



# HOT AIR

## NEWSLETTER

December 2008

**The Mobile AC, Electrical and Cooling Technicians of Australasia**

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## SAE International Cooperative Research Gives New Refrigerant HFO1234yf the thumbs up

WARRENDALE USA 21 November 2008

The new refrigerant for use in mobile air-conditioning systems, HFO1234yf, offers superior environmental performance and can be used in future vehicles that are designed to use the new refrigerant, according to results of an SAE International Cooperative Research Program (CRP).

The CRP 1234-1 and CRP1234-2 programs, launched in 2007, investigated the safety and performance of the new refrigerant.

Under the direction of the SAE CRP members (who are international experts in this field from OEMs, Tier 1 and 2 Suppliers and independent test facilities), air-conditioning system performance, material compatibility and relative risks of HFO1234yf were evaluated.

Based on these studies, this alternative refrigerant -- of all proposed alternatives -- has been judged to have the lowest risk for use in MAC systems in meeting environmental and consumer needs.

This is demonstrated in the results of the Life Cycle Climate Protection analysis to estimate CO<sub>2</sub> Equivalent emissions from MAC Operation (GREEN-MAC-LCCP©) as described in SAE J2766.

These SAE CRP activities are in response to the international regulations by the European Union that require all new vehicles receiving type approval in 2011 or later to use a refrigerant with a Global Warming Potential (GWP) below 150.

Current global MAC systems use HFC-134a, a refrigerant having a GWP of 1,430. HFO1234yf has a GWP of only four.

SAE International has been conducting cooperative research programs since 2001 to evaluate the new, environmentally friendly refrigerants for use in MAC systems.

CRP members include major automobile manufacturers from Europe, Asia, and the U.S.

These OEMs account for approximately 70 percent of all new vehicle sales in the EU and worldwide.

More detailed results of SAE International Cooperative Research Program 1234 will be provided in the near future.

SAE International is a global association of 115,000 engineers and related technical experts in the automotive, aerospace and commercial-vehicle industries.

SAE International's core competencies are life-long learning and standards development.

SAE International's charitable arm is the SAE Foundation, which supports many programs, including A World in Motion® and the Collegiate Design Series.



With thanks to VASA affiliate MACS Worldwide

## Technicians - get used to the idea of three different refrigerants for some time into the future

Australian and New Zealand technicians will most likely have to cope with three different refrigerant types well into the future.



That's the latest word from VASA President Mark Padwick, fresh from talks and discussions with industry leaders in Europe and Japan.

"The car companies are still being very tight-lipped about the technologies they will adopt when all new models after 2012 must be charged with a low global warming refrigerant, ruling R134a well out of the race," said Mark.

"It is still rumoured that some German car makers may still prefer to go the CO<sub>2</sub> route, while others will undoubtedly adopt the new refrigerant, which is supposed to be direct replacement for R134a, HFO1234yf.

"It doesn't always follow that what the car makers adopt in other parts of the world, will carry through to models released in Australia. So it could be R134a here for many years yet, with a combination of either or both of the other two gradually infiltrating during the next decade," he added.

## Padwick still leads ARC

VASA President Mark Padwick has been re-elected unanimously for his second term as Chair of the Australian Refrigeration Council, the Government-appointed body which administers the national licensing and authorisation scheme.

VASA has always played a key role in this body, as well as its predecessor, NRAC.

VASA Vice-President Mark Mitchell was a founding director of NRAC.

### **Congratulations!**

### **You've done the right thing.**

By now, all authorised sellers of R134a will have received their Congratulations kit from ARC.

VASA urges members to use these marketing devices to the hilt - don't just throw them in a drawer for another time.

As VASA President (and ARC Chair) points out, "The industry has been asking for help to educate the average motorist in the need for proper diagnostic checks on AC systems, rather than a regass or a top-up and send them on their way for another few kilometres."

"This material is designed to help workshops spread the message that the Australian government encourages motorists to do the right thing, thereby helping the environment.

The kit comprises three elements:

**A customer handout flyer**, confirming that you've conducted basic checks on their AC system.

**A counter stand**, offering recognition to the consumer that by using your business they are doing the right thing by the environment.

**Under bonnet service stickers**, which makes it easy for workshops to record the detail which complies with the Code of Practice.

