.087	8620643.864	7162	100762.4624626
COMM L5102601:11	729480.709	823473.426	8617233.363	8617458.435	6706	94020.72460431
COMM L5102701:11	732470.716	820684.363	8615584.152	8615622.037	6459	88219.02821431
COMM L5200101:1	717915.580	725948.096	8655600.052	8655611.742	546	8032.740474386
COMM L5200201:1	716770.857	730683.787	8653928.920	8653952.112	1055	13914.33333755
COMM L5200301:1	716736.102	737247.679	8652243.054	8652317.242	1397	20515.76079584
COMM L5200401:1	717346.590	738885.393	8650594.327	8650643.454	1622	21542.07568177
COMM L5200501:1	718776.882	740500.034	8648909.544	8648955.444	1491	21725.67049193
COMM L5200601:1	720121.005	742104.219	8647260.383	8647307.699	1642	21986.63814852
COMM L5200701:1	720123.156	747233.819	8645596.900	8645644.553	1869	27113.23970991
COMM L5200801:1	720125.528	748092.923	8643923.337	8643963.101	2103	27970.51270417
COMM L5200901:2	720112.534	748933.591	8642253.380	8642287.444	1953	28822.51095423
COMM L5201001:2	720106.457	749767.787	8640583.867	8640622.679	2212	29663.44316136
COMM L6100301:2	720234.610	748851.005	8638368.335	8638404.103	2211	28619.5251476
COMM L6100401:2	720224.936	748492.639	8637806.351	8637836.615	1913	28269.47175788
COMM L6100601:2	720214.052	747829.080	8636698.396	8636731.316	1957	27617.45261031
COMM L6100701:2	720234.027	747499.437	8636149.908	8636179.482	2086	27267.80760209
COMM L6100901:5	720211.701	746833.217	8635036.439	8635069.071	1933	26623.83004493
COMM L6101001:3	720232.829	754611.191	8634473.745	8634512.471	2244	34380.78267573
COMM L6101201:3	720189.249	754643.143	8633368.013	8633400.389	2273	34455.98478564
COMM L6101301:3	720172.634	754643.529	8632814.110	8632842.082	2729	34473.50816128
COMM L6101501:3	720177.871	754648.782	8631702.845	8631740.161	2678	34474.77264267
COMM L6101601:3	720189.605	754664.323	8631146.540	8631171.073	2292	34476.04407059
COMM L6101801:4	720160.343	754616.306	8630024.940	8630057.621	2424	34458.28865371
COMM L6101901:4	720176.515	754615.555	8629295.844	8629508.714	2512	34463.5884103
COMM L6102101:4	720154.811	754609.951	8628313.000	8628489.597	2488	34477.02925688
COMM L6102201:4	720162.275	754621.612	8627801.843	8627851.367	2502	34462.42959196
COMM L6102401:4	720132.923	754594.045	8626700.831	8626735.089	2513	34464.10987448
COMM L6102501:4	720143.340	754597.411	8626144.653	8626187.273	2464	34457.06339234
COMM L6102701:4	720126.684	754613.886	8625037.882	8625069.729	2474	34489.70018707
COMM L6102801:4	720127.952	754594.641	8624484.178	8624517.823	2513	34468.4574873
COMM L6103001:4	720092.756	754582.178	8623367.182	8623395.893	2487	34492.26146985
COMM L6103101:4	720121.032	754575.055	8622793.856	8623483.225	2491	34671.10941824
COMM L6103302:6	729471.099	754559.735	8621703.005	8621732.309	1822	25089.83504492
COMM L6103401:4	729476.869	754541.483	8621116.450	8621176.996	1792	25068.18035014
COMM L6103601:6	729474.739	754535.743	8620031.570	8620063.899	1820	25062.30064502
COMM L6103702:7	729475.966	754531.943	8619467.565	8619518.162	1805	25060.51261528
COMM L6103901:6	729473.648	754527.264	8618360.925	8618400.977	1827	25057.30104748
COMM L6104001:6	729471.987	754515.868	8617814.885	8617844.216	1823	25045.89264026
COMM L6104201:6	732461.947	754521.348	8616704.671	8616727.304	1602	22060.72103978
COMM L6104301:6	732470.170	754498.473	8616150.041	8616178.910	1607	22029.29196162
COMM L6104501:6	732479.579	754494.368	8615038.273	8615071.188	1610	22016.91311817
COMM L6104601:6	732352.558	754518.375	8614476.949	8614514.876	1608	22168.26320311
COMM L6104801:6	740675.357	754423.587	8613361.965	8613408.414	986	13750.46529065
COMM L6104901:6	740677.206	754437.120	8612821.053	8612897.804	1002	13762.85249556
COMM L6105001:6	740670.143	754443.667	8612256.439	8612287.328	988	13774.60505259
COMM L6105101:7	740686.458	754449.670	8611700.448	8611737.288	980	13764.34326173
COMM L6105201:6	740685.879	754461.161	8611135.023	8611179.319	993	13778.1996528
COMM L6105301:7	740691.502	754462.016	8610599.816	8610815.748	984	13792.74064857
COMM L6105401:7	740555.708	754464.535	8609842.196	8610073.339	1045	13946.86004767
COMM L6200201:7	768233.810	779513.612	8638377.189	8638404.078	826	11281.03835174
COMM L6200301:7	768237.667	779515.541	8637818.505	8637834.686	798	11278.14689954
COMM L6200501:8	768228.322	779510.914	8636707.166	8636728.786	766	11283.23776866
COMM L6200601:7	768239.811	779517.330	8636156.183	8636184.651	823	11278.66748014
COMM L6200801:8	768251.431	779510.687	8635029.768	8635060.002	855	11260.65792975
COMM L6200901:8	768274.769	779516.368	8634482.046	8634509.136	757	11242.43000695
COMM L6201101:8	768224.566	779508.957	8633358.979	8633390.952	760	11285.1463792
COMM L6201201:8	768221.876	779522.369	8632793.875	8633050.220	865	11350.42096331
COMM L6201401:8	768196.615	779520.699	8631654.029	8631946.103	863	11363.96527957
COMM L6201501:8	768220.253	779514.416	8631142.558	8631174.529	761	11295.07067942
COMM L6201701:8	768189.292	779514.332	8630024.933	8630063.011	791	11326.76367785
COMM L6201801:8	768211.558	779516.913	8629490.885	8629511.321	854	11305.91254559
COMM L6202001:8	768201.894	779516.791	8628367.351	8628400.015	885	11316.92503204
COMM L6202101:8	768223.926	779510.387	8627820.858	8627846.948	776	11287.17484631
COMM L6202301:8	768197.141	779513.179	8626709.185	8626731.144	787	11316.64742445
COMM L6202401:8	768194.932	779513.065	8626150.842	8626182.901	881	11319.74194937

COMM L6202601:8	768173.719	779517.557	8625035.270	8625063.529	879	11344.669094
COMM L6202701:6	768195.575	779513.842	8624479.346	8624502.432	793	11318.79292839
COMM L6202901:8	768202.162	779495.565	8623368.904	8623390.555	783	11294.25756658
COMM L6203001:8	768193.283	779497.510	8622809.879	8622840.285	867	11304.93008761
COMM L6203201:8	768189.363	779474.232	8621712.684	8621730.730	862	11285.68224547
COMM L6203301:8	768215.169	779466.765	8621156.794	8621176.118	783	11252.08377397
COMM L6203501:8	768196.247	786603.082	8620045.821	8620060.423	1277	18407.44138959
COMM L6203601:8	768198.013	786605.243	8619488.083	8619515.533	1410	18408.68834663
COMM L6203801:8	768188.383	786620.994	8618370.492	8618394.210	1391	18433.76172573
COMM L6203901:8	768198.700	786650.445	8617805.845	8617836.456	1286	18453.51605909
COMM L6204101:8	768154.391	786613.448	8616692.517	8616733.991	1290	18460.56810286
COMM L6204201:8	768169.993	786606.934	8616141.837	8616182.349	1401	18440.50247273
COMM L6204401:8	772160.354	786582.711	8615035.595	8615072.115	1093	14424.03168719
COMM L6204501:8	772162.139	786596.023	8614481.595	8614521.483	999	14436.83705216
COMM L6204701:10	772157.233	786606.816	8613339.361	8613403.776	1058	14451.83147161
COMM L6204801:10	772153.287	786596.881	8612822.885	8612857.814	1031	14444.754359
COMM L6204901:10	772144.455	786594.483	8612265.681	8612288.845	1051	14451.32984948
COMM L6205001:10	772140.339	786582.994	8611704.874	8611740.780	1038	14444.71478274
COMM L6205101:11	772147.241	786575.112	8611140.764	8611167.735	1039	14429.03503471
COMM L6205201:11	772133.120	786578.886	8610587.515	8610621.620	1065	14447.57304443
COMM L6205301:11	772127.450	786564.459	8610045.173	8610071.599	1027	14438.36160167
COMM L6205401:11	772131.476	786557.500	8609485.413	8609509.759	1063	14426.9372661
COMM L6205601:13	772120.895	786604.943	8608372.940	8608393.357	1005	14484.61658125
COMM L6205701:11	772121.243	786603.136	8607822.838	8607843.429	1028	14482.73295754
COMM L6205801:13	772111.914	786590.240	8607263.908	8607283.057	1021	14478.84789557
COMM L6205901:13	772110.668	786585.889	8606704.837	8606724.427	1089	14475.65383957
COMM L6206001:13	772100.047	786579.343	8606154.683	8606191.159	1025	14480.48368259
COMM L6206101:13	772103.906	786571.135	8605599.792	8605617.386	1076	14467.88175451
COMM L6206201:13	771987.563	786569.948	8605043.669	8605076.226	1036	14583.4707097
COMM L6206301:13	771996.718	786566.000	8604475.809	8604550.019	1081	14575.0787916
COMM L6206501:13	772029.847	786566.559	8603367.871	8603405.140	1066	14537.83768018
COMM L6206601:13	772047.787	786566.010	8602820.776	8602840.788	1039	14518.72706752
COMM L6206701:13	772050.884	786558.969	8602256.664	8602285.172	1060	14509.0701642
COMM L6300101:6	758578.520	766626.039	8625929.057	8625946.405	584	8047.651841442
COMM L6300301:6	758574.694	766624.127	8625241.174	8625285.370	573	8050.699283664
COMM L6300401:6	758579.114	766638.714	8624932.489	8624962.395	566	8060.846204185
COMM L6400101:7	756861.728	764923.977	8621931.655	8621945.675	576	8062.566586962
COMM L6400201:7	756857.843	764915.320	8621597.931	8621613.841	589	8058.070356334
COMM L6400301:7	756857.002	764898.030	8621260.883	8621310.804	572	8043.357735596
COMM L6400401:7	756857.379	764881.953	8620933.166	8620957.177	584	8025.653506142
COMM L6400601:7	756839.334	764861.664	8620256.936	8620287.186	588	8023.340574569
COMM L6400701:7	756833.304	764869.922	8619932.269	8619946.810	569	8036.809943374
COMM L6400801:7	756839.415	764874.219	8619599.331	8619616.712	597	8035.122685334
COMM L6400901:7	756833.999	764876.028	8619261.549	8619292.282	571	8042.486019439
COMM L6401101:7	756818.023	764887.351	8618591.071	8618615.203	572	8070.658829634
COMM L6401201:7	756827.914	764890.186	8618264.311	8618295.121	601	8063.039484618
COMM L6600101:13	801986.664	818651.691	8602258.639	8602286.085	1191	16666.41277028
COMM L6600201:13	802796.934	818614.537	8600568.040	8600620.293	1150	15820.77850865
COMM L6600401:13	804502.103	818550.345	8597263.761	8597282.307	1024	14048.89687954
COMM L6600501:13	805413.504	818513.200	8595593.549	8595617.246	932	13100.52516238
COMM L6600701:13	806173.019	818437.287	8592251.273	8592287.204	884	12265.29772811
COMM L6600803:25	805342.113	818404.945	8590588.086	8590612.968	956	13063.39454015
COMM L6601001:13	790754.445	818903.542	8587254.756	8587286.946	2054	28151.10247592
COMM L6601101:14	790130.639	823035.689	8585591.827	8585626.846	2345	32907.41663958
COMM L6601301:14	788730.375	823063.330	8582253.913	8582293.856	2431	34335.50943019
COMM L6601401:14	791849.020	823062.897	8580594.587	8580622.852	2350	31215.14638057
COMM ALL	626097.562	834809.037	8560587.675	8655611.742	496536	6861933.602307

EM Window data – repeat lines

```
COMM GA PROJECT NUMBER                                              1196
COMM FAS PROJECT NUMBER                                             2017
COMM AREA NUMBER:                                                      1
COMM SURVEY COMPANY:                              Fugro Airborne Surveys
COMM CLIENT:                                        Geoscience Australia
COMM SURVEY TYPE:                                   25Hz TEMPEST Survey
COMM AREA NAME:                                                  Woolner
COMM STATE:                                                           NT
COMM COUNTRY:                                                  Australia
COMM SURVEY FLOWN:                            October to November 2008
COMM LOCATED DATA CREATED:                                    April 2009
COMM
COMM DATUM:                                                        GDA94
COMM PROJECTION:                                                     MGA
COMM ZONE:                                                            52
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM NOMINAL TERRAIN CLEARANCE:                                    120 m
COMM FINAL REPEAT LINE KILOMETRES:                                104 km
COMM
COMM LINE NUMBERING
```

```
COMM
COMM REPEAT LINE NUMBERS:                              910000201 - 910001201
COMM                                                   911001501 - 911003001
COMM
COMM SURVEY EQUIPMENT
COMM
COMM AIRCRAFT:                                 CASA C212 Turbo Prop, VH-TEM
COMM
COMM MAGNETOMETER:                              Scintrex Cs-2 Cesium Vapour
COMM INSTALLATION:                                            stinger mount
COMM RESOLUTION:                                                  0.001 nT
COMM RECORDING INTERVAL:                                             0.2 s
COMM
COMM ELECTROMAGNETIC SYSTEM:                                  25Hz TEMPEST
COMM INSTALLATION:                   Transmitter loop mounted on the aircraft
COMM                                           Receiver coils in a towed bird
COMM COIL ORIENTATION:                                                  X,Z
COMM RECORDING INTERVAL:                                             0.2 s
COMM SYSTEM GEOMETRY:
COMM RECEIVER DISTANCE BEHIND THE TRANSMITTER:                      -120 m
COMM RECEIVER DISTANCE BELOW THE TRANSMITTER:                        -35 m
COMM
COMM RADAR ALTIMETER:                                        Sperry RT-220
COMM RECORDING INTERVAL:                                             0.2 s
COMM
COMM LASER ALTIMETER:                                   Optech 501SB (TEM)
COMM RECORDING INTERVAL:                                             0.2 s
COMM
COMM NAVIGATION:                                real-time differential GPS
COMM RECORDING INTERVAL:                                             1.0 s
COMM
COMM ACQUISITION SYSTEM:                                            FASDAS
COMM
COMM DATA PROCESSING
COMM
COMM MAGNETIC DATA
COMM DIURNAL BASE VALUE APPLIED                                   47436 nT
COMM PARALLAX CORRECTION APPLIED (during final processing)           1.0 s
COMM IGRF BASE VALUE APPLIED                                      46836 nT
COMM IGRF MODEL 2005 EXTRAPOLATED TO                                2008.8
COMM
COMM ELECTROMAGNETIC DATA
COMM SYSTEM PARALLAX REMOVED, AS FOLLOWS
COMM X-COMPONENT EM DATA                                             1.6 s
COMM Z-COMPONENT EM DATA                                             0.2 s
COMM DATA CORRECTED FOR TRANSMITTER HEIGHT, PITCH AND ROLL
COMM DATA CORRECTED FOR TRANSMITTER-RECEIVER GEOMETRY VARIATIONS
COMM CONDUCTIVITY DEPTH INVERSION CALCULATED                  EMFlow V5.10
COMM CONDUCTIVITIES CALCULATED USING HPRG CORRECTED EMX & EMZ DATA
COMM
COMM DIGITAL TERRAIN DATA
COMM PARALLAX CORRECTION APPLIED TO LIDAR ALIMETER DATA              0.0 s
COMM PARALLAX CORRECTION APPLIED TO GPS ALIMETER DATA                0.0 s
COMM DTM CALCULATED [DTM = GPS ALTITUDE - LIDAR ALTITUDE - GPS/LIDAR DIST]
COMM N-VALUE APPLIED TO CORRECT DTM TO AUSTRALIAN HEIGHT DATUM (AHD)
COMM DATA HAVE BEEN MICROLEVELLED
COMM
COMM ---------------------------------------------------------------------
COMM DISCLAIMER
COMM ---------------------------------------------------------------------
COMM It is Fugro Airborne Survey’s understanding that the data provided to
COMM the client is to be used for the purpose agreed between the parties.
