

Mobile Phone Base-Station Audit

Audit site: Armadale Academy
West End
Armadale
Bathgate
EH48 3LY

The Radiocommunications Agency (RA) is responsible for management of the civil radio spectrum in the UK. The Government has asked the RA to implement a national measurement programme to ensure that emissions from cellular base stations do not exceed the guidelines for public maximum exposure set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

Electric field strength measurements made in various bands are referenced to and presented alongside the relevant ICNIRP public maximum exposure levels. On the left hand side of the results page(s) is a graphical representation of the radio spectrum surveyed at each location on the site. The green line on each graph indicates the ICNIRP guideline exposure level for that frequency band. To the right hand side of each graph is a table showing the ten highest level emissions recorded within a band.

Further explanation of the results and their context within the ICNIRP guidelines can be provided by the RA officers at the time of the audit or by contacting the RA on 020 7211 0211 or by e-mail at rfaudit@ra.gsi.gov.uk

Results taken from all audit sites and further information on the audit programme can be found on the RA website at www.radio.gov.uk

Report Summary

As the radio spectrum is continually changing, these measurements can only provide information on the radio frequency (RF) conditions for the specific locations at the time of the survey.

The Radiocommunications Agency performed this survey of the RF emission environment prevailing in the vicinity of Armadale Academy on 4 October 2002.

The following table, sorted in descending order of signal level, summarises the results obtained at each measurement location.

Summary of results:		
Location	Total Band Exposure	Relationship to ICNIRP Limit
Centre Spot of Grass Football Pitch Nearest School	6.67E-04	1/1499
T3	9.59E-05	1/10424
Joinery Class Saw Room	7.52E-05	1/13297
Grass Sports Area 15 Metres East of Transmitter	3.20E-05	1/31280
Library	3.25E-06	1/308090
Top of Stairs at Business Studies	1.88E-06	1/532526
Boys Gym Hall	9.00E-07	1/1111366

Issued on behalf of the Radiocommunications Agency.

Issued by:

Received by:

Colin Gardner
Radiocommunications Specialist

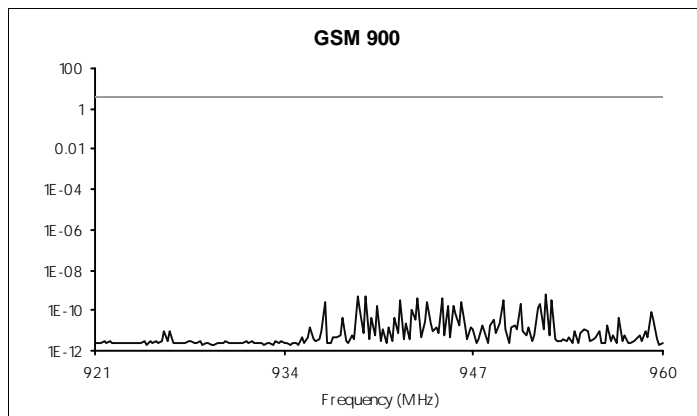
Mr Donald Cameron
Depute Headteacher

Site: Armadale Academy
Location: Joinery Class Saw Room

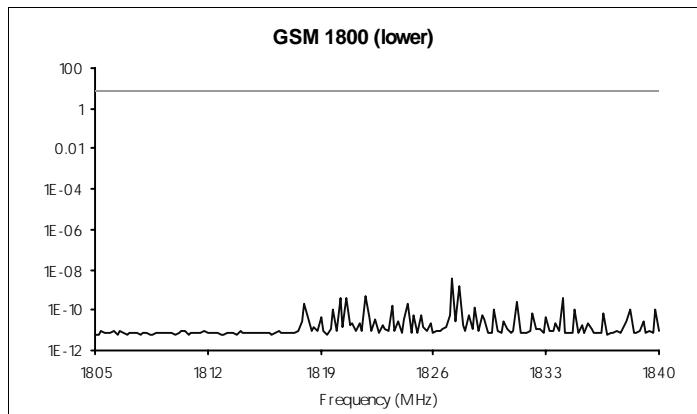
NGR: NS 9269 6874 **Taken from GPS**
Start Time: 04 October 2002 10:28:18
Officer: Colin Gardner

Receiver:
Manufacturer: ROHDE&SCHWARZ
Model: EB200
Serial Number: 839.784/013

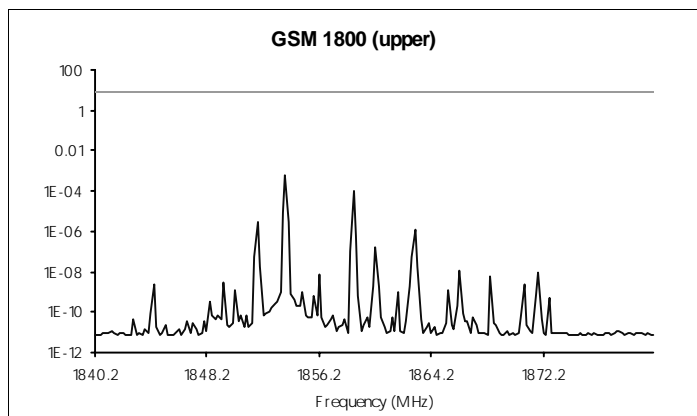
Antenna:
Manufacturer: Rohde & Schwarz
Model: HE200.4050.3609.02
Serial Number: 839891/055



