

CENTRESTAND

...received in the last issue of Centrestand...
...thought wanted further discussion...
...desperately needs...

General - Sep 27, Nov 11, Dec 13
Toy Run - Oct 18, Nov 15, Dec 13

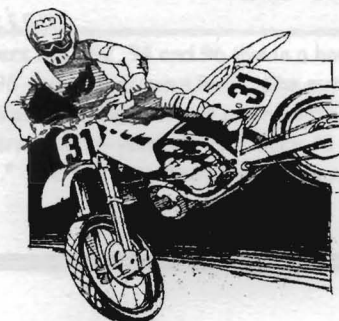
JUNE 2004

MRA...
TOY RUN...



let those who ride decide

The journal of the Motorcycle Riders' Association of SA Inc. Printpost approved No. PP:530028/00014



M.R.A.
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ASSOCIATION (SA) INC.

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MRA (SA) : GPO Box 1895
Adelaide SA 5001

Telephone : 08 8262 2150

Fax : 08 8262 2151

E-mail: mrasa@mrasa.asn.au

Web Site: http://www.mrasa.asn.au

Public Officer : Peter Mount

All advertising enquiries to the above address.

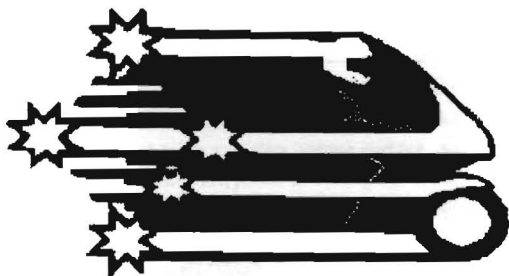
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**COVER PHOTO: Main tent, Great Escape Rally,
May 14 - 16**

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EDITORIAL

There was a fairly lengthy report on the May speed seminar in the last issue of *Centrestand*, but we have received no comments on any points that members may have thought warranted further discussion.

Is speed, in motorcyclists' minds, not the controversial issue that many others in the community perceive it to be? Should the MRA be more demonstrably supportive of programs and campaigns that focus exclusively on speed? Are riders satisfied with current enforcement methodology and protocols? Do members want the MRA to be an active, critical assessor of trends and developments in this field, particularly as these trends and developments apply to training, cognitive capabilities, road infrastructure, and technology such as intelligent transport systems (ITS)?

Should the MRA be an active or passive advocate for motorcyclists? That is, should we initiate action on issues that we collectively consider necessary or appropriate in the interests of motorcyclists' safety and rights, or should we be reactive to situations that others create which we deem in our interests to pursue? Or should we merely report on issues which are occurring or proposed locally, nationally and globally?

While the MRA Committee members are, themselves, motorcyclists of considerable experience and knowledge, and therefore eminently capable of reflecting the views and best interests of the wider motorcycling community, the effectiveness of this structure is ultimately dependent upon feedback, comment, observation, liaison and discourse.

So communicate with the Committee. Write to the MRA. Email the MRA. Ensure the MRA's progress and representation. Safeguard your own future.

Ride on, read on, and write.

Peter Mount

*we don't see things as they are, we
see them as we are*

Anais Nin

BENCH VISE

By Sean McPherson

I have a cartoon which I got during my apprenticeship which is stuck on the fridge. It shows a rather bedraggled creature with the comment "STRESS" - the confusion created when one's mind overrides the desire to choke the living daylight out of someone that desperately needs it!

Well it's been one of those years. Around the rally some nutter was causing all sorts of problems. Whether they were well-meaning or not, it was still a major concern.

Things have been a little slow due to the wet weather. Still, some good things have arisen lately. Firstly, the annual AMC conference went off very well. Soon all motorcycle lobby groups will be united and we can start expecting the government to take more notice of us.

The MRA hasn't been idle either. We've been keeping an eye on the Adelaide Hills Community Road Safety Group with their motorcycle strategy. A glossy brochure has been printed (*by SAPOL to promote Operation Safe Hills, which applies to all vehicles - see report p.8...Ed*) which looks pretty but I won't pick it to pieces as it would take up most of Centrestand.

