Issue 6 Volume 3

Hot Air

Newsletter of the Vehicle Air-conditioning Specialists of Australia

July Edition – 1997

National Secretariat: VASA (ACN 063 969 782) PO Box 6222 Silverwater NSW 2128

The Issues will be HOT at Hot Hot Hot! 97 on the Gold Coast

Convention fever is at a Hot Hot Hot pitch, on the eve of what is shaping up as the best VASA get-together yet.

The organising committee has been building on the success of last year's event in Sydney, and promise a rollicking good time, spiced with a goodly share of healthy discussion about current industry issues, a top class trade exhibition and international keynote speakers.

About 100 delegates are expected at the Hot Hot Hot Convention, with almost 200 lining up for the annual dinner.

The business side of the Convention is likely to be dominated by some of the technical issues associated with the transition from R12 to 134a.

The VASA technical committee will produce a national flushing procedure at the convention, which will cover all facets of the problem, with input from all sections of the industry. The committee intend to circulate their paper for comment and feedback from delegates.

This will be supported by training sessions on the subject of flushing. Saturday afternoon has been split into two high powered sessions on flushing, to be conducted by VASA chief trainer Grant Hand.

VASA's progress in the big insurance debate will undoubtedly be on the agenda. Following last year's milestone conference with the insurance leaders, VASA was approached by all major companies for advice on the problems of retrofitting.

VASA has been asked to adopt a national approach to the question.

Based on the recent New South Wales experience, VASA has learnt that the issue of insurance is important and sensitive. It is pleasing to see that VASA's New South Wales committee has opted to appoint a specialist team to look at insurance.

It is likely that VASA will use this as a model for a national approach to insurance negotiations.

VASA is proudly affiliated with:-

IMACA
International Mobile Air Conditioning Association

Affiliate Member of MACS

At Convention, this initiative will be proposed.

The Convention guest list is inspirational, with international guest speaker Frank Allison from USA leading the charge.

The Hot Hot Hot Convention Team

NB: Team member David Chenoweth was too busy gathering sponsorships to be photographed.

Chairman
Steve Whitelock

Geoff Merrett

Secretary
Sarah Gallagher

(From Page 1)

Frank is executive director of IMACA, with whom VASA holds international affiliation.

The International Mobile Air Conditioning Association is based in Fort Worth, Texas and since formation in 1958 has served the automotive air conditioning industry and the motoring public by establishing standards for components, procedures and customer service.

Frank will bring to Convention a fascinating overview of the latest in the States with regard to new refrigerants and the retrofit industry.

Alternative refrigerants is the subject on everyone's mind. VASA is fortunate in being able to attract an expert panel for a update on refrigerants and the alternatives. The panel will be led by VASA's Grant Hand and Mark Padwick and will comprise John Bresnahan from ICI, Carl Heslop from Elf AtoChem and Tom Drummond of Dupont.

The Late Hots!

It's never to late to get the hots for Hot Hot Hot Convention 97.

So if you've had a change of heart and decided to keep up with your industry in the best possible talk-fest and trade exhibition, fill in your registration form and rush it back NOW.

Registrations officially closed back in April, but VASA will close one eye and let the latecomers in.

Accommodation is still available at The Royal Pines Resort and the Gold Coast also offers an exciting array of attractions and theme parks so get your fingers and faxes working NOW!!!

RAH...RAH....RAH....FOR THE SPONSORS

At the time of going to press VASA has received sponsorship from the following companies towards the Hot Hot Hot! 97 Convention.

VASA values this sponsorship and support.....without it, the costs would have to be passed on to the members.

Keeps Carparts
SuperCool Pty Ltd
Ingrams
Cooltemp Pty Ltd
Melbourne Auto Air
Autofrost
Summercool
Air On Wheels
AKTF
Nanbri Auto Air
Unicla Australia
Car Air Systems Qld
Sanden Australia

The Convention Committees over the years have prided themselves on the fact that registration fees are kept to the bare minimum to encourage member participation.

So how about a pat on the collective heads of the sponsors and support them wherever you can.

Nominate a Pioneer

VASA will make its second Pioneer Award at Hot Hot Hot! 97 at the Royal Pines on the Gold Coast.

The Award was inaugurated last year to recognise those who have contributed over the years to standards and growth of the industry. The first "pioneer" was Jim Russell, the Kit King, founder of A.K.T.F. Pty Ltd.

As President Mark Mitchell explains, "The award stems from a feeling that there is a lack of heritage in today's air conditioning industry."

"We don't need to dwell on the past, but we certainly need to learn from it," said Mark.

The Award is intended for those who have made a significant contribution to the auto air conditioning industry - and commercial success is not necessarily a factor.

Nominations close on July 20 1997.

Here's what you do:-

1 **On your letterheads – write or type "PIONEER AWARD" at the top and then clearly write or type the name of your nomination, together with the person's address and phone number.**

2 **Add a brief description of your nominated person's background in the industry, together with a brief outline of why you feel the person should be recognised as a pioneer.**

3 **Sign the letterhead and fax it to VASA Secretary/Treasurer John Blanchard at 03 98900061**

Hot Hot Hot!

Support the Exhibitors ...and bring your friends

At the time of going to press, the following exhibitors had confirmed their display stands at the Hot Hot Hot 97 Convention at Royal Pines on the Gold Coast.

This is Australia's leading expo for the mobile air conditioning industry and this year it will be open to all comers.

