VALVE BOUNCE

JUNE, 2022

Les Morral pushing hard over the crest at Bryant Park in his Escort.

Photo: Chris Hickey

In this edition: coming events; building an outboard motor-powered open-wheeler hillclimb special; review of Targa Tasmania and its future; AGM; event results.

- Gippsland Car Club Inc PO Box 493, Morwell, 3840 A3759. ABN 76 691 013 424
- Website: gippslandcarclub.com.au
- Track: Bryant Park, Bill Schulz Drive, Yallourn, 3852.

GIPPSLAND CAR CLUB INCORPORATED
2022-3 BOARD OF DIRECTORS

CHAIRMAN	Rhys Yeomans rhysyeomans@gmail.com	0400 519490
DEPUTY CHAIRMAN	Scott Seddon seddo@seddo.me	0427 962733
SECRETARY	James Dyer james.dyer.90@gmail.com	0437 760019
TREASURER	John Bryant johnandcarolbryant@yahoo.com.au	0439 741473
COMPETITION SECRETARY	Rhys Yeomans rhysyeomans@gmail.com	0400 519490
KHANACROSS	Rob Duncan hxdude76@yahoo.com.au	0419 501394
PROPERTY	Bill Jennings niscap@aussiebroadband.com.au	0459 833431
MEMBERSHIP	Ken Neilson ken@streetwize.net.au	0409 427199
VALVE BOUNCE EDITOR	Jarrod Bryant jarrodbryant29@gmail.com	
PUBLICITY AND MARKETING	James Dyer james.dyer.90@gmail.com	0437 760019
HEALTH AND SAFETY	James Dyer james.dyer.90@gmail.com	0437 760019
BUILDINGS	Phil Tullett phil.tullett@energyaustralia.com.au	5127 8915
TRACK	Wayde Griffiths arrowlinemarking@y7mail.com	0458 882353
CLUB WEBSITE/FACEBOOK	Rhys Yeomans rhysyeomans@gmail.com	0400 519490
CLUB PERMIT REGISTRAR	Ken Neilson P.O. Box 1377, Traralgon, 3844 ken@streetwize.net.au	0409 427199
CLUB POINTS SCORER	(enquiries to Rhys Yeomans)	
CLUB ASSET HIRE	John Bryant johnandcarolbryant@yahoo.com.au	0439 741473
SOCIAL	Jill Hickey Jillracer727@gmail.com	0409 412452
GENERAL BOARD MEMBER	Ian Maud icfm710@gmail.com	0414 580921
CAMS DELEGATE		

MAGAZINE CONTRIBUTIONS Forward by email to jarrodbryant29@gmail.com Contributions should be forwarded by the third Friday in the month.

BANK DETAILS: Bendigo Bank, BSB 633000, Account Number 1574 73836, Gippsland Car Club

WEB PAGE: www.gippslandcarclub.com.au

GIPPSLAND CAR CLUB VISION: To inspire and enable people to participate in motor sport.

GIPPSLAND CAR CLUB MISSION: To provide affordable motor sporting experiences for people of all abilities in a safe and friendly environment.

CALENDAR 2022

JUNE

Friday to Sunday, 10/12	Australian Motor Racing Series at Winton
Saturday 11	*Bicycle racing at Bryant Park*
Saturday to Sunday, 11/12	VHCC Round at One Tree Hill, Ararat
Sunday 12	MSCA Sprint at The Bend (SA)
Sunday 12	**RACES East Sale Sprint - CANCELLED**
Tuesday 14	Board Meeting, Clubrooms, 7.00 p.m.
Friday to Sunday, 17/19	Repco Supercars at Hidden Valley, NT
Saturday 18	MADCC Boisdale Twilight Hill Climb short track
Saturday 18	Tampered Motorsport Track Day at Sandown
Sunday 19	**GCC Multiclub Hill Climb at Bryant Park**
Saturday to Sunday, 25/26	Shannons Motorsport Australia Championships at Phillip Island

