



Hot Air

NEWSLETTER

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

August 2011

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Budget
training
formula
scores
top marks

VASA Annual General Meeting



LEARN TO EARN

VASA's decision to subsidise its Wire & Gas training programs has earned it top marks from the 100 delegates who came from around Australasia to the Melbourne event in mid June.

That it was a scaled down version of the training convention didn't seem to worry any of the delegates, many of whom were regular conventioners.

The four trainers were exceptional – each delivering his presentation four times over the two days.

The increasing interest in business training which first became evident at the 2010 Wire & Gas on the Gold Coast, was re-confirmed in Melbourne, with business training nominated as the most desired by the biggest number of delegates.

Future preferred training also included heavy machinery air conditioning systems and electrics and engine management live data and codes.

The sponsors who also mounted tabletop displays reported good business and considered the effort worthwhile. Their presence certainly added the excitement of a trade show to the weekend.

The happy hour on the Saturday night was the social and networking highlight, with more than one delegate saying 'this is far better than a big sit down dinner'.

The future of Wire & Gas will be determined at the next VASA board meeting in August. The original plan was to hold two training weekends a year in March and September, in different locations. But at the VASA annual general meeting, there was still strong support for keeping the event in June.

Overall value of weekend



An alliance was formed between VASA and the peak car industry body in Victoria, the Victorian Automobile Chamber of Commerce (VACC) at Wire & Gas.

As well as sending four of their own trainers to the VASA event, the Board of Directors met with senior managers of VACC to discuss how they could work together in future for the betterment of the industry.

Looking in on one of the training sessions in the pic above were (from left) Mark Padwick, Ian Stangroome, Tim Grimes, Deyan Barrie, Bernard Murray and Brian Savage (VACC) and Jeff Smit.



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Quake wipes out VASA member business

The June Hot Air told of the havoc caused by the Christchurch earthquake leading to the closure of a VASA pioneer business, Christchurch Auto Air, owned by Auckland Auto Air founder and former VASA director Barry Rogers and his son Philip.

Philip has since sent pictures

of the quake damage to his workshop. The building shook violently, stock fell from shelves and cement-like ooze spewed up through the floor.

Equipment and stock has been moved to Auckland Auto Air and there are no immediate plans to return to Christchurch.



Long time New Zealand member Steve McCarthy, owner of SMAC Automotive Air Conditioning at Tauranga is the first winner of an iPad, for having correctly answered the questions in the first RTP quiz.

It is intended to hold a new quiz every two months, and members and their staff will have as many opportunities as they like to submit their answers.

The VASA directors will select the winner from those who submitted correct answers, and who gave the best response to the question relating to VASA and the industry which will appear at the end of each technical questionnaire.

As forecast in June's Hot Air, VASA Legend Mark Mitchell has stood down as a director of the organisation he was instrumental in founding. His place on the board has been taken by Brett Meads, a long time member of VASA, who runs Gympie Auto Air in Queensland.

Other board positions remain unchanged:

President – Ian Stangroome
 Vice President – Mark Padwick
 Treasurer – Jeff Smit
 Directors – Deyan Barrie, Tim Grimes, Catherine Tocker and Brett Meads

First iPad goes to New Zealand member



Steve and his wife and business partner Kim are familiar faces at most VASA training events. Within a day of returning home after the Wire & Gas weekend in Melbourne in June, he sent this email.

'I am sitting in my office reflecting on all the knowlege that has been passed on to me and how great the weekend was technically and how well organised it was. I would just like to say thanks heaps for your efforts and well done and I look forward to the next VASA get together.'

That's the sort of spirit which keeps VASA alive and relevant.



President Ian Stangroome delivers annual report

The air conditioning, electrical and cooling systems aftermarket has probably been busier than ever, but the amount of work we do does not necessarily translate into income dollars.

This comment only reflects the feedback we receive from so many workshops that complain they don't have enough hours in the day, but the money in the till at the end of a busy month is just enough to pay the staff and the essential bills.

This scenario, while apparently widespread in the aftermarket automotive sector, does not represent the true state of the industry. There are many very profitable workshops and technicians, but almost without exception, these workshops are run by people just like those of you here today.

The fact that you are here puts you in the elite society of knowledgeable and professional tradesmen and women.

