RCEA
(SUSSEX)

An Association for Retired Professional Engineers

NEWSLETTER December 2008

PROGRAMME OF EVENTS 2009 Session

13th Jan	Tuesday.	**Talk.** Diesel Motorsport – an introductory presentation, Speaker Dave Morrison, Ricardo Engineering
15th Jan	Thursday	Coffee - at Spotted Cow, Angmering
29th Jan	Thursday	Coffee - with Partners at Beach Hotel, Worthing
10th Feb	Tuesday	**Talk**. The European Space Agency
17th Feb	Tuesday	**Visit** 2.30 pm. Tour of West Dean College with particular reference to the wood chip heating plant
19th Feb	Thursday	Coffee - at Spotted Cow, Angmering
26th Feb	Thursday	Coffee - with Partners at Beach Hotel, Worthing
5th Mar	Thursday	**Lunch at Northbrook College. (NOTE CHANGE OF DATE)**
10th Mar	Tuesday	**Talk.** DeHavillands – mainly during and after WW2, 'From Tiger Moth to Comet 4', speaker Alan Constantine
18th Mar	Wednesday	**Visit** 11.00 am Mercedes-Benz World, Brooklands.
19th Mar	Thursday	Coffee - at Spotted Cow, Angmering
26th Mar	Thursday	Coffee - with Partners at Beach Hotel, Worthing
22nd Apr	Wednesday	**Outing.** 2.30 pm. Thales Training and Simulation Centre,

		Crawley.
16th Apr	Thursday	Coffee - at Spotted Cow, Angmering
30th Apr	Thursday	Coffee - with Partners at Beach Hotel, Worthing
13th May	Wednesday	**Outing.** 2.00 pm Guided tour of Nymans Gardens.
21st May	Thursday	Coffee - at Spotted Cow, Angmering
28th May	Thursday	Coffee - with Partners at Beach Hotel, Worthing
9th Jun	Tuesday	**Outing**. 2.00 pm**.** Guided tour of Fishbourne Palace
18th Jun	Thursday	Coffee - at Spotted Cow, Angmering
25th Jun	Thursday	Coffee - with Partners at Swallows Return, (Northbrook)
9th Jul	Thursday	**Outing.** President's Garden Party
16th Jul	Thursday	Coffee - at Spotted Cow, Angmering
22nd Jul	Wednesday	**Outing**. Croquet, Duncton **(NOTE CHANGE OF DATE AND VENUE)**
30th Jul	Thursday	Coffee - with Partners at Swallows Return, (Northbrook)
20th Aug	Thursday	Coffee - at Spotted Cow, Angmering
27th Aug	Thursday	Coffee - with Partners at Beach Hotel, Worthing

All Talks and Meetings will commence at 2.30 pm and be held in the Chichester Room, Field Place, Worthing, unless another venue or time is indicated.
Timings for visits and outings will be as printed in the detailed description of the activity.

Coffee mornings commence at 10.30 a.m., except at The Beach, which is from 10.45 a.m

Membership

New Members, can you please check the entry below. This is the data that will be published in the members' handbook. If there are any errors can you please let the Secretary know as soon as possible.

2008 **WYLD, P.V.** C.Eng. MIET
14 Laines Road Steyning BN44 3LL
Peter and Rosemary (01903 814394)
Peterww46@yahoo.co.uk

1967-08 Group HR and Risk, IT Director, Operations Director, Test Engineering Manager, Manufacturing Control Manager, Quality Engineer. **Sector**: Electronics Manufacturing – STC, ITT, GEC Computers, Eurotherm.

Interests: Walking, Drawing and Watercolour, Birds.

2008 **OWEN, C. R. W.** C. Eng BSc MIET

21 Twyford Road Worthing BN13 2NP
Cliff and Imelda (01903 262219)
cliff.owen@tesco.net

57-67 Electronics Engineer Officer RAF.
67-92 Telecoms Engineer – Installation and Sales.
92-03 Installation/Customer Service Manager Telecoms, Multiplexing equipment and Exchanges

Interests: Sailing and Current Affairs.