"It's pleasing to see that the fliers and counter stand are badged with the Australian Government logos, which confirms, in the minds of your customers, the authenticity of the information, and corroborates your claim to sceptical customers that simply 'topping up' a system is illegal, and the system must be repaired before being re-gassed," added Mark.

**VASA members are encouraged to make good use of all this material, and orders for quantities can be made through the ARC Help Desk on 1300 884 483.**



*Australian AC trainer Grant Hand at a VASA training session at the Wire & Gas Convention in June 2008*

## **You'll be glad you paid attention at Wire & Gas training!**

The global financial upheavals and the subsequent devastating effect on the Australian money market is upsetting, especially for those watching their investments shrink. But as they say, every cloud has a silver lining.

The silver lining in this case happens to be that the aftermarket car repair industry can expect boom conditions for the next few years.

Car sales have nose-dived, which translates to hundreds of thousands of families making the decision to hang on to their existing vehicles while they weather the financial storms.

So that means that most people will be spending whatever money it takes to keep their current vehicles in good running order.

President Mark Padwick, in his end of year greeting to all VASA members, said that auto associations had revealed in recent discussions that their members across the board were reporting busy workshops, with jobs backing up well into the new year.

"Our members should be gearing up right now to take advantage of the summer months," he said.

"But on top of that, VASA members need to spread the message that they can repair and restore failing AC systems so that their customers can keep enjoying their vehicles during these uncertain times.

"The customer will be in a better frame of mind to spend some money on their trusty older car, when compared to the financial difficulties they might have endured if they had jumped in for a new \$30,000 or \$40,000 vehicle.

"Members need to promote their expertise to existing customers, so that they can feel comfortable that cars can be professionally repaired, and continue to meet their owner's expectations, regardless of their age," Mark added.

Everything is pointing to vehicle repair being the growth business of the next five years or so.

"So don't read the bad press. Gear up your workshop and your promotion to get the message out to everyone in your community.

"And remember this - despite the recent fall in petrol prices, motorists are generally more aware of the money they can save by shopping locally.

"If that's the case, every VASA member should consider letterbox dropping every household within a couple of square kilometres of their business, just to remind them that there are professional, licenced repairers in their neighbourhood who can help them survive this economic downturn.

"So apart from a hot summer, the best wish I can extend to members is that they reap the benefits of their special skills, and help keep Australia's fleet cool, no matter what the car's age," added Mark.

OK, so we weren't exactly killed in the rush to have your history recorded for this project. Don't hold back, members, this is important.

So we are going to have one more shot at it before we move on.

If you have ever installed an air conditioning system in a vehicle, we would like you to fill in the form on the back page and send it in to VASA.

The form can also be accessed from the front page of the website: [www.vasa.org.au](http://www.vasa.org.au)

## Part II of the Australian History of Vehicle Air Conditioning



Ralph Cadman, a VASA pioneer and Life Member, has started the ball rolling on the VASA history project with the following memoirs.

The car air conditioning industry in Australia was full of characters and if you look hard enough you would undoubtedly still find some around today.

We may see some of them as larrikins, others as opportunists, some as true entrepreneurs, but all of them in their own way were explorers.

They all played a part in the development and maturing of the industry.

### 1970 Olympic Air Silverwater NSW John Lambert

Many small sub manufacturers emerged due to specific needs, such as food van cooling, bus cooling and refrigeration. Most of these manufacturers gained their education from travelling the world and taking risks. John Lambert was one of several.

He was a tiny operator with some mechanical and electrical knowledge with one girl in the office and an attitude in the workshop.

### 1971 Mark IV Australia Kogarah NSW George Jackson

Mark IV Australia was introduced into Australia with the support of John E Mitchell

Co of Dallas and Discal Corp of San Francisco (Wayne Fogestrom) and an employee of Discal, George Jackson, was sent down-under to start operations.

Typical of the time, two of the most popular under dash evaporators, Allegro and Escort included left hand controls with die cast heavy bezels. Although there was some initial buyer resistance, there was no doubt the evaporator performance was enough for consumers to overlook any such minor inconvenience.

The accent was on performance, certainly not weight! Mark IV grew and Smiths declined.