If the events of the past year have demonstrated anything, it is that there is a very close relationship between profitability and continuous learning. And in this trade, as you all obviously know, the gathering and absorbing of new information must be a continuing passion.

Aftermarket workshops are not just an alternative to the dealerships. Without the aftermarket workshops, our roads would be littered with vehicles which simply cannot be repaired because there are not the skills available to repair them.

The astounding fact that aftermarket workshops must

learn to service, maintain and repair hundreds of different vehicle makes and models, makes the aftermarket workshops a very smart institution.

Dealerships service mostly one model of vehicle, and even then, most dealerships have long since abandoned complex diagnostic processes and they simply remove and replace, and often they do this as often as necessary to stumble on the real cause of the problem. This amounts to an incredible waste of resources under warranty, and an often horrendous and unnecessary plunder of the customer's wallet just out of warranty.

This is not to be construed as an attack on the dealership network, but simply an acceptance of reality, one which we can all take advantage of, and I would urge all aftermarket workshops to establish and maintain working relationships with the dealerships within their areas. I believe these relationships can serve to provide a mutual benefit.

Knowledge is your competitive edge, and the more you have, the more profitable you have the potential to be.

It is said 'knowledge is power', but real power comes from putting your knowledge into action.

Membership of anything is a two-way street. An association, such as VASA, is only a corporate platform, a building foundation if you like, which depends so much on the activity of its directors and its members to become something great, to

survive, be relevant and to stand out. VASA is simply a network, which is only useful if you use it and take an interest in it.

I think it is to your great credit that VASA not only survives, but is regarded as a 'kick-butt' organisation which is not afraid to protect its members or speak up at the highest levels of government if we feel that issues are going off the track.

Perhaps the second biggest issue which has occupied our minds in the year under review, is the need to encourage the next generation to take an active role in the management of the association.

With the realisation that board members will move on over time, the VASA directors, in the past year, offered to pay the expenses of any member who would like to attend a board meeting, in an attempt to spark some interest in the board's activities. There was not a great rush to take up this offer, but it did stir some action and the outcome of our election of directors will provide the proof of that.

The same offer still stands to any member and I would urge you to take up this opportunity – we just need you to voice your interest.

Those of us who undertake air conditioning service and repair will be concerned about the forecast massive increases in the price of refrigerant and the impact this will have on workshop practice.

A recent survey VASA undertook, on behalf of Refrigerant Recovery Australia, made it abundantly clear that members are concerned about price rises of refrigerant,

giving rise to the potential to increase the drift to hydrocarbon refrigerants or cheaper blends adding to widespread contamination, and the impact of the proposed carbon tax and emissions trading scheme on refrigerants.

Much of this is still uncertain, but VASA will watch these issues closely and do its best to provide the right advice on the management of these questions. In the midst of this is the now world-wide adoption by the major car makers of the new refrigerant 1234yf. It's unlikely we will see this for a few years across the board in Australian vehicles, but we must be prepared for it. All of these issues will be factored into future training events.

Encouraging youth

Perhaps one of the other significant moves by your directors in the past year has been to align itself more closely to the training system, dominated by the TAFE colleges.

We have begun a pilot program, which will be expanded this year, to issue free membership of VASA to TAFE students while they continue with their courses, to be followed up with a no-obligation invitation to join up as fully fledged members of our network once they leave the classroom.

This is an abridged version of the annual report.

Read the whole report at www.vasa.org.au



Farewell to the man who was VASA's shadow



Mitchell reminds us - what if VASA never happened

As Mark Mitchell vacated the director's seat he has occupied since 1993, he reminded members what might have been had those industry stalwarts not banded together to form VASA.

"Without VASA, there could well have been an unhappy and unhealthy phase-out of CFCs. We could have had a dogged government controlled ban on CFC and industry would have had a much harder time had it not taken on an industry based, well organised transition," he said.

"Even in the controlled environment we ended up with, we were concerned about the price of refrigerant, but it could have been a lot worse.

"The whole Montreal Protocol approach that we took on in Australia as an industry, in conjunction with the government, was a huge success and a great partnership.

"In this process, VASA forced recognition of the mobile air conditioning industry in an era when many stakeholders in automotive would have preferred for us not to have a voice. Many didn't know we existed," Mark added.