2008 **HIND, M. A.** C Eng FIEE, JP
7 The Castle Horsham RH12 5PX
Malcolm and Jennifer (01403 251719)
malcolmhind@msn.com

64-69 Research Engineer, Brush Electrical. 69-72 Research Asst. University of Bristol.
72-79 Technical Director, Crompton Electronics. 79-84 Chief Engineer B L Cars.
84-87 Chief Engineer, Allen Bradley. 87-92 Engineering Director, Lansing Bagnall.
92-96 Associate Director, ERA Technology. 97-08 MD Castle Business Associates Ltd

Interests: Motorcycling, Music (modern organs), Scuba Diving, DIY.

Subscriptions for 2008 / 2009

These were due on 1st October; if you have not done so already, can you please send your cheque for £12 to the Hon. Ast. Treasurer, **J H Underwood, 168 Alinora Crescent, Goring by Sea, BN12 4HW**
(Reply slip at end of newsletter.)

2008/2009 Handbooks

By now everyone should have a copy of the 2007/8 Handbook. If you have not received a copy can you please let the secretary know and he will arrange for you to receive one. If, in error, you have received two copies, could you please return one to any member of the Committee.

Website for the RCEA

For latest information and photographs, log into **www.rceasussex.org.uk**

Brief Detail – Talks, Outings and other activities January – March 2009

Talk.
Tuesday 13th January, Field Place, Durrington, Worthing
Diesel Motorsport – an introductory presentation, Speaker Dave Morrison, Ricardo Engineering
Diesel motorsport is not new. The first diesel racers appeared in the 1930's but had limited success. However, with the increasing pressure in motorsport, together with recent developments in diesel technology have resulted in an emergence of "serious" diesel engines in many motorsport fields. The best known include the Audi and Peugeot

Le Mans engines, as well as the extreme performance engines used in the Dieselmax land speed record car. The presentation covers some early and recent history of diesel racing, the technical challenges in designing a competitive diesel engine for Le Mans. Other applications for diesel racing are mentioned and finally some new facts about Dieselmax fuel economy

Visit
January - Guided tour of Vosper Thornycroft Shipyard Portsmouth
This visit will have to be rescheduled for later in the year due to operational problems

Talk.
Tuesday 10th February, Field Place, Durrington,
The European Space Agency by Terry Turner
The talk will cover background information on the ESA and satellites in general. This will include satellite testing, launchers and satellite testing. Some recent, current and future missions will be discussed.

Visit.
Tuesday 17th February at 2.30 pm.
Visit to West Dean College to view the wood chip fired boiler installation.
The plant provides central heating and hot water supplies to this large historic building, all of the wood being harvested from the College estate. Talks will be given by the Head Forester and by the Plant Manager

Our visit will also include a guided visit to the Horological Workshop where the College runs residential courses in antique clock restoration in collaboration with the British Antique Dealers Association. Students come from all over the world and the courses are very highly regarded world-wide, perhaps world leading.

The tour is limited to a maximum of 15 people. The Post Code of West Dean (for SatNav) is PO18 0QZ

*Please return the reply slip at the end of this newsletter no later than **1st February***

Spring Lunch.
Thursday 5th March, 12.00 for 12.30 pm Northbrook College, Worthing in the Arundel Room Training Restaurant.
The cost this year for a three-course lunch and coffee will be £ **11.00.** Our number will be limited to 40 because of their space consideration. The price this year includes a non-refundable deposit of £5 per head for cancellations after the 20th February.

If more than 40 members and guests apply, we will prepare a "waiting list"; you will be informed if you are on this list. In all other cases you can assume you have been allocated the places you have applied for.

*Please return the reply slip at the end of this newsletter no later than **14th February***

Talk.
Tuesday 10th March, Field Place, Durrington,
DeHavillands – mainly during and after WW2, 'From Tiger Moth to Comet 4', speaker Alan Constantine
The speaker will briefly discuss the history of the Company, and the influence Sir Geoffrey deHavilland had on the development of aircraft in the UK, including the training given to students and the wartime aircraft, including the Tiger Moth and the Mosquito. The speaker will refer to the range of DH jet-powered aircraft, including Vampire, DH10 and the Comet.

