



All British Classics Car Club (Vic)

A Friendly Family Social Motoring Club

Edition 167

December 2013

ABCCC Incorporation Registered Number: A00035462V

BUILT ON AIRCRAFT PRINCIPLES



Ray and Joan Parker's fabulous Bristol 401 pauses at the Cave Hill Quarry in Lilydale. The door window was not open for long; it became damp as rain closed in.

MEMBERSHIP SUBSCRIPTIONS

The annual membership subscription for the All British Classics Car Club Inc. is \$35.00. There is a once-only joining fee of \$30.00. Please send membership subscriptions to Pat Douglas, PO Box 201, Chirnside Park, VICTORIA, 3116.

Please Note: Membership subscriptions are due by end of December.

Life Members: Pat J Douglas, Ross Wolstenholme.

**THE ALL BRITISH CLASSICS CAR CLUB (VICTORIA) INC.,
FOUNDED 23rd SEPTEMBER 1997.**

Club Founder – The Late Frank E Douglas

**“OWNING AND/OR APPRECIATING THE SPIRIT OF FINE
BRITISH CLASSICS”**

THE ALL BRITISH CLASSICS CAR CLUB – YOUR COMMITTEE

Executive Positions	Name	Telephone No.	Other Telephone No.
President	Tony Pettigrew	(03) 9739 1146	
Vice President (Acting)*	Bill Allen	(03) 9846 2323	
Treasurer	Bill Allen	(03) 9846 2323	
Secretary	Pat Douglas	(03) 9739 4829	
Membership Secretary	Pat Douglas	(03) 9739 4829	
Other Positions	Name	Telephone No.	Other Telephone No.
Editor	Michael Allfrey	(03) 9729 1480	
Assistant Editor	Betty Taylor	(03) 9739 1879	
AOMC Delegate	Ross Gardiner	(03) 9589 2013 (AH)	
AOMC Delegate	Bill Allen	(03) 9846 2323	
VCPS Officer (Applications)	Nello Mafodda	(03) 9719 7949	
VCPS Officer (Renewals)	Colin Brown	(03) 5964 9291	
Club Events Registrar	Sue Allfrey	(03) 9729 1480 (AH)	
Club Regalia	Maxine Pettigrew	(03) 9739 1146	
Committee Member (Events)	Frank Sawyer	0408 633 778	
Committee Member	Colin Brown	(03) 5964 9291	
Web Master	Ed Bartosh	(03) 9739 1879	
The All British Classics Car Club Website is: http://www.abccc.com.au/			
The Association of Motoring Clubs Website is: http://www.aomc.asn.au/			

* Till next AGM

IMPORTANT CLUB INFORMATION

The All British Classics Car Club (Victoria) Inc., (ABCCC) is a fully incorporated club in accordance with the Associations Incorporation Act. Accordingly, any publication or document officially issued by the ABCCC must carry the ABCCC's Association Incorporation Registered Number: A00035462V.

The Official Club Magazine – *Your ABCCC News*

Your ABCCC News, is the official magazine of the ABCCC (Vic) Inc. The magazine's issue date is during the week of the 25th of every month. To make the Editor's task a little easier, it is requested that articles, event information and photographs are with the Editor prior to the 14th of each month. Articles published in *Your ABCCC News* may be used without permission, however, the ABCCC does ask that appropriate acknowledgement be given.

For those members who receive their issue of *Your ABCCC News* via E-mail, the magazine will be available to download from the ABCCC Website at the same time that the printed copy of the magazine is mailed to those who do not have access to the Internet.

Disclaimer

This publication contains general information that should not be relied upon without the specific advice from a suitably qualified professional. The authors and the ABCCC Inc. expressly disclaim liability for anything done or omitted to be done by any person in consequence with the contents of this publication.

Those products and/or services mentioned in this publication are not necessarily endorsed by the ABCCC Inc. Articles and photographs published in *Your ABCCC News* do not necessarily reflect the views of the Committee, the Club's Membership or the ABCCC Inc. Events, other than those conducted by the ABCCC, are included for interest purposes only, and they are reproduced in good faith. The ABCCC Inc. cannot be held responsible for any inaccuracies relating to other clubs' events.

All correspondence should be addressed to the Editor *Your ABCCC News*, 59 Rowson St, Boronia, Victoria, 3155. Other Editorial contact information is listed above. It is club policy to have the right to refuse placement of advertising material in *Your ABCCC News*, from those who are not members of the ABCCC Inc.

The Victorian Club Permit Scheme

The ABCCC Inc. is a club that is authorised by VicRoads to operate vehicles under the Victorian Club Permit Scheme (VCPS). On the Committee there are two VCPS Officers and their contact details are listed above.

Club members will be kept up to date with respect to changes and improvements to the VCPS. However, it cannot be stressed enough, that a vehicle operated on the VCPS, must carry the VicRoads Logbook and Permit (current) and proof that the permit holder has a current membership in the auspicious club (e.g., your ABCCC membership card). All enquiries should be addressed to the VCPS Officers.

THE VICTORIAN CLUB PERMIT SCHEME

NEW PERMIT APPLICATIONS

For members wanting to operate a motor car on the Victorian Club Permit Scheme (VCPS) under the auspices of our club, please contact Nello Mafodda on (03) 9719 7949, who is the ABCCC VCPS Officer In Charge. Nello will be able to provide all the information required to operate a motor car on the VCPS. Nello's position is entirely voluntary, so due consideration should be given when contacting him.

The ABCCC has the following conditions for operating a motor vehicle [twenty-five (25) years old and older] on the Victorian Club Permit Scheme:

1. Initial contact should be made with the club's VCPS Applications Officer, currently Nello Mafodda. He will advise the procedure for application with respect to the conditions set by the ABCCC.
2. A club member who proposes to place his/her motor vehicle on the VCPS under the auspices of the ABCCC must have been a ABCCC member for more than one year.
3. A Roadworthy Certificate must accompany an application for the Victorian Club Permit Scheme under the auspices of the ABCCC.
4. A club member who operates a motor vehicle on the Victorian Club Permit Scheme, under the auspices of the ABCCC, must attend a minimum of three (3) club events per year. The car does not have to attend three events, just the owner. Excluded from the count are the Annual Winter Luncheon and the Christmas Luncheon events.
5. VicRoads requires a permit holder to be in good financial status in order to drive the car under this Permit.
6. The ABCCC will notify VicRoads when a permit holder becomes an unfinancial member.
7. The ABCCC will maintain a Register of those Motor Vehicles operated on the Victorian Club Permit Scheme under the club's conditions. Such Register will be submitted to VicRoads upon request.
8. The motor vehicle operated under the Permit Scheme should be used within the spirit of the motor vehicle club scheme.

PERMIT RENEWALS

VicRoads requires that an ABCCC authorised VCPS Officer's signature is entered on the permit renewal notice. Therefore, your VCPS renewal should be sent to Colin Brown, PO Box 40, Coldstream, Victoria 3770. Enclose with it a stamped envelope addressed to VicRoads, along with a cheque/money order for the VCPS fee. Colin will sign on behalf of the ABCCC, and then forward the permit renewal on to VicRoads. The form also requires YOUR signature, so be sure to sign it as the permit holder as well. Colin's position is entirely voluntary, so due consideration should be given when contacting him.