COMM That purpose was a significant factor in determining the scope and
COMM level of the Services being offered to the Client. Should the purpose
```

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COMM for which the data is used change, the data may no longer be valid or
COMM appropriate and any further use of, or reliance upon, the data in
COMM those circumstances by the Client without Fugro Airborne Survey's
COMM review and advice shall be at the Client's own or sole risk.
COMM
COMM The Services were performed by Fugro Airborne Survey exclusively for
COMM the purposes of the Client. Should the data be made available in whole
COMM or part to any third party, and such party relies thereon, that party
COMM does so wholly at its own and sole risk and Fugro Airborne Survey
COMM disclaims any liability to such party.
COMM
COMM Where the Services have involved Fugro Airborne Survey's use of any
COMM information provided by the Client or third parties, upon which
COMM Fugro Airborne Survey was reasonably entitled to rely, then the
COMM Services are limited by the accuracy of such information. Fugro
COMM Airborne Survey is not liable for any inaccuracies (including any
COMM incompleteness) in the said information, save as otherwise provided
COMM in the terms of the contract between the Client and Fugro Airborne
COMM Survey.
COMM
COMM With regard to DIGITAL TERRAIN DATA, the accuracy of the elevation
COMM calculation is directly dependent on the accuracy of the two input
COMM parameters lidar altitude and GPS altitude. The radar altitude value may
be
COMM erroneous in areas of heavy tree cover, where the altimeter reflects the
COMM distance to the tree canopy rather than the ground. The GPS altitude
value
COMM is primarily dependent on the number of available satellites. Although
COMM post-processing of GPS data will yield X and Y accuracies in the
COMM order of 1-2 metres, the accuracy of the altitude value is usually
COMM much less, sometimes in the ±5 metre range.  Further inaccuracies
COMM may be introduced during the interpolation and gridding process.
COMM Because of the inherent inaccuracies of this method, no guarantee is
COMM made or implied that the information displayed is a true
COMM representation of the height above sea level.  Although this product
COMM may be of some use as a general reference,
COMM THIS PRODUCT MUST NOT BE USED FOR NAVIGATION PURPOSES.
COMM ----------------------------------------------------------------------
COMM
COMM ELECTROMAGNETIC SYSTEM
COMM
COMM TEMPEST IS A TIME-DOMAIN SQUARE-WAVE SYSTEM,
COMM TRANSMITTING AT A BASE FREQUENCY OF 25Hz,
COMM WITH 2 ORTHOGONAL-AXIS RECEIVER COILS IN A TOWED BIRD.
COMM FINAL EM OUTPUT IS RECORDED 5 TIMES PER SECOND.
COMM THE TIMES (IN MILLISECONDS) FOR THE 15 WINDOWS ARE:
COMM
COMM WINDOW      START       END      CENTRE
COMM    1        0.007      0.020      0.013
COMM    2        0.033      0.047      0.040
COMM    3        0.060      0.073      0.067
COMM    4        0.087      0.127      0.107
COMM    5        0.140      0.207      0.173
COMM    6        0.220      0.340      0.280
COMM    7        0.353      0.553      0.453
COMM    8        0.567      0.873      0.720
COMM    9        0.887      1.353      1.120
COMM   10        1.367      2.100      1.733
COMM   11        2.113      3.273      2.693
COMM   12        3.287      5.113      4.200
COMM   13        5.127      7.993      6.560
COMM   14        8.007     12.393     10.200
COMM   15       12.407     19.993     16.200
COMM
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COMM PULSE WIDTH: 10 ms
COMM
COMM TEMPEST EM data are transformed to the response that would be
COMM obtained with a B-field sensor for a 100% duty cycle square
COMM waveform at the base frequency, involving a 1A change in
COMM current (from -0.5A to +0.5A to -0.5A) in a 1sq.m transmitter.
COMM It is this configuration, rather than the actual acquisition
COMM configuration, which must be specified when modelling TEMPEST data.
COMM
COMM
COMM
COMM LOCATED DATA FORMAT
COMM
COMM  Output field format : DOS  - Flat ascii
COMM  Number of fields    : 102
COMM
COMM Field  Channel         Description                         Units  Undefined     Format
COMM -----  -------         -----------                         -----  ---------     ------
COMM
COMM     1  LINE            Line                                        -99999999      i10
COMM     2  FLIGHT          Flight                                      -99             i4
COMM     3  FID             Fiducial                              (s)   -999999.9     f8.1
COMM     4  PROJECT_FAS     FAS Project Number                          -9999           i6
COMM     5  PROJECT_GA      GA Project Number                           -9999           i6
COMM     6  AIRCRAFT        System Number                               -9              i3
COMM     7  DATE            Date                             ddmmyyyy   -9999999        i9
COMM     8  TIME            Time - local midnight                 (s)   -9999.9       f8.1
COMM     9  BEARING         Line Bearing                        (deg)   -99             i4
COMM    10  LATITUDE        Latitude  GDA94                     (deg)   -99.9999999  f12.7
COMM    11  LONGITUDE       Longitude GDA94                     (deg)   -999.9999999 f13.7
COMM    12  EASTING         Easting   MGA51                       (m)   -99999.99    f10.2
COMM    13  NORTHING        Northing  MGA51                       (m)   -999999.99   f11.2
COMM    14  LIDAR           Final Lidar altimeter                 (m)   -999.99       f8.2
COMM    15  RADALT          Final Radar altimeter                 (m)   -999.99       f8.2
COMM    16  TX_ELEVATION    Final Transmitter Elevation - AHD     (m)   -999.99       f8.2
COMM    17  DTM             Final Ground Elevation - AHD          (m)   -999.99       f8.2
COMM    18  MAG             Final TMI                            (nT)   -99999.999   f11.3
COMM    19  TX_PITCH        Transmitter loop pitch              (deg)   -999.99       f8.2
COMM    20  TX_ROLL         Transmitter loop roll               (deg)   -999.99       f8.2
COMM    21  TX_HEIGHT       Transmitter terrain clearance         (m)   -999.99       f8.2
COMM    22  HSep_Raw        Tx-Rx horizontal separation           (m)   -999.99       f8.2
COMM    23  VSep_Raw        Tx-Rx vertical separation             (m)   -999.99       f8.2
COMM    24  TX_HEIGHT_std   Tx HPRG terrain clearance             (m)   -999.99       f8.2
COMM    25  HSep_std        Tx-Rx HPRG horizontal separation      (m)   -999.99       f8.2
COMM    26  VSep_std        Tx-Rx HPRG vertical separation        (m)   -999.99       f8.2
COMM    27  EMX_nonhprg[1]  Raw (non-HPRG) EMX01 Window          (fT)   -999.999999  f12.6
COMM    28  EMX_nonhprg[2]  Raw (non-HPRG) EMX02 Window          (fT)   -999.999999  f12.6
COMM    29  EMX_nonhprg[3]  Raw (non-HPRG) EMX03 Window          (fT)   -999.999999  f12.6
COMM    30  EMX_nonhprg[4]  Raw (non-HPRG) EMX04 Window          (fT)   -999.999999  f12.6
COMM    31  EMX_nonhprg[5]  Raw (non-HPRG) EMX05 Window          (fT)   -999.999999  f12.6
COMM    32  EMX_nonhprg[6]  Raw (non-HPRG) EMX06 Window          (fT)   -999.999999  f12.6
COMM    33  EMX_nonhprg[7]  Raw (non-HPRG) EMX07 Window          (fT)   -999.999999  f12.6
COMM    34  EMX_nonhprg[8]  Raw (non-HPRG) EMX08 Window          (fT)   -999.999999  f12.6
COMM    35  EMX_nonhprg[9]  Raw (non-HPRG) EMX09 Window          (fT)   -999.999999  f12.6
COMM    36  EMX_nonhprg[10] Raw (non-HPRG) EMX10 Window          (fT)   -999.999999  f12.6
COMM    37  EMX_nonhprg[11] Raw (non-HPRG) EMX11 Window          (fT)   -999.999999  f12.6
COMM    38  EMX_nonhprg[12] Raw (non-HPRG) EMX12 Window          (fT)   -999.999999  f12.6
COMM    39  EMX_nonhprg[13] Raw (non-HPRG) EMX13 Window          (fT)   -999.999999  f12.6
COMM    40  EMX_nonhprg[14] Raw (non-HPRG) EMX14 Window          (fT)   -999.999999  f12.6
COMM    41  EMX_nonhprg[15] Raw (non-HPRG) EMX15 Window          (fT)   -999.999999  f12.6
COMM    42  EMX_hprg[1]     HPRG Corrected EMX01 Window          (fT)   -999.999999  f12.6
COMM    43  EMX_hprg[2]     HPRG Corrected EMX02 Window          (fT)   -999.999999  f12.6
COMM    44  EMX_hprg[3]     HPRG Corrected EMX03 Window          (fT)   -999.999999  f12.6
COMM    45  EMX_hprg[4]     HPRG Corrected EMX04 Window          (fT)   -999.999999  f12.6
COMM    46  EMX_hprg[5]     HPRG Corrected EMX05 Window          (fT)   -999.999999  f12.6
COMM    47  EMX_hprg[6]     HPRG Corrected EMX06 Window          (fT)   -999.999999  f12.6
COMM    48  EMX_hprg[7]     HPRG Corrected EMX07 Window          (fT)   -999.999999  f12.6
COMM    49  EMX_hprg[8]     HPRG Corrected EMX08 Window          (fT)   -999.999999  f12.6
COMM    50  EMX_hprg[9]     HPRG Corrected EMX09 Window          (fT)   -999.999999  f12.6
COMM    51  EMX_hprg[10]    HPRG Corrected EMX10 Window          (fT)   -999.999999  f12.6
COMM    52  EMX_hprg[11]    HPRG Corrected EMX11 Window          (fT)   -999.999999  f12.6
COMM    53  EMX_hprg[12]    HPRG Corrected EMX12 Window          (fT)   -999.999999  f12.6
COMM    54  EMX_hprg[13]    HPRG Corrected EMX13 Window          (fT)   -999.999999  f12.6
COMM    55  EMX_hprg[14]    HPRG Corrected EMX14 Window          (fT)   -999.999999  f12.6
COMM    56  EMX_hprg[15]    HPRG Corrected EMX15 Window          (fT)   -999.999999  f12.6
COMM    57  X_Sferics       X_Sferics                                   -9999.999    f10.3
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COMM    58  X_Lowfreq        X_Lowfreq                              -9999.999    f10.3
COMM    59  X_Powerline      X_Powerline                            -9999.999    f10.3
COMM    60  X_VLF1           X_18.2kHz                              -9999.999    f10.3
COMM    61  X_VLF2           X_19.8kHz                              -9999.999    f10.3
COMM    62  X_VLF3           X_21.4kHz                              -9999.999    f10.3
COMM    63  X_VLF4           X_22.2kHz                              -9999.999    f10.3
COMM    64  X_Geofact        X_Geometric factor                     -9999.999    f10.3
COMM    65  EMZ_nonhprg[1]   Raw (non-HPRG) EMZ01 Window      (fT)  -999.999999  f12.6
COMM    66  EMZ_nonhprg[2]   Raw (non-HPRG) EMZ02 Window      (fT)  -999.999999  f12.6
COMM    67  EMZ_nonhprg[3]   Raw (non-HPRG) EMZ03 Window      (fT)  -999.999999  f12.6