George Jackson was eased out of Mark IV following some controversial incidents and Rick Pickering was promoted to GM from his previous role of Sales Manager. Rick's brother-in-law, Ian Lough became Sales Manager and Mark IV continued its growth.

By this time, Marlan had grown to five metro branches and 80 employees. Marlan quickly became Mark IV's largest customer and Smiths declined in aftermarket sales and attempted to enter the OEM market, initially through Ford as they had OEM heater and instrument business.

In the mid 70s, Marlan was still limited with supplies, particularly louvres, switching, compressors and condensers. These were sourced from USA from many suppliers who were also supporting Mark IV and Smiths, causing conflict in Australia. Marlan had to resort to air freighting York compressors and other components to keep pace with the market.

### Mapco Kirrawee NSW Preston Hazzard

Preston Hazzard was one of the designers of the revolutionary Abacus swashplate compressor, when he was employed as chief engineer for Mark IV in USA.

Seeing the rapid industry changes coming, including the onslaught of factory air, Preston decided to move to Australia. Knowing he could immediately claim business from Mark IV Australia, it was a sound move, at least in the early days.

Preston's inflexible attitude, having been used to the huge North American market, resulted in the loss of an enthusiastic young engineer Jim Russell.

Jim formed AKTF (Australian Kits That Fit), no doubt a send-up in name of Preston's failings.

Mapco's business declined over the years. Preston went back to USA, leaving his son Larry, who was working with Mark IV and eventually Marlan. Mapco was sold to Marlandaire, and slowly expired in the process.

### 1972 Unicla Australia Eastwood NSW Hans Tol

Unicla was welcomed into the Australian market with tailored hoses and integrated evaporators.

Components were actually built to fit! A new era had commenced. While Marlan and similar operators were struggling to supply their own market, Unicla quickly and economically provided neatly packed MD Kits for Japanese vehicles and were able to supply integrated evaporators which could be installed in minutes.

A great advantage for Australia was RHD evaporators and precision manufactured components. The air conditioning world was almost all LHD vehicles and so, the Japanese components were welcomed in Australia and the Asian region.

Manufacturing standards were far above the American style, which relied heavily on performance, rather than quality.

Japanese car distributors such as Honda, Nissan, Mitsubishi and then Ford liked the quality and were keen to use Unicla. At the same time, a strong Australian distribution network was commenced. Unicla Japan was manufacturing a small twin cylinder reciprocating compressor for the USA market and the compressor became popular briefly in Australia for some of the tight European imports. (Continued next issue)

[Go to the last page to claim your place in history](#)

# The Code spells out the things you **MUST** do and the things you **SHOULD** do

Hot Air is publishing the entire Code of Practice, piece by piece, to help with interpretations.

VASA has received a number of requests for information, as well as some criticism of the Code for its lack of detail.

While VASA and the MTA had a great deal of input into the Code, at the end of the day, the Code had to undergo a strict government process involving technical as well as legal scrutiny.

It is important for technicians to understand that this Code is delivered on the assumption that those who pick it up to read it, **ALREADY KNOW WHAT THEY ARE DOING.**

In other words, too many technicians are expecting the Code to be a full-on workshop manual. The Code is only supposed to be read by technicians who are already well trained, and have at least the minimum Certificate II standard of understanding of vehicle AC systems.

Members need to understand that this Code does not constitute a technical design document and must be used with other standards and Codes of Practice already in existence - in particular, AS 4211.1 - 1996 gas recovery or combined recovery and recycling equipment.

## ***The Code in detail***

### **A.10 Oil**

#### **A.10.1**

In the event of a hose failure or oil having been removed from the system during servicing, the quantity of oil remaining in the system must be checked against the manufacturer's specifications and a corresponding amount of oil added, if deemed necessary.

#### **VASA COMMENT:**

If a system has lost oil through hose failure, for example, there are no real choices, other than replacing the hose, flushing the system and replacing the oil to manufacturer's specifications. If this procedure is not followed, the technician is only guessing about the amount of oil lost.

To give you an idea of how oil is dispersed through the system, here's an indication of the amount of oil typically retained in other system components after running at 1000 rpm for ten minutes before de-gassing. These volumes of course will vary with different designs of components.