ABCCC EVENTS DIRECTORY

Note: All events listed in this directory are placed in good faith. Events for inclusion here, must be provided to the Magazine Editor prior to the 14th of each month. Official ABCCC events are those with 'ABCCC Inc.' shown after the event's title. These events are recorded for the Victorian Club Permit Scheme's Register. Events organised by other clubs or associations have their own telephone number to use prior to the event.

The Registrar for ABCCC Inc. events is Sue Allfrey. Event organisers, please send attendance lists to sue.allfrey@bigpond.com as soon after the event as is practicable.

IMPORTANT: TEXT IN RED INFORMS OF CHANGED OR CORRECTED EVENT INFORMATION.

January 2014

Sunday 19th RACV Great Australian Rally – [A Major ABCCC Event](#) Colin Brown (03) 95964 9291
Start Points: Melbourne, Stud Park and Hastings.
Main Display – Mornington Racecourse, Mornington.

February 2014

Sunday 2nd The BMS Mega Run – [An ABCCC Event](#) Karen McDonald 0409 028 534
Start Venue – Supermarket in Station Street, Kooweerup (Map 718; Ref: B3)

Sunday 16th The Annual General Meeting of the ABCCC Inc. Pat Douglas (03) 9739 4929
Venue – Chirnside Park Country Club, 68 Kingswood Drive, Chirnside Park (Mel 37; K3).

March 2014

Sunday 2nd A Special Day Out – [An ABCCC Event](#) Bryan Tootell (03) 9891 6905
Start Venue – To Be Advised

Sunday 9th Phillip Island Classic – Historic Racing Register
Venue – Phillip Island Motor Racing Circuit, Back Beach Road, Phillip Island.

Saturday 15th RACV Fly The Flag Tour – The Great North Eastern Tour – [Organised By The ABCCC](#)
to Saturday 22nd Start Point – RACV Noble Park Tony Pettigrew (03) 9739 1146

Sunday 30th RACV Classic Showcase – ABCCC Members to make a big effort. AOMC Office (03) 9555 0133
Conducted by The Association Of Motoring Clubs Inc.

April 2014

Saturday 12 th	Como Gardens Open Weekend – An ABCCC-Assist Event .	George Hetrel (03) 9761 1341
Sunday 13 th	Venue – 79 The Basin To Olinda Road, The Basin	
Wednesday 30 th	An Interesting Run – An ABCCC Event Start Venue – To Be Advised	Mary and Rob Nolan 0488 547 499

May 2014

Sunday 4 th	The Rex and Deanna Hall Run – An ABCCC Event Start Venue – To Be Advised	Rex Hall (03) 9795 7669
Sunday 18 th	AOMC Heritage Motoring Day – An AOMC Fostered Event Use Your Classic Car And Be Seen.	AOMC Office (03) 9555 0133
Sunday 25 th	Historic Winton – Austin 7 Club Venue – Winton Motor Raceway, Near Benalla.	

June 2014

Saturday 7 th to Monday 9 th	Hamilton Rally – Hamilton & District Car Club Inc. Venue – Hamilton, Victoria.	Tony Pettigrew (03) 9739 1146
Sunday 22 nd	An Interesting Day Out – An ABCCC Event Start Venue – To Be Advised	Peter Lester (03) 9795 0033

July 2014

Sunday 6 th	Run To Point Cook – An ABCCC Event Start Venue – To Be Advised	Colin Oberin (03) 9817 3182
Friday 18 th to Sunday 20 th	Weekend Away – An ABCCC Event Details – To Be Advised	Bryan Tootell (03) 9891 6905

August 2014

Sunday 3 rd	The ABCCC's Annual Luncheon – An ABCCC Event Venue – To Be Advised	TBA
Wednesday 20 th	A Mid-week Run With A Difference – An ABCCC Event Start Venue – To Be Advised	Marj Pepper (03) 9439 7875
Sunday 31 st	A Run Put On For Us – An ABCCC Event Start Venue – To Be Advised	Greg Anglin (03) 9876 3293

September 2014

Sunday 14 th	Run To Maldon – An ABCCC Event Start Venue – To Be Advised	Torre Panuzzo (03) 9764 2276
Sunday 28 th	A Phantastic Day Out To Mount Macedon – An ABCCC Event Start Venue – To Be Advised	Phil Cook (03) 9842 5449

October 2014

Wednesday 8 th	A Most Enjoyable Outing – An ABCCC Event Start Venue – To Be Advised	Lyn Higginson (03) 9310 5286 (BH)
Thursday 16 th to Thursday 23 rd	<i>Proud Mary</i> River Murray Cruise – An ABCCC Holiday Event Meet-up Point – To Be Advised (See Page 10 for trip details)	Marj Pepper (03) 9439 7875
Saturday 18 th & Sunday 19 th	Como Gardens Open Weekend – An ABCCC-Assist Event Venue – 79 The Basin To Olinda Road, The Basin.	George Hetrel (03) 9761 1341

November 2014

Sunday 2 nd	Club Run – An ABCCC Event Start Venue – To Be Advised	Gordon Lindner (03) 9707 1294
Friday 14 th to Sunday 16 th	The Famous Indulgence Tour – An ABCCC Event Start Venue – To Be Advised	Peter McKiernan (03) 9787 6003
Sunday 30 th	A Special Surprise Run – An ABCCC Event Start Venue – To Be Advised	Rob and Mary Nolan 0488 547 499

December 2014

Sunday 14 th	Christmas Lunch – An ABCCC Event Venue – To Be Advised	Maxine Pettigrew (03) 9739 1146
-------------------------	---	---------------------------------

EVENT ORGANISERS!

PLEASE ENSURE THAT EVENT INFORMATION IS WITH THE EDITOR THREE MONTHS IN ADVANCE OF THE EVENT BEING PROMOTED. FREQUENTLY, SCHEDULES CAN BE A BIT TIGHT. HOWEVER, WE NEED TO BE AWARE THAT THE MEMBERSHIP BE INFORMED OF EVENT MEETING POINT AND OTHER PERTINENT INFORMATION IN A TIMELY MANNER SO THAT MAXIMUM EXPOSURE PROVIDES GOOD RESULTS.

EDITORIAL NOTES – ISSUE NUMBER 167

In February, next year, we have a rather special event prepared for us. It is the BMS Mega Run and it is being put together for us to enjoy by Geoff and Judy Birkett, Frank Sawyer, Val MacRae and Karen and Ken McDonald. For our club this is wonderful stuff, the combined event organising skills of six of our members. Having recently been given a superbly organised visit to Beleura House, and the very interesting tour of Melba's Highway in the Lilydale area and now this BMS Mega Run, things are really going well for all of us. Thank you folks!

This may be a little bit later than it should be. The Editor's computer decided to do some really stupid actions and finally demanded attention from the local computer technician. It all commenced when a part of the Associations Model Rules were downloaded from the Department of Consumer Affairs for the piece about our fast-approaching AGM. If you can't trust such a Website, who or what can you trust? It seems that a nasty virus managed to get into my system and started making a real mess of the 2014 RACV Fly The Flag Tour's Daily Running Sheets. Nasty things like insisting that words like 'centre', 'kilometre' and such be spelt the American way. In addition to that, all the headings went berserk and appeared in all sorts of places in the thirty-plus page document. Then there were changes to the font I normally use and paragraphs changed in strange ways. Hopefully all is properly fixed now.