COMM    68  EMZ_nonhprg[4]   Raw (non-HPRG) EMZ04 Window      (fT)  -999.999999  f12.6
COMM    69  EMZ_nonhprg[5]   Raw (non-HPRG) EMZ05 Window      (fT)  -999.999999  f12.6
COMM    70  EMZ_nonhprg[6]   Raw (non-HPRG) EMZ06 Window      (fT)  -999.999999  f12.6
COMM    71  EMZ_nonhprg[7]   Raw (non-HPRG) EMZ07 Window      (fT)  -999.999999  f12.6
COMM    72  EMZ_nonhprg[8]   Raw (non-HPRG) EMZ08 Window      (fT)  -999.999999  f12.6
COMM    73  EMZ_nonhprg[9]   Raw (non-HPRG) EMZ09 Window      (fT)  -999.999999  f12.6
COMM    74  EMZ_nonhprg[10]  Raw (non-HPRG) EMZ10 Window      (fT)  -999.999999  f12.6
COMM    75  EMZ_nonhprg[11]  Raw (non-HPRG) EMZ11 Window      (fT)  -999.999999  f12.6
COMM    76  EMZ_nonhprg[12]  Raw (non-HPRG) EMZ12 Window      (fT)  -999.999999  f12.6
COMM    77  EMZ_nonhprg[13]  Raw (non-HPRG) EMZ13 Window      (fT)  -999.999999  f12.6
COMM    78  EMZ_nonhprg[14]  Raw (non-HPRG) EMZ14 Window      (fT)  -999.999999  f12.6
COMM    79  EMZ_nonhprg[15]  Raw (non-HPRG) EMZ15 Window      (fT)  -999.999999  f12.6
COMM    80  EMZ_hprg[1]      HPRG Corrected EMZ01 Window      (fT)  -999.999999  f12.6
COMM    81  EMZ_hprg[2]      HPRG Corrected EMZ02 Window      (fT)  -999.999999  f12.6
COMM    82  EMZ_hprg[3]      HPRG Corrected EMZ03 Window      (fT)  -999.999999  f12.6
COMM    83  EMZ_hprg[4]      HPRG Corrected EMZ04 Window      (fT)  -999.999999  f12.6
COMM    84  EMZ_hprg[5]      HPRG Corrected EMZ05 Window      (fT)  -999.999999  f12.6
COMM    85  EMZ_hprg[6]      HPRG Corrected EMZ06 Window      (fT)  -999.999999  f12.6
COMM    86  EMZ_hprg[7]      HPRG Corrected EMZ07 Window      (fT)  -999.999999  f12.6
COMM    87  EMZ_hprg[8]      HPRG Corrected EMZ08 Window      (fT)  -999.999999  f12.6
COMM    88  EMZ_hprg[9]      HPRG Corrected EMZ09 Window      (fT)  -999.999999  f12.6
COMM    89  EMZ_hprg[10]     HPRG Corrected EMZ10 Window      (fT)  -999.999999  f12.6
COMM    90  EMZ_hprg[11]     HPRG Corrected EMZ11 Window      (fT)  -999.999999  f12.6
COMM    91  EMZ_hprg[12]     HPRG Corrected EMZ12 Window      (fT)  -999.999999  f12.6
COMM    92  EMZ_hprg[13]     HPRG Corrected EMZ13 Window      (fT)  -999.999999  f12.6
COMM    93  EMZ_hprg[14]     HPRG Corrected EMZ14 Window      (fT)  -999.999999  f12.6
COMM    94  EMZ_hprg[15]     HPRG Corrected EMZ15 Window      (fT)  -999.999999  f12.6
COMM    95  Z_Sferics        Z_Sferics                              -9999.999    f10.3
COMM    96  Z_Lowfreq        Z_Lowfreq                              -9999.999    f10.3
COMM    97  Z_Powerline      Z_Powerline                            -9999.999    f10.3
COMM    98  Z_VLF1           Z_18.2kHz                              -9999.999    f10.3
COMM    99  Z_VLF2           Z_19.8kHz                              -9999.999    f10.3
COMM   100  Z_VLF3           Z_21.4kHz                              -9999.999    f10.3
COMM   101  Z_VLF4           Z_22.2kHz                              -9999.999    f10.3
COMM   102  Z_Geofact        Z_Geometric factor                     -9999.999    f10.3
COMM
COMM Line Number    X-minimum      X-maximum      Y-minimum      Y-maximum      # of points Total
distance
-----------    ---------      ---------      ---------      --------       ----------- ----------
----
D910000101:1   758617.973    766595.117    8625929.214    8625951.529    593      7977.960349781
D910000201:2   758614.627    766605.068    8625930.235    8625948.988    611      7991.157895713
D910000301:3   758617.752    766602.559    8625930.117    8625948.046    630      7985.071977546
D910000401:4   758611.606    766594.805    8625921.834    8625947.767    576      7984.167942048
D910000601:6   758606.464    766598.474    8625929.259    8625946.404    580      7992.141857788
D910000901:9   758613.838    766605.406    8625925.485    8625954.563    573      7992.126408156
D910001201:12  758607.447    766606.442    8625928.823    8625945.733    546      7999.319002098
D910001201:12  758622.956    766606.442    8625928.823    8625945.733    545      7983.803057622
D911001501:15  751706.078    759788.070    8568934.638    8568950.168    559      8082.2088958
D911001801:18  751701.721    759789.825    8568922.931    8568945.713    582      8088.483041208
D911002101:21  751710.376    759788.164    8568938.295    8568948.949    575      8078.168517275
D911002401:24  751703.730    759783.265    8568936.783    8568946.489    582      8079.688873307
D911002701:27  751705.815    759787.134    8568932.214    8568950.259    568      8081.686572674
D911003001:30  751700.154    759780.395    8568936.550    8568950.734    581      8080.582651933
ALL            751700.154    766608.622    8568922.931    8625954.563    7556     104410.5028871
```

Conductivity data – survey lines

```
COMM GA PROJECT NUMBER                                       1196
COMM FAS PROJECT NUMBER                                      2017
COMM AREA NUMBER:                                               1
COMM SURVEY COMPANY:                       Fugro Airborne Surveys
COMM CLIENT:                                 Geoscience Australia
COMM SURVEY TYPE:                           25Hz TEMPEST Survey
COMM AREA NAME:                                           Woolner
COMM STATE:                                                    NT
```

```
COMM COUNTRY:                                                  Australia
COMM SURVEY FLOWN:                                October to November 2008
COMM LOCATED DATA CREATED:                                    April 2009
COMM
COMM DATUM:                                                        GDA94
COMM PROJECTION:                                                     MGA
COMM ZONE:                                                            52
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM TRAVERSE LINE SPACING:                                   238-5000 m
COMM TRAVERSE LINE DIRECTION:                                090-270 deg
COMM NOMINAL TERRAIN CLEARANCE:                                    120 m
COMM FINAL LINE KILOMETRES:                                      6862 km
COMM
COMM LINE NUMBERING
COMM
COMM TRAVERSE LINE NUMBERS:                            1000101 - 1102301
COMM                                                   2800101 - 2802901
COMM                                                   2900101 - 2901502
COMM                                                   3000103 - 3303101
COMM                                                   4100201 - 4300503
COMM                                                   5000101 - 5200101
COMM                                                   6100301 - 6601401
COMM
COMM SURVEY EQUIPMENT
COMM
COMM AIRCRAFT:                                 CASA C212 Turbo Prop, VH-TEM
COMM
COMM MAGNETOMETER:                              Scintrex Cs-2 Cesium Vapour
COMM INSTALLATION:                                           stinger mount
COMM RESOLUTION:                                                 0.001 nT
COMM RECORDING INTERVAL:                                            0.2 s
COMM
COMM ELECTROMAGNETIC SYSTEM:                                 25Hz TEMPEST
COMM INSTALLATION:                 Transmitter loop mounted on the aircraft
COMM                                         Receiver coils in a towed bird
COMM COIL ORIENTATION:                                                X,Z
COMM RECORDING INTERVAL:                                            0.2 s
COMM SYSTEM GEOMETRY:
COMM RECEIVER DISTANCE BEHIND THE TRANSMITTER:                     -120 m
COMM RECEIVER DISTANCE BELOW THE TRANSMITTER:                       -35 m
COMM
COMM RADAR ALTIMETER:                                       Sperry RT-220
COMM RECORDING INTERVAL:                                            0.2 s
COMM
COMM LASER ALTIMETER:                                   Optech 501SB (TEM)
COMM RECORDING INTERVAL:                                            0.2 s
COMM
COMM NAVIGATION:                                real-time differential GPS
COMM RECORDING INTERVAL:                                            1.0 s
COMM
COMM ACQUISITION SYSTEM:                                           FASDAS
COMM
COMM DATA PROCESSING
COMM
COMM MAGNETIC DATA
COMM DIURNAL BASE VALUE APPLIED                                  47436 nT
COMM PARALLAX CORRECTION APPLIED (during final processing)          1.0 s
COMM IGRF BASE VALUE APPLIED                                     46836 nT
COMM IGRF MODEL 2005 EXTRAPOLATED TO                               2008.8
COMM DATA HAVE BEEN MICROLEVELLED
COMM
COMM ELECTROMAGNETIC DATA
```

```
COMM SYSTEM PARALLAX REMOVED, AS FOLLOWS
COMM X-COMPONENT EM DATA                                            1.6 s
COMM Z-COMPONENT EM DATA                                            0.2 s
COMM DATA CORRECTED FOR TRANSMITTER HEIGHT, PITCH AND ROLL
COMM DATA CORRECTED FOR TRANSMITTER-RECEIVER GEOMETRY VARIATIONS
COMM DATA HAVE BEEN MICROLEVELLED
COMM CONDUCTIVITY DEPTH INVERSION CALCULATED                  EMFlow V5.10
COMM CONDUCTIVITIES CALCULATED USING HPRG CORRECTED EMX & EMZ DATA
COMM
COMM DIGITAL TERRAIN DATA
COMM PARALLAX CORRECTION APPLIED TO LIDAR ALIMETER DATA             0.0 s
COMM PARALLAX CORRECTION APPLIED TO GPS ALIMETER DATA               0.0 s
COMM DTM CALCULATED [DTM = GPS ALTITUDE - LIDAR ALTITUDE - GPS/LIDAR DIST]
COMM N-VALUE APPLIED TO CORRECT DTM TO AUSTRALIAN HEIGHT DATUM (AHD)
COMM DATA HAVE BEEN MICROLEVELLED
COMM
COMM --------------------------------------------------------------------
COMM DISCLAIMER
COMM --------------------------------------------------------------------
COMM It is Fugro Airborne Survey’s understanding that the data provided to
COMM the client is to be used for the purpose agreed between the parties.
COMM That purpose was a significant factor in determining the scope and
COMM level of the Services being offered to the Client. Should the purpose
COMM for which the data is used change, the data may no longer be valid or
COMM appropriate and any further use of, or reliance upon, the data in
COMM those circumstances by the Client without Fugro Airborne Survey's
COMM review and advice shall be at the Client's own or sole risk.
COMM
COMM The Services were performed by Fugro Airborne Survey exclusively for
COMM the purposes of the Client. Should the data be made available in whole
COMM or part to any third party, and such party relies thereon, that party
COMM does so wholly at its own and sole risk and Fugro Airborne Survey
COMM disclaims any liability to such party.