Evaporator	60cc
Condenser	30cc
Receiver-drier	15cc
Accumulator	60cc
Hoses	10cc

## **A.11 Cleaning**

#### **A.11.1**

Refrigerant gas must not be used for the purpose of cleaning debris or dust from the air conditioner condenser fins or other parts.

#### **A.11.2**

If refrigerant gas is used for flushing it must be recovered.

#### **A.11.3**

Debris which may inhibit air flow should be removed from the condenser.

#### **VASA COMMENT:**

Flushing has never been an exact science in some Australian workshops, hence the small number of workshops in possession of a full flush unit, which are quite expensive.

Most rely on using shop air or nitrogen to clean out a system.

This section of the code is quite explicit – if you use refrigerant for flushing, it must be recovered. General cleanliness of systems

cannot be overstressed here. This means that when a system comes into your workshop for attention, the first thing that should be done before opening the system or releasing a hose, is to externally clean all components. VASA receives horror stories from members working in remote farming communities, where systems fail and even after so-called professional attention, they still find components buried under layers of dirt and grass seeds, making proper diagnosis an impossible task. A standard procedure is to keep dirt and foreign material from getting on or into the compressor or the AC system. The area around AC hose fittings should be carefully cleaned with a non-petroleum-based solvent before the connections are broken. All parts to be re-sealed or installed should be cleaned with a non-petroleum-based solvent and blown dry with clean compressed air or lint-free cloths.

## **A.12 Filter/dryer and accumulators**

#### **A.12.1**

Whenever the refrigerant system is opened, the filter/dryer or accumulator, when fitted, must be replaced in accordance with the manufacturer's instructions.

Where the manufacturer has not issued instructions, the units must be replaced whenever the system is opened or after 5 years of service.

#### **A.12.2**

Where during servicing and after the filter/dryer or accumulator has been replaced it is found necessary to re-open the system, the filter/dryer-accumulator should again be replaced if:

(i) The system has been left open to atmosphere for more than 10 minutes

or

(ii) The system when properly capped or plugged, has been de-gassed for a total of more than 2 hours unless

(iii) Specific recommendations are contained in the manufacturer's instructions

Note: Climatic conditions - humidity and/or wet weather may lessen the time spans in (i) and (ii) above.

#### **VASA COMMENT:**

It must be understood that a receiver drier is charged with several varieties of desiccant which is a small quantity of a substance such as silica gel, which has one job – absorb moisture.

So once a repair is completed and the system is recharged with refrigerant, it doesn't matter how meticulous the procedure in the workshop, there is always the risk of moisture infiltration. In the tropics, moisture can exist in brand new hoses or equipment. Moisture, as we all know, is a killer of AC systems.

As soon as the system is sealed and the compressor is running, the receiver drier will have absorbed the residual moisture in the system, and that means it has done its job. In the majority of situations, the receiver drier cannot be relied on to take any more moisture out of a system. In other words, its ability to absorb is finite.

So if, within a few minutes, something else is discovered which means disconnecting a hose, for example, the Code is virtually saying that you might get away with it if you reconnect everything within 10 minutes of opening it up. This implies that if the system is exposed to atmosphere for an excessive amount of time over 10 minutes, you have no choice. To be on the safe side, you must replace the receiver drier again.

# Two big VASA events to look forward to – make your choice, one in Sydney and one in Adelaide next May and June (*or go to both, you won't be disappointed*)

## VASA Annual General Meeting, training day and gala dinner SATURDAY, 30 MAY 2009

**The Royal Automobile Club of Australia (RACA)**  
89 Macquarie Street,  
Sydney  
9.30AM to midnight

In a very new idea, the directors have decided to charge each technician who attends the training, meeting and trade show, a flat \$95.

That payment will entitle each person to complimentary tickets for both themselves AND their partner for the evening dinner function.

This deal is available only to

will be invited to run a trade table exhibit in the afternoon.

Sponsors are also sought for dinner drinks and entertainment.

Interested companies contact [secretary@vasa.org.au](mailto:secretary@vasa.org.au)

Darren Todd, one of Bosch's main trainers will conduct a session dealing with the new sensors being used in R744 AC systems AND climate control component testing.

Bosch will be using the weekend to launch some new equipment for the AC trade.