We, on the Committee, wish all members an especially good new year and we look forward to seeing many of you regularly through 2014, on all of those rather special events that have been put together for your enjoyment.

Mike Allfrey – Editor. E-mail: michael.allfrey@bigpond.com

THE VICTORIAN CLUB PERMIT SCHEME – INFORMATION

A Report From The AOMC Newsletter – November 2013

Since the introduction of the new log-book system for the Club Permit Scheme APSE, a number of issues have been under review by VicRoads. The most significant of these has been the question of inspection standards for modified vehicles on the scheme. This has been the subject of intense discussion between VicRoads and AOMC for a considerable time with AOMC putting forward proposals to ensure that the resulting rules are appropriate for the historic vehicle movement. We have sought rules which target those highly modified vehicles where significant changes to a vehicle's performance and/or structure indicate that engineering inspection is warranted to ensure that its safe use on the roads is not compromised. Conversely, we have argued that the many older vehicles which may have undergone relatively minor change in specification arising from long-established practices evolved from parts availability issues or period appropriate component upgrades are not subject to an unnecessary and costly certification regimes. The initial approach by VicRoads was to apply their existing rules for modern vehicles to the CPS and this was also the approach supported by the Federation of Veteran, Vintage and Classic Vehicle Clubs. AOMC consistently argued that this is not appropriate and presented proposals for a fairer, simpler, more relevant and practicable set of rules for the main categories of older vehicles. VicRoads has recently issued a summary of the policy directions currently resolved or being worked on.

To help clarify some of the matters some comments are offered:

- Points 1 and 2 (in the Extract of the VicRoads Document, below) refer to the work now underway by VicRoads to write specific rules to identify those vehicle modifications which will require engineering inspection and certification. These rules will deal with the age categories proposed by AOMC. We anticipate the new rules will reflect much of the input from AOMC, but we cannot yet be sure that all of our concerns will be dealt with. When the draft new rules are made available further discussion is likely.
- Point 3 refers to a likely change to make a RWC mandatory for most vehicles going onto the CPS, whilst those vehicles still able to be subject to club safety checks VicRoads will specify the test standards and methods to be used.
- Points 4 and 5 are calls by AOMC for a plate type to identify those vehicles modified to an extent that they require certification.
- Point 6 is a new procedure for clubs which will support the monitoring of modified vehicles undertaken subsequent to entry onto the scheme.
- Point 7 will limit those club officers who may sign CPS applications, renewals and statements of safety (where applicable).

All of these items have to some degree been presented at recent AOMC meetings. The second set of attention points (❖) are reflecting policy matters still to be developed. Of these the first is perhaps the most significant for AOMC member clubs to consider with feed backing their views to the Committee. These as well as the following points are derived from concerns about the integrity of some newly formed clubs. It is the belief that some vehicles being put forward for the CPS may be more in the nature of domestic workhorses than enthusiast hobby vehicles. AOMC welcomes comment from its clubs on any of the matters raised in the VicRoads update. We will continue to strive to gain the best possible outcome for the majority of the historic vehicle movement.

Rod Amos Vice President – AOMC

Extract Of The VicRoads Document

In light of discussions so far with peak bodies and stakeholders including the Victoria Police, VicRoads is developing detailed guidelines clarifying existing requirements for club permits.

- Vehicle standards for club permit vehicles (including establishing the extent vehicles can be modified from standards that are suitable to the era, e.g., pre 1949, after 1948 and before 1969, etc.
- These standards will differ according to age and be "age appropriate". For example, pre-1949 vehicles will be permitted to have bodywork changes typical of the era without further certification so long as the vehicle's general appearance is in accord with vehicles of that type with a similar date of manufacture. Post-1969 vehicles may only have body modifications in line with those allowed in VicRoads' Vehicle Standards information No. 8. (VSI-8)
- Inspection standards and arrangement for club permit vehicles. This includes the possibility of certificate of road-worthiness being required for the initial permit issue for some club permit vehicles, and a more closely defined club "certified" inspection for other vehicles.
- The possibility of a new club permit vehicle "class" of modified club permit vehicle (requiring a "higher level" inspection).
- If a modified club permit vehicle class is to be put in place, it is proposed that these vehicles be identified with a new number plate series.
- Clubs will be required to maintain photographs of vehicles they are recommending for admission to the club permit scheme.
- For renewals or new applications, VicRoads to only accept the signature of the club secretary and/or one designated club permit officer who will be certifying that the vehicle is safe for use on the road and meets the club permit scheme requirements and standards.

In addition to the above, VicRoads will also be considering matters such as:

- ❖ Whether to change (with an appropriate transition arrangement) the minimum age of club permit vehicles to 30+ years.
- ❖ What constitutes a club and whether "internet clubs" will be recognised?
- ❖ Clarifying the requirements for the "rally permit" scheme and determining whether rally cars currently on the club permit scheme should be on a revised rally permit scheme.
- ❖ Liability of permit holders and clubs to report vehicle modifications to VicRoads.
- ❖ For non-Australian vehicles without a previous registration history, that Commonwealth Government import approval papers must form part of the initial club permit application.

From The November AOMC Newsletter – With Thanks.

From The November AOMC Delegates' Meeting

During the meeting, Rod Amos (*Vintage Sports Car Club*) presented the findings of a survey of matters related to the Victorian Club Permit Scheme (VCPS). It was revealed that the AOMC had sent the survey to member club Secretaries and therefore, Delegates were probably not informed. Some of the results were as follows:

- using a Roadworthy Certificate to prove a vehicle is safe to operate on the VCPS – Two-thirds of responders said 'Yes'. The other third supported 'No Change'.
- issuing a different style number plate for modified vehicles – the result was 90% in favour.
- having the club's Secretary and one officer to sign VCPS applications and renewals being kept in place – the response was in favour.
- should the rolling vehicle qualifying of 25 years be increased to 30 years – the response was in favour (I think).

The fact that the survey had not been discussed at club level was quite a surprise, to both the AOMC Committee and Delegates present. In my own situation, as the Jowett Car Club Delegate, it was not so surprising, because that club has a ban on matters AOMC. Our Delegate, Bill Allen, had an apology lodged for the Delegates' Meeting, hence this skeleton report.

Mike Allfrey – Editor.

EVENT REPORTS AND NOTIFICATIONS

PAST EVENTS – WHAT WE HAVE BEEN DOING

DRIVING MELBA'S HIGHWAY – Sunday, 24th November, 2013

I elected to use *Pea Soup* due to the drizzling rain. This turned out to be a worthwhile decision because the rain became more persistent later on. The TomTom navigation device, initially, wanted to guide me to a Lilydale in New South Wales, rather than the town of the same name that sits on the eastern side of Melbourne. All of this Sydney-centric stuff is getting a bit much! Once the device had been set up it, surprisingly, guided me to 61 Castella Street.

Our meeting time was 9:30 am and at precisely that time, *Pea Soup* pulled up outside the Old Lilydale Court House and I felt that I was awfully late! All participants on this event were inside enjoying morning tea or coffee and we soon

heard the call, "Silence in court!". We all listened to Sue Thompson telling us the history of the Court House – disturbed only by the rattle of cups and saucers. While listening and gazing around, thoughts came to wondering what tales the room could tell us?