Frequency (MHz)	Maximum Exposure (W/m ²)	ICNIRP Limit (W/m ²)	Frequency Exposure Quotient
952.000	5.83E-10	4.76	1.23E-10
939.000	5.05E-10	4.70	1.07E-10
939.600	4.61E-10	4.70	9.81E-11
943.200	4.05E-10	4.72	8.58E-11
944.800	3.62E-10	4.72	7.66E-11
949.000	3.33E-10	4.75	7.03E-11
942.000	3.06E-10	4.71	6.50E-11
952.400	3.06E-10	4.76	6.44E-11
946.200	2.63E-10	4.73	5.56E-11
936.800	2.46E-10	4.68	5.25E-11
Band Exposure Quotient:			1.39E-09



Frequency (MHz)	Maximum Exposure (W/m ²)	ICNIRP Limit (W/m ²)	Frequency Exposure Quotient
1,827.200	3.50E-09	9.14	3.83E-10
1,827.600	1.40E-09	9.14	1.53E-10
1,821.800	5.02E-10	9.11	5.51E-11
1,820.600	4.46E-10	9.10	4.90E-11
1,820.200	4.46E-10	9.10	4.90E-11
1,834.000	4.16E-10	9.17	4.54E-11
1,831.200	2.33E-10	9.16	2.55E-11
1,824.400	2.15E-10	9.12	2.36E-11
1,818.000	2.08E-10	9.09	2.29E-11
1,823.400	1.55E-10	9.12	1.70E-11
Band Exposure Quotient:			1.13E-09



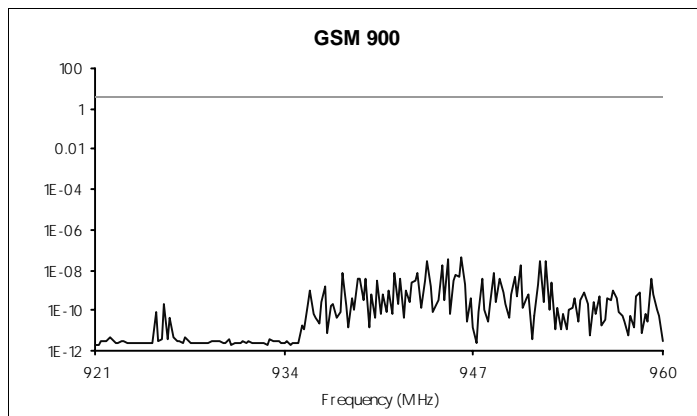
Frequency (MHz)	Maximum Exposure (W/m ²)	ICNIRP Limit (W/m ²)	Frequency Exposure Quotient
1,853.800	5.68E-04	9.27	6.13E-05
1,858.600	1.12E-04	9.29	1.20E-05
1,853.600	9.42E-06	9.27	1.02E-06
1,851.800	3.04E-06	9.26	3.28E-07
1,854.000	2.78E-06	9.27	3.00E-07
1,863.000	1.26E-06	9.31	1.36E-07
1,858.800	6.28E-07	9.29	6.76E-08
1,860.200	1.82E-07	9.30	1.95E-08
1,858.400	1.17E-07	9.29	1.26E-08
1,862.800	5.51E-08	9.31	5.92E-09
Band Exposure Quotient:			7.52E-05

Total number of measurements: 572

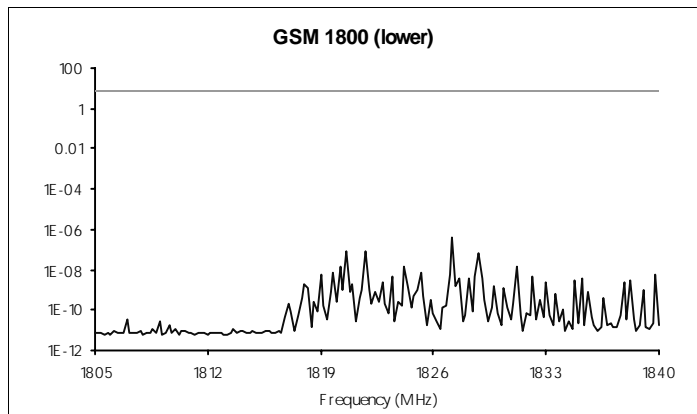
Total Band Exposure Quotient: **7.52E-05**

Site: Armadale Academy
Location: Centre Spot of Grass Football Pitch Nearest School
NGR: NS 9272 6864 **Taken from GPS**
Start Time: 04 October 2002 10:49:01
Officer: Colin Gardner

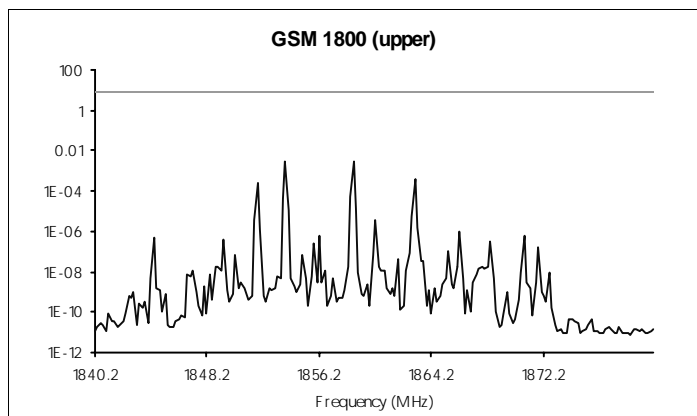
Receiver:
 Manufacturer: ROHDE&SCHWARZ
 Model: EB200
 Serial Number: 839.784/013
Antenna:
 Manufacturer: Rohde & Schwarz
 Model: HE200.4050.3609.02
 Serial Number: 839891/055



