



Hot Air

NEWSLETTER

April 2011

The Automotive Air-conditioning, Electrical and Cooling Technicians of Australasia

Corporate affairs: secretary@vasa.org.au Phone: 0438 569 517 www.vasa.org.au

Administration: treasurer@vasa.org.au 72 Holtermann St CROWS NEST NSW 2065 Phone: 02 9437 9942

Big member discounts still available for Melbourne in June

VASA directors have extended the member's discounts on both their membership dues and the Wire & Gas registration if they sign up for both before the end of April.

A number of members have already taken advantage of the special offer, which represents a 10% saving on the annual membership fees, plus another 10% on the member's registration for Wire & Gas, provided both payments are made together.

The rebate towards convention expenses of \$110 will stay in place for VASA members who reside outside of Victoria only until 1 June 2011.

These are the biggest incentives ever offered to members and

reflect the directors' commitment to providing affordable top class training.

VASA members will pay only \$385 for a weekend of training, including lunches and morning and afternoon teas and a Saturday night happy hour and networking session.

If the member lives outside Victoria, the price drops to \$275. These prices apply to all staff members from member workshops as well.

An apprentice from a member workshop will be admitted for only \$110.

This is a very different kind of



convention, with no big trade show or gala social events.

However, the happy hour will be a major social event and there will be a mini trade show

throughout the two days which to date will have a minimum of six companies showing their latest wares.

The sea-change you can really see!

The venue is Novotel St Kilda Beach, where VASA held highly successful conventions in June 1995 and again in 1999.

VASA has selected four of Australia's top trainers, some of whom you have enjoyed

The US Environmental Protection Agency, after a long review, has approved 1234yf as an acceptable refrigerant for new cars, and car makers are preparing for the changeover.

General Motors has announced it will use the new refrigerant in some 2013 models. The world's car makers have supported the new refrigerant.

The changeover from R134a to 1234yf will take years, especially since the factories making it are only now gearing up to meet the more urgent European Union ban on R134a.

previously, to deliver hard hitting, concentrated training for two solid days. Each training session will run for three hours, classroom style, with all technical training including vehicles for hands-on experiences.

The discounts will only apply for those members who have not yet paid their membership subscription to VASA.

To receive the discounts, the registration form included with this copy of Hot Air must be sent in with your member subscription and both paid at the same time.

If you have already paid your subscription and changed your mind about the convention, there will be no retrospective discounts but if you live outside Victoria you can still come to the convention for only \$275.

But it's not all a bed of roses in the refrigerant market, because a shortage of R134a, combined with price hikes, has triggered fears of a flood of improper refrigerant substitutions in mobile air conditioning systems.

Associations like VASA and its US and European affiliates are renewing calls for service centres to stick with manufacturers' service requirements to allay concerns about cooling performance, system reliability and safety.

In Australia and New Zealand, price hikes of R134a are expected.

HFO-1234yf jumps the last hurdle for US car industry acceptance

HERE'S WHAT THE TRAINERS ARE TURNING ON



Understanding modern automotive a/c systems

There is a wide range of systems on the market – conventional, mechanical variable, electronic variable, clutchless compressors – and a wide range of management systems controlling them. Analysing a system from the old 'read the gauge pressures' philosophy doesn't work any more.

I will take you through the systems on the market, how to interpret their operation and test procedures. How do you know in an electronically controlled pump if it is the management system at fault, an internal fault within the compressor or is it simply doing what it is meant to do given that its operation is now dependent on climate control settings.

As well as system variations, we now have suction and liquid lines all in one, thin walled secondary loop heat exchangers, fly-by-wire throttle control, pulse width modulation condenser fans and a range of other system revisions. You will learn strategies and testing procedures that can be used on all systems.

I will overview the operational strategies, look at why the old analysis methods do not apply, and what alternative testing programs can be used.

We need to keep in mind that a modern electronically controlled compressor on some prestige vehicles can cost around \$4000 so we need to be sure that it is actually the compressor at fault and not something else.



Climate control systems on late model vehicles

I will cover electronic climate control description, operation and theory as well as sensors technology, types and locations.

Issues with Holden and Ford electronic climate control components and functions will be examined.

I will take you through diagnosis processes without using scan tools where possible.

Individual component tests and selected on-board diagnostic systems will be covered.

There will be some handout information and other material on line and I hope to have with me an operating display that I've developed for training purposes and of course there will also be a vehicle in the room.

To assist delegates to plan their homeward journeys, VASA advises that, apart from personal networking, there are no functions after 4pm Sunday.



Diagnosis and interpreting waveforms

The essence of diagnostics is to apply gathered knowledge to maximise honing-in skills and minimise guess-work, thus avoiding unnecessary replacement of components.

My training session is specifically designed to not only use and interpret waveforms but also to determine whether the component, be it an input sensor or output control device, is within expected parameters.