COMM
COMM Where the Services have involved Fugro Airborne Survey's use of any
COMM information provided by the Client or third parties, upon which
COMM Fugro Airborne Survey was reasonably entitled to rely, then the
COMM Services are limited by the accuracy of such information. Fugro
COMM Airborne Survey is not liable for any inaccuracies (including any
COMM incompleteness) in the said information, save as otherwise provided
COMM in the terms of the contract between the Client and Fugro Airborne
COMM Survey.
COMM
COMM With regard to DIGITAL TERRAIN DATA, the accuracy of the elevation
COMM calculation is directly dependent on the accuracy of the two input
COMM parameters lidar altitude and GPS altitude. The radar altitude value may
be
COMM erroneous in areas of heavy tree cover, where the altimeter reflects the
COMM distance to the tree canopy rather than the ground. The GPS altitude
value
COMM is primarily dependent on the number of available satellites. Although
COMM post-processing of GPS data will yield X and Y accuracies in the
COMM order of 1-2 metres, the accuracy of the altitude value is usually
COMM much less, sometimes in the ±5 metre range.  Further inaccuracies
COMM may be introduced during the interpolation and gridding process.
COMM Because of the inherent inaccuracies of this method, no guarantee is
COMM made or implied that the information displayed is a true
COMM representation of the height above sea level.  Although this product
COMM may be of some use as a general reference,
COMM THIS PRODUCT MUST NOT BE USED FOR NAVIGATION PURPOSES.
COMM --------------------------------------------------------------------
COMM
COMM ELECTROMAGNETIC SYSTEM
COMM
```

```
COMM TEMPEST IS A TIME-DOMAIN SQUARE-WAVE SYSTEM,
COMM TRANSMITTING AT A BASE FREQUENCY OF 25Hz,
COMM WITH 2 ORTHOGONAL-AXIS RECEIVER COILS IN A TOWED BIRD.
COMM FINAL EM OUTPUT IS RECORDED 5 TIMES PER SECOND.
COMM THE TIMES (IN MILLISECONDS) FOR THE 15 WINDOWS ARE:
COMM
COMM WINDOW      START       END      CENTRE
COMM    1        0.007      0.020      0.013
COMM    2        0.033      0.047      0.040
COMM    3        0.060      0.073      0.067
COMM    4        0.087      0.127      0.107
COMM    5        0.140      0.207      0.173
COMM    6        0.220      0.340      0.280
COMM    7        0.353      0.553      0.453
COMM    8        0.567      0.873      0.720
COMM    9        0.887      1.353      1.120
COMM   10        1.367      2.100      1.733
COMM   11        2.113      3.273      2.693
COMM   12        3.287      5.113      4.200
COMM   13        5.127      7.993      6.560
COMM   14        8.007     12.393     10.200
COMM   15       12.407     19.993     16.200
COMM
COMM PULSE WIDTH: 10 ms
COMM
COMM TEMPEST EM data are transformed to the response that would be
COMM obtained with a B-field sensor for a 100% duty cycle square
COMM waveform at the base frequency, involving a 1A change in
COMM current (from -0.5A to +0.5A to -0.5A) in a 1sq.m transmitter.
COMM It is this configuration, rather than the actual acquisition
COMM configuration, which must be specified when modelling TEMPEST data.
COMM
COMM
COMM
COMM LOCATED DATA FORMAT
COMM
COMM  Output field format : DOS  - Flat ascii
COMM  Number of fields    : 68
COMM
COMM Field  Channel         Description                        Units  Undefined    Format
COMM -----  -------         -----------                        -----  ---------    ------
COMM
COMM     1  LINE            Line                                       -99999999      i10
COMM     2  FLIGHT          Flight                                     -99             i4
COMM     3  FID             Fiducial                             (s)   -999999.9     f8.1
COMM     4  PROJECT_FAS     FAS Project Number                         -9999           i6
COMM     5  PROJECT_GA      GA Project Number                          -9999           i6
COMM     6  AIRCRAFT        System Number                              -9              i3
COMM     7  DATE            Date                            ddmmyyyy   -9999999        i9
COMM     8  TIME            Time - local midnight                (s)   -9999.9       f8.1
COMM     9  BEARING         Line Bearing                       (deg)   -99             i4
COMM    10  LATITUDE        Latitude  GDA94                    (deg)   -99.9999999  f12.7
COMM    11  LONGITUDE       Longitude GDA94                    (deg)   -999.9999999 f13.7
COMM    12  EASTING         Easting   MGA51                      (m)   -99999.99    f10.2
COMM    13  NORTHING        Northing  MGA51                      (m)   -999999.99   f11.2
COMM    14  LIDAR           Final Lidar altimeter                (m)   -999.99       f8.2
COMM    15  RADALT          Final Radar altimeter                (m)   -999.99       f8.2
COMM    16  TX_ELEVATION    Final Transmitter Elevation - AHD   (m)   -999.99       f8.2
COMM    17  DTM             Final Ground Elevation - AHD         (m)   -999.99       f8.2
COMM    18  MAG             Final TMI                           (nT)   -99999.999   f11.3
COMM    19  CND_DS01        CDI_depth_slice_01   0-    5 m   (mS/m)   -9999.999    f10.3
COMM    20  CND_DS02        CDI_depth_slice_02   5-   10 m   (mS/m)   -9999.999    f10.3
COMM    21  CND_DS03        CDI_depth_slice_03   10-  15 m   (mS/m)   -9999.999    f10.3
COMM    22  CND_DS04        CDI_depth_slice_04   15-  20 m   (mS/m)   -9999.999    f10.3
COMM    23  CND_DS05        CDI_depth_slice_05   20-  30 m   (mS/m)   -9999.999    f10.3
COMM    24  CND_DS06        CDI_depth_slice_06   30-  40 m   (mS/m)   -9999.999    f10.3
COMM    25  CND_DS07        CDI_depth_slice_07   40-  60 m   (mS/m)   -9999.999    f10.3
COMM    26  CND_DS08        CDI_depth_slice_08   60- 100 m   (mS/m)   -9999.999    f10.3
COMM    27  CND_DS09        CDI_depth_slice_09   100-150 m   (mS/m)   -9999.999    f10.3
COMM    28  CND_DS10        CDI_depth_slice_10   150-200 m   (mS/m)   -9999.999    f10.3
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COMM    29  CND[1]          Conductivity_001      0-  5 m   (mS/m)   -9999.999    f10.3
COMM    30  CND[2]          Conductivity_002      5- 10 m   (mS/m)   -9999.999    f10.3
COMM    31  CND[3]          Conductivity_003     10- 15 m   (mS/m)   -9999.999    f10.3
COMM    32  CND[4]          Conductivity_004     15- 20 m   (mS/m)   -9999.999    f10.3
COMM    33  CND[5]          Conductivity_005     20- 25 m   (mS/m)   -9999.999    f10.3
COMM    34  CND[6]          Conductivity_006     25- 30 m   (mS/m)   -9999.999    f10.3
COMM    35  CND[7]          Conductivity_007     30- 35 m   (mS/m)   -9999.999    f10.3
COMM    36  CND[8]          Conductivity_008     35- 40 m   (mS/m)   -9999.999    f10.3
COMM    37  CND[9]          Conductivity_009     40- 45 m   (mS/m)   -9999.999    f10.3
COMM    38  CND[10]         Conductivity_010     45- 50 m   (mS/m)   -9999.999    f10.3
COMM    39  CND[11]         Conductivity_011     50- 55 m   (mS/m)   -9999.999    f10.3
COMM    40  CND[12]         Conductivity_012     55- 60 m   (mS/m)   -9999.999    f10.3
COMM    41  CND[13]         Conductivity_013     60- 65 m   (mS/m)   -9999.999    f10.3
COMM    42  CND[14]         Conductivity_014     65- 70 m   (mS/m)   -9999.999    f10.3
COMM    43  CND[15]         Conductivity_015     70- 75 m   (mS/m)   -9999.999    f10.3
COMM    44  CND[16]         Conductivity_016     75- 80 m   (mS/m)   -9999.999    f10.3
COMM    45  CND[17]         Conductivity_017     80- 85 m   (mS/m)   -9999.999    f10.3
COMM    46  CND[18]         Conductivity_018     85- 90 m   (mS/m)   -9999.999    f10.3
COMM    47  CND[19]         Conductivity_019     90- 95 m   (mS/m)   -9999.999    f10.3
COMM    48  CND[20]         Conductivity_020     95-100 m   (mS/m)   -9999.999    f10.3
COMM    49  CND[21]         Conductivity_021    100-105 m   (mS/m)   -9999.999    f10.3
COMM    50  CND[22]         Conductivity_022    105-110 m   (mS/m)   -9999.999    f10.3
COMM    51  CND[23]         Conductivity_023    110-115 m   (mS/m)   -9999.999    f10.3
COMM    52  CND[24]         Conductivity_024    115-120 m   (mS/m)   -9999.999    f10.3
COMM    53  CND[25]         Conductivity_025    120-125 m   (mS/m)   -9999.999    f10.3
COMM    54  CND[26]         Conductivity_026    125-130 m   (mS/m)   -9999.999    f10.3
COMM    55  CND[27]         Conductivity_027    130-135 m   (mS/m)   -9999.999    f10.3
COMM    56  CND[28]         Conductivity_028    135-140 m   (mS/m)   -9999.999    f10.3
COMM    57  CND[29]         Conductivity_029    140-145 m   (mS/m)   -9999.999    f10.3
COMM    58  CND[30]         Conductivity_030    145-150 m   (mS/m)   -9999.999    f10.3
COMM    59  CND[31]         Conductivity_031    150-155 m   (mS/m)   -9999.999    f10.3
COMM    60  CND[32]         Conductivity_032    155-160 m   (mS/m)   -9999.999    f10.3
COMM    61  CND[33]         Conductivity_033    160-165 m   (mS/m)   -9999.999    f10.3
COMM    62  CND[34]         Conductivity_034    165-170 m   (mS/m)   -9999.999    f10.3
COMM    63  CND[35]         Conductivity_035    170-175 m   (mS/m)   -9999.999    f10.3
COMM    64  CND[36]         Conductivity_036    175-180 m   (mS/m)   -9999.999    f10.3
COMM    65  CND[37]         Conductivity_037    180-185 m   (mS/m)   -9999.999    f10.3
COMM    66  CND[38]         Conductivity_038    185-190 m   (mS/m)   -9999.999    f10.3
COMM    67  CND[39]         Conductivity_039    190-195 m   (mS/m)   -9999.999    f10.3
COMM    68  CND[40]         Conductivity_040    195-200 m   (mS/m)   -9999.999    f10.3
COMM
COMM Line Number     X-minimum      X-maximum      Y-minimum      Y-maximum      # of points Total distance
COMM -----------     ---------      ---------      ---------      --------       ----------- --------------
COMM L1000101:15     701699.649     755735.871     8598930.412    8598968.032    4067        54039.886185
COMM L1000201:14     772068.207     788661.980     8598929.413    8598948.284    1187        16594.68325671
COMM L1000301:26     665068.950     673106.890     8593932.710    8593951.015    587         8038.312239841
COMM L1000401:15     701668.710     762773.967     8593915.687    8593969.139    4255        61112.24761159
COMM L1000501:16     771902.492     787461.491     8593926.073    8593956.247    1082        15560.01208714
COMM L1000601:26     665028.782     673114.007     8588929.863    8588946.515    581         8085.413592158
COMM L1000701:16     701630.042     786326.716     8588753.658    8589014.670    6250        84750.80188417
COMM L1000801:26     661356.010     672870.726     8583927.396    8583954.635    834         11515.68305178
COMM L1000901:16     701604.008     783214.729     8583888.921    8583974.947    5812        81630.50498423
COMM L1001001:26     648784.908     672810.212     8578927.246    8578943.893    1744        24025.86922623
COMM L1001101:17     701573.665     781185.843     8578796.729    8579045.528    5934        79649.63924522
COMM L1001201:18     640131.229     783179.249     8573894.275    8574072.448    10225       143077.5668749
COMM L1001301:25     786265.992     801716.058     8573912.754    8573960.395    1114        15455.56091809
COMM L1001401:18     632030.903     787862.563     8568924.538    8568980.949    11527       155839.3222702
COMM L1001501:32     626097.562     787965.201     8563895.226    8563966.772    11471       161891.7224076