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
946.200	4.37E-08	4.73	9.23E-09
945.200	3.31E-08	4.73	6.99E-09
943.800	2.80E-08	4.72	5.94E-09
951.600	2.60E-08	4.76	5.47E-09
952.000	2.49E-08	4.76	5.23E-09
944.800	1.90E-08	4.72	4.02E-09
950.200	1.80E-08	4.75	3.78E-09
938.000	7.28E-09	4.69	1.55E-09
948.400	6.96E-09	4.74	1.47E-09
943.200	6.72E-09	4.72	1.42E-09
Band Exposure Quotient:			6.53E-08



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,827.200	4.31E-07	9.14	4.72E-08
1,821.800	9.13E-08	9.11	1.00E-08
1,820.600	7.75E-08	9.10	8.52E-09
1,828.800	6.85E-08	9.14	7.49E-09
1,820.200	1.58E-08	9.10	1.74E-09
1,831.200	1.47E-08	9.16	1.61E-09
1,824.200	1.42E-08	9.12	1.56E-09
1,819.800	8.11E-09	9.10	8.91E-10
1,825.200	7.64E-09	9.13	8.37E-10
1,839.800	6.08E-09	9.20	6.61E-10
Band Exposure Quotient:			8.94E-08



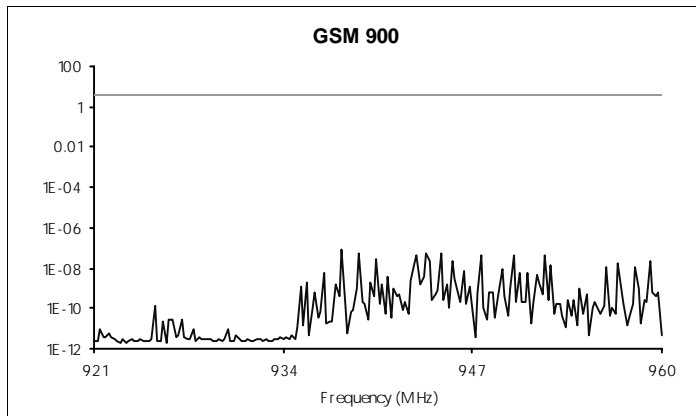
Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,858.600	2.74E-03	9.29	2.95E-04
1,853.800	2.72E-03	9.27	2.93E-04
1,863.000	3.56E-04	9.31	3.82E-05
1,851.800	2.36E-04	9.26	2.55E-05
1,858.400	4.87E-05	9.29	5.24E-06
1,853.600	4.31E-05	9.27	4.65E-06
1,858.800	1.31E-05	9.29	1.41E-06
1,854.000	1.24E-05	9.27	1.34E-06
1,862.800	5.38E-06	9.31	5.78E-07
1,851.600	4.01E-06	9.26	4.33E-07
Band Exposure Quotient:			6.67E-04

Total number of measurements: 572

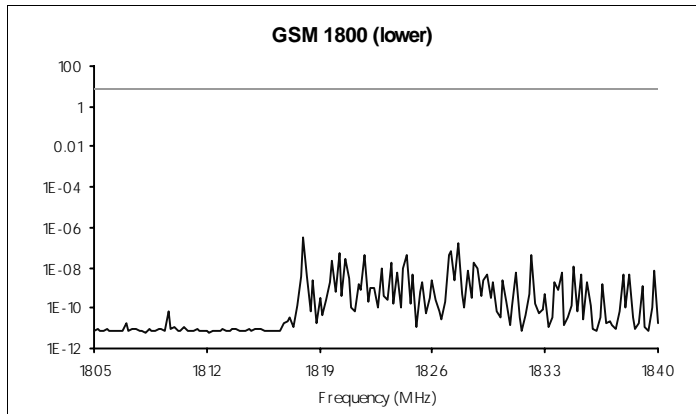
Total Band Exposure Quotient: **6.67E-04**

Site: Armadale Academy
Location: Grass Sports Area 15 Metres East of Transmitter
NGR: NS 9257 6857 **Taken from GPS**
Start Time: 04 October 2002 11:06:19
Officer: Colin Gardner

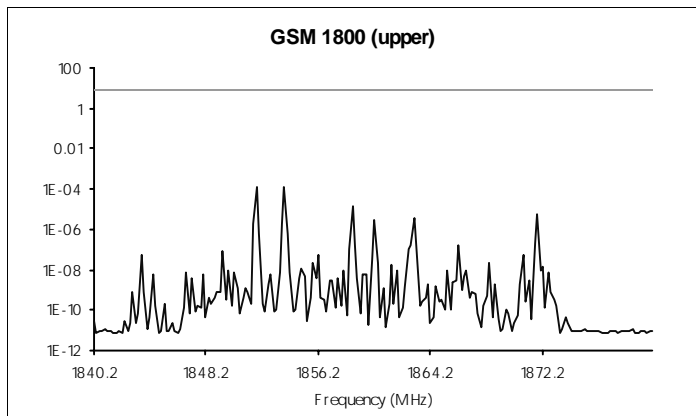
Receiver:
 Manufacturer: ROHDE&SCHWARZ
 Model: EB200
 Serial Number: 839.784/013
Antenna:
 Manufacturer: Rohde & Schwarz
 Model: HE200.4050.3609.02
 Serial Number: 839891/055