Different approaches such as scan tool data list, digital multi-meter and tricks of the trade will also be discussed.

With the aid of circuit diagrams, oscilloscope and hands-on activities, delegates should be able to apply gathered knowledge, in their own workshop, the very next day.

After all, it isn't what you know but rather it is the application of knowledge that makes the difference in diagnosing symptomatic vehicles.

Interpreting waveforms is a critical part of that knowledge.



Building better business

I would like to charge what I am worth' is a common complaint with many workshop owners feeling that if they charge full price they will lose customers. This causes owners to focus on pushing more and more cars through the workshop just to stay profitable, rather than focusing on getting more sales from each car that they work on.

To help technicians charge what they are worth the TaT Biz team will focus on:

- 1) Improving customers' perceived value and service satisfaction
- 2) Selling your services.

By the end of the session attendees will walk away with a number of real life strategies that will help them sell their expertise, knowledge and time while at the same time improve customer satisfaction to ensure that they return.



**Saturday 11 June 2011
5pm – 6.30pm VASA Annual
General Meeting and forum for
all delegates in the main ball-
room. Non-members of VASA
are invited to attend.**

Win yourself an iPad

A slight delay, but it's still on

We promised this issue would see the start of our competition aimed at encouraging members and their staff to revisit the legendary RTP (Registered Technicians Program) which originally came out with a questionnaire attached. Those who got the questionnaire right were given a certificate.

VASA has upped the stakes and will now give an iPad away every two months to a technician selected by the board and based on a correct entry.

The reason for the delay is that the VASA website is being upgraded to provide new mechanisms for increasing traffic flow to members through online marketing.

Built into this effort is the online questionnaire for the RTP, but it's not quite ready.

However, VASA directors want to present the first iPad to a member or staffer at the AGM in June, so when the online facility is ready to roll, we will send out an email to all members, inviting them to take part in the contest.

The rules of the game will be spelt out in the online form.

This is an online contest only, so those with no email address should really consider getting one so they can not only join in the fun, but tap into the tremendous technical resources available on the web.

Hot Air has already started to reproduce the RTP in modern dress, so members should keep their newsletters for reference. The answers to the questionnaire will be found in the RTP.

So check your emails regularly and get ready to logon to

www.vasa.org.au

Authorities moving fast on R134a phase out

The US Environmental Protection Agency intends to withdraw its approval for the potent greenhouse gas HFC R134a to be used in new automobile air conditioning systems.

The EPA had approved the use of HFCs for mobile air conditioning at a time when safer alternatives were not available, and when fast action was needed to replace an even more climate damaging chemical, CFC12.

The alternatives to HFC134a include HFO1234yf, a gas with a low global warming potential which was approved by the EPA in February this year.

In the meantime, VASA's US affiliate MACS Worldwide, has issued a warning about refrigerant purity in the wake of rising costs of R134A.

The concern is that market conditions will lead to improper refrigerant substitutions in mobile a/c systems.

MACS strongly recommends the use of a refrigerant identifier during mobile a/c service to inform the technician of the chemical content of the refrigerant.

They recommend always using a refrigerant identifier when performing service.

This practice will allow for a proper repair and prevent possible contamination of systems or service and repair equipment.

If non-OEM approved refrigerants are installed in HFC-134a systems, concerns include:

- system cooling performance
- system reliability
- material compatibility
- chemical damage from blend refrigerants to system lubricant, seals and hoses
- contamination with lubricants required for blend refrigerants
- safety

The president wants a word

Hot Air has made repeated pleas for VASA members to put their hands up and take an interest in the activities of the VASA board and Wire & Gas Committee.



revitalised with new and fresh input and ideas from time to time to ensure its direction is up to date and relevant to its members and our rapidly changing industry.

We were hoping that some members would accept our invitation to attend a board meeting to sit in on the discussions and decision making.

Who knows, as a result of sitting in on such a meeting, perhaps a spark of interest within an individual would be enough to ignite a flame of passion to serve your fellow members, the VASA organisation and provide a guiding influence in the future direction of your industry.

Disappointingly, but not surprisingly, not one solitary member has put themselves forward. The silence has been deafening.

But do not despair. If you were considering putting your name forward or are just slightly interested and want more information, the offer is still open as it always is.

An organisation such as ours thrives on the unselfish voluntary efforts of its membership and our industry has been served and guided extremely well to date by the very capable board members current and past.

But an organisation needs to be

You can argue all day about who invented car air conditioning but there's no doubt some early ideas were good for a laugh, even if not all that practical.

When cars became enclosed in cabins, the interiors got very hot and something serious needed to be done. They built vents in the floor of the car, but this brought in more dirt and dust than it did cool air.

More ingenious was William Whiteley who, in 1884, placed blocks of ice in a holder under horse carriages and blew air inside by means of a fan attached to the axle.