COMM L1100101:17     703412.927     737089.658     8590392.827    8590679.382    2396        33730.55523818
COMM L1100302:22     703425.988     737010.183     8587191.670    8587440.317    2455        33619.86523188
COMM L1100402:22     703426.527     736983.536     8585595.994    8585735.860    2411        33569.35971734
COMM L1100602:22     703368.660     736954.479     8582250.991    8582310.062    2416        33592.61775769
COMM L1100702:25     703367.811     736950.876     8580582.247    8580735.818    2410        33600.81996603
COMM L1100901:22     703402.699     736886.226     8577251.793    8577296.300    2494        33487.54320863
COMM L1101001:22     703336.282     736887.723     8575599.873    8575631.461    2415        33553.13927627
COMM L1101201:22     703307.540     736910.005     8572269.610    8572292.654    2422        33603.76590959
COMM L1101301:22     703307.635     736880.380     8570576.829    8570642.146    2479        33579.25229863
COMM L1101501:22     703289.497     736817.273     8567221.157    8567292.258    2455        33535.03962871
COMM L1101701:22     708971.133     736823.359     8565592.437    8565629.569    2009        27854.76621012
COMM L1101901:22     703249.975     736789.062     8562269.461    8562307.967    2408        33542.60500707
COMM L1102001:22     703258.349     736782.540     8560587.675    8560630.890    2445        33527.65579076
COMM L2800101:14     749660.766     757720.612     8597589.903    8597608.604    567         8060.349044366
COMM L2800201:14     750100.598     758179.274     8597265.369    8597293.321    593         8079.132004985
COMM L2800301:14     750545.428     758635.236     8596921.488    8596951.180    573         8091.400555112
COMM L2800401:14     750219.062     759115.658     8596606.353    8596617.980    647         8896.842526245
COMM L2800501:14     749889.823     759575.187     8596254.182    8596283.871    686         9687.397935591
COMM L2800601:16     749550.744     760049.664     8595914.663    8595950.719    752         10501.32977696
COMM L2800701:16     749214.182     760580.571     8595566.481    8595612.925    817         11367.48935581
COMM L2800801:16     748882.338     760983.338     8595255.627    8595283.130    862         12101.51327241
COMM L2800901:16     748620.047     761486.339     8594919.224    8594948.157    924         12867.46105177
COMM L2801001:16     748610.876     761909.183     8594586.586    8594620.862    948         13299.45075511
COMM L2801101:16     748622.235     762511.806     8594203.325    8594282.189    985         13894.35570009
COMM L2801301:17     748597.525     762491.196     8593595.484    8593620.179    1018        13894.94865052
COMM L2801401:17     748602.015     762487.953     8593257.247    8593284.763    1002        13886.89549317
COMM L2801501:17     748603.596     762499.052     8592917.288    8592950.280    1013        13896.69468186
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COMM L2801601:17	748606.005	762506.208	8592590.852	8592614.001	1003	13900.83671288
COMM L2801701:17	748613.290	762514.983	8592237.433	8592288.741	1005	13903.98846913
COMM L2801801:17	748618.723	762524.356	8591926.917	8591947.651	1007	13906.7287543
COMM L2801901:18	750610.439	765090.777	8591595.852	8591663.129	1028	14484.80912762
COMM L2802001:17	751533.885	780986.610	8591252.400	8591289.853	2129	29455.95804262
COMM L2802101:16	751515.189	786339.274	8590901.082	8590974.524	2540	34833.64237222
COMM L2802201:17	751491.663	786348.064	8590515.327	8590683.986	2500	34878.81511054
COMM L2802301:17	751468.119	786339.912	8590154.695	8590364.768	2536	34891.41084106
COMM L2802401:17	751438.656	786326.017	8589885.824	8589971.175	2468	34899.06015242
COMM L2802501:17	751460.799	786325.177	8589487.824	8589754.662	2556	34928.2904017
COMM L2802601:18	769553.537	786318.467	8589263.139	8589281.188	1202	16765.98970967
COMM L2802801:18	769499.129	786315.673	8588562.346	8588621.292	1193	16819.46377093
COMM L2802901:18	769494.754	786315.928	8588247.895	8588419.128	1213	16843.79103514
COMM L2900101:18	770261.157	783209.886	8584595.863	8584619.326	911	12949.6503976
COMM L2900201:18	770248.364	783209.653	8584253.371	8584284.195	948	12962.48091359
COMM L2900401:18	770239.851	783216.150	8583599.599	8583627.844	951	12977.34186883
COMM L2900501:18	770248.500	783220.493	8583260.572	8583287.920	906	12972.96892787
COMM L2900601:18	770244.726	783212.026	8582926.479	8582970.154	959	12970.86049936
COMM L2900702:25	770245.835	783219.791	8582588.940	8582620.408	934	12974.61457866
COMM L2900801:19	770248.626	783228.780	8582259.971	8582282.029	929	12981.1348468
COMM L2900901:19	770252.414	783225.772	8581930.006	8581954.285	939	12974.93311861
COMM L2901001:19	770248.482	783228.792	8581583.802	8581635.602	923	12983.81744507
COMM L2901101:19	770243.960	783226.859	8581261.430	8581287.458	943	12983.44570371
COMM L2901201:19	770250.908	783238.731	8580931.425	8580956.444	920	12988.51390562
COMM L2901302:25	770242.716	783237.467	8580585.419	8580616.428	935	12996.45135201
COMM L2901401:19	770251.143	783231.018	8580267.231	8580293.535	918	12980.81610607
COMM L2901502:25	770247.703	783240.074	8579927.863	8579945.300	928	12993.10191638
COMM L3000103:24	786408.450	801684.850	8576234.665	8576279.519	1084	15278.16275695
COMM L3000203:24	786421.824	801697.732	8575916.200	8575949.711	1128	15277.66903479
COMM L3000301:24	786430.176	801700.961	8575587.958	8575613.207	1068	15271.81633116
COMM L3000402:25	786445.815	801696.705	8575265.584	8575280.212	1154	15251.62425591
COMM L3000502:25	786449.578	801701.169	8574932.701	8574945.292	1060	15251.95929669
COMM L3000602:25	786464.388	801715.930	8574594.771	8574627.003	1134	15253.30556705
COMM L3000701:24	786469.302	801713.745	8574262.995	8574307.416	1081	15246.54643568
COMM L3000902:25	786519.508	801711.613	8573595.864	8573625.082	1057	15193.45883508
COMM L3001001:24	786527.079	801692.705	8573266.941	8573281.925	1105	15166.2016407
COMM L3001102:25	786538.073	801674.460	8572927.942	8572951.859	1062	15137.59722351
COMM L3001202:25	786540.063	801659.030	8572592.781	8572627.351	1119	15120.98332133
COMM L3001301:25	786550.665	801643.771	8572260.253	8572280.334	1066	15094.11340808
COMM L3001401:25	786563.375	801619.361	8571928.547	8571949.563	1112	15057.41724108
COMM L3001501:25	786567.828	801601.628	8571447.308	8571615.362	1080	15058.03627977
COMM L3001601:25	786585.932	801588.716	8571260.580	8571286.453	1102	15004.04478285
COMM L3001702:26	786586.543	801570.547	8570933.117	8571025.129	1105	14993.39843432
COMM L3001802:26	786591.991	801548.383	8570582.757	8570614.399	1062	14956.89633035
COMM L3100104:30	703383.520	711436.565	8580244.636	8580304.395	583	8058.28046207
COMM L3100204:30	703382.487	711444.624	8579938.376	8580011.075	584	8066.646199768
COMM L3100304:30	703385.863	711454.785	8579596.434	8579627.490	580	8070.732445964
COMM L3100404:30	703396.590	711450.836	8579244.820	8579353.629	580	8062.040269139
COMM L3100604:30	703358.083	711460.894	8578593.113	8578631.216	589	8103.901442525
COMM L3100704:30	703371.465	711461.260	8578266.648	8578284.670	576	8090.413566565
COMM L3100804:30	703383.207	711479.035	8577928.982	8577960.639	588	8096.68820777
COMM L3100904:30	703387.829	711474.691	8577564.961	8577615.182	577	8089.805879697
COMM L3101104:30	703408.664	711458.673	8576925.527	8576961.352	583	8051.577068533
COMM L3101204:30	703422.494	711466.310	8576596.499	8576620.684	589	8044.707766341
COMM L3101304:30	703438.997	711475.924	8576269.517	8576285.492	582	8037.38240057
COMM L3101404:30	703442.543	711478.985	8575932.158	8575965.130	578	8036.989174333
COMM L3101604:30	703470.368	711509.821	8575260.708	8575305.479	581	8040.433109175
COMM L3101704:30	703468.205	711507.061	8574926.816	8574952.562	585	8039.482734948
COMM L3101805:31	703465.101	711505.002	8574599.809	8574622.763	557	8040.638211187
COMM L3101905:31	703457.958	711514.064	8574264.192	8574287.318	610	8056.599354282
COMM L3102104:30	703484.058	711539.229	8573592.011	8573620.267	591	8056.039267879
COMM L3102204:30	703485.558	711548.135	8573262.859	8573279.923	574	8062.94885347
COMM L3102303:30	703504.153	711547.545	8572926.164	8572955.694	595	8044.784314324
COMM L3102403:30	703507.084	711557.529	8572602.002	8572615.347	574	8050.734155665
COMM L3102603:30	703473.794	711557.499	8571932.007	8571950.003	576	8084.185212064
COMM L3102703:30	703488.245	711561.476	8571595.320	8571617.024	602	8074.584270376
COMM L3102803:30	703510.580	711569.518	8571269.304	8571281.265	573	8059.388638711
COMM L3102903:30	703536.742	711579.866	8570934.549	8570948.045	594	8043.488985628
COMM L3103103:30	703523.968	711581.637	8570267.455	8570285.557	596	8058.429525366
COMM L3103203:30	703523.008	711576.313	8569933.250	8569949.418	571	8053.658415056
COMM L3103303:30	703552.952	711592.147	8569597.776	8569617.024	592	8039.851255946
COMM L3103403:30	703520.806	711567.077	8569262.352	8569282.747	568	8046.765768756
COMM L3300101:30	710253.621	719476.592	8569648.489	8569665.264	652	9223.239090885
COMM L3300201:30	710216.955	719480.191	8569415.736	8569436.432	688	9263.767953628
COMM L3300302:31	710199.132	719475.026	8569158.713	8569192.967	669	9277.200142738
COMM L3300501:31	710192.515	719469.237	8568689.204	8568717.348	675	9278.140372028
COMM L3300601:31	710207.317	719480.081	8568458.646	8568488.249	694	9274.450506544
COMM L3300701:31	710206.350	719480.591	8568196.508	8568243.332	681	9277.582894599
COMM L3300801:31	710204.106	719484.809	8567992.630	8568006.886	686	9281.265661583
COMM L3300901:31	710209.255	719483.064	8567738.591	8567767.556	666	9275.144666803
COMM L3301001:31	710211.505	719490.194	8567494.747	8567554.793	680	9287.646861308
COMM L3301202:32	710200.554	719509.662	8567037.265	8567049.900	710	9309.408894302
COMM L3301301:31	710199.409	719511.619	8566793.806	8566818.609	663	9313.464914218
COMM L3301402:32	710200.977	719515.314	8566554.073	8566576.514	704	9315.013903744
COMM L3301501:31	710206.628	719521.471	8566301.878	8566341.170	659	9318.06965651
COMM L3301601:32	710207.393	719531.450	8566080.027	8566100.197	710	9325.391505681
COMM L3301701:32	710214.342	719524.676	8565800.461	8565858.551	680	9313.560372921
COMM L3301901:32	710238.705	719522.521	8565359.176	8565394.139	685	9287.6503423
COMM L3302001:32	710240.805	719527.625	8565114.105	8565162.477	708	9292.89185908
COMM L3302101:32	710239.602	719527.331	8564875.959	8564932.100	684	9292.620581261
COMM L3302201:32	710243.016	719525.035	8564641.891	8564687.077	705	9287.240271192

COMM L3302301:32	710241.894	719531.790	8564416.477	8564431.334	671	9290.400903946
COMM L3302401:32	710248.399	719535.236	8564174.254	8564274.823	699	9297.606722386
COMM L3302601:32	710216.609	719545.363	8563703.105	8563720.186	702	9329.235370491
COMM L3302701:32	710210.803	719537.240	8563458.180	8563480.504	668	9327.575365182
COMM L3302801:32	710220.765	719551.865	8563229.039	8563245.707	701	9331.444380319
COMM L3302901:32	710222.787	719550.933	8562980.561	8563006.904	668	9329.076758445
COMM L3303001:32	710237.528	719554.336	8562747.284	8562770.027	702	9317.174645236
COMM L3303101:32	710235.463	719557.479	8562341.062	8562534.013	673	9353.149132624
COMM L4100201:26	665061.537	673115.507	8592264.147	8592298.725	575	8055.053220691
COMM L4100301:26	665041.411	673108.959	8590595.564	8590612.075	583	8067.856868137