A few members of the MRA committee have been interviewed in the media regarding the Swann Insurance report that most car drivers cause collisions, but beware, this is only tabled from comprehensive insurance claims. I know some motorcyclists are not angels, but it pays to treat all other road users as though they are trying to kill you.

I can't go much further without thanking all those people who helped me when the jungle-jeep broke down. Not having a back-up vehicle this time was a pain, but it has been fixed and now I must get to work on the bike (one of these days it would be nice to RIDE to a rally!).

Don't forget the Annual General Meeting in September. Let's see your faces and hear what you've got to say. It won't be long before the good riding weather is here so take care.

I'm going to leave you folks now with one of my favourite comments from literature: "Just keep banging the rocks together".

Three sisters aged 92, 94 and 96 live in a house together. One night the 96-year-old draws a bath. She puts her foot in and pauses. "Was I getting in or out of the bath?" she yells to the other sisters. The 94-year-old yells back, "I don't know. I'll come up and see." She starts up the stairs and pauses. "Was I going

MRA MATTERS

By Harald Lindemann

Meeting dates for the rest of the year:
 Committee – Sep 13, Oct 11, Nov 8
 General – Sep 27 AGM, Nov 29
 Toy Run – Oct 18, Nov 1, Nov 22, Dec 6, Dec 13

MRA Events

TOY RUN Sunday December 12
 BUSH PIG RALLY 18/19 September
 Rocks Poker Run – late August (see club notes)
 Five Ferries Run – late September (see club notes)

General Meetings

These have been poorly attended by members recently so we will be discussing this at the AGM ie What we could do about it? Is the venue suitable? etc.

Media News

The MRA has been approached for comments on topical motorcycle issues. The main story was regarding the Western QBE report that 70% of two vehicle crashes involving bikes and cars were primarily the car driver's fault. Les Dicker was interviewed by Leon Biner on 5AA, Harald Lindemann and Sean McPherson spoke to the Adelaide Advertiser and Harald was interviewed by ABC radio at Port Pirie.

Meetings Attended

Les and Sean attended a public road safety forum held at the Walkerville Town Hall on June 17 and Harald and Les represented the MRA at the June Meeting of the Motorcycle Task Force.

Toy Run Report

The Toy Run Committee is meeting regularly and the event is slowly coming together. We are looking for more sponsorship for the event so if you know of anyone interested then give them Paul Morgan's number. We will soon be calling for volunteers to help with the marshalling on the day, so if you want to be actively involved in the event, help out, still get to ride on the run and wear a bright red dayglo vest to set you apart from the non-helping bikers (as well as get free barby (*not the doll...Ed*) and softies on the day) then ring Paul to register your interest. Don't wait, call now.

up the stairs or down? She asks. The 92-year-old is sitting at the kitchen table having tea and listening to her sisters. She shakes her head and says, "I hope I never get that forgetful, knock on wood." Then she yells, "I'll come up and help both of you as soon as I see who's at the door."

FLASH NEWS

Wire Barriers to Motorcycle Safety

VicRoads is considering the installation of wire rope safety fence (WRSF) along the middle of some regional undivided roads to stop head-on crashes. At present, WRSF is only used (in Victoria) on roadsides and the median strips of divided highways.

However, the proposal is attracting strong opposition from motorcycle groups on the basis that it poses an additional hazard to riders' safety.

The proposal recommends that an extra lane be added to the road, with the WRSF allowing two lanes of traffic in one direction and one in the other, and its placement reversed every 2km or so to enable passing.

WRSF was introduced to Australia in the mid-90s and has been a contentious issue for motorcyclists ever since, with riders dubbing it "cheese grater". The Australian Motorcycle Council (AMC) and state rider groups such as MRA SA have been lobbying for a halt on its installation until research into its harmful effects on an impacting rider has been conducted. The research is now in progress, but so is installation of the barriers.