This can only be achieved by maintaining a proactive agenda of promoting the introduction of new faces to our board in a carefully planned succession strategy.

We have an incredible range of talent within our membership and it would be greatly appreciated to be able to tap into that on the board or, just as importantly, to assist in the organisation of the very popular Wire & Gas conventions and training events.

So if you feel you would like to become involved, or you know of another member who you believe has qualities or talents which would lend themselves to being a valuable contributor why not make it known. Remember every single one of you has something uniquely valuable to offer, so don't hold back. There never will be a perfect or ideal time to become involved, so find your voice, jump out of your comfort zone and step up now.

The VASA board, your board, needs your help and so does your Wire & Gas committee.

*Ian Stangroome
President*





VASA Technical Bulletin

Category: ELECTRICAL

Volume 1 Bulletin 1

Every issue of Hot Air will revisit the RTP, in the order in which it was first delivered to members a decade ago. The technical information is as relevant now as it ever was. Members will find it a great resource for younger technicians, or those venturing into electrics and vehicle climate control repairs.

PRINCIPLES OF ELECTRONICS

This bulletin has two parts, principles of electronics and meter fundamentals.

These bulletins are concerned with principles from which we can build a working knowledge of basic electronics and fundamental meter usage which is vital for all technicians.

In the section on meters you should get a meter in your hands and do some basic testing while following the text if you are unfamiliar with the concepts presented in this bulletin.

In this bulletin a semiconductor is defined as a material that behaves as neither an insulator nor a conductor in natural state, but can adopt the characteristics of either (conductor/insulator) if placed under certain predetermined conditions (ie voltage bias/temperature).

In other words it acts as a conductor under certain conditions or as an insulator under other conditions.

Electronics, for the purpose of clarity, could be defined as the technology of controlling electricity.

It is a high profile technology at the center of virtually all vehicle control systems that incorporate such devices as transistors, diodes, thermistors, integrated circuits and microprocessors.

The aim of this program is not to provide everyone with an electronics degree, but rather to give you a working knowledge of what each component does, how it fits and works in a complete system, and the operational strategies of the complete system.

This will provide you with the base knowledge which, together with relevant resource material such as wiring diagrams, will allow you to analyse and diagnose system faults.

Review of current flow, conductors and insulators

Conductors are defined as a material whose outer electron shell contains three or less loosely held electrons that were termed **free** or **valence** electrons.

If an electrical pressure is applied (a voltage) the electrons will move from one atom to another.

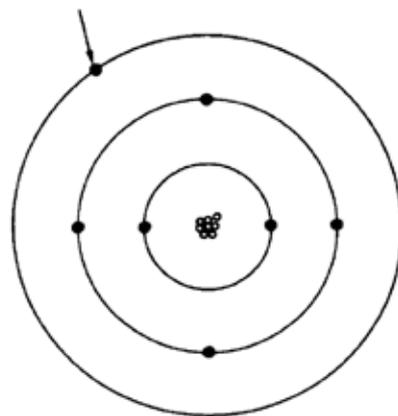
Conductors are therefore used to carry an electrical current to the load (component) where the work is done.

An insulator has five or more tightly held electrons in its outer shell which are not free to move.

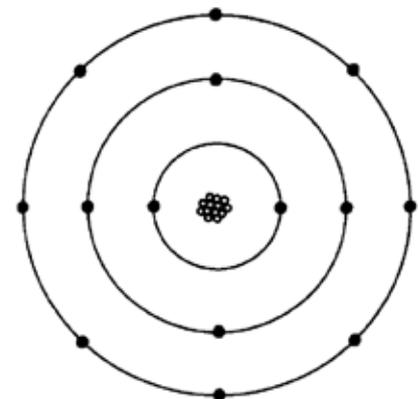
Without free electron flow there can be no current flow. A material that does not allow current flow is an insulator.

Semiconductors usually have four electrons in their outer shell and are therefore not good conductors, nor good insulators in their natural state.

Valence Electron



Atom of a conductor



Atom of an insulator

Their conductivity properties can, however, be changed by placing the semiconductor material under different operating conditions (ie applying a voltage or changing operating temperature).

Electronic components rely on a change in the atomic structure of their material for their operation. These are referred to as solid state components.

Solid state = no moving parts

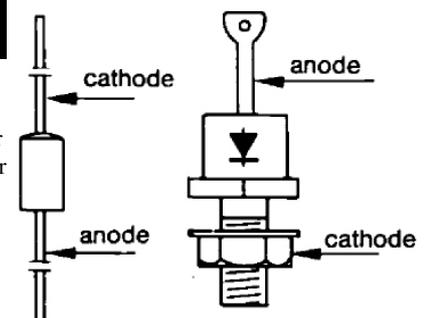
Semiconductor devices

Semiconductor, or solid state devices, are the basic building blocks for electronic circuits. Of these, the diode, the transistor and the thermistor are the most common devices used.