Visit.
Wednesday 18th March at 11.00 am Mercedes-Benz World, Brooklands.
A guided tour will include three attractions Watch, Build and Solve. Mercedes-Benz World is a World of experiences. The tour begins with a seat in 'Watch' - a state of the art surround sound cinema. Accelerate from the birth of the car to the latest innovations in eight eye-opening minutes. Then we will get up close to automotive legends like the Patent Motor Wagen and the 'Gullwing' in the Mercedes-Benz Gallery. Next we will find out what it's like to be a Mercedes-Benz on its journey of creation at 'Build', a simulated ride. Next, we soak up the stories, characters and rich heritage of Mercedes-Benz & Brooklands in 'Discover', finally visiting 'Solve' to explore and solve the design challenges faced by the inventors of the first automobiles.

There will also be an opportunity to try Mercedes' unique driving experience or explore the fascinating exhibitions in the Brooklands Museum.

Please meet at the information desk at **10.45 am**. There is a restaurant / café on the site

Directions:
Mercedes-Benz World is just a few minutes from Junction 10 of the M25. Follow the A3 towards London taking the first exit and turn left at the roundabout onto the A245 (signposted to Weybridge). Continue along the A245 for approximately 1.5 miles. At the second roundabout turn right onto Sopwith Drive. Continue straight over two roundabouts to arrive at Mercedes-Benz World.

Cost is £8 per head and reply slips should be received no later than Friday 27th February

REPORTS

Visit:
Tuesday 7th October 2008. Tour of the Portsmouth E.R.F. facilities.
Twenty members and their guests attended this afternoon presentation and tour of the Integra South East Energy Recovery Plant in Portsmouth. Joanna Dixon Communications and Education Officer, Veolia Environmental Services, gave an illustrated talk outlining the plant and the waste management systems employed by the company in the Hampshire area. It was interesting to see how the Hampshire approach to the problem is somewhat different to that for West Sussex as outlined in the talk given to the RCEA in September.

The presentation was followed by a tour of the plant where we were able to ask many questions of Joanna and Kate our guides, and the plant Control Room Staff who were also able to demonstrate many aspects of the plant on their screens.

The following few paragraphs are an extract from the Veolia Publicity Material (printed booklets and web pages) outlining the Hampshire approach to waste management and the plant at Portsmouth.

At the end of the 1980s it became evident that Hampshire was facing a waste disposal crisis. Landfill space was rapidly running out, incinerators built in the 1970s were not going to meet EU emission regulations, indeed the Portsmouth plant was closed early in 1995 and waste levels were continuing to rise.

Traditionally household waste has been landfilled. Instead of landfilling, three Energy Recovery Facilities have been developed in Hampshire: Integra South East at Portsmouth, Integra South West at Marchwood near Southampton and Integra North near Basingstoke.

Integra South East is capable of processing 165,000 tonnes of waste per year and recovers heat energy from the waste to produce steam. This is used to generate up to 14MW of electricity, which is supplied to the National Grid. This is sufficient to power 14,000 local homes for the life of the facility.

Household waste is delivered to the Energy Recovery Facility where it is tipped into a bunker. One of the crane grabs lifts the waste and places it into the feed hopper. It then drops down a feed chute onto the grate. The action of the grate turns the waste to allow it to burn fully. The burnt-out ash passes through the ash discharger onto an ash handling system, which extracts metal for recycling. The remaining ash is sent for recycling or disposal. Hot gases produced in the combustion process pass through a water-tubed boiler where they heat the water to become steam. A turbo-generator uses the steam to produce electricity for export to the National Grid. The gases from the boiler go through an extensive flue gas cleaning process, which starts with a gas scrubber where lime milk is injected to neutralise acid gases. Activated carbon is added to remove dioxins, urea is added to remove oxides of nitrogen and finally a bag filter takes away the remaining particulates. The resulting material known as Air Pollution Control Residue (APCR) is used to neutralise other wastes at a licensed site. The cleaned gases are finally released into the atmosphere through the chimney.

When household waste is burnt in a modern purpose built Energy Recovery Facility, various environmental objectives are achieved. It is truly a win-win solution. Waste is managed in a sustainable manner. Energy is recovered from the waste. Dependence on landfill is reduced. Release of methane from landfill is avoided (methane being a greenhouse gas many times more potent than carbon dioxide). The use of fossil fuels is reduced, a tonne of solid waste equates to one third of a tonne of coal The benefits of recovering resources for all

On Tour

Waste Gas Cleaning Plant

Flue Dust Collection

Solid Waste

Steam Turbine Air cooled condenser

Discussion Group

Visit:

Wednesday 22nd October, Visit to Bowers and Wilkins, East Worthing.