JULY

Sunday 3	AROCA Sprints at Phillip Island
Tuesday 5	Valve Bounce collation
Friday to Sunday, 8/10	Repco Supercars at Townsville, FNQ
Tuesday 12	Board Meeting, Clubrooms, 7.00 p.m.
Thursday 14	*Photo track hire 6.00 a.m. to 6.p.m. (TBC)*
Friday 15	*Photo track hire 6.00 a.m. to 6.p.m. (TBC)*
Saturday 16	MADCC Boisdale Twilight Autocross long track
Sunday 17	Victorian Super Sprint Championship Round 2 at Winton
Sunday 17	***GCC Khanacross at Bryant Park***
Monday 18	*Photo track hire 6.00 a.m. to 6.p.m. (TBC)*
Tuesday 19	*Photo track hire 6.00 a.m. to 6.p.m. (TBC)*
Sunday 24	**GCC Multiclub Hill Climb at Bryant Park**
Saturday to Sunday, 30/31	Victorian 6 Hour Regularity Relay at Phillip Island
Saturday to Sunday, 30/31	V8 Supercars at The Bend, SA

AUGUST

Tuesday 2	Valve Bounce collation
Friday to Sunday, 5/7	Shannons Motorsport Australia Championships at Queensland Raceway
Saturday to Sunday, 6/7	Winton Festival of Speed
Tuesday 9	Board Meeting, Clubrooms, 7.00 p.m.
Friday to Sunday, 12/14	Victorian State Race Championships Round 4 at Sandown
Saturday 13	MADCC Boisdale Twilight Hill Climb long track
Sunday 14	VSCC Hill Climb at Rob Roy
Friday to Sunday, 19/21	Repco Supercars at Sandown
Sunday 21	MSCA Sprint at Winton
Saturday to Sunday, 27/28	Australian Rally Championship, Gippsland Rally
Sunday 28	***VHCC Round 7 at Bryant Park (VMCI Track Hire)***

SEPTEMBER

Saturday 3	AROCA Sprints at Sandown
Sunday 4	**RACES East Sale Sprint**
Tuesday 6	Valve Bounce collation
Saturday to Sunday, 10/11	Repco Supercars at Pukekohe, NZ
Saturday to Sunday, 10/11	Australian Khanacross Championship, Mid Murray Complex
Sunday 11	Victorian Super Sprint Championship Round 3 at Phillip Island
Sunday 11	MADCC Boisdale Hill Climb short track
Sunday 11	***GCC Khanacross at Bryant Park***
Tuesday 13	Board Meeting, Clubrooms, 7.00 p.m.
Friday to Sunday, 16/18	Shannons Motorsport Australia Championships at Sandown
Sunday 18	MSCA Sprint at Phillip Island

Friday to Sunday, 23/25	Victorian State Race Series Round 5 at Phillip Island
Sunday 25	**GCC Multiclub Hill Climb at Bryant Park**

OCTOBER

Saturday to Sunday, 1/2	AROCA 12 Hour Relay at Winton
Saturday to Sunday, 1/2	Australian Motorkhana Championship, Willowbank, QLD
Sunday 2	MG Car Club Interclub Round 3 at Rob Roy
Tuesday 4	Valve Bounce collation
Thursday to Sunday, 6/9	Repco Supercars Bathurst 1000
Tuesday 11	Board Meeting, Clubrooms, 7.00 p.m.
Friday to Sunday, 14/16	MotoGP at Phillip Island
Saturday to Saturday, 15/23	RACV Alpine Trial Centenary
Saturday to Sunday, 15/16	Mt Tarrengower, Maldon, Historic Hill Climb
Sunday 16	Australian Supersprint Championship, Sydney Motorsport Park
Sunday 16	MASDCC Boisdale Hill Climb short track
Sunday 16	*BMW Drivers Club Melbourne track hire at Bryant Park*
Thursday to Sunday, 20/23	Australian Hill Climb Championship, Mt Cotton, QLD
Friday to Sunday, 21/23	Shannons Motorsport Australia Championships at The Bend
Saturday 22	*MG Car Club track hire at Bryant Park*
Sunday 23	***GCC Khanacross at Bryant Park***
Sunday 23	MSCA Sprints at Sandown
Saturday to Sunday, 28/30	Repco Supercars at Surfers Paradise
Saturday 29	AROCA Sprints at Winton
Sunday 30	**GCC Multiclub Hill Climb at Bryant Park**