The Court House had been conveniently located right alongside the original police station. It was built in 1876 by William Blyth for the princely sum of £961. Blyth's architect is believed to have been named Mr. Paxton of the Public Works Dept. The wooden extension of the building's rear was added in 1967. The building is described as being of Italianate Classic Revival style. The good news is that it came to be listed with the National Trust of Victoria (1970), and is also on the National Estate Register of the Australian Heritage Commission (1978).

The building was closed in 1997 when the Court moved to Ringwood. It was purchased by the Yarra Ranges Shire in 2005 and has become the home of the Lilydale & District Historical Society. It is also used by the Yarra Ranges U3A (University of the Third Age). At least it is safe for now.

Once all the crockery had been handed in, we motored the 250 metres to our next point of interest, the Athenaeum Hall and Mechanics' Institute. The reason for driving the short distance was because the Court House was up the hill from our second stop and Sue had set us a very slick schedule. On our tour there were marshals who were members of the Lilydale & District Historical Society to guide us along the way.

The hall and institute building was built in 1888 as a centre for social activities. It was officially opened by Major Blannin, who was a councillor at the Shire of Healesville. The building has served the community for all manner of functions: dances, roller skating, debutante balls, picture theatre, meetings, and concerts including those given by Dame Nellie Melba. The first time Melba's voice rang through the hall was in 1904 when a selection of her gramophone records were played during a benefit concert to raise funds for the family of Mr Fahey a Cave Hill - a worker who was killed in a rock fall at the limestone quarry. The concert raised £117. Melba's first concert in the hall was on March 29th, 1909. All proceeds from these concerts went to the Lilydale Baths, Lilydale Brass Band, Lilydale Fire Brigade and Lilydale Benevolent Society. Her last concert – dubbed her Farewell Concert – was on May 30th, 1928. It was to be broadcast by the ABC's radio station 3LO but a defective line meant people could only pick up snatches of the items performed. The concert raised £188 for the adjoining Melba Park. As a tribute to Dame Nellie, the theatre has a Melba room displaying a range of Melba memorabilia.



Her last concert – dubbed her Farewell Concert – was on May 30th, 1928. It was to be broadcast by the ABC's radio station 3LO but a defective line meant people could only pick up snatches of the items performed. The concert raised £188 for the adjoining Melba Park. As a tribute to Dame Nellie, the theatre has a Melba room displaying a range of Melba memorabilia.

Left, Listening attentively to the history of Lilydale's Athenaeum Hall and Mechanics' Institute are our cars and tour participants.

The front room on the right was the town's Mechanic's Library staffed by volunteers and funded by its borrowers. Today, the National Trust classified building is called the Athenaeum Theatre and is the home of the Athenaeum Theatre Company. This group has re-organised the interior and restored it to the period, making an excellent and intimate setting for their theatre productions, of which there are currently four a year.

Right: The limestone masonry portals of Melba Park.

From there we moved on to the old Lilydale Shire Office building, built in 1889. Here Sue told us the story about the foundation stone being 'forgotten' during the initial building process. The specially prepared stone, which carries the 1889 date, was installed before the building was completed. There is a wooden section at the rear which was added in 1942, to cope with the growing Shire. The front, brick and stone section of the building has a National Trust classification and is also on the National Estate Register. The building we visited was, indeed, Lilydale's second Shire Office building. The original was at the corner of Clarke and Jones Streets.



The building we examined served the Shire of Lilydale until the new offices were built in Anderson Street in 1960. It again became the shire offices in 1969 when fire destroyed most of the Anderson Street building. The old Shire offices building was put to use by other groups before it became the Lilydale & District Historical Society Museum. In 1991 the Shire took over the museum and the name was then changed to the Museum of Lilydale. After a \$4.5m redevelopment and extension it became the Yarra Ranges Regional Museum.

Just around the corner we were shown the impressive gateway for Melba Park, featuring the impressive David Mitchell wrought-iron gates and fine stone walls to each side. The two gate support structures are not symmetrical, the left hand side featuring a large black disc recessed into the stonework, pronouncing the entrance to Melba Park. This is where things became interesting, because Sue related the story of the clock that used to be there. The story goes that the clock, driven from the Shire Office building, ran so slowly that many train commuters complained about

missing their trains because they believed the time displayed on the clock. The council fixed the problem by simply removing the clock and installing the 'Melba Park' signage disc!

We will, very likely, never know if the clock's hands were driven by a swinging pendulum that, at the end of each swing, made contact with electric solenoids, which sent pulses down the wires linking the clock to the office building. This type of clock was popular in British factories and the reason for their use was because several clock faces could be driven from the one pendulum. Where I worked in England, all the clock-on/off clocks were driven by just one pendulum swinging inside a steel cylinder, greased top and bottom with thick glass capping discs held in place by the vacuum inside the cylinder. The idea was that the pendulum would not be affected by draughts! I now wonder if such existed in Lilydale and all that was needed was some simple set-up technique for the pendulum? I digress!

The stone gate pillars, walls and gates were erected by Dame Nellie Melba in 1928. Melba and her granddaughter Pamela Armstrong laid the foundation stone, using a silver stone-mason's trowel, for the gates on November 5, 1928. In addition, Melba had the plans drawn up for the gates and paid for them herself.

Just within the park, we were shown the Mafeking Tree, which was planted on 13th June 1900 to commemorate the relief of Mafeking during the Boer War in South Africa. The tree's planting was because some young men from the district took part in that war. The oak tree at last has a commemorative plaque embedded in the ground at the trunk's base.

We were then informed about the Lilydale Brass Band Rotunda that was built as part of the War Memorial in Main Street and officially opened on 19th May 1922. The rotunda remained in place until 1951, when it was demolished. A replica has been built, using bricks from the original base, in Memorial Park. We were supposed to spot the rotunda on our way to Coldstream, I didn't,

Our next port of call was the White Dog Hotel, in Main Street. This building appeared to be dormant and, hopefully, it will be renovated because. At the time it was built, it was described as 'the finest structure in Victoria'. The name came from a white dog that used to frequent the hotel.

From the hotel, we walked up to the modern fire station to have a look at the original fire warning bell which has been preserved in the station's driveway. This fine old bell was first mounted on a tower next to the band rotunda in 1906. The tower was built by a firm in Warrnambool and, strangely, the bell came from Sale. When rung, men would rush from shops and homes to attend to the fire. The bell tower played another important role in the history of Lilydale. In 1918, when she was telephoned and told World War I had ended, Dame Nellie Melba rushed from Coombe Cottage at Coldstream to Lilydale. Although it was the middle of the night, she rang the fire bell exuberantly, until people emerged and were told the Great War had ended. It is a great shame that the old bell can't be rung anymore. However, one of our group tapped it with his knuckles and the sound was very pleasant!



As our tour continued, a good-soaking rain commenced as we drove up to the entrance to Cave Hill Quarry. While we all huddled under our umbrellas, Sue informed us that on April 3rd, 1878, a leading businessmen of Melbourne David Mitchell, (Dame Nellie Melba's father) officially opened his marble and limestone quarries at Cave Hill Farm, Lilydale. At the quarry, the limestone was dug out, placed in lime kilns, burnt, bagged and sent to his Burnley works for processing into his *Portland* and *Emu* brands of cement.

Left: Absorbed listeners at Cave Hill. The gentleman holding the red and yellow umbrella is John Brown of the Lilydale & District Historical Society.