Diodes

The conventional diode is simply a one-way check valve for electricity. It will allow current to flow in one direction only.

Current flowing in the other direction will be blocked.

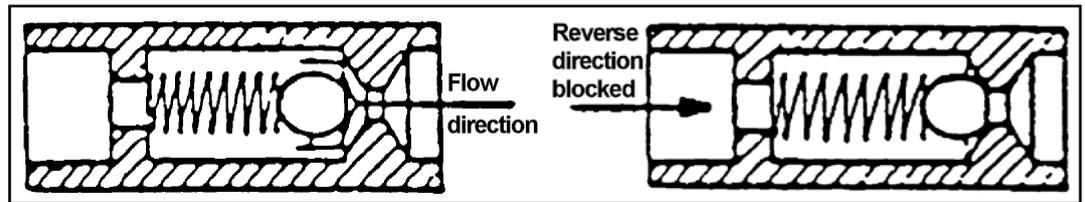


Basic diode types

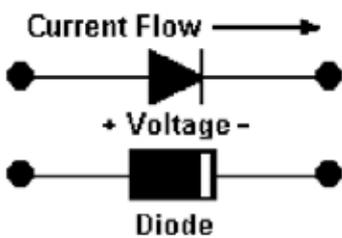
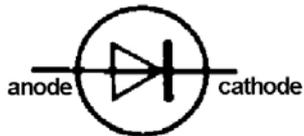


Diode – electronic check valve

In the basic diode type chart, the terminal connected to the arrowhead is termed the anode with the vertical line side being the cathode. The arrow shows the direction in which the current will flow, the vertical line being a *blocking bar*. Reversing the current flow will put the diode in a blocking condition with no current flow.



current direction



Diode symbols

Diode ratings

Diodes are rated according to the job they must do.

The amount of current they can pass safely is called the *forward current rating*. Exceeding the current rating will damage or destroy the diode, usually burning it open (the current will not pass in either direction).

A diode will generate large amounts of heat if continually operating under high current flow conditions, hence the need for heat sinking in these applications.

The second method of rating diodes is their *peak inverse voltage (PIV)*. This is the peak voltage that the diode can withstand safely in its blocking mode. The PIV normally ranges from 50 to 1000 volts or possibly more.

Exceeding the PIV usually results in damage to the diode. Characteristically it short circuits when the PIV has been exceeded and it will pass current in both directions.

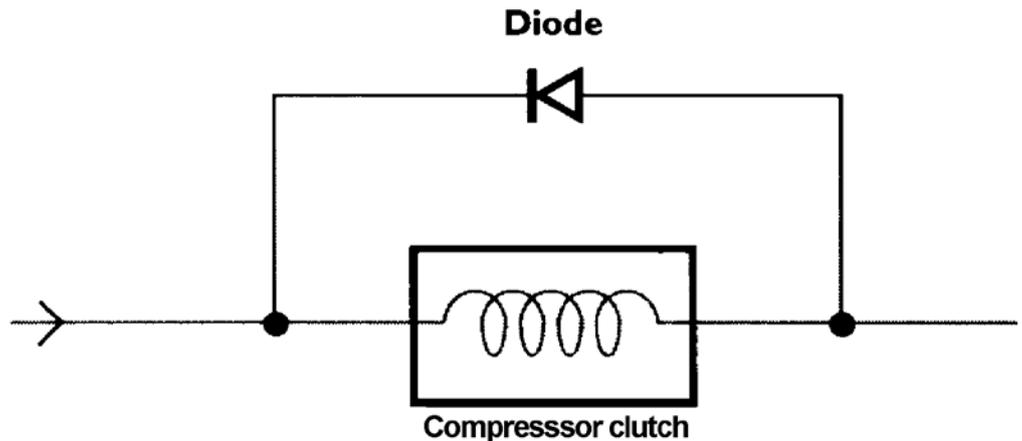
Diode applications

Diodes are commonly used in three applications:

1. Rectification such as AC to DC (ie alternator/charging)
2. Isolation diode/reverse polarity protection
3. Surge quench diodes – otherwise referred to as de-spiking or suppressor diodes (as used on Sanden TR compressors).

These applications will be discussed in circuit in following bulletins.

Suppressor diodes on compressors are critical in protecting sensitive electronics from voltage spikes generated when the magnetic field collapses.



Diode testing

A diode can be tested with a self powered test light or an ohm meter for continuity (passing current in one direction only).

If an analogue (needle) ohm meter is used it should have low resistance in one direction and high resistance when the leads are reversed.

If using a digital meter, use the diode test position only, as the ohm meter range may have insufficient applied voltage to give accurate results.

By reversing the leads, continuity will be indicated in one direction only. Check with the meter information booklet for the expected reading as this varies from meter to meter.