COMM L4100501:26	665012.377	673113.954	8587267.276	8587287.716	585	8102.13035629
COMM L4100601:26	664997.331	673117.098	8585599.998	8585618.176	586	8120.179530468
COMM L4100801:26	659158.244	672773.542	8582254.955	8582301.002	970	13618.02155689
COMM L4100901:26	659100.918	672715.167	8580598.642	8580615.757	977	13614.83625323
COMM L4101101:26	656096.824	672763.232	8577251.107	8577303.359	1188	16670.23551805
COMM L4101201:26	656106.587	672716.142	8575599.038	8575616.724	1175	16610.23961642
COMM L4200101:26	686161.426	694399.351	8575587.208	8575619.457	604	8239.101499004
COMM L4200301:26	686145.346	694332.832	8572266.100	8572285.846	602	8187.982072498
COMM L4200401:26	686151.207	694337.005	8570589.299	8570613.415	576	8186.256864921
COMM L4300101:26	678499.733	686572.543	8567264.762	8567281.550	575	8073.132143029
COMM L4300203:29	678491.786	686552.846	8565592.971	8565618.822	571	8062.054728129
COMM L4300403:29	678386.909	686438.624	8562259.765	8562288.817	572	8052.609519281
COMM L4300503:29	678372.874	686427.787	8560592.700	8560628.299	617	8056.621934125
COMM L5000101:5	720107.187	750477.663	8638932.608	8638949.648	2131	30371.22105519
COMM L5000201:7	755595.385	779510.480	8638921.919	8638959.683	1689	23916.92980451
COMM L5000301:9	791801.502	833794.852	8638923.696	8638952.174	2911	41994.4787011
COMM L5000401:5	720088.298	779522.655	8633916.259	8633960.822	4366	59441.02660505
COMM L5000501:9	791765.519	834201.055	8633924.623	8633954.300	3160	42438.39642382
COMM L5000601:5	720038.993	779521.084	8628923.242	8628955.397	4202	59485.34164304
COMM L5000701:9	791705.967	834643.276	8628926.523	8628950.669	3012	42939.40164633
COMM L5000801:5	720004.158	779507.946	8623925.114	8623961.219	4425	59509.58544055
COMM L5000901:9	791654.121	833103.237	8623915.325	8623966.872	3079	41455.81916757
COMM L5001101:10	729468.284	829159.243	8618926.246	8618984.176	7388	99696.36127847
COMM L5001301:10	740523.693	755463.667	8613929.191	8613950.585	1061	14941.07570926
COMM L5001401:11	772159.893	815392.936	8613931.109	8613958.167	3224	43234.81794223
COMM L5001501:12	719861.814	755424.710	8608735.868	8609007.057	2707	35614.71717722
COMM L5001601:12	772119.377	814175.053	8608927.256	8608965.415	3163	42057.69236334
COMM L5001701:11	719867.177	755462.339	8603922.281	8604001.521	2519	35601.39600482
COMM L5001801:13	772018.891	818692.749	8603926.062	8603962.928	3376	46676.76210147
COMM L5002101:13	803599.282	818581.398	8598927.877	8598950.520	1071	14983.39539932
COMM L5002201:13	806150.179	818477.940	8593930.020	8593951.468	894	12328.6441434
COMM L5002303:25	804445.656	818369.080	8588933.546	8588949.537	970	13923.84854111
COMM L5002401:14	789366.529	823049.215	8583901.490	8583955.008	2542	33687.29354654
COMM L5002501:14	791966.769	799955.332	8578930.868	8578957.091	573	7989.772704591
COMM L5100301:7	720125.566	749173.845	8637242.447	8637291.555	2093	29051.01544539
COMM L5100401:5	752835.464	779510.211	8637260.142	8637298.920	1966	26677.57650386
COMM L5100501:9	791795.274	833917.906	8637252.353	8637295.886	3286	42125.56832445
COMM L5100601:5	720086.641	779518.249	8635594.839	8635627.971	4129	59435.83723522
COMM L5100701:9	791772.463	834059.573	8635589.055	8635633.797	2945	42290.9510729
COMM L5101001:5	720068.133	779513.032	8632250.496	8632290.023	4235	59447.87420924
COMM L5101101:9	791741.717	834257.563	8632256.762	8632280.647	3002	42517.37932542
COMM L5101201:5	720035.029	779517.853	8630590.028	8630691.648	4315	59491.79376936
COMM L5101301:9	791730.192	834530.292	8630585.077	8630624.858	3288	42803.22504307
COMM L5101601:6	720024.825	779517.102	8627256.988	8627292.417	4266	59494.48030395
COMM L5101701:9	791695.928	834809.037	8627249.468	8627301.377	3251	43119.68969402
COMM L5101801:6	720012.841	779510.268	8625591.981	8625617.957	4253	59499.27419609
COMM L5101902:10	791671.101	834124.861	8625585.858	8625618.330	3072	42456.63823381
COMM L5102201:10	729472.928	779489.198	8622258.655	8622288.773	3694	50018.78634031
COMM L5102302:14	791638.151	831535.254	8622251.213	8622293.165	2822	39899.94576484
COMM L5102401:10	729470.484	830226.489	8620577.087	8620643.864	7162	100762.4624626
COMM L5102601:11	729480.709	823473.426	8617233.363	8617458.435	6706	94020.72460431
COMM L5102701:11	732470.716	820684.363	8615584.152	8615622.037	6459	88219.02821431
COMM L5200101:1	717915.580	725948.096	8655600.052	8655611.742	546	8032.740474386
COMM L5200201:1	716770.857	730683.787	8653928.920	8653952.112	1055	13914.33333755
COMM L5200301:1	716736.102	737247.679	8652243.054	8652317.242	1397	20515.76079584
COMM L5200401:1	717346.590	738885.393	8650594.327	8650643.454	1622	21542.07568177
COMM L5200501:1	718776.882	740500.034	8648909.544	8648955.444	1491	21725.67049193
COMM L5200601:1	720121.005	742104.219	8647260.383	8647307.699	1642	21986.63814852
COMM L5200701:1	720123.156	747233.819	8645596.900	8645644.553	1869	27113.23970991
COMM L5200801:1	720125.528	748092.923	8643923.337	8643963.101	2103	27970.51270417
COMM L5200901:2	720112.534	748933.591	8642253.380	8642287.444	1953	28822.51095423
COMM L5201001:2	720106.457	749767.787	8640583.867	8640622.679	2212	29663.44316136
COMM L6100301:2	720234.610	748851.005	8638368.335	8638404.103	2211	28619.5251476
COMM L6100401:2	720224.936	748492.639	8637806.351	8637836.615	1913	28269.47175788
COMM L6100601:2	720214.052	747829.080	8636698.396	8636731.316	1957	27617.45261031
COMM L6100701:2	720234.027	747499.437	8636149.908	8636179.482	2086	27267.80760209
COMM L6100901:5	720211.701	746833.217	8635036.439	8635069.071	1933	26623.83004493
COMM L6101001:3	720232.829	754611.191	8634473.745	8634512.471	2244	34380.78267573
COMM L6101201:3	720189.249	754643.143	8633368.013	8633400.389	2273	34455.98478564
COMM L6101301:3	720172.634	754643.529	8632814.110	8632842.082	2729	34473.50816128
COMM L6101501:3	720177.871	754648.782	8631702.845	8631740.161	2678	34474.77264267
COMM L6101601:3	720189.605	754664.323	8631146.540	8631171.073	2292	34476.04407059
COMM L6101801:4	720160.343	754616.306	8630024.940	8630057.621	2424	34458.28865371
COMM L6101901:4	720176.515	754615.555	8629295.844	8629508.714	2512	34463.5884103
COMM L6102101:4	720154.811	754609.951	8628313.000	8628489.597	2488	34477.02925688
COMM L6102201:4	720162.275	754621.612	8627801.843	8627851.367	2502	34462.42959196
COMM L6102401:4	720132.923	754594.045	8626700.831	8626735.089	2513	34464.10987448
COMM L6102501:4	720143.340	754597.411	8626144.653	8626187.273	2464	34457.06339234
COMM L6102701:4	720126.684	754613.886	8625037.882	8625069.729	2474	34489.70018707
COMM L6102801:4	720127.952	754594.641	8624484.178	8624517.823	2513	34468.4574873
COMM L6103001:4	720092.756	754582.178	8623367.182	8623395.893	2487	34492.26146985

COMM L6103101:4	720121.032	754575.055	8622793.856	8623483.225	2491	34671.10941824
COMM L6103302:6	729471.099	754559.735	8621703.005	8621732.309	1822	25089.83504492
COMM L6103401:4	729476.869	754541.483	8621116.450	8621176.996	1792	25068.18035014
COMM L6103601:6	729474.739	754535.743	8620031.570	8620063.899	1820	25062.30064502
COMM L6103702:7	729475.966	754531.943	8619467.565	8619518.162	1805	25060.51261528
COMM L6103901:6	729473.648	754527.264	8618360.925	8618400.977	1827	25057.30104748
COMM L6104001:6	729471.987	754515.868	8617814.885	8617844.216	1823	25045.89264026
COMM L6104201:6	732461.947	754521.348	8616704.671	8616727.304	1602	22060.72103978
COMM L6104301:6	732470.170	754498.473	8616150.041	8616178.910	1607	22029.29196162
COMM L6104501:6	732479.579	754494.368	8615038.273	8615071.188	1610	22016.91311817
COMM L6104601:6	732352.558	754518.375	8614476.949	8614514.876	1608	22168.26320311
COMM L6104801:6	740675.357	754423.587	8613361.965	8613408.414	986	13750.46529065
COMM L6104901:6	740677.206	754437.120	8612821.053	8612897.804	1002	13762.85249556
COMM L6105001:6	740670.143	754443.667	8612256.439	8612287.328	988	13774.60505259
COMM L6105101:7	740686.458	754449.670	8611700.448	8611737.288	980	13764.34326173
COMM L6105201:6	740685.879	754461.161	8611135.023	8611179.319	993	13778.1996528
COMM L6105301:7	740691.502	754462.016	8610599.816	8610815.748	984	13792.74064857
COMM L6105401:7	740555.708	754464.535	8609842.196	8610073.339	1045	13946.86004767
COMM L6200201:7	768233.810	779513.612	8638377.189	8638404.078	826	11281.03835174
COMM L6200301:7	768237.667	779515.541	8637818.505	8637834.686	798	11278.14689954
COMM L6200501:8	768228.322	779510.914	8636707.166	8636728.786	766	11283.23776866
COMM L6200601:7	768239.811	779517.330	8636156.183	8636184.651	823	11278.66748014
COMM L6200801:8	768251.431	779510.687	8635029.768	8635060.002	855	11260.65792975
COMM L6200901:8	768274.769	779516.368	8634482.046	8634509.136	757	11242.43000695
COMM L6201101:8	768224.566	779508.957	8633358.979	8633390.952	760	11285.1463792
COMM L6201201:8	768221.876	779522.369	8632793.875	8633050.220	865	11350.42096331
COMM L6201401:8	768196.615	779520.699	8631654.029	8631946.103	863	11363.96527957
COMM L6201501:8	768220.253	779514.416	8631142.558	8631174.529	761	11295.07067942
COMM L6201701:8	768189.292	779514.332	8630024.933	8630063.011	791	11326.76367785
COMM L6201801:8	768211.558	779516.913	8629490.885	8629511.321	854	11305.91254559
COMM L6202001:8	768201.894	779516.791	8628367.351	8628400.015	885	11316.92503204
COMM L6202101:8	768223.926	779510.387	8627820.858	8627846.948	776	11287.17484631
COMM L6202301:8	768197.141	779513.179	8626709.185	8626731.144	787	11316.64742445
COMM L6202401:8	768194.932	779513.065	8626150.842	8626182.901	881	11319.74194937
COMM L6202601:8	768173.719	779517.557	8625035.270	8625063.529	879	11344.669094
COMM L6202701:6	768195.575	779513.842	8624479.346	8624502.432	793	11318.79292839
COMM L6202901:8	768202.162	779495.565	8623368.904	8623390.555	783	11294.25756658
COMM L6203001:8	768193.283	779497.510	8622809.879	8622840.285	867	11304.93008761
COMM L6203201:8	768189.363	779474.232	8621712.684	8621730.730	862	11285.68224547
COMM L6203301:8	768215.169	779466.765	8621156.794	8621176.118	783	11252.08377397
COMM L6203501:8	768196.247	786603.082	8620045.821	8620060.423	1277	18407.44138959
COMM L6203601:8	768198.013	786605.243	8619488.083	8619515.533	1410	18408.68834663
COMM L6203801:8	768188.383	786620.994	8618370.492	8618394.210	1391	18433.76172573
COMM L6203901:8	768198.700	786650.445	8617805.845	8617836.456	1286	18453.51605909
COMM L6204101:8	768154.391	786613.448	8616692.517	8616733.991	1290	18460.56810286
COMM L6204201:8	768169.993	786606.934	8616141.837	8616182.349	1401	18440.50247273
COMM L6204401:8	772160.354	786582.711	8615035.595	8615072.115	1093	14424.03168719
COMM L6204501:8	772162.139	786596.023	8614481.595	8614521.483	999	14436.83705216
COMM L6204701:10	772157.233	786606.816	8613339.361	8613403.776	1058	14451.83147161
COMM L6204801:10	772153.287	786596.881	8612822.885	8612857.814	1031	14444.754359
COMM L6204901:10	772144.455	786594.483	8612265.681	8612288.845	1051	14451.32984948
COMM L6205001:10	772140.339	786582.994	8611704.874	8611740.780	1038	14444.71478274
COMM L6205101:11	772147.241	786575.112	8611140.764	8611167.735	1039	14429.03503471
COMM L6205201:11	772133.120	786578.886	8610587.515	8610621.620	1065	14447.57304443
COMM L6205301:11	772127.450	786564.459	8610045.173	8610071.599	1027	14438.36160167
COMM L6205401:11	772131.476	786557.500	8609485.413	8609509.759	1063	14426.9372661
COMM L6205601:13	772120.895	786604.943	8608372.940	8608393.357	1005	14484.61658125