### 12 noon Lunch

**1pm** - Presentation from one of the Bosch equipment managers for 30mins. Short break and then Dave Townley.

**3pm** Finish of training sessions. Free time till dinner

### Partners Program:

While the members are at training, partners will be on board a coach to wine tasting, followed by lunch.

Their tour finishes at Haighs Chocolate for tastings and each lady will receive a box of Haigh chocolates.

The dinner will be memorable for more reasons than conviviality and fellowship.

It will be the inauguration of the RAA award to a VASA work shop for outstanding service.

This will be a great honour for the winning business.

The award will be presented by RAA Technical Liaison Manager, Scott Robertson, or RAA Manager Technical Services Mark Borlace.

During the weekend, there will be some pretty good give-aways.

**Sunday 14 June**  
Wind up breakfast



*Top trainer Dave Townley is the star attraction at the Adelaide VASA show in June.*

## VASA Training Weekend and Social MAIN DAY SATURDAY, 13 JUNE 2009 At a top Adelaide venue to be announced next issue

The active South Australian VASA members, led by VASA director Dave Jackson and Ian Stangroome and their wives and other helpers, have secured Robert Bosch Australia to sponsor this top event.



Co-sponsors are VASA members Adair and Heatcraft.

The show actually begins on the Friday night, 12 June, when Bosch will hold an evening for their service dealers, most of whom are VASA members.

### Saturday 13 June

**10am**



In a bid to attract members (and prospective members) to the Annual General Meeting, Sydney directors have planned a big day out, in a classic old building in the heart of the city, where there's cheap accommodation for the early birds.

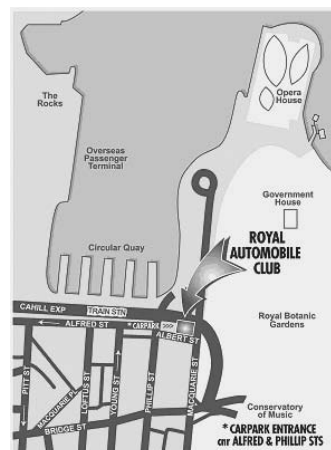
### Saturday 30 May 2009

**9.30am-10am** The day starts with a morning tea  
**10am-12noon** Training provided by The Automotive Technician trainers.  
**12noon-1pm** Lunch  
**1pm-3.30pm** VASA Annual General Meeting and general forum  
**3.30pm-4pm** Afternoon tea  
**4pm-6pm** Mini Trade Show with drinks and canapés  
**7pm-midnight** Three course dinner with drinks and entertainment

those who attend the full day training and AGM. In other words, the gala dinner cannot be attended as a separate event.

There will be seven trade show exhibitors.

Wholesaler, OEM members or other suppliers can sponsor this event for \$400, and they



As a benefit of membership VASA members receive free subscription to The Automotive Technician and their problem solving service.  
[www.tat.net.au](http://www.tat.net.au)

# RETROFIT - REPLACEMENT OF OIL

A motorist posed this question to VASA:

“If I have my 1989 Corolla air conditioning retrofitted from the current F12 gas to R134a, will it be necessary to replace the air conditioning oil?”

Some VASA air conditioning workshops have

told me that it is not essential, and they do not do it. What are the consequences of not replacing the oil?

Is it likely to damage the air conditioning system? Hope you can help with some information about this.”

**VASA responded (with help from the TaT help team)**

“As a general rule, it is not necessary to replace the AC system oil.

However, a thorough inspection of the system should be done to ensure that the oil already in the system is not overly contaminated or

sludged up.

Depending on the kilometres travelled and the internal condition of the system, we would recommend that a new receiver drier and TX valve be fitted and suitable oil is added.

On the limited information provided, we would, as a minimum, remove the TX and receiver drier, flush the condenser, evaporator and all the lines, leaving only the compressor untouched.

We would then fit a new TX valve and receiver drier, with seals, and add 100-120mls of ROC 1 oil. Then fit new 134a fittings and service as required.”

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***A refresher course from the original RTP, a distinctive training program developed by VASA for its members. Although written in the late 1990s, the information it contains is as relevant today as it ever was!***

The principles of refrigeration

To interpret the advanced facets of mobile air conditioning systems it is imperative that the operational concepts of a refrigeration/air conditioning system are fully understood.