Non-members of VASA in the mobile air conditioning trade will be welcome at the Trade Expo sessions on Friday, July 25 from 10.30am to 5.30pm and on Saturday, July 26 from 2pm to 6pm.

VASA congratulates these exhibitors and asks all delegates to patronise the displays as often as they can during convention.

Cooltemp Pty Ltd	**A/C systems**
Car Air Systems (Qld)	**A/C systems and component parts**
Palm Air	
Car Air Systems (Qld)	**A/C systems**
Javac	**A/C service equipment**
K D Binnie	**A/C services and manufacturer**
Unicla	**A/C systems, component parts and compressors**
TRX Auto	**Mount and drive kits**
Car Aire (SA)	**A/C systems, component parts and equipment**
Ingram Australia	**Component parts**
VASA Heritage Booth	**Industry nostalgia**
Melbourne Auto Air	**Component parts and equipment**
Tridon Australia	**Robinair equipment**
Keeps Car Parts	**Component parts, A/C systems and equipment**
Sanden International	**Compressors**
Imperial Eastman	**Service equipment**
Kysor (Melbourne Auto Air)	**Off road equipment**
R & H Wholesale	**Service equipment**
Nippon Air	**Exchange compressors**
Frozen Air	**A/C systems**
Johnson Products	**Receiver driers**
Davies Craig	**Fans**

Back to the Future?????

Feature speaker at Hot Hot Hot! will be Professor Maurice Lupino, who will take a gloves off approach to business practice as he explores the value of customer service in the automotive business.

In what promises to be an entertaining, if not enlightening address, the Prof. will talk about Management practice towards the year 2000 and he intends asking the question "are we going back to the future? We shall see.....

THREE NEW STANDARDS FROM IMACA

Three new standards which will be adopted by most of the mobile air conditioning industry across America have been made available to VASA by IMACA (International Mobile Air Conditioning Association).

The standards are:-

No 305 Fittings and tubing details
No 320 Fittings, hose and assemblies
No 200 Vehicle Air conditioner Capacity (Btu) or (Watts) Certification

In addition, IMACA has made available a fact sheet entitled "Just the Facts for MVAC's: EPA Regulatory Requirements for Servicing of Motor Vehicle Air Conditioners".

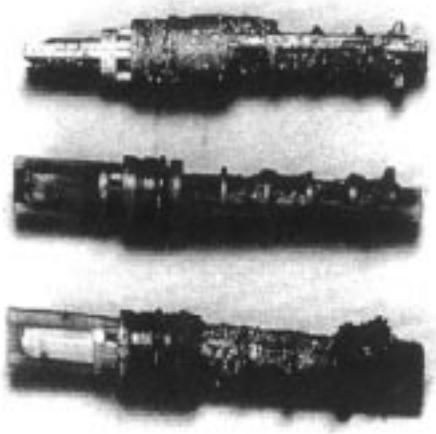
This fact sheet was developed by the US Environmental Protection Agency. Although the regulations will not pertain to Australia, executive director Frank Allison thought members might find the information useful since it describes the current status and use restrictions for R-12, R-134a and blend refrigerants in the US.

The Standards and Fact Sheet are available to members through the Technical Committee. They will be of particular interest to those members who are manufacturing and assembling hose fittings and those designing evaporators or measuring air conditioner capacities.

Phone numbers for Technical Committee contact are on the back page of Hot Air.

Look at the Orifice Tube when you retrofit

With all the hype about absolute-minimum retrofits – just pulling out the CFC-12, going to deep vacuum, then recharging with HFC-134a and synthetic oil (or doing even less), why not take this important extra step so long as you have the system de-gassed: *why not inspect the orifice tube.*



Inspecting the orifice tube on OT systems can provide an important warning before you retrofit. The severe sludging, metal wear particles and, in the top OT some desiccant particles, can alert you to the danger of a bare-bones retrofit.

If a system has been leaking refrigerant, you should be tracing and repairing the leak anyway. What's more (as the rest of us keep observing), you often have no idea of what service was done before, and therefore really don't know what kind of O-rings are in the lines. If it's a Ford system, for example, you certainly would be doing the customer a favour if you install the latest service O-ring's. HFC-134a has smaller molecules and operates at higher peak pressures, so you want the best sealing possible. No O-ring or gasket seal is perfect, so why not go with the best you can when retrofitting what had been a leaking CFC-12 system.

Taking an extra few minutes to inspect the orifice tube could save you a real headache. You might find a really loaded orifice tube filter, perhaps even with granules from a split desiccant bag. If you see a lot of debris on the OT filter, you certainly should warn the customer that the compressor is on its way out – in fact, you can show him or her some good evidence. If the intent is to keep the car, you'll surely want to replace an accumulator at least, if there's some sign of a break in the desiccant bag. And you definitely don't want to warrant the job if the compressor is marginal.

Sure the quick-lube guys aren't going to warrant anything but the limited service they perform. And a motorist is unlikely to expect any more than that from these guys, just as he wouldn't expect them to warrant an engine after an oil and filter change (unless they left a drain plug loose, for example, and the oil leaked out). You're a specialist, they know they'll spend more with you, but they expect more too.

MACS MARKET SURVEY

VASA has received a copy of the latest Service Data Book from MACS which contains a fascinating insight into the profile of the general automotive air conditioning industry, gained from industry field survey.

It was the fourth such survey conducted by MACS since 1990.

Some interesting outcomes from the vehicle ownership profile particularly, which found that owners are keeping their cars longer than they used to.