The AMC is also concerned that such placement would not allow the barrier to comply with erection criteria determined by Australian Standards (which the AMC was involved in developing).

WA Nonfeasance Non-event

In the wake of the Western Australian Government's recent public liability and negligence law reforms, the Local Government Association is arguing that the changes do not deal with their loss of immunity to nonfeasance.

Previously, councils in WA and other states could avoid responsibility for accidents through the "immunity" clause. However, successful individual and group claims by, for example, the Ulysses Club in NSW (wherein a number of motorcyclists came to grief due to poor road maintenance and inadequate signage), led to the loss of this immunity.

Nevertheless, the Civil Liability Amendment Bill provides a new defence for councils when their actions (or inaction) can be shown to be based on public policy, and allows them to claim proportionate liability for only damages for which they are considered liable.

Such an approach to councils' avoidance of responsibility may have national implications for motorcyclists' claims in the future.

AusRAP

AusRAP, the Australian Road Assessment Program, has recently been launched nationally by the Australian Automobile Association. The project, which will be implemented by the AAA's state and territory bodies, aims to colour-code all national highways, in stretches of at least 3 km, in accordance with risk and relative safety.

AusRAP is based on a similar project in Europe called EuroRAP, which is supported by 13 countries, and is claimed to have had a significant positive effect on road safety throughout the continent.

The risk and relative safety of individual sections are calculated by factoring in crash rate and severity, traffic volume and infrastructural components that might make the road safer to travel, such as sealed shoulders and adequate run-off area, or clear zones. This results in the road being allocated a colour of black, yellow, red or green in descending order of risk, and the publication of road maps with this colour-coding. People can then make an informed choice based on safety considerations regarding the routes they will take when travelling inter- and intrastate.

Due to the high cost and complexity of implementing AusRAP, the AAA has no plans at this stage to assess roads according to unique requirements of any specific road user group, such as motorcyclists. For example, if a barrier is deemed necessary at a site, no particular barrier system will be recommended. On the other hand, after the national road grid is completed, the AAA hopes to focus on lesser roads.

Road Safety Barrier Seminar

The Australasian College of Road Safety will host a seminar at Transport SA's Walkerville premises on August 26, 2004, to promote the imminent publication of the new Standards Australia (SAA) Road Safety Barrier Systems Manual.

This is a 300-odd-page interpretive document intended to be used alongside the 1999 Standard to assist road engineers determine which barrier system would be the most appropriate for a particular situation given the safety requirements of various road user groups.

References to motorcyclists' safety feature prominently throughout the manual and, although related directly to rider and bike interaction with barrier systems, are not limited to such interaction. For instance, the manual discusses the road surfaces, verge profiles and barriers' proximity to the carriageway that can lead to a rider coming to grief. This is information which cannot be included in the Standard.

The manual is the result of five years' collaborative effort by five members of the SAA Barriers Committee, one of whom is a motorcyclist.

Seminar speakers will be the principal author, Mr Dan Fardon, of the University of SA, and significant contributors Professor Raphael Grzebieta of Monash University, and Professor Rod Troutbeck of the Qld I University of Technology.

Bouncing Ideas: Rubber Crash Cushions

The Centre for Accident Research and Road Safety – Queensland (CARRS-Q) hosted the Road Safety Inventors Forum in May this year. An invention of potential interest to motorcyclists is a rubber crash cushion which is claimed to protect motorists from solid roadside hazards and returns to original form after impact.

The concept is not dissimilar to polystyrene crash attenuators for the posts of W-Beam barriers which were being researched by the Federation of European Motorcyclists Associations (FEMA) in the late 90s.

Truckie-Cams

A network of 12 Safe-T-Cam cameras has been placed in secret locations on poles and bridges along the major transport routes between SA and NSW to record speeds, times and distances travelled by truckies in an effort to ensure compliance with speed limits and compulsory rest stops.

With fatigue and speed being considered two of the primary causes of all vehicle crashes, particularly in the country, what are the odds that the success of this measure will be used to argue for camera control of all country travel, including that by private car and motorcycle?