It was not very long before David Mitchell wanted to transport his limestone to Melbourne quicker and more efficiently, so, he successfully

lobbied the Colonial Government to extend the railway line from Hawthorn to Lilydale in 1881 - years earlier than planned. He even allowed the line to be built on his land so it could be located west of the quarry to enable building his own rail siding. His shipments contributed substantially towards the cost of the line. Sue told us that the suburban line between Mooroolbark and Lilydale is the longest stretch between suburban stations in Australia.

Obviously, the lime kilns required an enormous amount of wood to fire them. The wood came, initially, from his own substantial holdings. To move the wood around his vast holdings David Mitchell constructed his own tramway. But needing a permanent supply, he decided to build his own railway line which opened in about 1903. In true Mitchell style he consulted with the best and the Cave Hill standard gauge tramway was the result. This was probably because he knew he could get engines and rolling stock more easily. A spur line ran along the present David Road to almost Birmingham Road, all of which was originally part of David Mitchell's property.

With his limestone and cement operations going well, David Mitchell turned to other projects on the farm. He was a man who believed in complete integration of his operations and everything produced was the best possible. He was the first person to import high quality Holstein dairy cattle into Australia. The dairy was a model of the time but with falling prices for milk he met with local farmers and built a butter factory in 1892 to take in their milk. By October of that year, he was exporting his butter to England where it gained top price.

The cheese factory was opened in 1893 and by February the following year eight tons of 'Cave Hill Straw Colour' cheese was shipped to London. Being one who wasted nothing, David introduced pigs to the farm and a bacon curing plant was built by employees in 1893. The plant was a large room with a two-storey smoke room capable of holding 500 sides of bacon at a time. The cool room, refrigerated by the butter factory, could hold 100 sides while the drying room could hold 300 sides of bacon. This was not, by any means, a small operation. Other products produced at the bacon facility were hams, pork sausages, German black and white puddings and other smallgoods. The installation of an American sausage filler meant 150 lbs of sausages could be turned out each hour. Within the first year, the plant was turning out 100 sides of bacon a week.

After hearing all about the lime and meat products, we motored on, to Victoria Road so that we could visit Dame Nellie Melba's grave in Lilydale Cemetery. Here we were informed that David Mitchell died in 1916 at his Burnley home and was buried with his wife and children in Melbourne General Cemetery. When Melba returned home shortly afterwards, she was horrified as her father had wanted to be buried at Lilydale. The problem was quickly solved – Melba had all four disinterred and re-interred at Lilydale Cemetery and erected the stunning monuments that stand there today. Just across the walkway is Melba's own final resting place. Melba died in Sydney on February 23rd, 1931 and was returned to Melbourne *via* a special train. After a funeral at Scots Church, her cortege travelled to Lilydale where, at the band rotunda, her casket was placed on a horse drawn gun carriage for the final journey to the Lilydale Cemetery.

We then drove to Coldstream, I missed John Brown's red coat and motored straight on, instead of making a right turn to Coldstream. I quickly made a 'U' turn and was soon in Coldstream. There we had a look through the imposing gates for *Coombe Cottage*. Sue had much to tell us here, and it was a shame that there was so much traffic noise drowning words of knowledge about the property. After years of travelling and living overseas, in 1909 Melba decided it was time she purchased a home of her own.

Melba was staying with her father at St Hubert's winery and while on her way into Lilydale one day she spotted a 'For Sale' sign on the gate of a 76-acre property at the intersection of the now Melba and Maroondah Highways. She went inside, looked at the property and bought it on the spot. The records show Melba paid £2,750 for the property then called *St Leonards*. It was purchased from the estate of retired stevedore John Dooley. Melba soon renamed it *Coombe Cottage* after a property she leased in England. In February 1910 Melba also purchased two other properties nearby totalling 338 acres which the family called *Coombe Farm*.

When Melba had to return to Europe the following year, her son George Armstrong, decided to stay, live on and work the properties. This was his home for the rest of his life. His only child Pamela, Lady Vestey lived there until her recent death. It is now owned by her two sons. It was at *Coombe Cottage* that Melba entertained everyone – royalty, politicians, Governors, Governors General, artists, performers, family and friends.

The gatehouse was added in 1927 and today, every hour on the hour the clock on the stables still chimes. In 1999 with her sons, Lord Sam Vestey and Mark Vestey, Pamela planted 60 hectares of vines and Coombe Farm Vineyards was born. The grapes are hand-harvested and today, the winery produces Pinot Gris, Arneis, Voignier, Chardonnay, Rosé, Merlot and Cabernet Merlot. Their interest in wine parallels that of David Mitchell, Pamela's great-grandfather who became a grape grower, wine merchant and exporter in the early 1900s. He took over the famed St Hubert's Vineyard from Hubert de Castella in the 1900s.

This was, effectively, the end of Sue's tour. A vast amount of work went into the preparation and we should all be very grateful for being able to get so close to times past. Frequently, during our information stops, I had the impression that Sue had been a personal friend of Dame Nellie Melba in those earlier days of Lilydale Shire. Our collective thanks to Sue, to her assistant Wal, and to John Brown of the Society, who kept us on the right roads. Thank you!

But that was not all, there was still the usual ABCCC Good Lunch to come. We drove up the road to Killara Winery where a splendid Italian-style lunch awaited us. Our little group was dwarfed by other larger groups and the chatter was quite deafening! It was a shame that John Brown could not join us for lunch. It would have been good to delve a little more into Lilydale's rich history.

Let's hope that the Avenue of Honour stays in Main Street, Lilydale forever and that the Shire Council remains deaf to calls for the trees' removal, and to other calls for replacing them with native trees. The first time I drove through Lilydale, back in 1969 on a fine summer's day, I liked very much what I saw — let's promise to keep the town as it was then!

A Final Note: This event report is, very likely, the longest in this magazine's history. I had a strong conviction that the information gained during our tour of Lilydale should be shared with our membership. Thanks Sue!

Mike Allfrey – Editor.

MAJOR ABCCC EVENT NEWS – THE RACV GREAT AUSTRALIAN RALLY

Please get your entries for the RACV Great Australian Rally completed and sent in as soon as you can. It is our intention to, once again, to break all of our previous records for this important event.

The RACV Great Australian Rally Advisory Committee.

FAST-APPROACHING ABCCC EVENTS

RACV GREAT AUSTRALIAN RALLY NOTICE

Hastings Start – A Request

The Hastings Start Committee for the RACV Great Australian Rally is seeking a few extra Rally Marshals to assist with parking for entrants, and guidance for them to the flag-off point. If you can provide marshalling for a short spell in the morning of 19th January 2014, in the Hastings Marina car park, please contact Mike Allfrey on (03) 9729 1480 or, Len Butcher on (03) 5979 1232. Your help will be greatly appreciated.

Mike Allfrey – Hastings Start Committee.

THE BMS (BIRKETT, McDONALD & SAWYER) MEGA RUN – Sunday, 2nd February 2014

Starting point is the supermarket car park, Station Street, Kooweerup (RACV–VicRoads Country Street Directory Map 718; B3), which is also beside the large Ponderosa timber yard. Be there for 9.00 am for a 9.30 am departure. Get your coffee fix before leaving for the Mega Run, as we will not be stopping before our luncheon venue, which is to be a surprise. The tour will be in two sections with further directions to be given out mid-way.

A fun day, with lots of magnificent views and great roads.