NOVEMBER

Tuesday 1	Valve Bounce collation
Saturday to Sunday 5/6	*Kyneton Car Club track hire at Bryant Park*
Tuesday 8	Board Meeting, Clubrooms. 7.00 p.m.
Friday to Sunday, 11/13	Bathurst Interrnational
Saturday 12	MADCC Boisdale Hill Climb, Noel Burley Memorial, short track
Saturday 12	*Nugget Nationals track hire at Bryant Park*
Saturday to Sunday, 12/13	MG Car Club Rob Roy Revival
Friday to Sunday, 18/20	Repco Supercars at Sydney Motorsport Park
Friday to Sunday, 18/20	Australian Motor Racing Series at Winton
Sunday 20	CCRMIT track hire at Bryant Park
Thursday to Sunday, 24/27	Challenge Bathurst
Sunday 27	**RACES East Sale Sprint**

DECEMBER

Saturday 3	**GCC Multiclub Twilight Hill Climb at Bryant Park**
Saturday 3	MSCA Come and Try Day at Phillip Island
Tuesday 6	Valve Bounce collation
Sunday 4	AROCA Sprints at Phillip Island
Sunday 11	***GCC Khanacross at Bryant Park***
Tuesday 13	Board Meeting

2023

MARCH

Sunday 5	Porsche Club of Victoria track hire at Bryant Park

MAY

Saturday and Sunday, 20/21	*Terry Baker Motorsport Weekend track hire at Bryant Park*

NOTE:

- All dates shown above are subject to change - please check with the organisers of the events to confirm the dates.
- Events shown as **Bold** are rounds of the Gippsland Car Club Club Championship (some of these dates may be changed)
- Events shown as **Bold Italics** are rounds of the Gippsland Car Club Khanacross Championship.
- GCC Practice Days are for members and associate members only, and will run from 1.00 pm until 4.00 pm.
- If you believe that any of the dates listed are incorrect, please contact John Bryant and they will be amended.

Editorial Ponderings:

I've been carrying on in the last couple of editions about how vital the magazine is to communication in the club; how essential it is to keep the position of Editor filled, etc, etc – and now it has been! Despite no-one nominating for the privilege of wearing out their keyboard by the time the AGM came around, our worries have been put to rest with the appointment of Jarrod Bryant to keep our pages filled. I'd like to wish him well in the role, and offer whatever small wisdom I can impart from my time filling these columns.

While it's the right decision for me to make at this time, I will actually miss the time spent churning out Valve Bounce: yes, it can be tedious at times, but it also involves an artistic element in getting everything in order, arranging it just so, and actually getting it to fit within the page limits. Call it my monthly jigsaw, if that's an easier concept. So now I'm going to be attending events without having to find someone to write a report, or spotting someone taking photos and asking them to send them through – it's going to be different! And…I might even get some time to get working on my race car again – bewdy!

I'd like to take a moment to acknowledge and thank our regular contributors for providing the content that has made Valve Bounce so readable (well, I think so – but then you'd expect that!) for our membership, and for those other folk out there in all manner of locations in Australia and abroad who have taken a moment to commend the quality of VB, or request the use of one of our items. I have been surprised and delighted to see how far and wide our magazine is spread. The contributors I refer to are in particular our own John Bryant, for his impressive knowledge, grasp of detail and historical recall; my mate and engineer supreme, Bill Freame, for supplying all manner of items from technical expertise to Targa reviews to opinion pieces; and Chairman Rhys Yeomans for his excellent and informative series on how to prepare yourself and your car, and how to drive Bryant Park: these three stalwarts have kept our covers 'plumped.' I have had more than one person comment that what has made VB an interesting read are all the articles we include, that you wouldn't find elsewhere: it seems we have filled a void for several members. I'm delighted to tell you that this edition continues in this niche, as our feature article is a fascinating account of building an open-wheel hillclimb special in the 1980s, using a mixture of resourcefulness and technical innovation. This is exactly the sort of article I myself delight in reading, where a past era is brought to life; something clever yet largely unknown or forgotten is revealed; and we get to share a valuable insight into some interesting and successful characters. The accounts of designing and building the Repco-Brabham, and its subsequent restoration, that were published during the Covid lockdown period (remember them?) are perfect examples of this, and I am delighted we were able to have them included in VB, especially when in some cases, they had not been published previously.