"VASA's constant reminder of the one hundred million dollar value of the mobile sector put us on the map as an industry.

"Standards in the aftermarket might have been a lot worse had VASA not led the field with the early development of its Registered Technicians Program, which ran for seven years and is still regarded as the bible of air conditioning best practice.

"VASA was a stakeholder and significant influence on the Refrigerant Reclaim Australia (RRA) scheme. We

participated in the world's best stewardship scheme for recovery and destruction of unwanted refrigerants. RRA has won two United Nations awards.

"If VASA had not been there, maybe the system would not be as good as it is. We have been a strong voice," Mark recalls.

"It has only ever been VASA that has been in there to represent the auto industry. Nobody else cared too much about refrigerant in automotive, whereas it is the lifeblood of the whole industry.

"Refrigerant runs in our veins. No other organisation has cared as much for the future of mobile refrigeration and air conditioning technicians as VASA.

"Merging with the auto electricians was a great merging of the minds, a natural progression, particularly in the passenger car sector.

"VASA was one the founding members of NRAC. We helped form it with our colleagues in other sectors of stationary, commercial and domestic refrigeration and air conditioning.

"VASA played a significant role in the formation of NRAC which was to become ARC which became the current licensing scheme. We did not get exactly what we wanted, but we got something which was better than what we had before.

"Our involvement continues to this day, with your vice president Mark Padwick as chairman of ARC.

"The challenge for the current VASA board is to make sure we continue to be relevant and make sure that if anyone asks 'what if we were not here' you can answer it with confidence."

Only the VASA pioneers would know about Frank Allison, the Texan who knew more about vehicle air conditioning than anybody and who played a significant role in VASA's formation.

On the VASA website, in the history page where pioneers are honoured, this comment appears at the end of a glowing tribute to Frank 'If this were a religious revival, we could claim that VASA has a direct link with God'.

Frank is on this Australasian website because VASA had conferred its rare Legend status on him for having assisted in framing VASA's philosophies and attitudes.



Frank was then CEO of the International Mobile Airconditioning Association in Texas (IMACA) and Mark Mitchell, in his quest for inspiration to start an industry organisation in Australia, turned to Frank for that inspiration and guidance.

Frank is credited with helping to kick start the mobile air conditioning industry in Australia and Japan.

In the mid 1960s, Frank boarded a propeller aeroplane for the three leg flight to Australia. He arrived in Sydney and cold-called likely candidates for his products from the phone book. Historic meetings and supply arrangements were made with Sydneysider Bernie Oros, and Melbourne businessman Bruce Humphries, which were the

most significant sparks to ignite the mobile air conditioning industry in Australasia. Another Australian pioneer of vehicle air conditioning, Ralph Cadman, who started his business around 1967 and who is a VASA pioneer, started sourcing information and product in America and it would be inevitable that he became a regular visitor to Frank's business and home.

Mr Tetsuo Nobata, the Japanese industrialist who founded

Unicla which went on to become the biggest independent vehicle air conditioning compressor and component manufacturer in Japan, had also called on Frank in his time as a retailer of air conditioning systems, and huge contracts followed.

Ralph Cadman became Mr Nobata's right hand man, a role he later turned over to Mark Mitchell, who is now a part owner of Unicla.

In his opening address at the VASA convention 2000 in Auckland, Mark said, "I turned to Frank Allison for some advice. Here was a man who has been in the game since the 50s, who knows at first hand about every airconditioning issue, every product, every service ethic and every threat and opportunity.

"No one will know, aside from myself and Frank, how many phone calls, faxes and now emails have passed between us. He has lectured to me, conferred with me, sometimes agreed with me, told me the dos and don'ts of running an organisation like