This covers the properties of refrigerants (including pressure/temperature relationships) and the dynamics of how that refrigerant behaves in the air conditioning system.

Historically the mobile air conditioning industry has been built on R12 with simplistic control of the systems.

Unfortunately (in the late 1990s) we found ourselves in the midst of rapid change on a number of fronts, namely:

- the change from R12 to R134a
- the unfortunate introduction of various azeotropic blends adding complexity to interpretation and diagnosis of systems
- an increased complexity in the management of the air conditioning system - interfaced into the engine management control and/or full climate control
- various flushing agents being used which in some cases are not entirely removed, thereby changing the physical and operational characteristics of the refrigerant
- increased complexity in vehicle design and the addition of extra heat loads on the system.

These changes lead us to rethink the way we approach the servicing, diagnosing and repair of the air conditioning systems.

Let's face facts - R12 was easy - clear

sight glasses, simply designed systems and a refrigerant extremely tolerant to limitations in system design and servicing procedures.

We need now to go back and grasp the principles of refrigeration in order to be a professional in the industry.

Let's think of what an air conditioning system has to do.

Many people view it from one angle only - that it absorbs heat from inside the cabin environment, and dehumidifies the air in that environment.

However heat is a form of energy and energy cannot be created or destroyed - it can only be changed from one form to another or shifted from one place to another. (A basic law of physics.)

If this is applied, the energy (heat) that is absorbed in the cabin has to be dissipated outside the cabin.

This is the role of the two principle heat exchangers of the air conditioning system - the evaporator absorbs heat for inside the vehicle and the condenser dissipates that heat outside the vehicle.

It is vital to identify that it is not the heat exchangers that do the actual work - it is the refrigerant that is travelling through them that actually absorbs and releases heat.

Let's identify the basic properties of a refrigerant that are vital for it to be efficient.

A refrigerant must:

- readily vaporise at low pressures

- readily liquefy at high pressures
- be a substance that has an appropriate vaporisation/condensation pressure range that is effective and usable
- be a substance that has a large latent heat of vaporisation
- the critical temperature should be far higher than the condensation temperature.

In addition to these operational qualities there are also some additional features required of any refrigerant.

These include:

- non toxic
- non flammable or explosive
- stable throughout the entire operating range (no change in its properties and must not decompose)
- soluble in oil
- safe to the ozone layer.

There are a number of refrigerants being marketed that have suitable operational qualities but fail in one or more of the above areas.

It is for this reason the OEMs and VASA have chosen R134a.

It possesses all of the operational qualities of R12 (with slightly more sensitivity due to its pressure/temperature relationship) with no limitations from a safety perspective, or material compatibility perspective.

***Refresher course will be continued in future issues of Hot Air.***

***In the meantime, if any member would like to see Hot Air address any specific technical issue, please let us know.***



First of the next generation hybrids - the Chevrolet Volt - electric motor recharged from the mains and a small petrol engine.

## EVER BEEN IN A REVOLUTION? - YOU'RE IN ONE RIGHT NOW!

*You don't have to be Einstein to figure out that the world of motor cars, as our generation knows them, is changing rapidly.*

*Traditional revolutions, such as you might have in unstable dictatorships, can happen overnight. The car revolution is happening just as quickly.*

*In an industry that usually takes up to 10 years to design, develop and trial a new model vehicle, it is surprising to see how many new concept cars are suddenly appearing on show stands around the world, virtually overnight.*

*This is a revolution of a kind we haven't seen before, driven by a number of factors, principally the global recession, the price of fuel, the move away from unsustainable fuels and the emergence of markets we don't begin to understand, like China and India.*

*VASA members - whatever your workshop preference - AC, electrics, mechanical, you are going to have to pay real attention to the world of emerging technologies NOW.*

*What's going on around you at a dazzling pace, will determine your future direction in life.*

*It may influence whether you will stay in this business, and will certainly determine whether your company will ever be called 'Smith and Son'. Your son may not want to know - then again, if he's an electronics or computer genius, he could be heading for a fortune in car repair - kitted out with white gloves and sophisticated digital tools.*

*No more greasy overalls for him. Traditional mechanics will still be needed, to keep the old fleet running, until they are all museum pieces, which might not be long.*