I'm remaining on the Board for the time being, to assist Ken in whatever is needed to complete the two new buildings and bring them to completion. Yes, it took a great deal of work and scratching around in piles of documents to put the funding submission together, but I'll be really pleased to see the project finalised, and our excellent venue become even better.

It was wonderful to see a good-sized collection of classic cars attending the 'cars'n'coffee' gathering prior to the AGM. There was an interesting diversity of vehicles, from an early Ford through to American 60s acreage, to newer performance cars. Perhaps we could make this a more regular assembly?

That's enough from me: I'm hanging up my keyboard for the time being: enjoy the new editions of VB, and support Jarrod by writing items and sending in photos. -IM. The Ed.

Chairman/Competition Secretary Report – Rhys Yeomans

Cars and Coffee, Annual General Meeting

Thank you to those who braved a cold Sunday morning to attend our Cars & Coffee and AGM on Sunday 29th May. It was great to see many members in different vehicles to the hillclimb cars we're used to seeing you competing in, along with an influx of those from the public who stopped by to enjoy a coffee or two, and even some sighting laps around the track. While it probably wasn't as exhilarating as a competition run, all were surprised to see how tight and undulating Bryant Park is compared to how it looks from up in the pits or from the balcony. I'd expect we'll get a couple of new competitors at future events, going by the positive conversations had with those who were attending Bryant Park for the first time.

The Annual General Meeting covered off the requirements we are expected to, along with the general business item of the proposed points score changes for 2023, which was detailed in May's Valve Bounce. Following some in-depth discussion with those in attendance, a motion was raised and subsequently moved to adopt the changes to the Club Championship points score in 2023. A major positive of this point-scoring method is the inclusion of all competition events run by Gippsland Car Club in determining the Club Championship, which includes Khanacross, Hillclimb and hopefully Sprints in 2023.

Congratulations to those who achieved success in their classes for both khanacross and hillclimb: many of whom were presented with their 2021 Club Championship trophies at the AGM. Once again, congratulations to Larry Kogge for winning the Club and Hillclimb Championship, and Matt Paulet for winning the Khanacross Championship. I will catch up with those who were not in attendance and present your trophies to you in the near future.

There have been some changes to the Board for 2022/2023, with an updated list in the front of this issue of Valve Bounce. I'd like to thank Wayde Griffiths for his efforts in his position looking after the Track, and while he remains on the Board, Ian Maud for his efforts with Valve Bounce. Jarrod Bryant will take over Valve Bounce for the next year. With Jarrod's involvement in the Club since birth and his archives of photographs, of which many can be found on the Facebook page 'Gippsland Park Morwell Hillclimb 1960s-2008', I look forward to the future issues under his watch as editor.

On a personal note, thank you to those who noticed my absence at round 4 VHC back in April! Our first child arrived a few weeks early on Thursday 21st April, which meant I was getting up to speed on changing nappies instead of trying to get more pace out of my Civic at the hillclimb! Both Lauren and our son Henry are doing well. He is growing at a rapid rate, and being the first grandchild on both sides, is being showered with love and affection.

Ed: some photos here and on the next page from the 'Cars & Coffee' morning.


9433-H6

What do you need to know now?

- **CLUB CHAMPIONSHIP 2022:**

- **Next GCC HILLCLIMB:**

Sunday, June 19th GCC multiclub event -GCC Championship

- **Next GCC KHANACROSS:**
  - Sunday, July 17th -GCC Championship

- **VICTORIAN HILLCLIMB CHAMPIONSHIP 2022 - next round:**
- Saturday/Sunday, June 11/12th VHC Round 6 at One Tree Hill, Ararat

WHY ENGLISH IS HARD TO LEARN

We'll begin with *box*; the plural is *boxes*,
But the plural of ox is *oxen*, not *oxes*.
One fowl is a *goose*, and two are called *geese*,
Yet the plural of *moose* is never called *meese*.

You may find a lone *mouse* or a house full of *mice*;
But the plural of *house* is *houses*, not *hice*.
The plural of *man* is always *men*,
But the plural of *pan* is never *pen*.