VASA Technical Bulletin

Category: ELECTRICAL

Volume 1 Bulletin 2

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

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

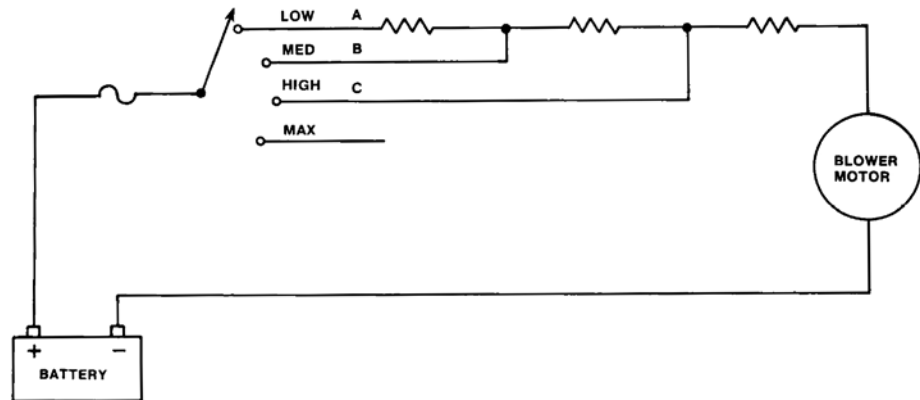
In the section on meters you should get a meter in your hands and do some basic testing while following the text if you are unfamiliar with the concepts presented in this bulletin.

Many modern systems such as climate control use amplifying transistors to control blower speed. The principle of operation of varying resistance in the blower motor circuit is the same as with individual resistors shown here - just finer control.

In manufacture, resistors are calibrated to give the desirable blower speed and subsequent air volume for the individual speeds.

Blower motor circuit

The blower motor circuit uses resistors in series with a load to control the work that the component does. Blower motor circuits are the classic **voltage divider** circuit where there is a designed-in voltage splitting between two or more components.



If the internal resistance of the blower motor is 1 Ohm then on maximum speed (sometimes called boost):

- it is the only resistance in the circuit
- the motor will use the full 12 volts
- the current draw will be 12 amps.
(Ohms law $I = \frac{V}{R}$)

If each resistor is 1 Ohm on high speed:

- there are two 1 Ohm resistors in circuit, the blower motor and resistor C. (call them R1 and R2)
- the voltage drop across each resistor will be 6 volts – the 12 volts are split evenly
- the total circuit resistance is $R1 + R2 = 2$ Ohms
- applying Ohms law the current flow is now only 6 amps.

If we select medium speed:

- there are 3 Ohm resistors in circuit (2 resistors + blower motor)
- the voltage will now be divided three ways – the voltage drop across each resistor will be 4 volts ($4V + 4V + 4V = 12V =$ supply)
- the total circuit resistance will be 3 Ohms
- the current flow will therefore be 4 amps.

TASK:

1. Calculate the **voltage splitting** when low speed is selected.
2. Calculate total circuit resistance on low speed.
3. Calculate current flow on low speed.

Summary

Due to more resistance in the supply circuit the voltage to the motor is dramatically reduced on lower fan speeds. From the circuit evaluation:

On 1st speed motor supply = 3V
On 2nd speed motor supply = 4V
On 3rd speed motor supply = 6V
On 4th speed motor supply = 12V

EXAMPLE ONLY

NOTE: Under normal circumstances a relay would be used on 4th speed.

Ammeters

Amperage, or current that is flowing through a circuit will do work. The more work that is being done the more current the circuit will draw.

The more resistance in the circuit the lower the current flow, hence an insufficient amount of

work will be done as unwanted resistances are present. If there is excessive resistance in the compressor clutch circuit current flow will be proportionally down, as will the work done.

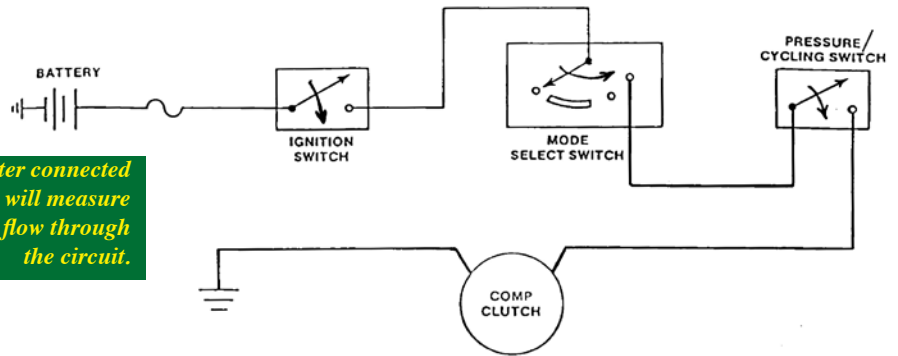
This could, and in many cases does, reduce the clutch magnetic

field to a degree where clutch engagement is less than positive with subsequent heat generation and clutch failure.