**Rather than bore you with yet another narrative on new technology and the future of the car business, here is a list of facts, collected from reputable sources and magazines, which might surprise, perhaps even frighten you.**

- Car sales in the USA are running 16% below last year.
- The big three, GM, Ford and Chrysler are in big trouble, existing on \$25 billion bailouts from congress. GM is on the brink of receivership.
- Sales in Japan are expected this year to be the lowest since 1974.
- The emerging markets are Brazil, Russia, India and China (BRIC).
- The BRIC economies are expanding so fast, their slowdowns would leave them with growth rates which would still be the envy of the west.
- Thanks to the emerging economies, global car sales in 2008 may still reach an all time record of about 59 million.
- A \$2,500 car about to be released, is expected to do for India what the Model T Ford did for America early last century.
- The social changes in the BRIC countries will likely be the saviour of the big car makers.
- The Brazilian market saved Italy's Fiat from failure.
- Volkswagen is the market leader in China and will

soon challenge Toyota as the world's biggest car maker

- According to motor industry prophets, nothing else but zero-emission vehicles, powered by batteries, will stop the world from exploding.
- The emerging markets are leapfrogging old combustion engine technologies.
- Car makers generally agree that the move away from mineral energy is unstoppable.
- Almost every car maker in the world is planning to launch vehicles with hybrid powertrains in the next few years.
- Battery technology is rapidly improving to the degree that the same technologies used to power your iPod will be used to power cars - lightweight fast charging lithium-ion.
- First of the next generation hybrid will be Chevrolet's Volt (above), with an electric motor recharged from the mains and a small petrol engine that acts as a generator.
- Initially higher priced than conventional cars, prices of hybrids and new technology cars will fall rapidly with mass production and government tax benefits
- Many believe hybrids are only a bridging technology on the way to cars powered only by batteries.
- Australia is one of three pioneer countries to adopt

the commercialisation of electric/battery stations to take the place of conventional petrol stations, enabling electric cars to travel long distances, using renewable energy resources such as wind generation, solar and others.

- It is likely that electric vehicles may be released on a large scale in China ahead of western countries.
- A Chinese car maker, BYD, a subsidiary of one of the world's biggest battery manufacturers, has developed a ferrous battery which is not only cheaper than those used in the Prius, but can be recharged to 50% of their capacity in 10 minutes.
- Car makers claim that even if electric cars had to be powered by energy generated from coal fired power stations, the overall emissions would be half those of today's cars.
- The big question which nobody seems to have an answer for (apart from buckets of money), is how to put an estimated three billion cars on the world's roads. Most emerging nations are already grid locked on shocking road systems. In India, for example, nearly half the traffic runs on just 2% of the country's roads. Cars in most such countries move at less than walking speed.

# Add your name to the history of Australian and New Zealand vehicle air AC

If you or your business have been working on installation and repair of vehicle air conditioning systems for more than 20 years, you deserve to be a part of the history of vehicle air conditioning.

For posterity, please take the time to fill in the attached form - and send to:

Fax: 07 5591 8172

If you feel you have made an important contribution to this industry, you should fill in this form.

Post: VASA  
PO Box 1160  
PARADISE POINT QLD 4216

If you know of anyone who you believe deserves to be included in this history, please let us know.

On-line:  
[www.vasa.org.au](http://www.vasa.org.au)  
Fill in the on-line form



## Mobile Air Conditioning History of Australia and New Zealand

Your full name: \_\_\_\_\_

How long have you been an AC technician? \_\_\_\_\_

What qualifications did you begin with? \_\_\_\_\_

List all your business names, dates of operation and addresses:

<i>Business name</i>	<i>When established</i>	<i>When closed</i>	<i>Address</i>

Did you install air conditioning systems as an aftermarket accessory? YES  NO

If so, in what type of vehicles did you install AC systems? \_\_\_\_\_

Describe in your own words, the special skills or techniques that you developed or acquired to enable you to install or repair AC in vehicles which were originally not intended for such an accessory.

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Do you have any early photographs of your first business premises, or of yourself at work on vehicles? If so, would you make them available for this history project? (Send as high resolution jpegs, or contact VASA for assistance - Phone 0438 569 517)

Please provide your current phone number and/or email address for further contact:

Phone: \_\_\_\_\_ Email \_\_\_\_\_