Also, the intervals between air conditioning services has widened, indicating that service quality has improved, thereby reducing frequent come-backs.

Any VASA member who would like a copy or excerpts from this rather detailed survey should contact Mark Padwick, Technical Committee Chairman (See Page 12 for contact numbers).

Make up your own mind...

VASA has been an active participant in the debate on refrigerant gases, blends, hydrocarbons and alternatives.

President Mark Mitchell says that while VASA has always supported the ideal of a mono refrigerant industry, it recognises that alternatives are flooding the market regardless.

"We have always tried to keep an open mind on the subject and we have gone out of our way to collect viewpoints from all sections of the industry, from manufacturers of vehicles to equipment makers, wholesalers and those who work daily in the repair and installation industries.

"In so doing, VASA has collected a mountain of information and all of it has been carefully checked by the technical committee.

"You don't need to be too bright to get one overpowering message from all of the material which we have provided - why complicate the issue of gases," said Mark.

"This issue of Hot Air contains yet more information from the four corners of the globe. These articles, plus the in depth report from MACS which follows, should be carefully read by the industry.....and at the end of the day, YOU draw your own conclusion," he added.

Affiliate Member of

MACS
MOBILE AIR CONDITIONING SOCIETY
WORLDWIDE

A Special World Report

The Use of Hydrocarbon Refrigerant in Mobile A/C Systems

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The continued discussion regarding alternative refrigerants for mobile A/C systems raises the question of installing a flammable hydrocarbon (HC) refrigerant.

There is no argument that hydrocarbon refrigerants will provide cooling. The question which this industry needs to address is: Can hydrocarbons safely be used in millions of vehicles?

From a safety perspective, the design of the A/C system and handling of HCs during service must be the foremost concern.

If and when the mobile A/C industry considers the use of a flammable refrigerant, significant system design changes must be addressed. These changes to a vehicle A/C system will most likely require additional space and weight, resulting in reduced vehicle fuel economy, and increased system costs.

These HC systems will also require a secondary cooling loop to eliminate the possible release of a flammable substance into the air distribution system. The use of a secondary cooling loop would also slow the A/C system cool down rate during high demand.

Potential Leak Sources

Current mobile A/C systems have several areas that are sources for potential leaks.

As the fourth highest leak source, the evaporator could allow the flammable refrigerant to directly enter the passenger compartment by way of the air distribution ducts.

The flexible elastomer hoses in the engine compartment are historically the highest leak source of the mobile A/C system and are surrounded by many ignition sources.

By comparison, automotive fuel systems containing a flammable substance use small diameter stainless steel lines for safety reasons.

Another high leak source of an A/C system is the compressor drive shaft seal which can pose an additional engine compartment leakage risk.

Ignition Sources and Concerns

Many electrical devices in a vehicle can be a source of ignition. Consider for a moment just the potential A/C system in the ventilated blower motor and the compressor clutch snap switch, sometimes located inside the evaporator case.

The safe handling of flammable refrigerants is paramount. This includes technician training. Potentially more than one million people in the US attempt to service mobile A/C systems, making universal training in this important area almost impossible. There are currently more than 850,000 service technicians certified under the US federal 609 requirements, and an unknown number of DIYs that enter the refrigerant circuit of mobile A/C systems.

In November 1993 Gerald A. Esper of the American Automobile Manufacturers Association wrote a letter to the US EPA indicating that flammable refrigerants should not be used in existing mobile A/C systems.

CALOR Gas (UK) CARE 30 Hydrocarbon Refrigerant

Various studies covering the use of HCs have been conducted. One of these, done in England by the Arthur D. Little Limited (October 1995) for Calor Gas, contained these conclusions:

▲Most leaks whether occurring "naturally" or following collision will occur in the engine compartment.

▲Engine compartment leaks, if ignited, will have negligible effects.

▲Releases into the passenger compartment may cause some minor injuries if they form flame jets; explosions would however blow out the windows rather than harm the occupants.

As observed during an industry meeting, if these risks are so limited, when will a report be issued that the Arthur D. Little authors personally experienced such a harmless explosion?

In April 1996 a representative of Calor Gas wrote,**"The purpose of this study was not to justify the use of H.Cs in existing mobile A/C systems. In fact you will not be able to find any instance where we have recommended their use in this way."**

By contrast, last July a police report indicated that two teenagers from the Michigan area received skin burns from sniffing a butane canister. The two were in a car sniffing butane when one lit a cigarette. After the fire, when they got into the shower and took their clothes off, large patches of skin began peeling off their bodies. Virtually all of the car's interior was gone, and melted plastic was splattered in the rear seats.

BOC Australia

BOC Gases of Australia is involved in the debate of using HCs in existing mobile A/C systems. They have stated: **"Our position in this matter is quite clear and we do not support the use of any alternatives other than R134a due to safety, operating and approval concerns."**

The Use of Hydrocarbon Refrigerant in Mobile A/C Systems

Arthur D. Little Reports

The Arthur D. Little reports generated in the US and UK do not address actual test programs but rely on information that may not represent the real world when a flammable refrigerant is used. These reports do not support or justify the use of HCs in existing mobile A/C systems. In addition the limited quasi risk assessment tests run on a vehicle AC system in Australia using hydro-carbons do not identify all the potential situations that can exist. Their selective video demonstra-tions do not simulate all the possible scenairos that can occur from A/C system leaks or service activities. However, these videos are shown to the general public indicating that HCs are safe to use in existing mobile A/C systems.