More Techno Tricks in Tow

- Hidden flashless speed cameras.
- Laser guns that can not only simultaneously measure the speed of two vehicles, but also the distance between them. Police claim a third of all crashes are rear-end collisions, and that the new guns will assist them to catch tailgaters. (Some years ago, in O'Connell St North Adelaide, police chatted a woman for driving through an intersection when the lights were amber. After she drove away, the police followed her, and when the lights went amber at the next intersection, she applied her brakes with more than her usual fervour, and guess who drove into the back of her?)
- Wheelie-bin cameras. Actually, they are said to look more like fridges, but a fridge on the side of the road would be a dead giveaway, wouldn't it? Either

way, they are expected to help police reap an additional \$22.5 m in fines this financial year.

- Digital red light and speed cameras that require no film and take more pictures, thereby reducing operational costs.
- Optical character recognition computers which, like cameras, can be mounted alongside or above a road to instantaneously identify unregistered vehicles through correlation with the rego database. The information is then sent to a police officer up the road, and the culprit sprung.

50km/h Controversy

Confusion and controversy still reign over the introduction of the 50km/h default urban speed limit.

On the one hand, the state government claims road fatalities have been reduced by 68% since its introduction in March last year, while Adelaide University's Centre for Automotive Safety Research claims a 23% reduction.

On the other hand, the Opposition has called for a review of the 50km/h limit on arterial and connector roads, claiming it is nothing more than a "cash cow" which has provided the government with an additional \$2 m, a view which has been supported by the Motor Trade Association.

On the third hand, the police claim the reduction of more than 100,000 speeding infringements over the past year is primarily attributable to the 50km/h limit.

It's not entirely clear how revenue can increase while infringements decrease, but it could have something to do with who's telling the story.

ACC Scooter/Moped Bonus

Adelaide City Council is conducting a feasibility study of the Lord Mayor's proposal to exempt mopeds and scooters from parking tickets, and give them preferential treatment over cars and motorcycles in city parking bays.

The proposal is based on their increasing popularity in Adelaide, Brisbane, Perth Melbourne and Barcelona (where the Lord Mayor, Mr Harbison, first noticed them).

Given the increasing traffic congestion in the city, the vehicles' fuel efficiency, and motorcyclists' belief that more "bums on seats" will lead to greater awareness of motorcyclists by drivers, and hence an improvement in riders' safety, one might reasonably conclude that the council is on the right track.

However, Mr Harbison would be wise to discuss his proposal with the MRA in order to clarify certain points. For instance, how would a distinction be made between a scooter and a motorcycle? Given that some scooters are larger than some motorcycles, on what basis would he argue that scooters warrant preferential treatment over motorcycles? If one of his arguments is based on reducing congestion, on what grounds would he claim that motorcycles are adding to it?

Nevertheless, it's a promising start, and the MRA looks forward to a consultative liaison with the council on the proposal.

Skip Rail? Skip That!

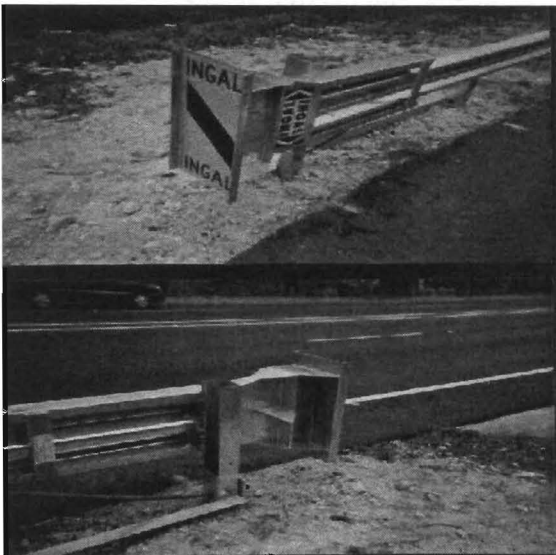
Coming to a site near you. An end-treatment of W-Beam intended to prevent "spearing", or penetration of a motor vehicle by the barrier, which tends to have an adverse effect on the occupants.