There are two basic forms of ammeter current flow measurement.



Low current flow circuits can be measured with a direct reading ammeter connected in series. That is, you must break into the circuit so current actually flows through the meter.



An ammeter connected in series will measure current flow through the circuit.



Inductive pickup

At no time must an ammeter be placed in parallel or across a load/component (as per voltmeter connection) as it is a low resistance meter and excessive current flow may damage the meter and/or circuit.

Likewise it must not be connected into a circuit that has no resistance (for example, a circuit that is blowing fuses) without a load bank (extra resistors) being put in circuit to control current flow to safe limits. Remember it is the circuit resistance that is controlling the current.

The second method of measuring current flow is by using an inductive pickup. This style of meter sampling relies on measuring the magnetic field around a conductor. Any time current flows through a conductor a magnetic field will be present around that conductor. By measuring this field, the meter is able to indirectly determine the amount of current flowing.

There are two distinct advantages of this type of measurement:

1. Simple connection - you do not have to break

into the circuit.

2. It can handle much higher current flow circuits. Direct reading ammeters only handle 10 or 20 amps, depending on meter capability.

An ammeter is a vital analysis meter to verify circuit integrity in a working (loaded) condition.

Going back to the simple compressor clutch circuit, if the resistance of the clutch coil is 4 Ohms, the current flow should be 3 amps for a 12 volt supply. (Ohms Law $I = \frac{V}{R}$)

If the actual current flow measured is only 1.5 amps we immediately know there is excessive circuit resistance to cause the lower than expected current flow.

This resistance could be in either the supply or earth circuit.

Voltage drop testing would then be conducted on the circuit to identify the points of voltage drop.

When checking current flow above the rating specified on the meter, for example 10A or 20A, an inductive pickup must be used.

For accurate resistance testing ensure the resistance of the leads is taken into account, especially when testing low resistive components.

Simply hold the leads together prior to testing to check lead resistance and subtract this value from your recorded readings.

Under no circumstances must an ohmmeter be connected into an electronically controlled system (particularly the ECU/computer/microprocessor) unless specifically instructed to do so. The internal supply from the meter can cause significant damage to the sensitive electronics due to excess current flow

Ohmmeters

The Ohmmeter is different to the voltmeter and ammeter in that the circuit is never tested live. When testing the component or section of the circuit it must be isolated. Ohmmeters have their own power supply (internal battery) which, when connected across a circuit or component, will cause current to flow through that circuit. It is the current flow through the circuit which causes the increase in needle movement or will cause the digital display to increase value. Relating back to Ohms Law, more current relates directly to less resistance. Therefore the meter can 'internally record' current flow, knows the voltage supply value, and can therefore calculate the circuit resistance. **No circuit resistance = maximum current flow.**

High circuit resistance = low current flow.

If the circuit is open (no continuity) the meter will record infinity as no current will flow. If you use an analog meter (needle type) the meter must be zeroed with the leads held together prior to any testing being conducted. With manually selectable ohmmeters always start on the low ohms scale and work up through the ranges if the resistance of the circuit/component is unknown. Ensure you do not have fingers on both probes when taking measurements for resistance - you may actually measure the resistance of your body.

Summary of meters

A voltmeter is connected in parallel with the circuit.

Normally it is used in two ways – check for voltage at a point in the circuit with respect to earth and to check for voltage drops across parts of the circuit.

An ammeter is connected in

series with the circuit. Low current flow circuits are tested with this method, but higher current flow circuits (above the rating of the meter) will require a current clamp to be interfaced with the meter.

An ohmmeter has its own internal power supply and when testing

the component must be taken out of circuit. Never test electronic circuits with an ohmmeter unless specifically requested to do so.

Ensure analog ohmmeters are zeroed prior to use and lead resistance is taken into account when using digital ohmmeters.

VASA SERVICES



See Automotove Training Solutions chief trainer Grant Hand 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.

Members web access

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

1. On the front page of the site, there are two links, one in the top navigation bar and the other on the left hand navigation links. Click on one of the links.



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.

If that doesn't work, please check your membership number and suburb and try again. Accuracy is essential. *After five password attempts the site will lock you out, and you will need to wait 10 minutes before trying again.*



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.