Twenty members and guests enjoyed an afternoon tour of the production facility of this local company, which produces some of the finest and most expensive loud speakers for domestic and commercial sound systems. The majority of the factory output is exported worldwide and sold through specialist agents / shops. The tour included a visit to the paint shop, the production line and intermediate testing stations, inspection of the latest Jaguar Car to be fitted with a B&W designed speaker system, and finally a demonstration in a quiet room of a set of speakers connected to a DVD player. Unfortunately we were unable to hear the speakers set up in their demonstration suite because it was in use that afternoon by a group of Chinese buyers.

Speakers awaiting assembly

Speakers designed for Jaguar Cars

Speaker housings in paint shop

Speaker Housings awaiting assembly

Speaker Housings awaiting assembly

Speaker cone production

Coil and cone assembly

Speaker assembly

Visit:

Wednesday 4th November, Tour of Parker SSD Drives Factory, Littlehampton.

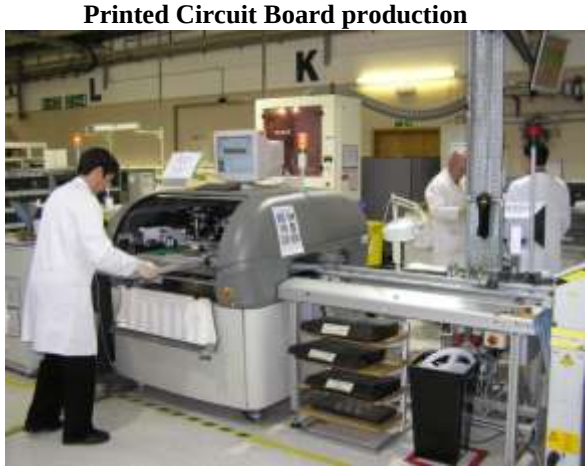
Twenty members and guests enjoyed a presentation by one of the Senior Managers at the plant in which he described the history of SSD leading up to it being bought and integrated into the Parker (USA) empire, its past and current products, and current markets worldwide. 380 staff are employed at the Littlehampton site.

The presentation was followed by a full tour of the production facility of this local company, which produces speed, power and direction control systems for industrial AC and DC electric motors. The controllers are used in many applications optimising and controlling the speed precisely while at the same time minimising the power requirement. The tour of the factory was especially interesting as it showed the very latest techniques in the manufacture of solid-state equipment.

Eurotherm was founded in 1965. In 1974 they formed Shackleton System Drives (SSD) Division – Littlehampton, since when it has a chequered history. After periods when the company was owned by Siebe and subsequently by Invensys, it was sold in 2002 to equity partners and the senior management team; it was then sold again in 2005 to the Parker Hannifin Corporation USA. its current owner.

Fitting Anti-static footware

Printed Circuit Board production



Custom Built Control Panels

Automatic soldering

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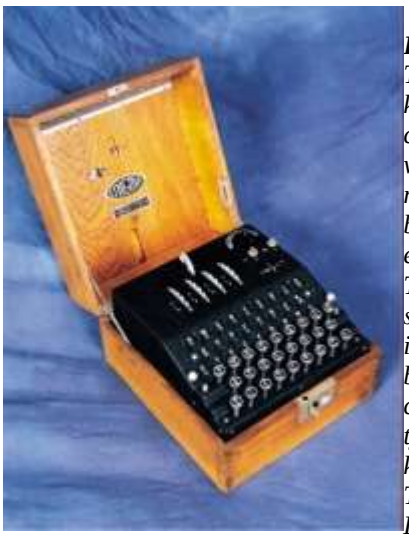
The Cooch Memorial Lecture:
Tuesday 18th November. Bletchley Park, the Enigma Machine and Code Breaking by Nick Myers, a member of the Lecturer's Panel at Bletchley Park.

This year's Cooch Memorial Lecture attracted one of the largest audiences we have had for a long time, quite a number of those present being visitors. In keeping with the audience numbers, we had, in the mind of many members, a most interesting lecture. Nick proved to be an enthusiast and an excellent speaker, very much appreciated by our audience.

Below, is an extract from the Bletchley Park website, which we are permitted to use; it covers the main content of the talk given to us by Nick.