If I speak of a *foot*, and you show me two *feet*,
And I give you a *book*, would a pair be a *beek*?
If one is a *tooth* and a whole set are *teeth*,
Why shouldn't two *booths* be called *beeth*?

If the singular's *this* and the plural is *these*,
Should the plural of *kiss* be ever called *keese*?

We speak of a *brother* and also of *brethren*,
But though we say *mother*, we never say *methren*.
Then the masculine pronouns are *he*, *his*, and *him*;
But imagine the feminine . . . *she*, *shis*, and *shim*!

- ANONYMOUS

Next GCC WORKING BEE

Upcoming Working Bee and Club practice – TBA

These are great opportunities for us to complete some of the major projects we've had running at Bryant Park in 2022, such as the timing building.
All members are welcome to attend working bees and we will endeavour to delegate a job to you that aligns with your skills.
The obvious task is cutting the grass, so if you have a lawn mower or whipper snipper, please bring it along. The gardens will need weeding and spraying; toilets, clubrooms & garages cleaning; etc.
The working bees start at 9:00am, with a free BBQ lunch provided at 12:00pm. Hill climb practice - **ONLY for GCC members who have assisted with the working bee** - is held from 1:00pm to 4:00pm. **If you have a valid reason for wanting to practice but cannot attend the working bee, please send Chairman Rhys an e-mail, or phone Rhys or Phil - beforehand.**

Wednesday working bees
We've had requests from people wanting to assist in the maintenance of Bryant Park during the week, outside of normal organised working bees.
It could be as simple as you cutting grass for an hour, weeding some of the garden or something else that is deemed as required.
These days will not be as formal as our regular working bees and there will be no practice or BBQ.
As Bill Jennings is at Bryant Park most Wednesdays, please contact him (details in front of Valve Bounce) if you would like to assist on an upcoming future Wednesday.

- What's on? -

Ed: Here's a selection of events scheduled by groups outside the GCC, that might be of interest to our members – all are subject to COVID restrictions.

Ed: there are all sorts of displays, shows and gatherings happening in the early part of 2022, as organisers presumably re-schedule from the past couple of years' disappointments. I have included here those I thought were most relevant to GCC members, but if you have an MG, a Charger, a Monaro, a vintage truck, Italian classic, Renault, or are interested in vintage and classic shows, or the work of Peter Turner – then you better have a look at the AOMC's calendar at:

https://www.aomc.asn.au/car-shows-and-events-calendar

Second Sunday of each month: why not join some of our members at the Gippsland Sporting and Classic Car Register's 'Breakfast Club' in Warragul? This is a very low-key, friendly event: people simply park their cars of interest (ALL sorts of vehicles welcome!) in the southern end of the Woolworth's car park, off Victoria St – and wander around! Breakfast and coffee available at a number of local businesses. Officially, this runs between 8:00 and 9:30am but many are now arriving before this. Everything from vintage to race to classic to hot rods…even a restored tow truck!

Revs & Rubber Car Show

AT OLD GIPPSTOWN

SATURDAY, 25 JUNE 2022

211 LLOYD STREET, MOE

ENTRY:

SHOW VEHICLES $10

ADULTS $10

CHILDREN $5

PROUDLY SPONSORED BY:

Shannons Car Insurance

ROB ROY

Venue of the first Victorian and Australian Hillclimb Championship 1938
Clintons Road, Christmas Hills Melway ref 265 A9

INTERCLUB CHALLENGE

LOTUS · ALFA ROMEO · NISSAN · Austin-Healey · SUBARU · MINI · MG · BMW · PORSCHE · RENAULT · PEUGEOT · MORGAN

2022

Instigated in 1996 to promote friendly rivalry, at a club level, between the local sporting car clubs.

Over the years, many clubs have supported this event, with several including the series as rounds of their own club championship.

Classes cater for all types of vehicles from road registered to hill climb specials.