Ken and Karen McDonald are liaising with the lunch venue. Will you please contact them with your intention to attend by January 24th, 2014. Look forward to seeing you, the BMS Crew. Contact – Karen McDonald on 0409 028 534

Frank Sawyer.

THE ANNUAL GENERAL MEETING OF THE ABCCC INC.

Sunday, 16th February 2014

The AGM will be held at the Chirnside Park Country Club, 68 Kingswood Drive, Chirnside Park (Mel 37; K3). A club-subsidised two-course luncheon, costing \$10.00 per person for financial members, will commence at 12:00 noon in readiness for a 2:00 pm AGM start. Drinks will be at bar prices. For catering purposes your attendance for lunch must be registered with the Secretary, Mrs Pat Douglas before the 6th February. Money will be collected at the door. Late cancellations and 'no shows' will be charged \$10.00 each. It is our wish to have as many club members present as possible.

Be sure to mark your calendar with the date and time. Please note that at our AGM, most of the Committee positions are declared vacant. We will not be electing just the Vice President's position. Remember that, under the new rules (excerpts shown in *Issue 166*), any financial member can propose themselves for any position with all elections will be by secret ballot.

There will be a comprehensive report on our club's activities and achievements for the year just gone. There are a number of club events scheduled for the coming months and information about all that is happening will be provided. There will also be an election of office bearers for our club's future management. If you wish to assist our club, please come forward and help make the election exciting, and, importantly, offer your help.

Tony Pettigrew – President.

A WARM WELCOME TO NEW MEMBERS

A hearty welcome to the well-oiled machine that is the All British Classics Car Club. Our club is one of the fastest growing motoring interest clubs in this country. We hope to be able to welcome you and, in actual fact, your British classic motor car, at one of our events soon. Our club aims to have two motoring events each month, so there are plenty of fabulous events for you to select from. Welcome!

Name	Car	Model	Year
Mac & Mary Wilson	Jaguar	420	1967
Glen Mafodda & Denh Lay	Ford	XW Fairmont	1969

Pat Douglas – Membership Secretary.

GETTING A LITTLE BIT TECHNICAL – KEEPING YOUR BEARINGS

Wheel bearings, like so many other components in the modern motor car, have become so reliable that we tend to ignore them until there's a problem. It pays to determine the cause of the failure, even if it's simply old age.

Please note: Some dimensions have been changed to metric equivalents. Australian spelling has been used.

Wheel bearing technology is just about as old as the wheel itself. The earliest Assyrian chariot bearings date from about 4,000 years ago. They had two creaky wheels, and could be heard approaching from some distance. Later Egyptian chariots were fitted with copper or bronze plates lining the hub and covering the axle. The earliest 'grease cups' were filled with rendered fat, tallow or lard and loosely hung at the end of the axle. Ball bearings are found on 2,000 years-old Roman ships, where they supported swivel platforms used both for loading and for warfare.

In decidedly more modern times, tapered roller bearings gradually supplanted ball bearings for front-wheel applications on rear-wheel-drive vehicles. Although more expensive to produce, tapered roller bearings generally

outlast ball bearings in such applications because they're better able to resist axial loads and stresses and are much more tolerant of slight misalignment. The cylindrical shape of each roller allows it to contact each race cup along its entire length (the roller's), as opposed to two single points of contact for a ball type bearing. Deep-groove ball bearings similarly allow a somewhat greater elliptical contact surface area, so they have become more common.

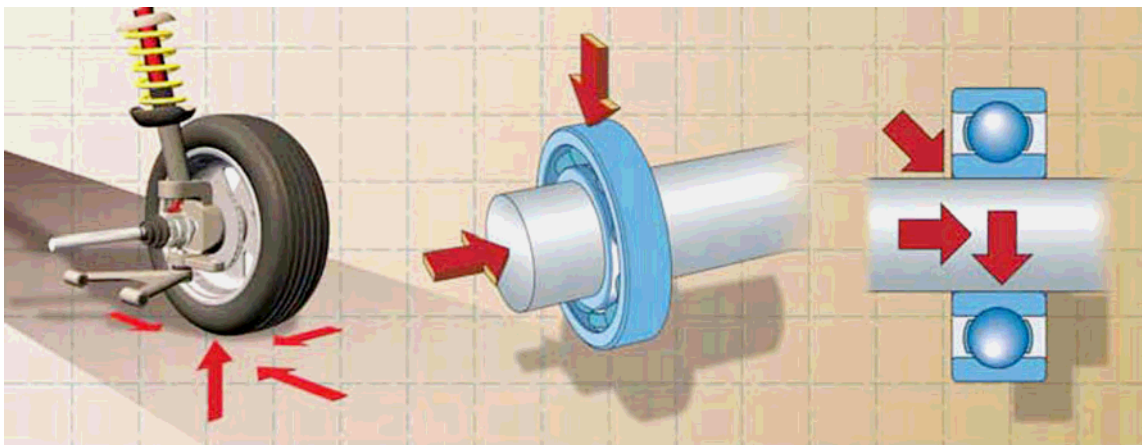
Most modern front-wheel drive cars use a pair of deep groove ball bearings, often sharing a common housing as a sealed bearing assembly. In many applications, the bearings are pressed into the steering knuckle with the axle hub pressed into their inner races with the drive axles slide into place through the hubs. Most front-wheel-drive cars today still use bearings pressed into the steering knuckle. For many years, bearing replacement meant knuckle removal.

For many small workshops, it also meant tying up a hoist while the knuckle was sent to the machine shop to have the old bearings pressed out and the new ones installed. Larger workshops often owned a press, but even then there was often a delay in finding appropriate fixtures to adapt the press equipment to the particular application. Fortunately, that situation has changed. Schley Products/SP Tools introduced a set of VW/Audi wheel bearing tools designed for on-car servicing back in about 1980. OTC and others later recognised the need for a more universal tool set adapted to a wider range of makes and models. The most important points to remember are:

- Hubs can be warped by heavy slide hammering. Using another sort of hub puller may be required if you encounter heavy resistance. Most kits include a hub puller for this reason.
- When removing a bearing from a bore, be sure to remove any snap-ring retainers first. Then select a receiver cup that's larger than the outside diameter of the bearing. Apply pressure from your forcing screw, via a thrust washer and the appropriate adaptor, to the inner race. This will apply the pressure evenly to the whole assembly and prevent it from cocking in the bore.
- Be sure to clean the entire bore and any snap ring groove before reinstallation. A thin film of grease, oil or anti-seize compound may be applied to the bore, if desired.
- When installing a bearing, apply pressure only to the outer race; never to the inner. Any pressure applied to the inner race will deform the balls and the races, causing early failure. If you don't have just the right adaptor in your kit, you can use the old bearing if you grind its outer shell down by a couple thousandths of an inch with your grinding wheel. Using the right centring adaptor at the inboard side of the knuckle bore will reduce the chance of cocking.

As tempting as it may be, don't use a hammer even to straighten a cocking bearing. This is even more important in the case of magnetically encoded bearings. If using an impact gun, stop when you hear the torque increase as the bearing is seated. Any further pressure will just damage the forcing screw's threads.

- If a snap ring or an external outer seal is used, be sure to install it now, along with a new backing plate, if needed. Only then should you install the hub. To avoid damaging the bearing, the pressing force from the screw must be applied to the inboard inner race and to the outboard face of the hub. Most kits include centring rings that fit neatly over the raised hub centre. To make sure that the inner race's bore is not obstructed by the adaptor at that end, use the flat side against the race, not the stepped side. This time you're exerting all the force between the hub and the inner race, not the outer. The forcing screw torque required to install the hub is usually not more than 100 lbs-ft., so don't lay on heavily with your impact gun.