For example:

- *No continuity may show OL, meter battery voltage (3V), open*
- *Continuity may show 0.5 volts to 0.7 volts (which represents voltage drop across the diode), or give an audible continuity signal.*
- *A self powered test light will light in one direction only.*

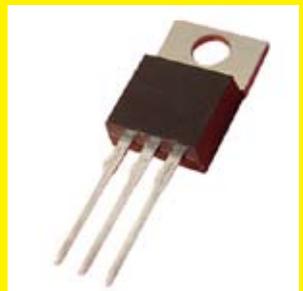
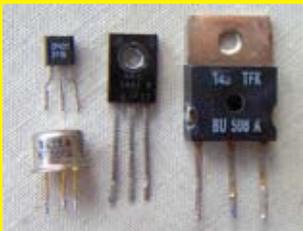
If the multimeter is equipped with a diode test function, it must be used for diode testing.

Do not use the ohmmeter function. Inconclusive results may result.



In almost all cases transistors are used to turn control circuits on and off in ECM (computer controlled) systems.

Understanding their operation is critical in diagnosing modern electrical systems.



Transistors

A transistor is a semiconductor device used for switching or amplification.

A transistor has three terminals and comes in two basic configurations known as NPN and PNP types. The basic operating principle is the same.

The three terminals are:

1. **The base (B)**
2. **The collector (C)**
3. **The emitter (E)**

Its basic operation can be compared to that of a relay or a water tap.

Mains pressure is held in the **collector**.

The tap handle is the **base**. When it is closed nothing flows. When it is open there is flow to the outlet (**emitter**).

The **base** controls the flow through the **collector/emitter** circuit.

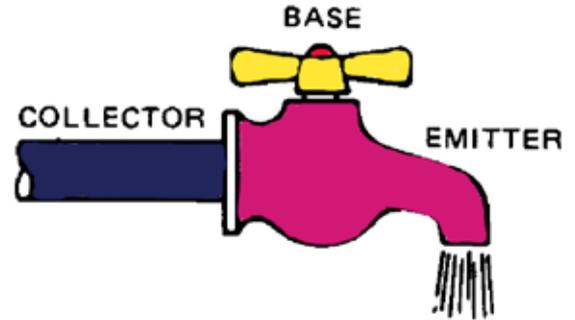
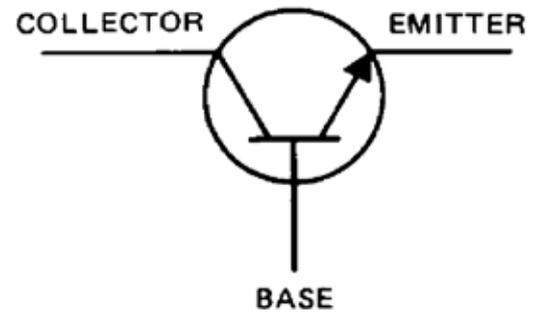
In a transistor the base is the trigger to allow current flow through the collector/emitter circuit.

For a more detailed operation compare a transistor to a relay.

How a relay works:

When a small current flows through a relay winding (coil) it:

- energises the relay
- closes the contacts
- allows a large current flow through the contact circuit.

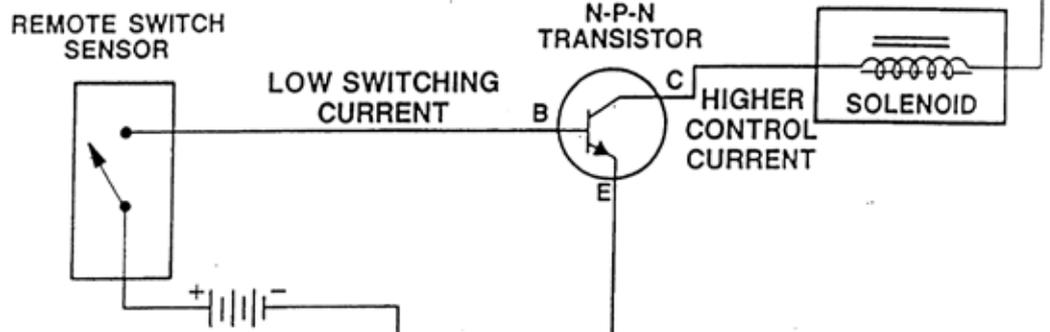


How a transistor works:

When a small current flows through the base/emitter circuit (from + to -) it:

- switches the transistor on
- allows a large current flow through the collector emitter circuit

A relay and a transistor basically do the same thing – they use a small switching current to complete a larger current flow circuit.



Transistor testing can be conducted in two ways:

1. Out of situ by testing base to emitter and base to collector continuity using diode test function

OR

2. In situ – when the transistor is turned **on** the collector emitter circuit will be at the same voltage or potential. Allow for small losses.