DATES MAY BE SUBJECT TO CHANGE, PLEASE CHECK ROBROYHILLCLIMB.COM.AU

ROUND 1	**20 MARCH**
ROUND 2	**22 MAY**
ROUND 3	**31 OCTOBER**

PLACINGS - 1st 10 points • 2nd 8 points • 3rd 6 points • 4th 5 points
ATTENDANCE - 1 point per competitor

promoted by the
M.G. CAR CLUB VICTORIA

Entry Forms	**robroyhillclimb.com.au**
Event Enquiries	**Wayne Rushton 0412 339 934**
Entry Enquiries	**John Kelso 0417 398 606**

ADMISSION: SINGLE ENTRY $10 OR $20 PER CAR
OFFICIAL TIMED RUNS COMMENCE 9AM

SUBJECT TO COVID RESTRICTIONS,
FULL CATERING MAY BE AVAILABLE AT EVENTS
Please check robroyhillclimb.com.au

ROB ROY REVIVAL

12 & 13 NOVEMBER 2022

A tribute to Garrie Cooper's Elfin cars with 10 Elfin cars competing

PROUDLY PRESENTED BY THE MG CAR CLUB VICTORIA

12HR

Alfa Club 2022
12 hour relay

1-2 October

Save the date!

You are invited to compete in one of Australia's premier grassroots motorsport events, the Alfa Romeo Owners Club Vic 12 Hour Relay at Winton Raceway Sat 1-Sun 2 October.

This is a team event, so the performance of cars, drivers and teams is important to succeed. It is a regularity event where consistency rather than speed is rewarded. Holders of Motorsport Australia and AASA Speed licenses or above are eligible to enter.

Supplementary regulations will be published May 2022, details available from Neil Choi, Alfa Romeo Club of Australia neilchoi116@gmail.com or go to www.alfaclubvic.org.au/motorsport/

BITS AND PIECES, INCLUDING 'FROM THE BOARD' - John Bryant

(Unfortunately, John has been unable to contribute his usual article this month due to IT problems)

← Nothing to do with motoring, really: but one of the best photobombs ever!

- Tilt trailer: 14’ x 6’, double axle, electric brakes, excellent condition. $7,000
- Hans Device: Hans 111, size XL, as new. $350
- 1 Helmet, open face: Bell, white, XLG: and open face: Snell, white, XL. $350.00

➔ Robert Webster 0419 440152.

Nugget Nationals Report

-Ying Hua & Blake Jones

Nugget Nationals is a low-cost and low-power sprint-based event where competitors must purchase a vehicle for $3000 with a maximum engine capacity of 1500cc. No rotaries, superchargers or turbo chargers are allowed, along with other regulations that govern any extensive modification of the vehicle. The focus of the series is on driver ability rather than the driver’s bank balance!

On a rainy and cold Sunday morning on May the 8th, a group of small and colourful hatchbacks descended upon Bryant Park for Round 3 of the Nugget Nationals championship.

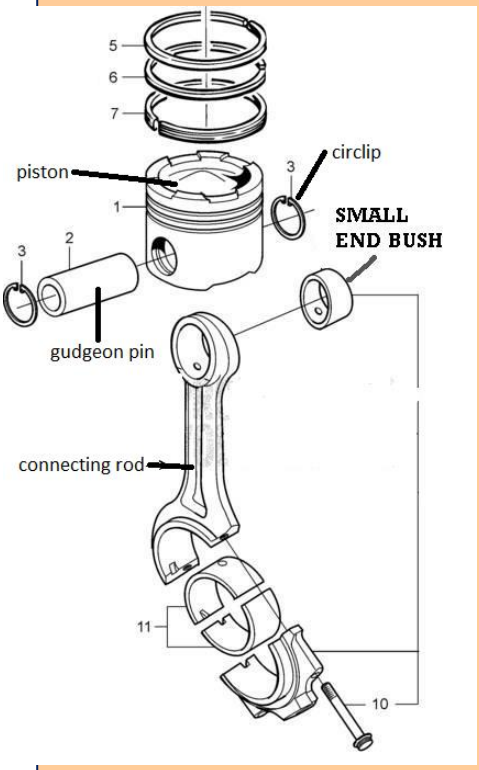
With treacherous conditions for new and veteran drivers alike, cautious early morning laps were put down by drivers. While the cars themselves are fairly low cost, most are also street registered and driven to the track, so a bingle on the hills would mean a fairly expensive tow home.