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
938.000	9.38E-08	4.69	2.00E-08
943.800	5.86E-08	4.72	1.24E-08
939.200	5.80E-08	4.70	1.23E-08
944.800	4.88E-08	4.72	1.03E-08
947.600	4.69E-08	4.74	9.91E-09
952.000	4.63E-08	4.76	9.74E-09
943.200	4.54E-08	4.72	9.63E-09
949.800	4.11E-08	4.75	8.65E-09
940.400	2.54E-08	4.70	5.40E-09
944.000	2.33E-08	4.72	4.94E-09
Band Exposure Quotient:			1.47E-07



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,818.000	3.37E-07	9.09	3.71E-08
1,827.600	1.76E-07	9.14	1.92E-08
1,827.200	7.32E-08	9.14	8.01E-09
1,820.200	4.89E-08	9.10	5.37E-09
1,827.000	4.62E-08	9.13	5.05E-09
1,832.200	4.55E-08	9.16	4.97E-09
1,824.400	4.19E-08	9.12	4.59E-09
1,821.800	4.08E-08	9.11	4.48E-09
1,820.600	3.09E-08	9.10	3.39E-09
1,819.800	2.04E-08	9.10	2.24E-09
Band Exposure Quotient:			1.15E-07



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,853.800	1.30E-04	9.27	1.40E-05
1,851.800	1.30E-04	9.26	1.40E-05
1,858.600	1.47E-05	9.29	1.58E-06
1,871.800	6.14E-06	9.36	6.56E-07
1,863.000	3.48E-06	9.31	3.73E-07
1,860.200	2.81E-06	9.30	3.02E-07
1,851.600	2.05E-06	9.26	2.22E-07
1,853.600	2.01E-06	9.27	2.17E-07
1,852.000	6.65E-07	9.26	7.18E-08
1,854.000	5.95E-07	9.27	6.42E-08
Band Exposure Quotient:			3.17E-05

Total number of measurements: 572

Total Band Exposure Quotient: **3.20E-05**

Site: Armadale Academy

Location: T3

NGR: NS 9269 6877 **Taken from GPS**

Start Time: 04 October 2002 11:29:44

Officer: Colin Gardner

Receiver:

Manufacturer: ROHDE&SCHWARZ

Model: EB200

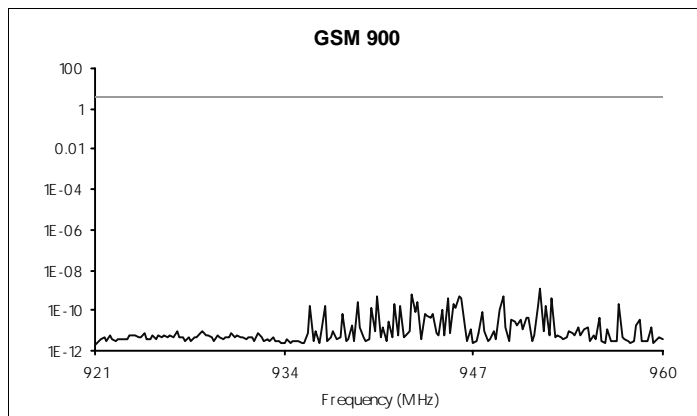
Serial Number: 839.784/013

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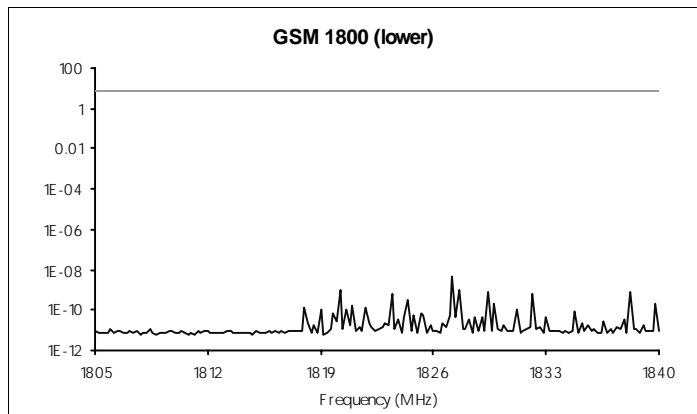
Manufacturer: Rohde & Schwarz