Over the years the auto industry has had exposure to engine fuel fires resulting in occupant injury and deaths. It is not acceptable to have any injury accident that can be prevented. The design integrity of a vehicle fuel system for containment of flammable fluids far exceeds the existing mobile A/C system designs. The product liability level is limitless when flammable refrigerants are used in existing mobile A/C systems.

Current Industry Information

The commercial refrigeration sector has established certain guidelines when flammable refrigerants are used, including design, safety and training requirements.

However, the proponents for the use of flammable refrigerant in current mobile A/C systems dismiss the importance of the existing commercial refrigerant industry safety guidelines.

System Design Requirements

We all have heard about the use of flammable refrigerants in Europe. These refrigerants are rigid pipe, sealed systems containing less than two ounces of a flammable coolant, and are by no means similar to an automotive A/C system.

If a flammable refrigerant leaks into a confined area and reaches a concentration level between 2% and 10% and an ignition source is present, an explosion may occur. As stated in one international report ***"Outside these limits there is no possibility of flammability".***

The average automobile could reach this explosion level if only four ounces of refrigerant leaked into the passenger compartment.*(See Figure)*

For safety, HC refrigerants have used an odour tracer to identify a leak. However, there are reports that the normally-used tracer – ethyl mercaptan – disappears during system operation, possibly being absorbed by the lubricant and the desiccant.

To prevent leaks, all commercial systems containing flammable refrigerant have soldered rigid pipes, and a sealed compressor. These requirements are not typical of current automotive systems.

Some system designs include "pump down" modes for storage of the refrigerant during the off operation.

US Requirements

In the US there are also many regulations that address the use of flammable refrigerants in the commercial refrigeration industry.

For example, one of these regulations is the New York City Fire Code that allows the use of butane, isobutane and propane as a refrigerant if it does not exceed 2.5 pounds for each 1,000 cubic feet of room volume which the system or any of its parts are installed. Additionally no flame-producing device or hot surface above 800 degrees F is permitted and all electrical equipment must conform to their hazardous location provisions.

Applying the city of New York requirements to an automotive A/C system flammable refrigerant charge to one half ounce.

Currently there are over 14 states having rules that prohibit the use of flammable refrigerant in mobile A/C systems. There are also some states that have existing laws affecting the sale, use, repair, recycling and disposal of hydrocarbon refrigerant.

In addition there are existing federal environmental health and safety requirements that may be applied to the use of hydrocarbon refrigerants in automotive applications.

Clean Air Act

The Clean Air Act establishes national ambient air quality standards, and requires states to develop implementation plans to meet these requirements. Smog, an air pollutant formed by atmospheric reactions between volatile organic compounds (VOCs) must be reduced in many metropolitan areas. Many hydrocarbons including propane and butane are considered as VOCs. If the EPA determines that venting during servicing and disposal of HC refrigerant from systems is a source

Type of Service	1993 MACS Survey		1995 MACS Survey	
Evac./Charge	45.1 oz.	1278 grams	43.7 oz.	1238 grams
Charge Only	22.8 oz.	646 grams	27.2 oz.	771 grams
"Top off"			18.6 oz.	
Avg. Amount Used	39.9 oz.	1131 grams	34.6 oz.	980 grams

Refrigerant Charge Amount Model Years 1980/1994
1oz=28.35g

Manufacturer	Low Amount		High Amount		Dual System	
General Motors	35 oz	992 grams	60 oz	1701 grams	72 oz	2041 grams
Chrysler	28 oz	794 grams	42 oz	1190 grams	65 oz	1842 grams
Ford	26 oz	737 grams	56 oz	1587 grams	72 oz	2041 grams
Toyota	24 oz	680 grams	35 oz	992 grams	45 oz	1275 grams
Nissan	21 oz	595 grams	36 oz	1020 grams	56 oz	1587 grams
Mercedes-Benz	26 oz	737 grams	56 oz	1587 grams	N/A	N/A

of VOC emissions, the individual states could impose new restrictions on such activities to meet their smog requirements.

OSHA

The Occupational Safety and Health Act (OSHA) may consider flammable refrigerants covered under OSHA as highly hazardous chemicals and subject them to the process safety management standard. This could also subject the handling and storage of propane, butane, and isobutane to OSHA's liquefied petroleum gases standard. Such OSHA requirements may impact the auto dealership and independent repair facilities.

DOT

Currently the Department of Transportation (DOT) hazardous materials act excludes the interstate shipment of flammable refrigerants in small cans. Shipment of larger quantities however, must comply with DOT requirements.

CPSA

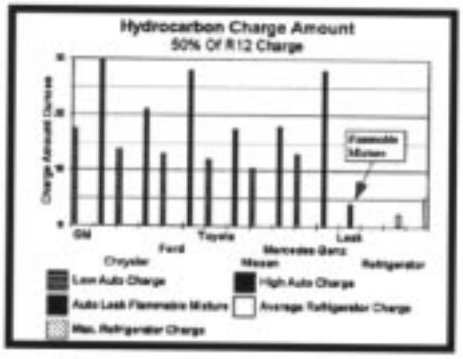
The Consumers' Product Safety Act (CPSA) does not currently have any requirements for the use of flammable refrigerants in mobile a/c systems. However, if the commission found that there was an unreasonable risk of injury they could regulate this consumers' product.

Federal Hazardous Act

FHSA is administered by the Consumer Product Safety Commission. It contains the authority to ban certain hazardous substances. Small cans of flammable refrigerants being sold and use by the general public to charge mobile a/c systems may be considered illegal under this statute.