As the weather cleared up and the track showed a dry line after lunch, the Nuggets found their feet on the clockwise figure 8 layout. Aaiden and his Honda Jazz set the pace with a time to beat of 66.72 on his 6th run. This time proved to be unbeatable and he took our first place honours.

The Hondas were in fine form on this day with 2nd place going to David in his Civic with a lap time of 67.79. Rounding out the top 3 was Glenn in his TRD-inspired Toyota Starlet with a 67.91.

As the afternoon progressed, the clouds opened up again with more rain wetting the track. This didn't deter the Nuggets as they proceeded out for more runs. Other popular vehicles that compete at Nugget Nationals include Toyota Echos, Mitsubishi Mirages and a slew of Hyundais. These cars have proven to be just at home on a race track as they are at the local grocery shop!

The Nugget series will again return to Bryant Park for their final event of the year which will be Round 6 on November 12th.



Pinning It

- by Bill Freame

Ed: our readers have enjoyed many of Bill's technical articles in the past couple of years. While he has written knowledgeably on such topics as cranks, rods, pistons and piston rings – here he enlightens us on the subtleties involved in gudgeon pins (as I've always called them!) As you will read, this is an area in which Bill has had much experience.

For the majority of internal combustion engines, the flexible connection between the piston and the connecting rod is made by a pin. Wrist pin, gudgeon pin, piston pin are the various names used to describe it. The stresses on this connection are reversed at the top and bottom of every stroke, with the mass of the piston trying to bend the pin between the small end of the rod and the pin holes in the piston. The pin wall has to be thick enough to resist this bending otherwise the pin could shear between the rod and pin boss with disastrous results. If the pin survives the bending, then there is a strong possibility that cracks will appear in the pin holes, travelling vertically up the pin boss, and in extreme cases will travel through the ring belt until it appears as a crack across the crown.

Assuming we have built a strong enough pin that is resisting destructive bending, we need to ensure that it will always remain located in the assembly without moving sideways. It may be fully floating by being retained by circlips (tangless round wire, stamped sheet Seegers or Spirolocs) in the piston pin bosses, or by screwed in caps into the piston pin bosses (BMW M3) or aluminium or bronze domed buttons in the ends (Bentley). Then there are piston pins that are a press fit into the small end of the connecting rod, or retained by a clamp bolt through the small end of the connecting rod, with a notch machined into the piston pin

Photo above, from left to right:

- *A round (spring) wire circlip, with a tang. It is fitted into a radiused groove, but needs flat ends on the pin. Suggestion: notch the piston and use tangless circlips!*
- *Next, a tangless round (spring) wire circlip, the best style for race engines!*
- *Next is a Seeger circlip: it's stamped from a spring steel and heat treated. Seegers need circlip pliers to install and remove them. Suggestion: have the pistons modified for tangless round wire circlips, or fit buttons in the ends of the pins.*
- *The USA favourite, the Spiroloc. It works so well that for performance applications they use two at each end of the pin (yuck!) Spirolocs are coiled and supplied to suit the pin diameter. Did I mention that round wire circlips are the best style to keep your pins in the pistons? Sell the Spirolocs to one of your competitors!*
- *Round wire touble-tanged circlip*
- *On show behind the circlips is an aluminium button, made to suit a Cooper 'S' piston, a method I use when there is insufficient pin boss width to circlip. The button is hollow drilled and there is a small hole drilled off centre to prevent air pressure building up inside the pin as the temperature rises during running. Overall length of the pin, with two buttons installed, should be about 0.2mm shorter than the bore size. It would be preferable to radius the end of the buttons, to match the bore size, but it's not critical.*

Photo: P Buggee

The pins described on the previous page: these are grooved so that a bolt passing through one side of the conrod (connecting rod) small end to a thread in the other side engages in the machined groove and locates it laterally. The larger one is from an MGA 'B' series engine.

Photo: P Buggee

so the pin cannot move sideways during running (*see photo*) – such as the early MGB 'B' series engine - or some engines have the piston pin retained by a bolt hole threaded through one piston pin boss, the bolt passing into a hole in one end of the piston pin. Usually, the piston pins are extremely parallel in the grinding of their outside diameter, however sometimes one end of the pin will be machined smaller by about 3mm with the same variation also required with the piston pin bosses. The larger end of the pin may be retained by a circlip, or it may be by a bolt through one boss, into a hole in the piston pin.