Due to the complexity of transistor testing it will be handled in detail when

circuits containing transistor switches/amplifiers are presented in future bulletins.

So far, we have presented an overview of transistors.

**Win yourself
an iPad**



**See the competition
detail in this issue**

In Hot Air so far we have covered the whole of Electrical Volume 1, Bulletin 1 of the famous Registered Technicians Program.

In this issue, we began Electrical Volume 1, Bulletin 2 which covers the principles of electronics.

We will continue electronics in the next issue as we move on to thermistors.

To be continued next issue

Vale Keith Murray



The industry was saddened to hear of the death of Gentleman Keith Murray, an expert and meticulous climate control designer and tradesman who for the past three and a half years was product manager in charge of air conditioning for CoolDrive Distribution, based in Melbourne.

Industry leaders and former work colleagues have spoken highly of Keith's personal and work ethics.

VASA legend Mark Mitchell said Keith was among the enthusiastic band of technicians who helped form the association and serve on its early technical committees.

'Keith was a good technical operator and excellent at concepts. Above all, he was a gentleman and was always willing to attend meetings and help out,' Mark recalls.

After getting his trade qualifications as a mechanic, Keith's entry into the vehicle air conditioning world began more than 30 years ago with Brian Wilkinson and Len Crone at Nanbri Auto Air. Keith was a contract fitter at Nambri, a job he did with great thoroughness, as Brian recalls. 'In those days, you had to design and fit as you went. There were few systems custom made for cars, and few cars were fitted with air conditioning at the factory,' recalls Brian.

Len Crone now national sales manager of Carrier Transicold worked with Keith at Nanbri and also at Crisp Air. 'Keith was a deep thinker and a confident and competent tradesman. He had an easy going nature, and was totally devoted to his family and the outdoors,' Len said.

VASA directors and members extend their condolences to Bernadette and family.

Trials begin on new e-learning program for air conditioning technicians

The Queensland Automotive Skills Alliance (QASA) in partnership with SkillsTech Australia has developed an innovative e-learning program for automotive air conditioning.

The program comes as a response to the demand from the automotive industry for more flexible training options for workers who must meet strict licensing requirements for the handling and disposal of refrigerant gases.



QUEENSLAND
AUTOMOTIVE SKILLS ALLIANCE
FOCUSED ON THE FUTURE

QASA Executive Officer, Paul Kulpa, said the flexibility of the program will allow regional students to participate in the program.

'The program will provide e-learning resources to students and combine these with a workplace learning model in order to facilitate the practical components of the course,' Mr Kulpa said.

The training began a pilot period in March 2011 with students from employer organisations the first to participate in the program funded by the Australian Flexible

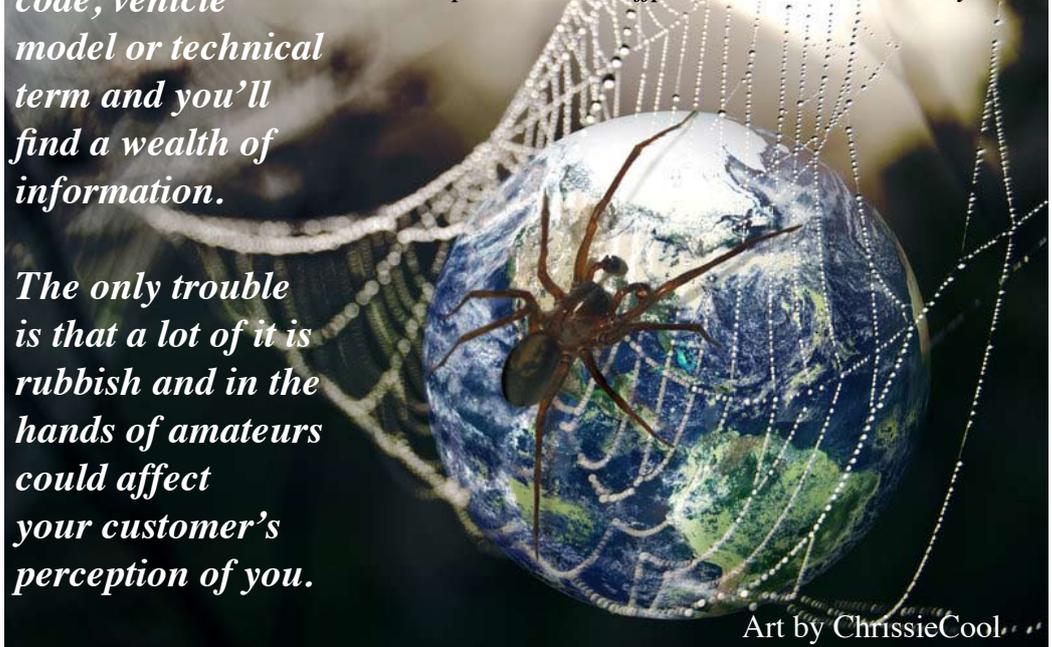
Learning Framework.