COMM L6205701:11	772121.243	786603.136	8607822.838	8607843.429	1028	14482.73295754
COMM L6205801:13	772111.914	786590.240	8607263.908	8607283.057	1021	14478.84789557
COMM L6205901:13	772110.668	786585.889	8606704.837	8606724.427	1089	14475.65383957
COMM L6206001:13	772100.047	786579.343	8606154.683	8606191.159	1025	14480.48368259
COMM L6206101:13	772103.906	786571.135	8605599.792	8605617.386	1076	14467.88175451
COMM L6206201:13	771987.563	786569.948	8605043.669	8605076.226	1036	14583.4707097
COMM L6206301:13	771996.718	786566.000	8604475.809	8604550.019	1081	14575.0787916
COMM L6206501:13	772029.847	786566.559	8603367.871	8603405.140	1066	14537.83768018
COMM L6206601:13	772047.787	786566.010	8602820.776	8602840.788	1039	14518.72706752
COMM L6206701:13	772050.884	786558.969	8602256.664	8602285.172	1060	14509.0701642
COMM L6300101:6	758578.520	766626.039	8625929.057	8625946.405	584	8047.651841442
COMM L6300301:6	758574.694	766624.127	8625241.174	8625285.370	573	8050.699283664
COMM L6300401:6	758579.114	766638.714	8624932.489	8624962.395	566	8060.846204185
COMM L6400101:7	756861.728	764923.977	8621931.655	8621945.675	576	8062.566586962
COMM L6400201:7	756857.843	764915.320	8621597.931	8621613.841	589	8058.070356334
COMM L6400301:7	756857.002	764898.030	8621260.883	8621310.804	572	8043.357735596
COMM L6400401:7	756857.379	764881.953	8620933.166	8620957.177	584	8025.653506142
COMM L6400601:7	756839.334	764861.664	8620256.936	8620287.186	588	8023.340574569
COMM L6400701:7	756833.304	764869.922	8619932.269	8619946.810	569	8036.809943374
COMM L6400801:7	756839.415	764874.219	8619599.331	8619616.712	597	8035.122685334
COMM L6400901:7	756833.999	764876.028	8619261.549	8619292.282	571	8042.486019439
COMM L6401101:7	756818.023	764887.351	8618591.071	8618615.203	572	8070.658829634
COMM L6401201:7	756827.914	764890.186	8618264.311	8618295.121	601	8063.039484618
COMM L6600101:13	801986.664	818651.691	8602258.639	8602286.085	1191	16666.41277028
COMM L6600201:13	802796.934	818614.537	8600568.040	8600620.293	1150	15820.77850865
COMM L6600401:13	804502.103	818550.345	8597263.761	8597282.307	1024	14048.89687954
COMM L6600501:13	805413.504	818513.200	8595593.549	8595617.246	932	13100.52516238
COMM L6600701:13	806173.019	818437.287	8592251.273	8592287.204	884	12265.29772811
COMM L6600803:25	805342.113	818404.945	8590588.086	8590612.968	956	13063.39454015
COMM L6601001:13	790754.445	818903.542	8587254.756	8587286.946	2054	28151.10247592
COMM L6601101:14	790130.639	823035.689	8585591.827	8585626.846	2345	32907.41663958
COMM L6601301:14	788730.375	823063.330	8582253.913	8582293.856	2431	34335.50943019
COMM L6601401:14	791849.020	823062.897	8580594.587	8580622.852	2350	31215.14638057
COMM ALL	626097.562	834809.037	8560587.675	8655611.742	496536	6861933.602307

Conductivity data – repeat lines

```
COMM GA PROJECT NUMBER                                                    1196
COMM FAS PROJECT NUMBER                                                   2017
COMM AREA NUMBER:                                                            1
COMM SURVEY COMPANY:                                    Fugro Airborne Surveys
COMM CLIENT:                                              Geoscience Australia
COMM SURVEY TYPE:                                         25Hz TEMPEST Survey
COMM AREA NAME:                                                        Woolner
COMM STATE:                                                                 NT
COMM COUNTRY:                                                        Australia
COMM SURVEY FLOWN:                                 October to November 2008
COMM LOCATED DATA CREATED:                                          April 2009
COMM
COMM DATUM:                                                              GDA94
COMM PROJECTION:                                                           MGA
COMM ZONE:                                                                  52
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM NOMINAL TERRAIN CLEARANCE:                                          120 m
COMM FINAL REPEAT LINE KILOMETRES:                                      104 km
COMM
COMM LINE NUMBERING
COMM
COMM REPEAT LINE NUMBERS:                              910000201 - 910001201
COMM                                                   911001501 - 911003001
COMM
COMM SURVEY EQUIPMENT
COMM
COMM AIRCRAFT:                                CASA C212 Turbo Prop, VH-TEM
COMM
COMM MAGNETOMETER:                              Scintrex Cs-2 Cesium Vapour
COMM INSTALLATION:                                              stinger mount
COMM RESOLUTION:                                                     0.001 nT
COMM RECORDING INTERVAL:                                                0.2 s
COMM
COMM ELECTROMAGNETIC SYSTEM:                                      25Hz TEMPEST
COMM INSTALLATION:                 Transmitter loop mounted on the aircraft
COMM                                         Receiver coils in a towed bird
COMM COIL ORIENTATION:                                                    X,Z
COMM RECORDING INTERVAL:                                                0.2 s
COMM SYSTEM GEOMETRY:
COMM RECEIVER DISTANCE BEHIND THE TRANSMITTER:                         -120 m
COMM RECEIVER DISTANCE BELOW THE TRANSMITTER:                           -35 m
COMM
COMM RADAR ALTIMETER:                                           Sperry RT-220
COMM RECORDING INTERVAL:                                                0.2 s
COMM
COMM LASER ALTIMETER:                                      Optech 501SB (TEM)
COMM RECORDING INTERVAL:                                                0.2 s
COMM
COMM NAVIGATION:                                real-time differential GPS
COMM RECORDING INTERVAL:                                                1.0 s
COMM
COMM ACQUISITION SYSTEM:                                               FASDAS
COMM
COMM DATA PROCESSING
COMM
COMM MAGNETIC DATA
COMM DIURNAL BASE VALUE APPLIED                                      47436 nT
COMM PARALLAX CORRECTION APPLIED (during final processing)              1.0 s
COMM IGRF BASE VALUE APPLIED                                         46836 nT
COMM IGRF MODEL 2005 EXTRAPOLATED TO                                   2008.8
COMM
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COMM ELECTROMAGNETIC DATA
COMM SYSTEM PARALLAX REMOVED, AS FOLLOWS
COMM X-COMPONENT EM DATA                                           1.6 s
COMM Z-COMPONENT EM DATA                                           0.2 s
COMM DATA CORRECTED FOR TRANSMITTER HEIGHT, PITCH AND ROLL
COMM DATA CORRECTED FOR TRANSMITTER-RECEIVER GEOMETRY VARIATIONS
COMM CONDUCTIVITY DEPTH INVERSION CALCULATED                 EMFlow V5.10
COMM CONDUCTIVITIES CALCULATED USING HPRG CORRECTED EMX & EMZ DATA
COMM
COMM DIGITAL TERRAIN DATA
COMM PARALLAX CORRECTION APPLIED TO LIDAR ALIMETER DATA            0.0 s
COMM PARALLAX CORRECTION APPLIED TO GPS ALIMETER DATA              0.0 s
COMM DTM CALCULATED [DTM = GPS ALTITUDE - LIDAR ALTITUDE - GPS/LIDAR DIST]
COMM N-VALUE APPLIED TO CORRECT DTM TO AUSTRALIAN HEIGHT DATUM (AHD)
COMM DATA HAVE BEEN MICROLEVELLED
COMM
COMM ---------------------------------------------------------------------
COMM DISCLAIMER
COMM ---------------------------------------------------------------------
COMM It is Fugro Airborne Survey’s understanding that the data provided to
COMM the client is to be used for the purpose agreed between the parties.
COMM That purpose was a significant factor in determining the scope and
COMM level of the Services being offered to the Client. Should the purpose
COMM for which the data is used change, the data may no longer be valid or
COMM appropriate and any further use of, or reliance upon, the data in
COMM those circumstances by the Client without Fugro Airborne Survey's
COMM review and advice shall be at the Client's own or sole risk.
COMM
COMM The Services were performed by Fugro Airborne Survey exclusively for
COMM the purposes of the Client. Should the data be made available in whole
COMM or part to any third party, and such party relies thereon, that party
COMM does so wholly at its own and sole risk and Fugro Airborne Survey
COMM disclaims any liability to such party.
COMM
COMM Where the Services have involved Fugro Airborne Survey's use of any
COMM information provided by the Client or third parties, upon which
COMM Fugro Airborne Survey was reasonably entitled to rely, then the
COMM Services are limited by the accuracy of such information. Fugro
COMM Airborne Survey is not liable for any inaccuracies (including any
COMM incompleteness) in the said information, save as otherwise provided
COMM in the terms of the contract between the Client and Fugro Airborne
COMM Survey.
COMM
COMM With regard to DIGITAL TERRAIN DATA, the accuracy of the elevation
COMM calculation is directly dependent on the accuracy of the two input
COMM parameters lidar altitude and GPS altitude. The radar altitude value may
be
COMM erroneous in areas of heavy tree cover, where the altimeter reflects the
COMM distance to the tree canopy rather than the ground. The GPS altitude
value
COMM is primarily dependent on the number of available satellites. Although
COMM post-processing of GPS data will yield X and Y accuracies in the
COMM order of 1-2 metres, the accuracy of the altitude value is usually
COMM much less, sometimes in the ±5 metre range.  Further inaccuracies
COMM may be introduced during the interpolation and gridding process.
COMM Because of the inherent inaccuracies of this method, no guarantee is
COMM made or implied that the information displayed is a true
COMM representation of the height above sea level.  Although this product
COMM may be of some use as a general reference,
COMM THIS PRODUCT MUST NOT BE USED FOR NAVIGATION PURPOSES.
COMM ---------------------------------------------------------------------
COMM
COMM ELECTROMAGNETIC SYSTEM
COMM
```

```
COMM TEMPEST IS A TIME-DOMAIN SQUARE-WAVE SYSTEM,
COMM TRANSMITTING AT A BASE FREQUENCY OF 25Hz,
COMM WITH 2 ORTHOGONAL-AXIS RECEIVER COILS IN A TOWED BIRD.
COMM FINAL EM OUTPUT IS RECORDED 5 TIMES PER SECOND.
COMM THE TIMES (IN MILLISECONDS) FOR THE 15 WINDOWS ARE:
COMM
COMM WINDOW      START       END      CENTRE
COMM    1        0.007      0.020      0.013
COMM    2        0.033      0.047      0.040
COMM    3        0.060      0.073      0.067
COMM    4        0.087      0.127      0.107
COMM    5        0.140      0.207      0.173
COMM    6        0.220      0.340      0.280
COMM    7        0.353      0.553      0.453
COMM    8        0.567      0.873      0.720
COMM    9        0.887      1.353      1.120
COMM   10        1.367      2.100      1.733
COMM   11        2.113      3.273      2.693
COMM   12        3.287      5.113      4.200
COMM   13        5.127      7.993      6.560
COMM   14        8.007     12.393     10.200
COMM   15       12.407     19.993     16.200
COMM
COMM PULSE WIDTH: 10 ms
COMM
COMM TEMPEST EM data are transformed to the response that would be
COMM obtained with a B-field sensor for a 100% duty cycle square
COMM waveform at the base frequency, involving a 1A change in
COMM current (from -0.5A to +0.5A to -0.5A) in a 1sq.m transmitter.
COMM It is this configuration, rather than the actual acquisition
COMM configuration, which must be specified when modelling TEMPEST data.