But watch out, motorcyclists! As though it isn't enough that we land on top of the barrier and cut ourselves to pieces, we can now do it on the end as well.

Just when we thought we were getting somewhere with Standards that clearly define the safety criteria for barrier systems, another manufacturer who doesn't give a damn about motorcyclists comes up with another diabolical device. And why are local and state governments encouraging the development of such products?

Currently in NSW, but as we all know, like Topsy, they grow.

STOP PRESS: New installation near Gumeracha Toy Factory



Hills Motorcycle Safety Strategy

By Peter Mount

Earlier this month (June) a meeting was held between the MRA, SAPOL, RAA and the Adelaide Hills Community Road Safety Group (AHCRSG) to flesh out and sign off on a motorcycle safety strategy for the Adelaide Hills.

The meeting was intended to reflect the final stages of a round of seminars conducted by the AHCRSG, courtesy of a small government grant, to determine through consultation the main issues of concern to riders, and potential solutions to reducing the crash rate in the region. 18% of motorcycle deaths occur in the Hills.

Surprisingly, the six representatives found that, in order to approve and implement the AHCRSG recommendations, it would be necessary to collaborate closely, make strategic decisions quickly, be mutually supportive within a consensus-driven context (in accordance with each individual organisation's charter), and be publicly seen to support campaigns and strategies which could be accommodated within these criteria.

Such a momentous conclusion was reached only due to acceptance that previous campaigns had not had the expected results because each organisation had been trying to go it alone, and in some cases (with which motorcyclists will be familiar), because organisations were working against each other's interests.

It was determined that stakeholder equity, consensus and ownership of initiatives and strategies would be integral to their success, that there needs to be an investment of commitment by all stakeholders, and that it would be essential that the stakeholder collective function within a framework of cooperation.

It was recognised that while, from time to time, there may be elements of campaigns with which individual stakeholders disagreed, these should be dealt with as they arose, rather than being viewed as barriers to any effective liaison.

The upshot of the meeting was that the MRA, RAA and AHCRSG offered to support SAPOL's "Operation Safe Hills" campaign for the months of July and August, as preparation for it was almost complete, and address the Hills Motorcycle Safety Strategy in the immediate future.

One of the principal reasons the MRA offered support for Operation Safe Hills was that it focussed on road user education, rather than exclusively enforcement.

Two peanuts walked into a bar. One was a saltea.

Commonwealth Club Road Safety Meeting.

By Leslie Dicker.

I saw this activity advertised in my local Messenger newspaper and decided to attend after being convinced to do so by Sean McPherson and Chris Zakelj. When we got there we had to pay \$2 admission! Once we got inside we met up with Neville Gray Vice-President of Ulysses, so South Australia's motorcyclists were well represented.

It was held on Thursday June 17 at the Walkerville Town Hall and was organised by the Commonwealth Club, an association which conducts public meetings to hear speeches on matters of general interest to members of the community.

The meeting was chaired by Professor Jack McLean from Adelaide University, and the speakers were SA Police Deputy Commissioner Graeme Barton,; Rita Excel of RAA, and Phil Allen of Transport SA. At the end of the meeting, after the speeches had been delivered, there was a short session of questions from the floor.

Dep. Comm. Barton's presentation was on the effectiveness of the various methods used by the police since 1970 to lower the road toll, such as random breath testing, radar, speed cameras, red light cameras etc. Rita Excel outlined the RAA's policies on road safety. Phil Allen spoke about Transport SA's ongoing improvement of roads such as edge sealing etc.

The questions from the floor covered a wide variety of issues such as wire rope barriers, bike lane problems, headlights on for all vehicles, and one person wanted to do a presentation on "white line fever" but there was not sufficient time.