Model: HE200.4050.3609.02

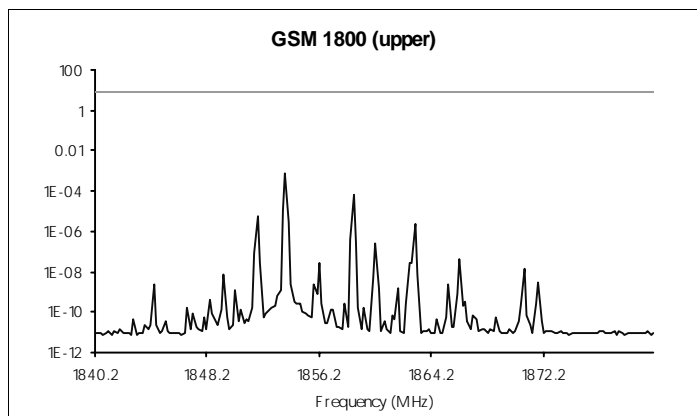
Serial Number: 839891/055



Frequency (MHz)	Maximum Exposure (W/m ²)	ICNIRP Limit (W/m ²)	Frequency Exposure Quotient
951.600	1.30E-09	4.76	2.74E-10
942.800	6.71E-10	4.71	1.42E-10
949.000	5.05E-10	4.75	1.06E-10
946.000	5.01E-10	4.73	1.06E-10
940.400	4.84E-10	4.70	1.03E-10
952.400	3.77E-10	4.76	7.92E-11
946.200	3.72E-10	4.73	7.86E-11
945.200	3.71E-10	4.73	7.85E-11
943.200	2.38E-10	4.72	5.05E-11
939.000	2.36E-10	4.70	5.03E-11
Band Exposure Quotient:			1.82E-09



Frequency (MHz)	Maximum Exposure (W/m ²)	ICNIRP Limit (W/m ²)	Frequency Exposure Quotient
1,827.200	4.31E-09	9.14	4.72E-10
1,820.200	1.02E-09	9.10	1.12E-10
1,827.600	9.65E-10	9.14	1.06E-10
1,829.400	7.69E-10	9.15	8.41E-11
1,838.200	7.29E-10	9.19	7.93E-11
1,823.400	6.94E-10	9.12	7.62E-11
1,832.200	6.14E-10	9.16	6.70E-11
1,824.400	3.25E-10	9.12	3.57E-11
1,829.800	1.98E-10	9.15	2.16E-11
1,839.800	1.97E-10	9.20	2.14E-11
Band Exposure Quotient:			1.40E-09



Frequency (MHz)	Maximum Exposure (W/m ²)	ICNIRP Limit (W/m ²)	Frequency Exposure Quotient
1,853.800	8.02E-04	9.27	8.66E-05
1,858.600	6.28E-05	9.29	6.76E-06
1,853.600	1.19E-05	9.27	1.28E-06
1,851.800	5.66E-06	9.26	6.11E-07
1,854.000	3.20E-06	9.27	3.45E-07
1,863.000	2.14E-06	9.31	2.30E-07
1,858.400	4.05E-07	9.29	4.36E-08
1,858.800	3.15E-07	9.29	3.39E-08
1,860.200	2.75E-07	9.30	2.96E-08
1,851.600	8.76E-08	9.26	9.47E-09
Band Exposure Quotient:			9.59E-05

Total number of measurements: 572

Total Band Exposure Quotient: **9.59E-05**

Site: Armadale Academy

Location: Boys Gym Hall

NGR: NS 9274 6876

Start Time: 04 October 2002 11:47:40

Officer: Colin Gardner

Receiver:

Manufacturer: ROHDE&SCHWARZ

Model: EB200

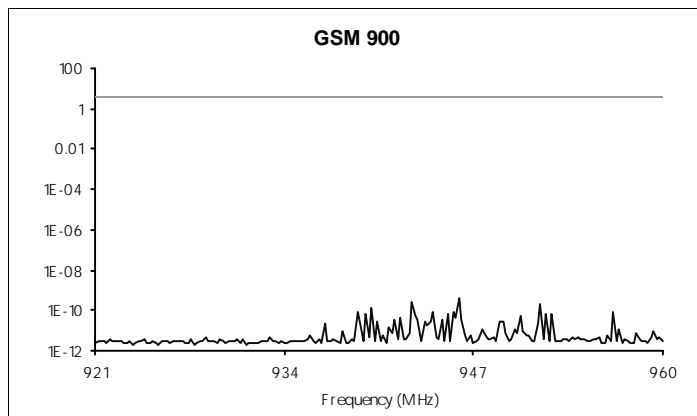
Serial Number: 839.784/013

Antenna:

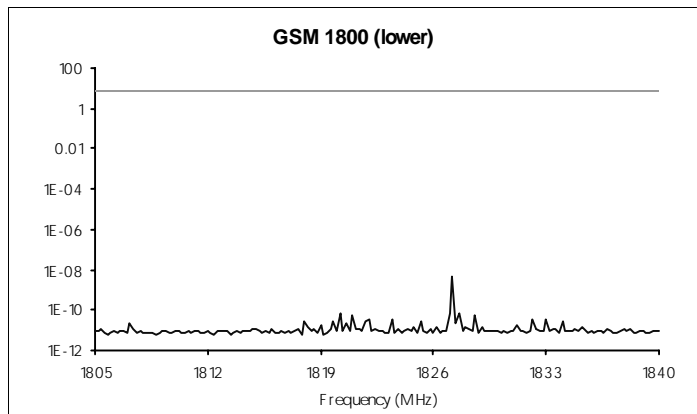
Manufacturer: Rohde & Schwarz

Model: HE200.4050.3609.02

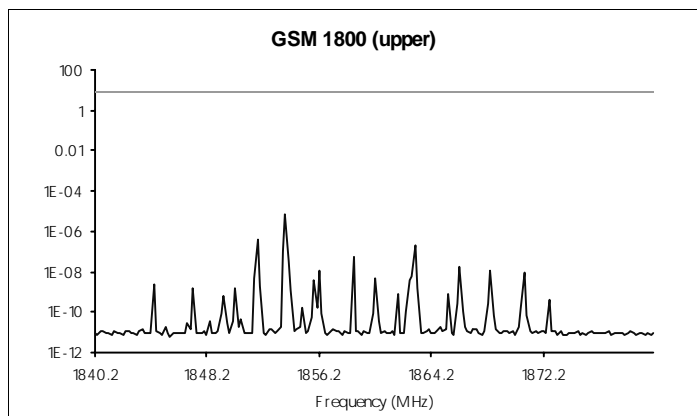
Serial Number: 839891/055



Frequency (MHz)	Maximum Exposure (W/m ²)	ICNIRP Limit (W/m ²)	Frequency Exposure Quotient
946.000	4.27E-10	4.73	9.02E-11
942.800	2.80E-10	4.71	5.93E-11
951.600	1.98E-10	4.76	4.15E-11
940.000	1.33E-10	4.70	2.83E-11
944.200	9.29E-11	4.72	1.97E-11
939.000	8.97E-11	4.70	1.91E-11
945.600	8.12E-11	4.73	1.72E-11
956.600	8.14E-11	4.78	1.70E-11
945.200	7.57E-11	4.73	1.60E-11
939.600	7.47E-11	4.70	1.59E-11
Band Exposure Quotient:			6.05E-10



Frequency (MHz)	Maximum Exposure (W/m ²)	ICNIRP Limit (W/m ²)	Frequency Exposure Quotient
1,827.200	5.06E-09	9.14	5.54E-10
1,820.200	7.57E-11	9.10	8.32E-12
1,827.600	7.16E-11	9.14	7.83E-12
1,827.000	6.67E-11	9.13	7.30E-12
1,828.600	5.31E-11	9.14	5.81E-12
1,821.000	5.13E-11	9.11	5.63E-12
1,822.000	3.55E-11	9.11	3.90E-12
1,823.400	3.40E-11	9.12	3.73E-12
1,833.000	3.38E-11	9.16	3.69E-12
1,832.200	3.22E-11	9.16	3.52E-12
Band Exposure Quotient:			7.86E-10



Frequency (MHz)	Maximum Exposure (W/m ²)	ICNIRP Limit (W/m ²)	Frequency Exposure Quotient
1,853.800	7.49E-06	9.27	8.08E-07
1,851.800	3.57E-07	9.26	3.86E-08
1,863.000	1.91E-07	9.31	2.05E-08
1,853.600	1.11E-07	9.27	1.19E-08
1,858.600	5.60E-08	9.29	6.02E-09
1,854.000	3.75E-08	9.27	4.05E-09
1,866.200	1.67E-08	9.33	1.79E-09
1,868.400	1.25E-08	9.34	1.33E-09
1,856.200	1.14E-08	9.28	1.23E-09
1,870.800	9.27E-09	9.35	9.91E-10
Band Exposure Quotient:			8.98E-07

Total number of measurements: 572

Total Band Exposure Quotient: 9.00E-07

Site: Armadale Academy

Location: Library

NGR: NS 9278 6877

Start Time: 04 October 2002 12:05:59

Officer: Colin Gardner

Receiver:

Manufacturer: ROHDE&SCHWARZ

Model: EB200

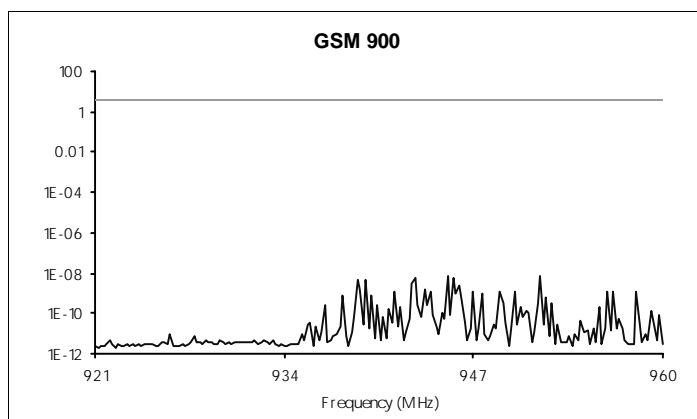
Serial Number: 839.784/013

Antenna:

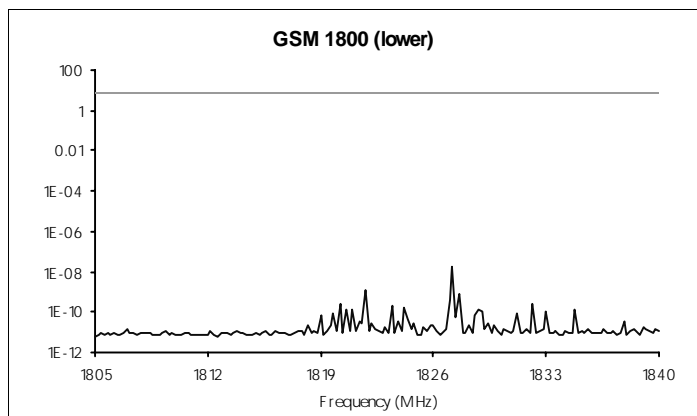
Manufacturer: Rohde & Schwarz

Model: HE200.4050.3609.02

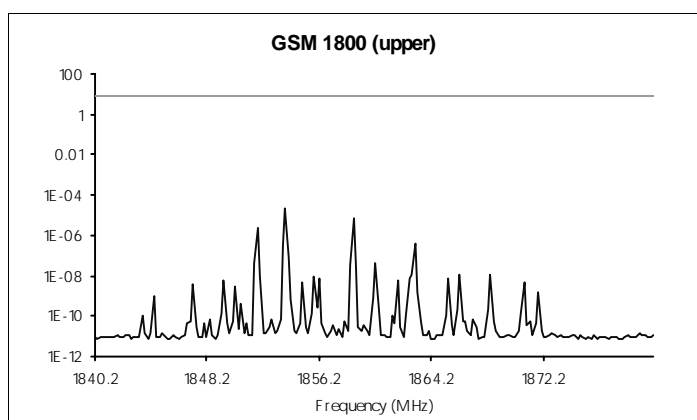
Serial Number: 839891/055



Frequency (MHz)	Maximum Exposure (W/m ²)	ICNIRP Limit (W/m ²)	Frequency Exposure Quotient
951.600	7.68E-09	4.76	1.62E-09
945.200	6.91E-09	4.73	1.46E-09
945.600	6.45E-09	4.73	1.36E-09
943.000	6.12E-09	4.71	1.30E-09
939.600	4.72E-09	4.70	1.00E-09
939.000	4.71E-09	4.70	1.00E-09
942.800	2.73E-09	4.71	5.80E-10
946.000	2.45E-09	4.73	5.19E-10
943.600	1.61E-09	4.72	3.42E-10
939.200	1.52E-09	4.70	3.25E-10
Band Exposure Quotient:			1.36E-08



Frequency (MHz)	Maximum Exposure (W/m ²)	ICNIRP Limit (W/m ²)	Frequency Exposure Quotient
1,827.200	1.80E-08	9.14	1.97E-09
1,821.800	1.23E-09	9.11	1.35E-10
1,827.600	7.16E-10	9.14	7.83E-11
1,827.000	4.21E-10	9.13	4.61E-11
1,820.200	2.81E-10	9.10	3.09E-11
1,832.200	2.81E-10	9.16	3.06E-11
1,823.400	2.25E-10	9.12	2.46E-11
1,824.200	1.83E-10	9.12	2.00E-11
1,821.000	1.29E-10	9.11	1.41E-11
1,820.600	1.29E-10	9.10	1.41E-11
Band Exposure Quotient:			2.65E-09



Frequency (MHz)	Maximum Exposure (W/m ²)	ICNIRP Limit (W/m ²)	Frequency Exposure Quotient
1,853.800	1.97E-05	9.27	2.12E-06
1,858.600	7.05E-06	9.29	7.58E-07
1,851.800	2.15E-06	9.26	2.32E-07
1,863.000	3.73E-07	9.31	4.00E-08
1,853.600	3.34E-07	9.27	3.61E-08
1,854.000	8.60E-08	9.27	9.28E-09
1,860.200	4.46E-08	9.30	4.79E-09
1,851.600	4.10E-08	9.26	4.43E-09
1,858.800	3.53E-08	9.29	3.80E-09
1,858.400	3.15E-08	9.29	3.39E-09
Band Exposure Quotient:			3.23E-06

Total number of measurements: 572

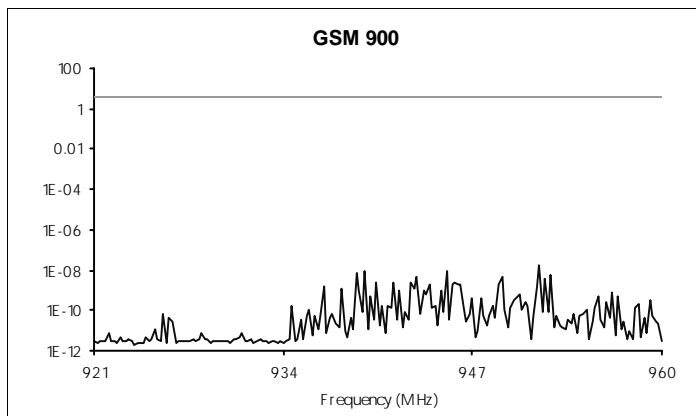
Total Band Exposure Quotient: 3.25E-06

Site: Armadale Academy
Location: Top of Stairs at Business Studies

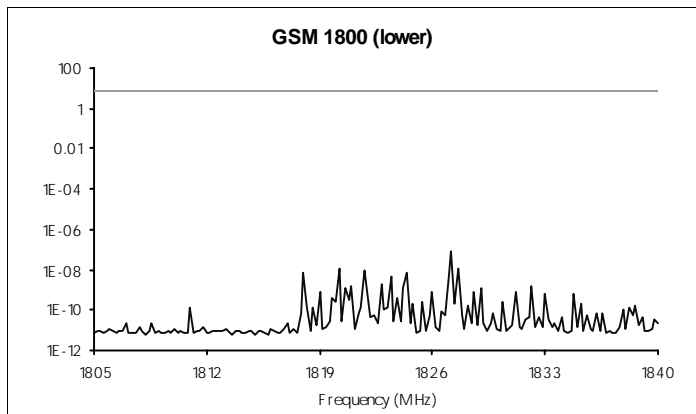
NGR: NS 9277 6876 **Taken from GPS**
Start Time: 04 October 2002 12:26:27
Officer: Colin Gardner