COMM
COMM
COMM
COMM LOCATED DATA FORMAT
COMM
COMM  Output field format : DOS  - Flat ascii
COMM  Number of fields    : 68
COMM
COMM Field  Channel         Description                        Units  Undefined    Format
COMM -----  -------         -----------                        -----  ---------    ------
COMM
COMM     1  LINE            Line                                       -99999999      i10
COMM     2  FLIGHT          Flight                                     -99             i4
COMM     3  FID             Fiducial                             (s)   -999999.9     f8.1
COMM     4  PROJECT_FAS     FAS Project Number                         -9999           i6
COMM     5  PROJECT_GA      GA Project Number                          -9999           i6
COMM     6  AIRCRAFT        System Number                              -9              i3
COMM     7  DATE            Date                            ddmmyyyy   -9999999        i9
COMM     8  TIME            Time - local midnight                (s)   -9999.9       f8.1
COMM     9  BEARING         Line Bearing                       (deg)   -99             i4
COMM    10  LATITUDE        Latitude  GDA94                    (deg)   -99.9999999  f12.7
COMM    11  LONGITUDE       Longitude GDA94                    (deg)   -999.9999999 f13.7
COMM    12  EASTING         Easting   MGA51                      (m)   -99999.99    f10.2
COMM    13  NORTHING        Northing  MGA51                      (m)   -999999.99   f11.2
COMM    14  LIDAR           Final Lidar altimeter                (m)   -999.99       f8.2
COMM    15  RADALT          Final Radar altimeter                (m)   -999.99       f8.2
COMM    16  TX_ELEVATION    Final Transmitter Elevation - AHD    (m)   -999.99       f8.2
COMM    17  DTM             Final Ground Elevation - AHD         (m)   -999.99       f8.2
COMM    18  MAG             Final TMI                           (nT)   -99999.999   f11.3
COMM    19  CND_DS01        CDI_depth_slice_01   0-    5 m   (mS/m)   -9999.999    f10.3
COMM    20  CND_DS02        CDI_depth_slice_02   5-   10 m   (mS/m)   -9999.999    f10.3
COMM    21  CND_DS03        CDI_depth_slice_03   10-  15 m   (mS/m)   -9999.999    f10.3
COMM    22  CND_DS04        CDI_depth_slice_04   15-  20 m   (mS/m)   -9999.999    f10.3
COMM    23  CND_DS05        CDI_depth_slice_05   20-  30 m   (mS/m)   -9999.999    f10.3
COMM    24  CND_DS06        CDI_depth_slice_06   30-  40 m   (mS/m)   -9999.999    f10.3
COMM    25  CND_DS07        CDI_depth_slice_07   40-  60 m   (mS/m)   -9999.999    f10.3
COMM    26  CND_DS08        CDI_depth_slice_08   60- 100 m   (mS/m)   -9999.999    f10.3
COMM    27  CND_DS09        CDI_depth_slice_09   100-150 m   (mS/m)   -9999.999    f10.3
COMM    28  CND_DS10        CDI_depth_slice_10   150-200 m   (mS/m)   -9999.999    f10.3
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COMM	29	CND[1]	Conductivity_001	0- 5 m	(mS/m)	-9999.999	f10.3
COMM	30	CND[2]	Conductivity_002	5- 10 m	(mS/m)	-9999.999	f10.3
COMM	31	CND[3]	Conductivity_003	10- 15 m	(mS/m)	-9999.999	f10.3
COMM	32	CND[4]	Conductivity_004	15- 20 m	(mS/m)	-9999.999	f10.3
COMM	33	CND[5]	Conductivity_005	20- 25 m	(mS/m)	-9999.999	f10.3
COMM	34	CND[6]	Conductivity_006	25- 30 m	(mS/m)	-9999.999	f10.3
COMM	35	CND[7]	Conductivity_007	30- 35 m	(mS/m)	-9999.999	f10.3
COMM	36	CND[8]	Conductivity_008	35- 40 m	(mS/m)	-9999.999	f10.3
COMM	37	CND[9]	Conductivity_009	40- 45 m	(mS/m)	-9999.999	f10.3
COMM	38	CND[10]	Conductivity_010	45- 50 m	(mS/m)	-9999.999	f10.3
COMM	39	CND[11]	Conductivity_011	50- 55 m	(mS/m)	-9999.999	f10.3
COMM	40	CND[12]	Conductivity_012	55- 60 m	(mS/m)	-9999.999	f10.3
COMM	41	CND[13]	Conductivity_013	60- 65 m	(mS/m)	-9999.999	f10.3
COMM	42	CND[14]	Conductivity_014	65- 70 m	(mS/m)	-9999.999	f10.3
COMM	43	CND[15]	Conductivity_015	70- 75 m	(mS/m)	-9999.999	f10.3
COMM	44	CND[16]	Conductivity_016	75- 80 m	(mS/m)	-9999.999	f10.3
COMM	45	CND[17]	Conductivity_017	80- 85 m	(mS/m)	-9999.999	f10.3
COMM	46	CND[18]	Conductivity_018	85- 90 m	(mS/m)	-9999.999	f10.3
COMM	47	CND[19]	Conductivity_019	90- 95 m	(mS/m)	-9999.999	f10.3
COMM	48	CND[20]	Conductivity_020	95-100 m	(mS/m)	-9999.999	f10.3
COMM	49	CND[21]	Conductivity_021	100-105 m	(mS/m)	-9999.999	f10.3
COMM	50	CND[22]	Conductivity_022	105-110 m	(mS/m)	-9999.999	f10.3
COMM	51	CND[23]	Conductivity_023	110-115 m	(mS/m)	-9999.999	f10.3
COMM	52	CND[24]	Conductivity_024	115-120 m	(mS/m)	-9999.999	f10.3
COMM	53	CND[25]	Conductivity_025	120-125 m	(mS/m)	-9999.999	f10.3
COMM	54	CND[26]	Conductivity_026	125-130 m	(mS/m)	-9999.999	f10.3
COMM	55	CND[27]	Conductivity_027	130-135 m	(mS/m)	-9999.999	f10.3
COMM	56	CND[28]	Conductivity_028	135-140 m	(mS/m)	-9999.999	f10.3
COMM	57	CND[29]	Conductivity_029	140-145 m	(mS/m)	-9999.999	f10.3
COMM	58	CND[30]	Conductivity_030	145-150 m	(mS/m)	-9999.999	f10.3
COMM	59	CND[31]	Conductivity_031	150-155 m	(mS/m)	-9999.999	f10.3
COMM	60	CND[32]	Conductivity_032	155-160 m	(mS/m)	-9999.999	f10.3
COMM	61	CND[33]	Conductivity_033	160-165 m	(mS/m)	-9999.999	f10.3
COMM	62	CND[34]	Conductivity_034	165-170 m	(mS/m)	-9999.999	f10.3
COMM	63	CND[35]	Conductivity_035	170-175 m	(mS/m)	-9999.999	f10.3
COMM	64	CND[36]	Conductivity_036	175-180 m	(mS/m)	-9999.999	f10.3
COMM	65	CND[37]	Conductivity_037	180-185 m	(mS/m)	-9999.999	f10.3
COMM	66	CND[38]	Conductivity_038	185-190 m	(mS/m)	-9999.999	f10.3
COMM	67	CND[39]	Conductivity_039	190-195 m	(mS/m)	-9999.999	f10.3
COMM	68	CND[40]	Conductivity_040	195-200 m	(mS/m)	-9999.999	f10.3

COMM

Line Number	X-minimum	X-maximum	Y-minimum	Y-maximum	# of points	Total distance
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D910000101:1	758617.973	766595.117	8625929.214	8625951.529	593	7977.960349781
D910000201:2	758614.627	766605.068	8625930.235	8625948.988	611	7991.157895713
D910000301:3	758617.752	766602.559	8625930.117	8625948.046	630	7985.071977546
D910000401:4	758611.606	766594.805	8625921.834	8625947.767	576	7984.167942048
D910000601:6	758606.464	766598.474	8625929.259	8625946.404	580	7992.141857788
D910000901:9	758613.838	766605.406	8625925.485	8625954.563	573	7992.126408156
D910001201:12	758607.447	766606.442	8625928.823	8625945.733	546	7999.319002098
D910001201:12	758622.956	766606.442	8625928.823	8625945.733	545	7983.803057622
D911001501:15	751706.078	759788.070	8568934.638	8568950.168	559	8082.2088958
D911001801:18	751701.721	759789.825	8568922.931	8568945.713	582	8088.483041208
D911002101:21	751710.376	759788.164	8568938.295	8568948.949	575	8078.168517275
D911002401:24	751703.730	759783.265	8568936.783	8568946.489	582	8079.688873307
D911002701:27	751705.815	759787.134	8568932.214	8568950.259	568	8081.686572674
D911003001:30	751700.154	759780.395	8568936.550	8568950.734	581	8080.582651933
ALL	751700.154	766608.622	8568922.931	8625954.563	7556	104410.5028871

APPENDIX V – Standby Days

Aircraft: VH-TEM

Date	Days	Description	Kms Flown
20/10/2008	1	High sferics	0
21/10/2008	1	Strong Winds/High Spherics	0

APPENDIX VI – List of all Supplied Data and Products

Streamed EM Data

For each survey flight the raw continuous time series data was delivered as a series of binary (*.raw) files for each traverse and calibration line (each file being a maximum 1Gb in size). An associated text file linking the traverse line to the file name accompanied the data.

Field Located Data

Following completion of acquisition, located data was delivered for all survey lines.

For the filename below, there are 2 files. Extension '.asc' is the data and '.hdr' is a header describing the data format and survey specifications.

Traverse lines:
 Woolner_TEM_field_data_all
High-Altitude (zero) lines:
 Woolner_TEM_field_zero_line_data
Repeat lines:
 Woolner_TEM_field_repeat_line_data

Final Located Data

For each filename below, there are 2 files. Extension '.asc' is the data and '.hdr' is a header file describing the data format and survey specifications.

Traverse lines:
 Woolner_Final_EM
 Woolner_Final_CND

Repeat lines:
 Woolner_Final_EM_RptLines
 Woolner_Final_CND_RptLines

For each of the suffixes EM and CND, the contents are as follows:
 EM – data **with** and **without** geometry correction as defined in Attachment 1, section 3.3 (b) of the contract.
 CND – Conductivity-depth data as defined in Attachment 1, section 3.3(c) of the contract.

Final Gridded Products

The following ERMapper format grids were delivered for each regional and infill area (with National Parks excluded), using the optimal grid cell size (1/5th of the line spacing):

- Total Magnetic Intensity
- Digital Elevation Model
- Interval Conductivity grids for the following depth ranges:
  - 0-5 metres
  - 5-10 metres
  - 10-15 metres
  - 15-20 metres
  - 20-30 metres
  - 30-40 metres
  - 40-60 metres
  - 60-100 metres
  - 100-150 metres
  - 150-200 metres

CDI Multiplots

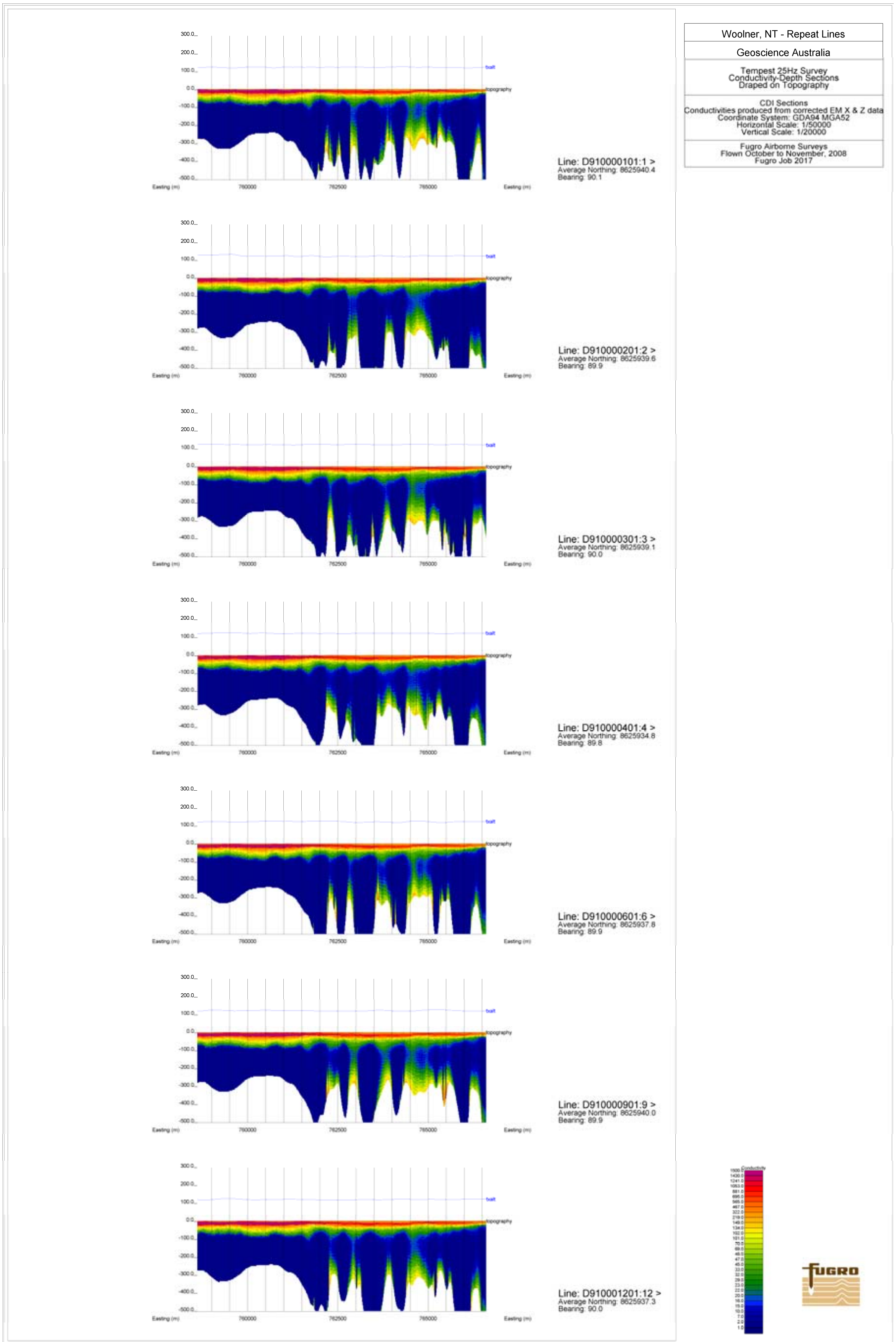
PDF format files of the EM multiplots, derived from the final processed and combined EM X and EM Z component data, were delivered for every survey line at 1:50 000 scale. The multiplots were trimmed to the National Park boundaries.

Final Acquisition and Processing Report

Delivered as hardcopy and digitally (6 copies)

APPENDIX VII – EM Repeat line CDIs

Repeat Line 910FFFFPP (758600mE 8625930mN to 766600mE 8625930mN)



Repeat Line 911FFFFPP (749700mE 8568950mN to 760000mE 8568950mN)