It was a fairly basic discussion on road safety for those of us who have been at it for some time, however it was a good introduction for those members of the public who may not have had much contact with the issues previously. If it helps more people give some thought to road safety then it will prove to have been worthwhile.

LETTERS

Dear Editor

I had just gone out and purchased the "best of the best" in bike gear and had gone to Mildura to show it off to my then boyfriend. It was quite exciting as I was bike mad (not much experience riding, though), and couldn't wait to try it out. He worked in a bike shop and offered to take me for a ride on a ZX12.

We were only on it for about 15 minutes and were in a 60kp/h zone on a very straight, road when he accelerated really quickly without warning. I copped the full force of the wind and was literally blown straight off the back.. He told me he was doing 160kp/h when I came off. He was just showing off and trying to impress me.

Unfortunately, I was wearing everything but my leather pants. Due to the hot day and the short time I was going to be on the bike I only wore jeans. I ended up in hospital for six weeks with third degree burns to most of my left thigh, chest (the jacket rolled up on me) and right hip, which required stitching.

My right knee had a hole through to the bone, I broke my kneecap, tore ligaments and the tendon. The glove came off my right hand and I lost skin off all my fingertips and palm (the gloves weren't mine and were too big), and tore ligaments as well.

I was off work for 3 months. I have been receiving treatment for my knee and shoulder and have damaged the nerves where I got the burns so I don't have much feeling in some areas.

The money I spent on my jacket was so worth it. If I didn't have it on I would have been in intensive care and minus a whole lot of skin and bone – and an arm! I could have died. I am really annoyed I didn't have my leather pants on.

I recently saw an ad for motorbikes with Wayne Gardner in it. There was this chick riding in just a T-shirt. Being brought up with bikes I have always been very safety-conscious around them, and to see this sort of thing really upsets me. It only takes one idiot to screw you up for the rest of your life.

Deciding to sell my gear was the hardest thing ever (he replaced my damaged gear because he felt so guilty), but I will never get another bike. My advice to anyone, whether novice or experienced rider, is to never compromise on safety. Wear the proper gear even if it is just a short trip, and make sure it fits! And pillions, make sure you know the rider – don't presume you will be safe just because they have been around motorbikes for many years!

Carla

Thanks for your story, Carla. It's a pity when somebody gives you such a bad experience that you don't want to ride anymore, isn't it? At least your advice might prevent a similar thing happening to another pillion rider ...Ed.

**ANNUAL GENERAL MEETING
OF MRA SA Inc.
Monday 27 th September
For details see page 9**

Ode to the Great Escape Rally.

Organising the rally really keeps us on our toes,
We tow everything up there behind Povey's Volvos!

We gathered together on Murray's farm at Marrabel,
The weather this year turned out to be classical.

Erecting the tents went without a hitch,
But where in the world were Turbo and Witch?

There was all the food and drink that you like,
Meataxe arrived on a very old bike!

This year the films were shown with a video projector,
So we watched the movie that the rally is named for!

Devil and Uncle Pervie must be seriously bent,
They spent the weekend working in the tent!

Sean got firewood by chainsawing logs,
The rest of the time he spent yelling at his dogs!

There was Peter and Harald and Steve Tyler,
And a girl named Sammi, but we couldn't beguile her!

The gymkhana was enjoyed by all who participated,
But I fear that the prizes left them intoxicated!

On Sunday morning we checked out that everyone survived.
We packed up and were leaving when Greg Stevens arrived!

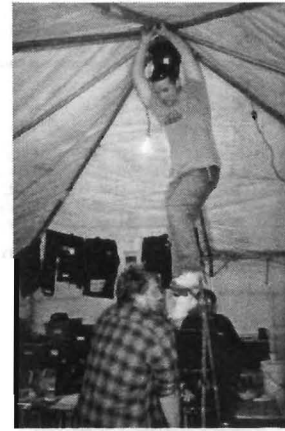
As we were coming into the outskirts of Elizabeth,
It was here that Sean's ute chose to explodeth!

But despite all these hassles, have no fear,
We're silly enough to do this rally again next year!