National Building Codes

There are several national building codes that cover the storage of flammable substances in both commercial and residential buildings. The codes are identified as UBC, BOCA and SBCCI and the storage of as little of 15 pounds can result in a hazardous occupancy classification. It may also include compliance of fire prevention requirements. This may impact the



storage of flammable refrigerant in parts storage areas at automobile dealerships and repair facilities.

System Charge Amounts

Automotive a/c system refrigerant charge amounts are a direct result of the system's component volume. This amount will vary between manufacturers and within product lines.

Based on the recommendations of the suppliers of hydrocarbon refrigerant the replacement amount would be 50 percent of the original mobile a/c system charge. Comparing several manufacturers and product lines for the model years of 1980 to 1994 the replacement charges amounts would range from 11 to 36 ounces. This is far in excess of the 1 to 2 ounces allowed in household appliances.

Dual evaporator systems, optional on vans and trucks can require more than twice the charge of a passenger car system. This is due to the extra volume of the second evaporator and longer hose lengths increasing the HC charge amount to the 36 ounce range.

The MACS Field Surveys indicate the average amount of refrigerant used to charge CFC-12 a/c systems in 1993 was more than 40 ounces, and reduced to 35 ounces in 1995. Using the reduced HC charge amount the typical a/c system requirements is in the 18 oz range, not the 10 oz range indicated by the HC suppliers.

Training

Commercial refrigerant users of HCs indicate that training, from the manufacture of the product to the service technicians, is required to safely use this product. They all stress that the training requirements include proper handling for transportation and storage, system service and charging procedures, and effective leak detection.

A statement found in an international report stressed this point. *"It is important that the industry takes responsibility for the competence of its people – whatever refrigerant they are using. It is just that with hydrocarbons, the risk of misuse or mishandling are more obvious".*

The same report states: *"Hydrocarbon refrigerants are not the answer for all air conditioning and refrigeration applications. – The key issue is safety and it must not be ignored."*

These statements although pertaining to the household appliance industry are relevant to any sector considering the use of flammable refrigerants.

Field Experience

Existing mobile a/c systems that have used hydrocarbon refrigerant are experiencing compressor shaft seal and other component leakage problems. Alleged field problems have included refrigerant leaks resulting in engine compartment flash fires. Currently there is little data available regarding the material compatibility of HCs and automotive a/c system components. Potential material damage could result in possible refrigerant circuit leaks.

With the adverse publicity that could occur if a customer or service technician is harmed and potential litigation, the use of a flammable refrigerant may not be a wise choice.

There are many unanswered questions regarding the safe use of flammable refrigerant in existing mobile a/c systems. This encompasses everything from consumer safety to the lack of trained service personnel. Currently HC refrigerants are being sold across the country. Recently the sale of HCs and their use has been reported in Arkansas, Arizona, California, Florida, Illinois and North Carolina.

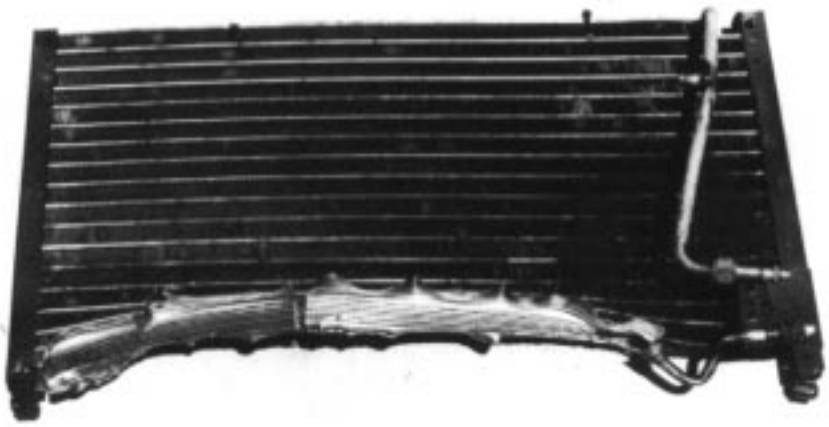
The use of flammable refrigerant in mobile a/c systems adds one more complication to already complex vehicle servicing requirements.

CAUTION – Air Conditioning systems can be dangerous!

REPRODUCED WITH PERMISSION FROM AIR-FORCE AUTOMOTIVE AIR CONDITIONING

Automotive Air Conditioning Bulletin AF97 - 1 – 28th February 1997

The purpose of this Bulletin is to alert technicians to the potential danger when checking or servicing an air conditioning system which is suspected of a serious malfunction, or which has been serviced by someone else and the refrigerant type and amount is unknown.



The photograh reproduced here is frightening. The condenser pictured literally exploded after the system was operated for only a few minutes. The person who had the misfortune to have his head under the bonnet when it happened may have incurred serious ear damage. He is lucky that it was the condensor which exploded and not a component such as a hose, pipe or receiver-drier in a position where there would have been no protection between the failed component and his face. He could have been maimed or blinded, or at the very least suffered severe freeze-burn.

From the condition of this condensor it seems that some service personnel not only have a questionable level of competence and little or no sense of responsibility, but may also be breaking the law.

The following points are worthy of note:

• The vehicle is a VN Commodore which is operated as a taxi. The model, system, and the fact that it is a taxi should have alerted the repairer to check pressures, condenser fin blockage, etc., very carefully.