VASA, along with other industry organisations was invited to participate in the development of the new program.

Google any auto code, vehicle model or technical term and you'll find a wealth of information.

The only trouble is that a lot of it is rubbish and in the hands of amateurs could affect your customer's perception of you.

Much of the following article was first published in MACS Action magazine. VASA appreciates the permissions granted by MACS president Elvis Hoffpaur and Action editor Jim Taylor.



Art by ChrissieCool

Many people use the internet to self diagnose their own ailments as well as those of their family car.

What they find there influences not only their choice of goods and services but their general attitude toward repair workshops like yours.

MACS Action editor Jim Taylor devoted quite a few hours to trawling the electronic ocean.

In a report summarising his findings, he notes: 'The world wide web has become a tangled place, but it is still often the first place a home mechanic or do-it-yourselfer will turn to for information. The quality of the information found ranges from truly excellent to downright

ghastly and dangerous.

'Each site and video presents itself as a source of expert information, but it is clear that an uninformed consumer attempting a driveway repair might not recognise which procedures are reasonable and which pose a variety of hazards.'

On the consumer's perspective, JT observes: 'In spite of the industry efforts to improve its image, many consumers believe that every technician and shop will rip them off or otherwise treat them badly.

'These statements and complaints almost always revolve around charges and dollar amounts rather than shoddy repairs or unreliable parts.'

MACS and VASA encourage their members to develop a web presence and tell their own story.

The VASA website already has that facility for those members who don't have the time or resources to do their own website.

Your efforts to provide accurate information to consumers may help many to avoid bad choices and could help bring them to your door.

Like the classic western *The Good, the Bad and the Ugly*, internet searches are basically a treasure hunt; some of the nuggets are gold, others are not.

Contact secretary@vasa.org.au if you would like to talk to us about setting up your own web page.

Web access for members

Follow this simple logon procedure to www.vasa.org.au

1. On the front page of the site, you will see this box. Click on the top blue panel to login.

VASA Members

CLICK HERE TO LOGIN

Not a member? Click here to join.

2. Type your member number in the first box. In the password box type, in lower case, the first four letters of the suburb in which your membership has been listed.

Member Log In

Member Number:

Password:

If that doesn't work, please check your membership number and suburb and try again.

With password entry to websites, accuracy is essential. A capital letter in your password will block your entry. So will an errant

full stop, comma or any other accidental key stroke.

Remember that after five password attempts the site will lock you out, and you will need to wait 10 minutes before trying again.

VASA members need to be very clear about what they are looking for on the web. Here's a general rule:

For matters affecting your membership of VASA, technical archives containing the Registered Technicians Program, consumer information about VASA and a full listing of all members by location and type of membership, the website address is:

www.vasa.org.au

If you have a serious technical problem with a particular vehicle, no matter what the problem is, and for access to a growing library of vehicle faults and solutions, the website address is:

www.tat.net.au

New Code of Service for your workshop



Customer Code of Service

The Automotive Air-conditioning, Electrical and Cooling Technicians of Australia

The VASA Service Centre

- Members of VASA Service Centres will engage in sufficient training, education or skills development to enable them to keep pace with the technologies required to repair modern vehicles.
- Members are responsible for applying the professional integrity and work ethics of the VASA network and the automotive industry, and will not accept any contract that may bring discredit to VASA and its members.
- Members will act with honesty, fairness and professional courtesy in all dealings with the public, other VASA members and fellow technicians.
- Members will apply best work practices as set in relevant technical resources and Codes of Practice and will promote the use of approved and recommended parts, equipment and consumables in all repair and maintenance.
- Members will endeavour to educate the public on the long term value of using approved replacement parts. Where a customer decides to have quality parts replaced, the Service Centre will take on the final decision that non-recommended parts have been manufactured by the customer. Therefore the Service Centre will accept no liability for any failure of parts or subsequent damage to vehicle systems.
- Members will discharge their responsibility to their employers by observing safety and collective and individual employment contracts or agreements, and by providing technical, support and instruction to enable them to be productive and efficient employees capable of contributing positively to the welfare of the business.
- Members will provide adequate working conditions, equipment and facilities, and ensure proper operation of all safety standards and work practices.
- Members reserve the right to refuse to undertake any repair that beyond the Service Centre's equipment capacity or skill level. This right also extends to any situation where the customer insists on a part repair that, in the member's opinion, will put other components or systems at risk. The member will inform the customer why such refusal is necessary.
- Members will take the time to educate customers on the need for proper maintenance of specific vehicle systems and make available to them user manuals or contact parts to generate a better understanding of the need for scheduled maintenance.
- Members will take responsibility for their own conduct and be prepared to guarantee that their practices and the parts or equipment they fit in any repair, will provide the best protection when used in accordance with manufacturer's specifications.
- Members will adopt open and readily understood warranty practices as an integral part of their business operations.
- Members will refrain from criticising the actions of fellow members, and use to strengthen the network through sharing of technical information and skills and offering assistance to fellow members when required.
- Members will be environmentally responsible, ensuring compliance with environmental and energy efficiency guidelines or regulations.