Uncle Pervie.



Steve working (not directing!)



Cirque du MRA



Huge dog guarding small bike and trailer



Meataxe and chopper



Many brought trailers (and fridges)



Sean's helpers

ANNUAL GENERAL MEETING

The Annual General Meeting of the Motorcycle Riders' Association of South Australia Inc. will be held on Monday 27th September at 7.00 pm at the **Broadview RSL Hall**

All the positions of the Association listed below will be declared vacant and the 2004 -2005 Committee will be elected.

President	Membership Secretary
Vice President	Minutes Secretary
Treasurer	Editor 'Centrestand'
Secretary	Stock Control Officer
Publicity Officer	Road Safety Officer
Register Liaison Officer	
General Committee Representatives (8)	

All financial members of the MRA SA Inc. are eligible to stand for election to one or more of the above positions. Nominations should be in writing to the Secretary of the Association prior to the beginning of the AGM.

All members and friends are invited to attend the meeting.

NOTE: The President, Vice-President, Secretary and Treasurer are the Office Bearers of the Executive Committee of MRA SA.

Kathleen Stevens
SECRETARY

The most dangerous strategy is to jump a chasm in two leaps

Benjamin Disraeli

How Two-Stroke Expansion Chambers Work and Why You Should Care

By Eric Murray

You know that changing the exhaust pipes on your two-stroke motorcycle can have a marked effect on the engine's power characteristics, but do you know why?

Simply put, it's because the two-stroke exhaust system, commonly referred to as an "expansion chamber", uses pressure waves emanating from the combustion chamber to effectively supercharge your cylinder.

In reality, expansion chambers are built to harness sound waves (created in the combustion process) to first suck the cylinder free of spent gases – in the process, drawing

the fresh air/fuel mixture (known as "charge") into the chamber itself – and then stuff all the charge back into the cylinder, filling it to greater pressures than could be achieved by simply venting the exhaust port into the atmosphere. This phenomenon was discovered in the 1950s by Walter Kaaden, who was working for the East German company MZ at the time. Kaaden understood that there was power in the sound waves coming from the exhaust system, which open up a whole new field of two-stroke theory and tuning.

An engine's exhaust port can be thought of as a sound generator. Each time the piston uncovers the exhaust port (which is cut into the side of the cylinder in two-strokes), the pulse of exhaust gases rushing out the port creates a positive pressure wave of sound which radiates from the port, and which will be at the same frequency as the engine is turning. That is, an engine turning at 8000 rpm generates an exhaust sound at 8000 rpm or 133 revs, or cycles, a second. Hence, an expansion chamber's total length will be decided by the rpm the engine will reach, not its displacement.

Of course, those waves don't radiate in all directions since there's a pipe attached to the port. Early two-strokes had straight pipes, a simple length of tube attached to the port. This created a single "negative" wave that helped suck spent exhaust gases out of the cylinder, and since sound waves that start at one end of a pipe travel to the other end at the speed of sound, there was only a small rev range where the negative wave's return would reach the exhaust port at a useful time. At too low an rpm the wave would return too soon, bouncing back out the port, and at too high an rpm the piston would have travelled up the cylinder far enough to close the port, the wave again having no benefit.

Indeed, the only advantage of this crude system was that it was easy to tune: you simply started with a long pipe and began cutting it off until the motor ran best at the engine speed you wanted.

After analysing this cut-off straight-pipe system, tuners realised two things: that pressure waves could be created to help pull spent waves out of the cylinder, and that the speed of these waves is more-or-less constant, although the speed is affected slightly by the temperature of the air. Higher temperatures mean that the air molecules have more energy and move faster, so sound waves move faster when the air is warmer.

A complicating factor here is that changes in the shape of the tube cause reflections, or changes, in the sound waves. Where the tube's diameter enlarges sound waves will be reflected back towards the start of the tube. These waves will be the opposite of the original waves from which they reflected, so they will also be negative pressure waves.