Machines behind the codes



Enigma

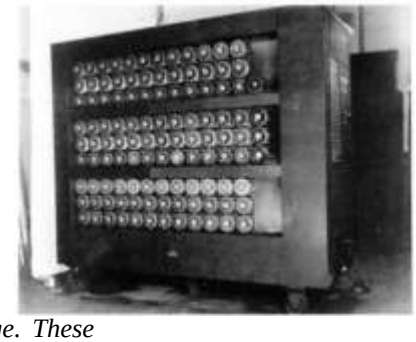
The German military used the Enigma cipher machine during WW2 to keep their communications secret. The machine was available commercially during the 1920s, but the military potential of the device was quickly realised and the German army, navy and air force all used a more developed model of the machine to encipher their messages believing that it would make these communications impenetrable to the enemy.

The Enigma machine is an electro-mechanical device that relies on a series of rotating 'wheels' or 'rotors' to scramble plaintext messages into incoherent ciphertext. The machine's variable elements can be set in many billions of combinations, and each one will generate a completely different ciphertext message. If you know how the machine has been set up, you can type the ciphertext back in and it will unscramble the message. If you don't know the Enigma setting, the message remains indecipherable.

The German authorities believed in the absolute security of the Enigma. However, with the help of Polish mathematicians who had managed to acquire a machine prior to the outbreak of WW2, British code breakers stationed at Bletchley Park managed to exploit weaknesses in the machine and how it was used and were able to crack the Enigma code.

Breaking the Enigma ciphers gave the Allies a key advantage, which, according to historians, shortened the war by two years thus saving many lives.

The Bombe



Before World War II, Polish crypto-analysts had already designed an electro-mechanical machine to test Enigma rotor settings called a 'Bomba'. However, in December 1938 the German military changed their system slightly thus thwarting the Poles' ability to decrypt Enigma messages. Before the war started, the Poles passed all of their information over to Britain and France and two mathematicians working at Bletchley Park, Alan Turing and Gordon Welchman, were able to build on this research to develop the 'Bombe' machine. Turing and Welchman exploited the fact that enciphered German messages often contained common words or phrases, such as general's names or weather reports and so were able to guess short parts of the original message. These guesses were called 'cribs'. The fact that on an Enigma machine no letter can be enciphered as itself made guessing a small part of the text even easier. It also meant that the potential number of settings that the Enigma could be in on that day was greatly reduced.

Before running the Bombe, the wiring at the back of the machine was connected in accordance with a 'menu' drawn up by the code breakers based on cribs. The Bombe found potential Enigma settings not by proving a particular setting, but by disproving every incorrect one in turn.

Over 200 of the Bombes were built by the British Tabulating Machine company at Letchworth, all of which were destroyed after the war. A Bombe machine is being rebuilt at Bletchley Park, further details can be seen here: Link to Bombe rebuild.

Lorenz

The Lorenz was an even more complex cipher machine than Enigma. Made by the Lorenz company, it was used exclusively for the most important messages passed between the German Army Field marshals and their Central High Command in Berlin. Its size meant that it was not a portable device like Enigma. Bletchley Park code breakers called the machine 'Tunny' and the coded messages 'Fish'.

Lorenz used the 'International Teleprinter Code', in which each letter of the alphabet is represented by a series of five electrical impulses. Messages were enciphered by adding, character by character, a series of apparently randomly generated letters to the original text. Crucially, to decrypt the enciphered message, the receiving Lorenz simply added exactly the same obsuring letters back to the ciphertext. The obsuring letters were generated by Lorenz's 12 rotors, five of which followed a regular pattern, while another five followed a pattern dictated by two pin wheels. Cracking Fish again relied on determining the starting position of the Lorenz machine's rotors.

The great Cryptanalyst, John Tiltman broke the first Fish messages at Bletchley in 1941 using hand-methods that relied on statistical analysis, but by 1944 the Germans had introduced complications which made it virtually impossible to break Tunny by hand alone. Dr Max Newman and his team in the 'Newmanry' were assigned the task of building machines to break Tunny.

Colossus

The first machine designed to break the Lorenz was built at the Post Office research department at Dollis Hill and called 'Heath Robinson' after the cartoonist designer of fantastic machines.

Although Heath Robinson worked well enough to show that Max Newman's concepts were correct, it was slow and unreliable. Max Newman called in the help of Tommy Flowers, a brilliant Post Office Electronics Engineer. Flowers went on to design and build 'Colossus', a much faster and more reliable machine that used 1,500 thermionic valves (vacuum tubes).