•The condenser has a large oily patch near the fittings, indicating an obvious leak which should have been identified and repaired.

• We are informed that R12 was used and as it is illegal to charge an air conditioning system with R12 if there is a known leak, it would seem that the service technician may have broken the law.

• The finning is badly blocked with insects and dirt and the system should never have been charged without the condenser being cleaned regardless of any other problem.

• We understand that the high pressure cut-out switch was by-passed. If this is true, the repairer is apparently either ignorant of, or does not care about, the Federal Code of Practice, or what would be normal good practice in the servicing of an air conditioning system anyway, whether it was done by the technician at the time of service, or at some time beforehand is irrelevant, the system should not have been charged until a suitable high pressure cut-out device was correctly installed.

• High pressure cut-out switches, we believe, are imperative in any system, but they are of particular importance in an orifice tube system as there is no receiver-drier to take up the refrigerant if there is a blockage in the liquid line or orifice tube.

•We cannot be absolutely sure what caused the explosion, but it would seem very likely that the pressure required to cause such an explosion could have come from R12 alone. Even a combination of a high side blockage and the condenser tube being full of liquid would normally produce a fracture or split, not an explosion of this magnitude.

Some Observations

This example, and with continual reports of air conditioning systems being serviced by untrained, and in some cases downright incompetent and irresponsible, people who either lack the knowledge to service air conditioning in a manner that ensures the safety of others, or who simply do not care means technicians would be well advised to approach all systems with caution. The following suggestions may be useful:

• Wear safety glasses. In the case above, ear protection would have been more appropriate!

• Always check the pressure in a system before operating or testing it. Static vapour pressure will often give you an indication of what is in the system.

• Always identify the refrigerant – If you are unsure of it, or believe that you have an unknown substance or mixture, approach it with extreme caution; some gases and mixtures can reach very high pressures in a very short time of operation, the danger of mixtures and/or unknown refrigerants or other gases cannot be over-emphasized.

• The pressures which may be reached with some 'cocktails' and

. . . Continued from previous page

other unknown or untested gases, and/or residues of foreign substances such as flushes and solvents are unknown. Some of these mixtures may well be dangerous. Total removal of all substances other than the correct type and amount of refrigerant and lubricant is essential.

• One substance which is under very high pressure is dry nitrogen. If you use dry nitrogen for any reason, it is critical that it is only used with extreme care and with close attention to a proper pressure gauge designed for use with nitrogen. Nitrogen is a non-condensable in the context of refrigerants and it is important that all of it is removed before any other substance is put into the system, or the system is operated.

• Another dangerous practice which, although uncommon, is not unheard of, is the use of other gases such as oxygen to 'blow out' a component. Oxygen can form an explosive or flammable mixture with some lubricants and chemicals. In some concentrations and/or mixtures it is explosive. The velocity of detonation of oxygen is in the region of 6000-8000 metres per second.

• It is a common misconception that a hose or fitting will blow out or leak before a metal component will fail. The minimum burst pressure specification of refrigerant hose is in the region of 11,700 to 13,800 kpa (1,700 to 2,000 psi), depending on the hose size. The actual burst pressure is usually much higher. Some metal components can (and do) distort or fracture at this sort of pressure, especially when such factors as age, damage, metal fatigue, and corrosion are taken into account.

Technical Tip

Some VN Commodores have a switch port (1/4" male flare access) near the firewall as well as on the discharge condenser pipe as shown in the photograph. Where this is fitted, it is good practice to check the high pressure gauge reading at both points. This will give some indication of any problem or blockage in the condenser or orifice tube. Remember that some drop in pressure between the compressor discharge and the liquid line is normal and this should be taken into account.

This is not the only example of dangerous pressure levels we have seen. Among others, we had a steel receiver-drier given to us on a previous occasion which had expanded and become oval shaped, we are advised by the manufacturer that the pressure required to do this is estimated at something in excess of 13,800 kpa (2,000 psi)! We have been informed of 'retrofitted' systems with high side pressures too high to read on a standard manifold gauge.

We have long advocated that only the recommended type and amount of refrigerant be used, and that the servicing should only be done by qualified, experienced technicians, particularly since the introduction of alternative refrigerants.

The reason for the kind of pressure which caused the explosion of this condenser is unknown, but it is timely to caution technicians about the use of any refrigerant, lubricant, flushing solvent, or any other gas or substance not specifically recommended by the manufacturer or distributor of the system or component.

S. Crossley
National Manager
Automotive Air Conditioning Division

Note: *This Bulletin forms part of, and should be read in conjunction with, the current Air-Force (TM) Automotive Air Conditioning Catalogue.*

EXTRA!!! The Times EXTRA!!!

Hot News

News Item from BOC

BOC Gases has launched a national OzoneCare package to help the auto industry provide customers with easy, industry standard air conditioning conversions.

The package has been designed specifically to meet the needs of customers requiring conversions from their current R12 system to the new R134a, which incidentally is the industry recommended choice for refrigerant gas for any new system and for retrofitting.

Any individual or company would be ill-advised to consider the use of alternative refrigerants without prior approval from the OEM manufacturer.

VASA's technical committee has advised operators would be extremely wise to stay within worldwide standards when looking at alternatives.

The BOC Gases' OzoneCare package includes flushing equipment, lubricants and R134a gas, plus a comprehensive training manual and video and a series of seminars in each capital city.

For further information, call Dirk Beven, BOC Gases sales manager, refrigertion on 03 9287 8494.