Receiver:
 Manufacturer: ROHDE&SCHWARZ
 Model: EB200
 Serial Number: 839.784/013

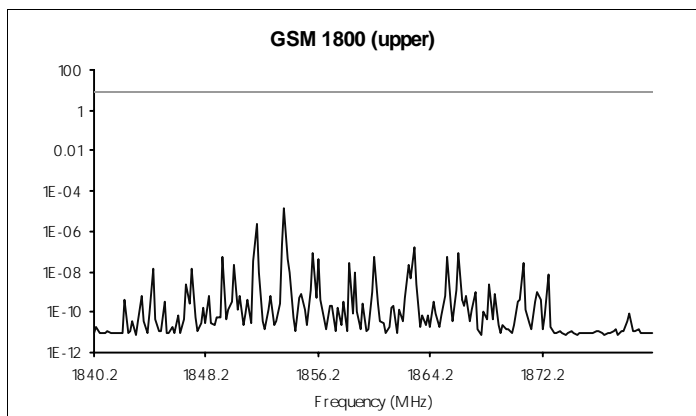
Antenna:
 Manufacturer: Rohde & Schwarz
 Model: HE200.4050.3609.02
 Serial Number: 839891/055



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
951.600	1.61E-08	4.76	3.37E-09
939.600	9.20E-09	4.70	1.96E-09
945.200	8.69E-09	4.73	1.84E-09
939.000	6.81E-09	4.70	1.45E-09
952.400	5.33E-09	4.76	1.12E-09
943.200	5.10E-09	4.72	1.08E-09
949.000	4.82E-09	4.75	1.02E-09
952.000	3.68E-09	4.76	7.73E-10
942.800	2.33E-09	4.71	4.94E-10
945.800	2.24E-09	4.73	4.73E-10
Band Exposure Quotient:			2.08E-08



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,827.200	7.84E-08	9.14	8.58E-09
1,827.600	1.22E-08	9.14	1.33E-09
1,820.200	1.17E-08	9.10	1.29E-09
1,821.800	9.56E-09	9.11	1.05E-09
1,818.000	7.37E-09	9.09	8.11E-10
1,824.400	6.64E-09	9.12	7.28E-10
1,827.000	5.55E-09	9.13	6.07E-10
1,823.400	5.03E-09	9.12	5.52E-10
1,822.800	1.82E-09	9.11	2.00E-10
1,821.000	1.58E-09	9.11	1.74E-10
Band Exposure Quotient:			1.71E-08



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,853.800	1.36E-05	9.27	1.47E-06
1,851.800	2.41E-06	9.26	2.61E-07
1,853.600	2.06E-07	9.27	2.22E-08
1,863.000	1.59E-07	9.31	1.71E-08
1,855.800	9.24E-08	9.28	9.96E-09
1,866.200	8.39E-08	9.33	8.99E-09
1,849.400	5.14E-08	9.25	5.56E-09
1,860.200	5.12E-08	9.30	5.50E-09
1,865.400	5.05E-08	9.33	5.41E-09
1,856.200	4.33E-08	9.28	4.66E-09
Band Exposure Quotient:			1.84E-06

Total number of measurements: 572

Total Band Exposure Quotient: **1.88E-06**

Glossary

- Site:** The building or area around which sets of measurements are taken
- Location:** The position within a site at which a single set of measurements is taken. A set of measurements consists of multiple scans of many frequencies within a number of bands
- Band:** A portion of the electromagnetic spectrum reserved for specific radio services
- NGR:** The Ordnance Survey national grid reference coordinates of the location. In this survey NGRs are specified to 8-digit (10-metre) resolution. E.g. SJ 9755 9888
- GPS:** The Global Positioning System
- Start Time:** The date and time at which the receiver started taking its measurements at a location
- Officer:** The name of the RA representative who carried out the audit
- Receiver:** The receiver used to perform the measurements
- Antenna:** The antenna used to perform the measurements
- Exposure:** The maximum measured electric field strength (dB(μ V/m)) converted to an equivalent power density (W/m²)
- Power Density:** The electromagnetic energy flowing through a unit area normal to the direction of propagation in a unit time. Measured in Watts per square metre (W/m²)
- ICNIRP Limit:** The reference level given by the International Commission for Non-Ionizing Radiation Protection (ICNIRP) for general public exposure to electromagnetic fields

Frequency	ICNIRP limit	
10MHz to 400 MHz	2 W/m ²	
400MHz to 2GHz	f / 200 W/m ²	(where f is frequency in MHz)
2GHz to 300GHz	10 W/m ²	

Frequency Exposure Quotient:

The ratio of the measured maximum power density to the ICNIRP limit at a given frequency. A value close to 1 signifies that exposure levels could be near to the ICNIRP limit for that frequency

Band Exposure Quotient:

The sum of the frequency exposure quotients for a single band at a location

Total Band Exposure Quotient:

The sum of the frequency exposure quotients for all of the measured bands at a location

- GSM:** Global System for Mobile communication
- ETACS:** Extended Total Access Communications
- TETRA:** Terrestrial Trunked Radio
- 3G:** Third Generation mobile-phone services

- 1.00E-03:** Exponential (or 'scientific') number format. Equal to one thousandth
- 1.00E-06:** Equal to one millionth
- 1.00E-09:** Equal to one thousand-millionth
- 1.00E-12:** Equal to one million-millionth