The first Colossus machine arrived at Bletchley in December 1943. This was the world's first practical electronic digital information processing machine - a forerunner of today's computers.

Lorenz had to be cracked by carrying out complex statistical

analyses on the intercepted messages. Colossus could read paper tape at 5,000 characters per second and the paper tape in its wheels travelled at 30 miles per hour. This meant that the huge amount of mathematical work that needed to be done could be carried out in hours, rather than weeks.
Mark I Colossus was upgraded to a Mark II in June 1944, and was working in time for Eisenhower and Montgomery to be sure that Hitler had swallowed the deception campaigns prior to D-Day on June 6th 1944. There were eventually 10 working Colossus machines at Bletchley Park.

Talk
Tuesday 9th December. Talk: Power Engineering – some career highlights by Roger J Arthur.
Roger's presentation centred on the highs and lows of a career in electrical engineering, partly spent in tropical climes, was warmly received on a cold December afternoon. Like his talk, his working life was in two halves, the first involving challenges of an extension to an existing power plant in Malaysia, the second his work in the Banking Sector.

Specifications and statistics were presented demonstrating the demands of the power plant project, which was carried out under the influence of local politics, the signs of the zodiac and even physical threat.

One of the lows, of this particular project, was the loss of a generator transformer from an unloading barge into the sea with a 3-knot tide running and a crane inadequate for the job. Costs were in terms of millions of dollars and a resultant six-month delay in obtaining a replacement. The original transformer is still buried securely in silt in the sea near Penang Harbour waiting for the archaeological divers of the future.

Happier recollections were of his two sons playing in the warm sea and interesting modes of transport.

The second period of this working life he described was when working for a household name major bank in the UK. This required the engineering and installation of secure power supplies for a Data Centre handling 25 million transactions a day. The requirement was for an extremely high degree of reliability where a 50 milli-second interruption of supply was unacceptable.

At the close, those present responded enthusiastically with a series of questions and some further discussion.

Christmas Lunch.
Wednesday 17th December.
Forty-six members and guests enjoyed a Christmas Lunch at the Beach Hotel.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FINAL SUBSCRIPTION REMINDER: (2008/2009)

To: Ast. Treasurer, Jim Underwood, 168 Alinora Crescent, Goring by Sea, BN12 4HW

Full name:……(Block capitals)
Address……
……
I enclose a cheque made payable to RCEA for **£……..…(£12.00)**

Please return this reply slip as soon as possible (Separate cheque please)
……

Insurance notice for those members who wish to participate in any of the Association activities.

RCEA members are covered by a Members' Club Protection Policy whilst engaged in Association activities. Please be advised that this cover does not extend to non – members and guests.

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REPLY SLIP 1:

To: Richard Norton, 106 Wallace Avenue, Worthing BN11 5QA
Tel 01903 242204, or at rmvnorton@iee.org
I wish to attend the Visit to West Dean College on Tuesday 17th February at 2.30 pm.

Full name……(Block capitals)
Address……
……
……
Phone number…… Name of Guest……

Numbers are limited to 15, so it will be first come, first served.

I enclose a cheque made payable to RCEA for **£……..…(£8.00 per person)**

Applications please by 1st February
……

INTENTIONALLY

BLANK

REPLY SLIP 2:

To Jim Underwood, 168 Alinora Crescent, Goring by Sea, BN12 4HW
Tel 01903 709033 (jimunderwood9@hotmail.com)

I/We wish to attend the Lunch at Northbrook College, Thursday the 5th March

Full name:……(Block capitals)
Address……
……
……
Phone No……. Number of Persons……..
Name of guest/s…….

I enclose a cheque made payable to RCEA for **£……..…(£11.00 per person)**

Please return this reply slip by 14th February

REPLY SLIP 3:

To Colin Pilling, 84 Marine Crescent, Goring by Sea. BN12 4JH
Tel: 01903 522356, or at colinpilling@ntlworld.com

I/We wish to attend the Visit to Mercedes-Benz World, Brooklands on Wednesday 18th March at 11.00 am.

Full name:……(Block capitals)
Address……
……
……
Phone No……. Name of Guest……

I enclose a cheque made payable to RCEA for **£……..…(£8.00 per person)**

Applications please by 27th February