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.

New Code of Service for your workshop

Customer Code of Service

- The customer will be treated with respect.
- Dealing with the customer will reflect a high quality of service and a professional image of a knowledgeable network of technicians.
- Every vehicle will be diagnosed and repaired in full consultation with the customer.
- The aim is to get the vehicle safely back on the road as soon as possible, regardless of any identifying issues or challenges relating to further repair, warranty disputes or incorrect diagnosis.
- Warranty is not the customer's problem - such issues will be resolved amicably and professionally between the Service Centre and its suppliers, without compromising the customer in any way.
- Following the preliminary inspection by the technician, the customer will be given an estimate of the cost of the necessary repair, an outline of the work and parts required. Replacement parts, with costs if available, will be listed separately to the service charges.
- The customer will be advised, preferably in writing, whether the estimate is subject to further diagnostic work, or whether the quotation is final.
- Where a complex diagnosis is required, the customer will be advised of any charges for diagnostic tests and a written report.
- If additional repairs are found to be necessary, the cost of which would exceed the amount quoted or estimated, the customer will be contacted to explain what is required and to seek authorisation for any additional costs before any further work proceeds.
- Full details of all work carried out will be listed on an invoice along with the corresponding charges for labour, spare parts and materials.
- All parts replaced will be available for inspection by the customer, where practicable, and an explanation of why the parts have failed will be offered.
- Services or repairs will be guaranteed against any failure due to defective recommended parts or faulty workmanship.
- Any dispute between the Service Centre and the customer will be resolved quickly and amicably.

www.vasa.org.au

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 technological requirements of repair modern vehicles.
- Members are responsible for upholding the professional integrity and ethics of the VASA network and the automotive industry, and will avoid any conduct 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 strict quality control as well as environmental resources and Codes of Practice and will promote the use of approved and recommended parts, equipment and consumables of original and replacement.
- Members will endeavour to educate the public on the long-term value of using approved replacement parts. Where a customer decides on a lower quality part option, the Service Centre will state on the final invoice that non-recommended parts have been supplied 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 employees by observing all laws and collective and individual employment contracts or agreements, and by providing technical training, 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 supervision of all safety standards and work practices.
- Members reserve the right to refuse to undertake any repair that is beyond the Service Centre's equipment capacity or staff expertise. This right also extends to any situation where the customer insists on a repair that is not recommended by the manufacturer, or any other component, or systems at risk of failure. The member will fully 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 relevant brochures or advisory parts to promote a better understanding of the need for scheduled maintenance.
- Members will take responsibility for their own workshop practices and be prepared to guarantee that their practices, tools and parts of equipment they fit in any repair will provide trouble-free operation when used in accordance with manufacturer's specifications.
- Members will adhere 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 will strengthen the network through sharing of technical information and skills and offering assistance to fellow members in need.
- 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

www.vasa.org.au

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

The VASA mission through honesty, professional integrity and dedication of superior technical knowledge is to provide every customer with an exemplary experience while maintaining their loyalty to the VASA brand.

The VASA objective is to offer the most complete professional network of technicians and Service Centres associated to industry best practice. Through the excellence of the VASA network through continuing education and training of staff, we at www.vasa.org.au have the pleasure to serve.

The VASA website has been revamped with new ways to find members as well as new features including a member competition to win an iPad.

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

Annual reports and minutes



VASA is proud to be affiliated with MACS Worldwide

The VASA Code of Service, circulated to all members during April and May, is a valuable marketing tool for workshops.

The codes, one covering the treatment of the customer, and the other covering workshop staff ethics can be displayed individually, or as a set.

VASA recommends that members frame the codes and display them prominently in their customer waiting areas.

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.

RTP

The RTP (Registered Technicians' Program) was a bit hit when first written by VASA, and is still considered the bible of air conditioning practice.

Members are encouraged to use this valuable resource for staff refresher courses, and for ready reference on a range of air conditioning issues.

The entire set of RTP bulletins can be found in the members' area of the VASA website www.vasa.org.au

Hot Air is reprinting the RTP in its entirety and in a new, dressed-up format.

So far, we have covered the whole of Electrical Volume 1, Bulletin 1.

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

In the next issue we move on to Electrical Bulletin 3, covering radiator and condenser fan speed control.