EXTRA!!! The Times EXTRA!!!

The Hot News page is for members to introduce new products and new ideas.

Contributions to The Editors
Fax: 07 5526 3404 or email:
newtons@OntheNet.com.au

The following article, reprinted with the kind permission of Automotive Airconditioning Reporter of Holland, is required reading for our industry. It is an insight into the work of one of the world's largest vehicle air conditioning manufacturers, the Behr company of Germany. The article describes their efforts in refining 134a, their work with the CO2 technology and their recently announced decision to abandon further R & D on the use of hydrocarbons for car air conditioners.

"On May 14th Behr held a technical press information day. The members of the automotive press were informed on Behr's technical air conditioning developments and plans. This year's meeting was dominated by the refrigerant issue and its consequence on the automotive air conditioning unit. Because of R134a's contribution to the greenhouse potential (through leakages because of damage, hose permeation and venting) the industry is searching for alternatives. Will the future - as Behr believes - lead us to CO2, hydrocarbons (propane, isobutane) or will the industry simply stick to R134a? Behr's perception became clearer on May 14th.

Research hydrocarbon automotive air conditioning unit on hold

In recent years, Behr has been intensively involved in researching the isobutane/propane unit. According to Behr a propane/isobutane unit would be well possible because of its physical cooling capacities. Evaporator, condenser and compressor could practically be built in the same way as for R134a. Extra safety features will be necessary because of the inflammable character of propane/isobutane when mixed with air. The risk of refrigerant leaking into the car interior should be minimised as much as possible.

Behr thinks a hydrocarbon unit will need (1) an evaporator with minimal refrigerant volume, (2) refrigerant sensors near the evaporator and (3) two valves, one before and one after the evaporator. In case of any damage to the interior part of the unit, with release of refrigerant, the sensors will immediately shut the valves to avoid more leaking. Simultaneously the side windows will open. Behr also determined that, in order to have sufficient cooling performance, the minimum refrigerant volume of the evaporator should be 40 grams.

The Automotive Airconditioning Reporter is a an international specialist magazine with a global point of view.

Ron Henselmans runs the magazine as a private venture and is anxious to expand readership in Australia. It is already read in 45 countries.

Coming issues will feature more articles on new developments in the industry and details on progress in CO2 units. The August issue will carry an exclusive report on a new generation of air conditioning units by a major German car builder. The concept is to be introduced soon. Ron's magazine was the only magazine selected to publish the details prior to market introduction.

VASA members who would like to subscribe to Automotive Airconditioning Reporter are encourage to do so (VASA itself is taking out a subscription) by making contact with Ron Henselmans at PO Box 612-5400 AP Uden Holland. His fax is +31-413-255406.

Ron has also kindly sent best wishes for a successful Convention and has given his permission to reprint in Hot Air the article on the Behr developments.

On the basis of this hypothetical construction, Behr did experiments to investigate the consequences of the ignition of a hydrocarbon-air mix inside the vehicle interior. Various volumes of this mixture were exposed to a source of ignition. It turned out that 15 grams were enough to ignite the mixture and start a fire in the dashboard. During some tests body parts even got deformed.

As a result of the outcome of the tests and the fixed minimum refrigerant volume of 40 grams per evaporator, Behr officially decided to stop all further research and engineering. Safety aspects and acceptable cooling performance seem impossible to combine in a satisfying manner.

Further development CO2 units

For CO2 the present development status and further outlooks are encouraging.

As a refrigerant CO2 performs less efficiently than R134a. According to Behr the difference is around 40% without any unit adaptations. A CO2 unit operates on pressure levels of between 100 and 150 bar (1470-2200 psi).

In order to withstand these pressures some essential parts of the unit will have to be redesigned. In a project in which Behr cooperates with various car and air conditioning component manufactures (Mercedes, BMW, Volvo and others) substantial progress has been made during the last year.

A CO2 compressor has been developed now. Based on the results so far, Behr estimates that the difference in efficiency will not exceed 10%. Components such as heat exchangers and tubing will have to be enlarged for that purpose. O-rings, various other seals and the system lubricant will have to be produced on another basis.

Also the unit will need new compo-

nents. An additional heat exchanger will be needed to assist the gas cooler (fulfils the function of condenser in a CO2 unit) to cool down the refrigerant sufficiently. The unit will also need an electronic control unit. The capacity of both compressor and expansion valve will be adjustable. Behr says there is potential for further improvement. At the moment much attention is paid to sealing of the unit and the lubricant to be used.

Time perspective

Despite the progress made, it is obvious that the industry is far from the first CO2 units. It still remains to be seen if they will ever be produced at all. During Behr's press day it became clear that the size of Behr's effort to further optimise the R134a unit is at least comparable to the CO2 engineering work. Behr does not only confine to R134a technical improvements but also focuses on improving the ergonomics in operating a/c units. Operating the a/c unit in an incorrect manner leads to inefficient use and may cause waste of energy because of useless fuel consumption.

Improving the ergonomical aspects of the a/c unit

By ergonomics Behr means the measure of safety, efficiency, comfort and user friendliness of a certain product. Recently Behr conducted a test in which 276 test persons were asked to operate the a/c system of 12 car models The test was conducted by suggesting situations as: "hot vehicle, 90 degree F ambient temperature, clear skies" , or "fogged windows". The test persons had to react by operating/adjusting the a/c system. The test results confirmed Behr's suspicion.