Above – Left: This illustration shows the major forces wheel bearings have to cope with in service use. The relative magnitudes of the forces change with vehicle weight and loading, road conditions, speed and manoeuvres. **Centre:** Those forces that are exerted parallel to the axis are called axial loads, those perpendicular to the axle are called radial loads. **Right:** The combined force vectors all resolve as the total (combined) load.

Many manufacturers have adopted a hub and bearing assembly, which is usually bolted into the steering knuckle with three or four bolts. The illustrations above detail the forces with which a wheel bearing assembly must cope. Wheel bearings, like many other components in the modern motor car, have become so reliable that we tend to ignore them until they fail. After all, a typical wheel bearing goes about 75 million revolutions in 160,000 ks of service.

The rate of wheel bearing failures increases sharply with mileage after about 130,000 ks, with a small percentage making it beyond the 195,000 ks travelled mark. We used to replace or at least repack them when we did a brake

overhaul on an older car, and we may still do this on some four-wheel-drive models or when doing rear brakes on a front-wheel-drive car.

Tapered roller bearings have their own care and feeding needs. Although they're somewhat more expensive to produce, they're better able than ball bearings – even deep-groove double row ball bearings – to withstand axial loads. They're also better able to tolerate slight deviations in alignment. Until the widespread adoption of front-wheel drive, they were the standard choice of manufacturers worldwide. Here are some tips you may have forgotten:

- Cleanliness is a must! There are two accepted ways to clean a bearing: Either force in all new grease or clean with solvent. If you choose the former, watch out for any contaminants remaining and be prepared to repeat the process. If you choose the latter, remember that the bearing must be completely repacked and all traces of any solvent removed. A bearing needs both proper lubrication and proper pre-loading before it's allowed to spin. Meanwhile, let it drip-dry on a clean shop towel. If you're in a hurry, use a dry compressed air, but don't let the bearing spin.
- Most new disc brake rotors are now supplied with outer bearing races. If you need to transfer the old ones, look for the cut-outs that allow you to access the thick edge of the bearing race cup. Use a brass drift to avoid damaging it, and reinstall it using the correct tool to seat the race around its entire circumference. Most bearing and seal installation kits have tapered (conical) drivers with a driving edge. Your tool should not apply any significant force to the raceway's working surface.
- Use a good quality grease, one that meets or exceeds the NLGI #2 and ASTM D 4950 GC/LB standards. Of course, you're replacing the grease seal. Make sure it faces the right way and is installed to the specified depth (usually flush, but sometimes deeper.) Lubricate the seal's inner lip to allow it to spin with the hub. You have to leave some room in the bearing housing to allow excess grease to be thrown off by the bearing in operation. Manufacturers suggest that the housing should be filled approximately one-third to half-way with grease. Any excess beyond these limits may cause higher operating temperatures and premature bearing failure.
- Install the inner bearing and seal along with the hub, the hub and disc rotor, or drum assembly onto the spindle. Put the outer wheel bearing on the spindle, then the hardened tongue washer. Now thread on the axle nut.
- Make sure the inner bearing is seated against the base of the spindle. Tighten the axle nut by hand, rotating the assembly as you do to make sure all of the tapers are appropriately seated.
- Now snug up the axle nut using only hand tools until the rotating assembly just binds. This slight bind indicates that all parts are seated correctly. This procedure sets the stage for adjusting the preload.
- Back off the axle nut by one-sixth to a quarter-turn to the nearest hole, and rotate the assembly again. Failing to back off the adjusting nut will cause premature catastrophic failure due to excess heat and friction. The end play should be between 0.025 and 0.180 mm for most applications. Check the manufacturer's specifications to be sure.
- Place the 'crown' stamping over the nut. Many axles have two drilled cotter pin holes at right angles to each another. Position the crown stamping to allow alignment with one of the holes and install the cotter pin. Be sure to bend it to prevent it from falling out! (On older cars, align the nearest slot in the nut with the hole in axle.)
- Install the centre grease cap. Replace any damaged or deformed caps that could allow water or dirt to enter the bearing area. Most technicians put some grease inside the cap to catch any contaminants, and to provide a better weather seal. Once again, don't overfill the cap; leave some room – at least half-empty.

Sealed bearings do still go bad, though, and the consequences can be disastrous, with ultimate failures often destroying axles, hub assemblies, wheels and even tyres, while the steering becomes a distant memory. Fortunately, pronounced warning signs usually emerge long before imminent catastrophe looms. In most cases, the earliest warning signals are low-pitched growling noises that vary with both speed and axial (side-to-side) load. It's not always easy to differentiate very early-stage wheel bearing noise from tyre or road noise, especially if the tyres feature an aggressive tread pattern or are substantially worn. One tip-off on your road test is a pronounced change in the sound as you slightly move the steering from side to side at moderate speed. If the noise greatly diminishes when the wheel is turned slightly in one direction but increases as it's turned the other way, you've almost certainly encountered wheel bearing noise. But which bearing is the bad one? Since so many applications use the sealed double roller bearings, it can be difficult to tell. A good rule of thumb is to suspect the bearing on the side *opposite* the rumbling.

One good way to pin down the location is with a mechanical stethoscope. Raise the car on a lift, properly vent the exhaust and have an assistant put the transmission in gear while you probe the knuckle or bearing housing with your stethoscope. Check both sides of the vehicle to verify and pinpoint your diagnosis. Remember, though, that if one wheel bearing is exhibiting signs of wear, its companion has usually logged about the same number of kilometres, so it makes sense to replace them in pairs unless there's some obvious external cause for the failure. Of course, this procedure won't work on a non-driven wheel without some modification. This time, have your assistant spin the wheel as fast as possible while you listen with your stethoscope. You may have to back off the brake adjustment to achieve sufficient speed.

Unfortunately, in many instances, and especially in the earliest stages, it will not be possible to confirm the problem acoustically without applying a sufficient radial load to the wheel in question. Without a powered-roller dynamometer, it may be nearly impossible to pin point the diagnosis until the bearing deteriorates a bit more.

Sometimes wheel bearings deteriorate to the point of developing considerable play without making any additional noise. It's not hard to locate these during a routine steering and suspension check. With the wheels free off the

ground, grasp the tire firmly at the 6 and 12 o'clock positions and apply a rocking pressure. If there's any motion, have an assistant watch and feel as you repeat the inspection. If there's no play in the ball joints or other components, check the bearing adjustment. If it's not adjustable and play is present, bearing replacement is required.

A couple of years ago, a body shop we often work with called with an ABS problem on a late-model Honda Accord. They had replaced the steering knuckle after an accident, but the ABS light had flashed as soon as they drove it. They accessed the code and replaced the speed sensor on the same knuckle. Unfortunately, the code recurred, so they brought the car in to us. The sensor and wiring were intact, but there was no reluctor ring on the axle. My first thought was that they might have changed the axle and obtained one for a non-ABS-equipped model, but a cursory check showed there was no reluctor ring on its mate, either. In the photo, at right, the wheel bearing's outer seal (far right) is magnetically encoded to allow the bearing to incorporate the reluctor function internally. The new bearing had been installed backward into the knuckle, so the encoding was hidden from the sensor. The only externally visible difference between the inboard and outboard sides of the bearing was the colour of the seal used. In this application, the side with the brown seal faces out, while the black seal faces in. You can use a paper clip to feel the light drag of the seal's magnetism; this will be the side to install facing the sensor. Be careful, though; the seal material is easily scratched and damaged, so you have to use a light touch and keep your paper clip parallel to the seal surface. When in doubt, check the opposite-side axle for orientation!