Issued by the Board of Directors of VASA May 2010



The VASA network

to offer members a professional network of technicians and service centres committed to industry best practice. Services to the VASA network through continuing education and training will add value to the bank with every business.

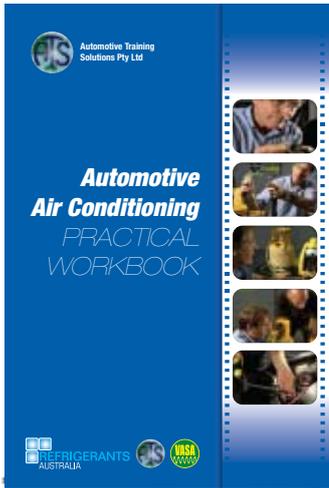
A new two-part Code of Service is being posted to members as they renew their annual subscriptions.

One is a customer code and the other a workshop code and they can be displayed individually, or as a set.

The artwork is available on the VASA website for those who want to print their own.

Hot Air is published every two months, and is posted to financial members of VASA, along with the current issue of the TaT magazine.

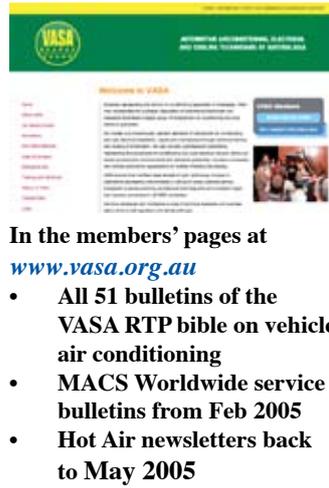
This newsletter contains information which will help you become a more productive technician. You are encouraged to leave past issues in your waiting room, so that your customers can see that you are a member of a professional repair network.



Automotive Training Solutions Pty Ltd

Automotive Air Conditioning PRACTICAL WORKBOOK

REFRIGERANTS AUSTRALIA



MACS SERVICE REPORTS

By Peter Ware - MACS Technical Consultant July 2010

MORE ELECTRICAL TROUBLE-SHOOTING TIPS

In the members' pages at www.vasa.org.au

- All 51 bulletins of the VASA RTP bible on vehicle air conditioning
- MACS Worldwide service bulletins from Feb 2005
- Hot Air newsletters back to May 2005



Practical Vehicle Air Conditioning Servicing 2008

- Professional AC service procedures
- Establishing a partnership with the customer
- Why components fail

Grant Hand wowed them at Wire & Gas conventions – you can see him at his best on this air conditioning servicing DVD that comes with a 24-page workbook. VASA member price is \$40.

To order your copy, email secretary@vasa.org.au with your name, membership number and phone number and we will post it to you immediately along with your invoice.



MACS SERVICE REPORTS

By Peter Ware - MACS Technical Consultant July 2010

Leading Wiring Faults

Open and Short

Most electrical wiring faults are caused by a loose or broken connection. The most common wiring faults are open and short circuits. An open circuit is a break in the wiring that prevents current from flowing. A short circuit is a low resistance path that allows current to flow where it shouldn't. Both can cause damage to electrical components and even start a fire.



VASA is proud to be affiliated with MACS Worldwide

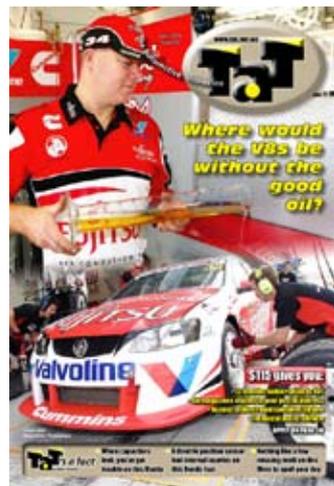


One of the big benefits of being a VASA member is that you receive a free copy of the TaT magazine, and with it free access to the TaT assist service.

This is a web-only service, so to access technical help, members must go to www.tat.net.au and log in, using the form which will be generated when you click this link on the left of your screen.

If this is your first sign-in Click Here and enter the same email you gave with your subscription to generate your login details.

In your case, as a VASA member, your email is already installed in the TaT system, so if it matches, you will be provided with your own password for all future visits.



Where would the VAS be without the good oil?

Valvoline

STIG'S SUPER POWER

When you access the TaT assist form, you must fill in as much detail as possible to give the experts enough information to consider your problem.

VASA members can also access a growing database of vehicle faults and solutions in the members' pages of the TaT website.