In 54% of all cases the a/c unit was not operated correctly in order to cope with the suggested circumstances. Also, substantial differences were noted between the several vehicles; eg. the fault rate in simply switching on the a/c unit varied from 34% to 85%.

Behr says that in most cases incorrect styling is the cause of the mistakes made. For this reason, Behr decided to spend extra attention to the ergonomical demands of an automotive a/c unit. Behr thinks that in real circumstances the stressful aspects of driving a vehicle will cause the measure of incorrect operation to be even higher.

Behr now plans to style the different controls in such a unique way that they can be recognised by touch only. Clear visual identity, clear arrangement and simple handling are other important aspects. Each separate function will thus have its unique shape and look. Behr's assumption is that during driving it is not always possible to actually look at the switches before activating them. The design of the switches must further be based on common sense. The switch to raise temperature should thus have a convex upper side, the one to lower temperature a hollow upper side.

Presently Behr is studying the concept for a new type of ATC control panel. It carries all features of a simple manual a/c unit without saving on the options of a more sophisticated system.

The panel consists of two controlling levels. On the primary level only the main functions such as temperature, defrost and rear window heating can be operated. Every switch has its unique styling and can be identified by touch only. The secondary level, which can be reached by opening a slide drawer in the panel, offers more detailed functions.

Further refining of R134a units

Assuming that it may take another 7 - 8 years until the first CO2 units will see the daylight, Behr is actively involved in improving the present R134a systems.

Starting point was a reconsideration of the philosophy concerning the capacity needed for a new unit. For ages this has been and still is, based on the hottest possible circumstances. As the average driving circumstances differ from this, the capacity of the present a/c units supersedes the capacity needed to satisfy the average cooling demand. In reality, cooled air is therefore often reheated before it reaches the car interior. This is in fact an example of waste of energy (fuel). The activated a/c unit regardless of the measure of cooling required, always runs full power. Temperature can only be controlled by combining heater and a/c system.

Behr calculated that a car's a/c at 15000km a year, annual a/c use 460 hours and a certain average speed raises the annual fuel consumption by 93 litres. Depending on the car type's fuel consumption this means 5 to 8% extra. 68 litres are accounted for by the compressor, 12 litres because the car is approx. 16 kg heavier with an a/c unit and 13 litres because of energy consumption by blower and auxiliary fan. Behr says it should be able to reduce a/c's fuel consumption by about 24% on short term. To achieve this Behr plans to implement some far reaching changes in their units. Some of them will be integrated very soon.

- *Electronic controlling of the evaporator temperature*
- *Variable controllable blowers and fans*
- *Reduction of the unit's weight*
- *Condenser with part for subcooling*
- *Variable POA valve.*
- *Additional heat exchanger.*

Around 16 litres can be saved by using newly developed compressors which are externally controlled. The amount of refrigerant is determined by an electronic sensor which constantly measures the temperature at the evaporator.

Thus the capacity of the compressor is adapted to the cooling demand. There is no further need to operate the heating system to eventually achieve the desired temperature. Another 9 litres can be saved by using variable controllable fans and blowers. The weight of the average unit can be reduced by approx 3 kilos - reduction in fuel consumption, 2,3 litres per year.

Customers could also be taught to only operate their unit when the temperature is above 10 degrees C (50 degrees F). This could save another 10 litres.
The last three changes would account for another 6,8 litres per year. Behr says that on short term a saving of 22 litres can be realised.

Finally

It is interesting that Behr stops further efforts in developing hydrocarbon units and continues to work on CO2 units. Companies like Behr are in frequent contact with leading car manufacturers. The fact that Behr also substantially invests in further improving R134a units means that also in these circles no certainty exists on the outcome of the future refrigerant issue."

HOT DROPS

This issue of Hot Air contains a survey document, inserted by Refrigerant Reclaim Australia.

VASA urges all members to **FILL THE FORM IN** and send back to Refrigerant Reclaim as soon as you can.

General Manager Michael Bennett explained that the survey will tell RRA the direction it needs to take and the changes in procedures it needs to make to provide a much greater level of service to the industry.

He said the preliminary results of the survey would be available by the end of July.

Hot Air will not repeat what is already contained in the survey document, but suffice it to say that RRA has always worked very closely with VASA and anything that will help members will be supported to the hilt by the VASA directors.

So the message, loud and clear, is. This is a survey which is vital to the future of your industry. It is not a marketing survey, so how about a full and frank response from the entire membership.

VASA READY REFERENCE DIRECTORY

1997

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Training will save costly downtime

VASA's training program is entering another phase in Queensland, with courses running from early July through to mid-August.

Training convenors cover the mid to far north of the state and the south east corner.

In a recent mailout to members in Queensland, training coordinator David Pude said that with the release of several alternative refrigerants, the need for advanced refrigeration diagnostics was of paramount importance. He said the industry was already experiencing difficulties in diagnosing and servicing systems with alternative, contaminated and fractionated refrigerants inside them.

He urged those companies which had not had personnel undertake Course 2 (advanced system diagnostics/retrofitting) to give it serious consideration.

The down time associated with ineffective diagnostic techniques can be considerable.

President Mark Mitchell said training was becoming vital to the auto air conditioning work environment. He thanked David Pude and Karen Porter at Summercool for pulling together the southern training programs, and also John Taylor of John Taylor Auto Air in Mackay for convening the central to northern Queensland training programs.

Members wishing to make contact should call John Taylor at 079 531135 or Karen Porter at 07 3369 3133.