You must avoid jarring blows to the magnetically encoded bearing assembly during handling and installation. A single sharp blow can damage all or some of the magnetic elements, leading to a costly comeback. Also, avoid using magnets or magnetized tools when working on or around these types of bearings.

Such 'active sensor' bearings are easily read by a Hall-effect sensor, providing a constant-amplitude digital square wave whose frequency increases with wheel speed. One advantage of this type of sensor and signal combination is that it can be read at very slow speeds, and even when stopped.

If you're in doubt about the integrity of the magnetic encoding, you can easily make a single-use detector of your own. Here's how: First, wrap the bearing in a plastic bag or a plastic wrap. Second, place a piece of thin paper ('onion skin') over the bearing. Use a full-size sheet, so it overhangs the bearing by at least five centimetres. Third, sprinkle a small quantity (about half a teaspoon) of iron filings onto the paper directly over the bearing's outline. Gently tap the paper with a fingernail to allow the filings to align themselves with the bearing's magnetic fields. Observe the filings; there should be a clear regularity to their orientation. Finally, carefully fold the paper up, collecting all the filings in the centre. Make sure there are no residual filings in the area before removing the plastic wrapper from the bearing.

Some other advanced bearing designs feature a more traditional reluctor ring centred between the two inner raceways. This design has the merit of keeping the reluctor away from extraneous metallic particles and protecting it from salt, sand and road debris.

So what kills bearings, anyway? In the majority of cases are from:

Abrasion is the wearing of one or more of the surfaces by friction, and is greatly accelerated when hard particles of gritty contaminants work their way between the bearing surfaces.

Fatigue occurs when repeated loading and unloading causes small pieces of the bearing material to break off from their original positions. The risk of fatigue increases with higher loading, whether from cargo weight or from jouncing over potholes and rough roads. Since there's always some deformation of the bearing material wherever the roller elements contact the races, there's always some danger of metal fatigue.

Pressure-induced welding takes place when two pieces of metal are jammed together with sufficient force that one transfers metal to the other. Rollers, balls and races are all irregularly rough at a microscopic level, no matter how smooth and uniform they appear. This roughness means that there may be some areas of localised extreme pressures, which may displace the lubricant. These tiny areas may weld together and then be pulled apart. Each occurrence contributes to a bearing's ultimate failure.

One easily preventable source of both metal fatigue and pressure-induced welding is incorrect bearing preload, often caused by over-torquing the axle nut.

Run dry is not one of the previously identified culprits of bearing failure, but it's obvious that it must play a key role. The lack of lubricant can lead to metal fatigue and welding. The hard particulates generated by the fatigued metal then cause significant abrasion, which, in turn, exacerbates both the fatigue and welding mechanisms, accelerating the abrasion until failure occurs. The analysis for most other wheel bearing failures would be similar, regardless of the actual root cause, whether it be a damaged seal, improper installation or just plain old age.

While the four culprits we identified are certainly responsible for the vast majority of wheel bearing failures, there is one more bearing killer we haven't yet identified – a broken earth strap.

Historically, certain cars and trucks have suffered a disproportionately high rate of wheel bearing failures. In many cases, these turn out to be the result of a type of unintentional electric arc welding. Once the strap broke, the rubber

suspension strut mounting effectively insulated the knuckle's static charge from the rest of the chassis, leaving no earth path except through the bearing.

Now, where and when does the electrical charge originate, and why should we care? There seem to be several competing theories with respect to the origin. One camp believes that, just as you can create a static charge in a rubber balloon by rubbing it on your hair, you can create a static charge in a rubber tyre by rubbing it on the road. Another group champions the theory that a significant charge will be induced by a rotating reluctor repeatedly passing near a permanent magnetic inductive pickup, such as a conventional wheel speed sensor. Still a third faction points to empirical evidence of repeat bearing failures after a body ground has been compromised.

As to the build-up of static charge causing bearing damage, I can say only that I have experienced noticeable static discharges (okay, shocks!) primarily when exiting vehicles equipped with certain types of tyres. I'm perplexed by the idea that earthing the strut and knuckle will somehow protect the bearing. If the static charge builds up in the wheel and tyre assembly, how can it be transmitted to the strut and knuckle without passing through the bearing's rolling elements?

Perhaps, as some have suggested, the earthing strap's real function is to reduce radio frequency interference not from the wheel and tyre, but from the high-frequency signals from the conventional ABS wheel speed sensor. I've seen far more bearing problems with failed or inadequate earth leads. To understand what happens, let's analyse the most extreme case, a car where the cylinder block earth is intact while the body earth is broken. Any electrical consumer not earthed to the block will have to find its own earth path back to the generator or battery. High-demand devices, such as wipers, window motors, fans and rear defroster grids, will follow an earth current path leading through the body, then to the steering column, through the steering gear, through the tie-rod joints, to the steering knuckle, back through the wheel bearing to the axle, then through the transmission to the cylinder block earth. The amount of current required to operate these heavy consumers is sufficient to cause arcing between the rolling elements of the bearing and its races. If left uncorrected, the arcing will quickly damage the bearing.

To the naked eye, the damage will look a lot like that caused by pressure welding. Microscopic examination may reveal tiny pits in the metal surface but, except for usually being somewhat more uniformly distributed, these may be difficult to distinguish from those occurring due to pressure welding. To avoid a repeat failure, be sure to check all cylinder block, chassis and body earths thoroughly whenever you replace a wheel bearing.

As always, checking the chassis earth is easily accomplished with a standard voltage drop test. Connect the negative lead of your multi-meter to the battery negative terminal and the positive lead to the chassis, preferably at a remote earthing point other than the body earth bolt. Select the DC voltage scale and engage the meter's Min/Max function. Now turn on all the major electrical consumers: high-beam headlamps, rear window defogger, high heater fan, wipers, and even heated seats. Read and record the Min and Max values. Then, just to stress the system to its utmost, crank the motor. Read and record the new Min/Max values and turn everything off.

How much is too much? While a few makes will register as much as 500 millivolts, most should come in under 300mV. Values over these suggested thresholds are likely the result of an insufficient earth. Clean the old one, or install a new one. It's perfectly acceptable to run your new ground between the engine block or the transmission and the body if that's more practical than running it from the battery to the body.

Finally, repeat your cranking voltage drop test on the main block ground as well. This is critical because a weak block earth can also cause bearing damage as 'supplemental' earth current passes to the high-demand starter motor through a good body earth via the wheel bearings. The important thing is to get the voltage drops on all earth legs under control to avoid repeated failures.

There has been more change in bearing technology in the last thirty years than in the previous thirty centuries! If you think only the squeaky wheel gets the grease, you ignore the quiet ones at your peril.

From *Motor*, June 2009 (US). Written by Sam Bell.

Don't forget: Membership subscriptions are due by end of December.
If you have Club Permit Scheme plates through ABCCC,
your membership must be current for your permit to be valid...