Aha! The next important discovery was made. By gradually increasing the diameter of the tube, a gradual,

more useful negative wave could be generated to help scavenge, or pull spent gases out of, the cylinder. In other words, adding divergent tubes (which used to be called “megaphones”) helped make useful power. Putting a divergent cone on the end of a straight pipe lengthens the returning wave, broadening the power band and creating a rudimentary expansion chamber.

To sum up, when the negative wave reaches the exhaust pipe at the correct time, it will pull some of the exhaust gases out of the cylinder, helping the engine to scavenge its spent exhaust gas, and putting a divergent cone at the end of the straight (parallel “head” pipe broadens the returning wave. The returning negative wave isn’t as strong, but it is longer, so it is more likely to find the exhaust port open and be able to pull out the gases.

As with straight pipes, the total length of pipe with a divergent cone welded on determines the timing of the return pulses and therefore the engine speed at which they are effective. The divergent cone’s critical dimensions are where it starts (the distance from the exhaust port), the length of the megaphone and the rate at which it diverges from the straight pipe. The two latter factors determine the intensity and length of the returning wave – a short megaphone which diverges at a sharp angle gives a short, strong pulse, while a long, gradually divergent megaphone creates a weaker pulse of longer duration. In addition, the negative wave is also strong enough to help pull fresh mixture up through the transfer ports.

While adding a divergent cone to the head pipe produced great tuning advantages, it had its limitations, too. The broader negative wave from a megaphone can still arrive too early and pull fresh mixture out of the cylinder. That’s exactly the problem that Kaaden had with the factory MZs. He realised that putting another cone, reversed to be convergent, on the end of the first divergent pipe would reflect positive waves back up the pipe. These positive waves would follow the negative waves back to the exhaust port, and if properly timed would stuff the fresh mixture that was pulled into the head pipe back into the exhaust port just as the piston closed the port. Kaaden immediately realised a large power gain, and the expansion chamber was born.

In addition to head pipe length, and divergent and convergent cone lengths, an expansion chamber has three more crucial dimensions: the length of the straight “belly” between the divergent and convergent cones, the length of the tailpiece “stinger”, or muffler, and the diameter of the belly section.

The stinger acts as a pressure bleed, allowing pressure to escape from the pipe. Back-pressure in the pipe, caused by a smaller-diameter or longer stinger section, helps the wave action of the pipe, and can increase the engine’s performance. This happens since the greater pressure

creates a denser, more uniform for the waves to act upon (waves travel better through dense, consistent mediums). For instance, you can hear a train from a long way off by putting your ear to the track, which is much denser and more uniform than air. However, this improved wave action also causes the engine to run hotter, usually a very bad characteristic in two-strokes.

The length of the belly section determines the relative timing between the negative and positive waves. The timing of the waves is determined by the length of the straight pipe. If the belly section is too short, positive waves have a shorter distance to travel, and return to the exhaust port sooner. This is good if the engine is running at a higher speed, bad if you want to ride on the street. The diameter of the belly section is crucial for one simple reason: ground clearance. It’s hard to keep big, fat pipes off the ground, though V-fours have solved that for now by having two of the pipes exit directly out the back.

A complete two-stroke pipe has properly tuned header, divergent, belly, convergent and stinger sections – a difficult process.

As the forces in a two-stroke exhaust system have become better understood, designers have been able to create better engines that take more advantage of them. In fact, modern two-strokes cannot run without an expansion chamber. For instance, a modern system has a gently divergent head pipe to keep gas velocity high near the port, a second cone of medium divergence, a third acutely divergent cone, and a belly section which connects to multi-angled convergent cones, which should exit in a straight line into the stinger for good power.

As you can see, modern two-stroke expansion chambers create a complex scenario and are quite difficult to tune.

The reason you should care is that now you can appreciate the amazing analytical capacity and inventiveness of the human mind when you next blithely jump on your bike to go for a ride...Ed.

The whole problem with the world is that fools and fanatics are always so certain of themselves, but wiser people so full of doubts.

Bertrand Russell

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