So that covers the various external shapes used to join the piston to the connecting rod: now we need to understand the various internal geometry shapes. For the very extreme piston pins used in top end motorsport, the internal surfaces will also be ground or honed. That will include the tapered ends, tapered to reduce the weight at the less stressed ends of the pins. Additionally, the outside surface will probably be coated with DLC (Diamond Like Carbon), to reduce the possibility of scuffing if the lubrication breaks down under the extreme pressure between the surfaces. Pins for these conditions will be manufactured from high quality alloy steels, with the controlled addition of nickel, chrome, vanadium, manganese and other suitable elements with the probability that the steel was vacuum melted at least once during manufacture. Possibly someone has succeeded in even using titanium as a piston pin, but it would definitely need DLC coating - I'm sure it has been tried!

Coming downscale to our level of motorsport, (and finances) finds us using affordable quality steels that are readily available from steel suppliers. Piston pins from the USA are most likely to be made from H-11, a popular impact-tough low-carbon tool steel with around 5% chrome content. Upscale a bit and the USA can supply a higher strength tool steel as a premium material: these, however, must never be anything but fully floating, because when used as a pressed-in pin they will fracture, no ifs or buts - they will fracture with a very obvious failure with rods getting outside the motor. There are also chrome/moly pins available. There are many levels of chemical variations in what is commonly called chrome/moly, depending on the uses it is to be put to. H-11 could be called a chrome/moly steel. All these pins can be DLC coated or some can be chrome plated as a cheaper alternative coating.

All the performance pins I have been involved in manufacturing have been made from a steel that's identified as 'EN-36A', a low carbon Nickel steel that is ideal for highly stressed applications like axles, gears and piston pins and could be considered to be one of those chrome/moly steels. It will readily case harden and heat treat to suit our application. For average size pins I have always specified a case depth of 0.7- 0.8mm and hardened to 58- 62 Rc (Rockwell hardness on the c scale) as the required tolerance for my EN-36A pins. That means that for a pin with a 5mm wall thickness, on a finished diameter of 22mm, there will be a non-hardened core of about 3.4mm, remembering that the inside surface is also being case hardened at the same time as the outside diameter, during the case hardening process. However, a taper-bored pin will be almost through hardened at the very ends, a situation to be avoided if possible. These pins will usually be machined in a lathe, smooth drilled and reamed or bored and turned to the required dimensions, allowing about 0.2mm for grinding after heat treatment. The taper-bored ends and circlip chamfers for round wire circlips

should also be machined at this time, prior to the heat treatment process. 62 Rc is still machinable with general purpose carbide tools, but it is better to have done it before hardening.

Many high-volume pins from the USA will have been forged by punching from each end, but always leaving a plug in the centre that is about 6mm thick. Punching the plug any thinner would risk the fracturing of the punches, for no gain. The plug then needs to be removed by drilling it out, usually with a drill about 1mm smaller than the punched hole. Notched pins for a clamp bolt will be made very similar to this method, except probably drilled from each end and having a wider plug to be drilled out before being notched. The ends of the high-volume pin will be radiused on the outside diameter and the bore will usually be just chamfered, all done prior to heat treatment.

When I was employed by Repco, there would have been millions of piston pins made in that time to keep up with the pistons that were being churned out each day. Repco were the OE supplier to Holden, Ford, Chrysler/Mitsubishi, BMC/Leyland, Nissan and Toyota. Plus, Repco also had their own brand of oversize replacement pistons for the trade, the bulk engine reconditioners and also other brands of motor car not manufactured in this country. Repco, being a manufacturer, also produced ring sets, gaskets, valve guides, sleeves, ring gears and electrical components. But as this part of the story is intended to be about the cold forging of piston pins, I better not stray too far off subject.

Repco Engine Parts was using the technique of cold forging the high-volume pins for many piston applications, a process that improved the strength and grain flow of a cheap steel. Thus, because of the volume of pins being made, they were cheaper to produce despite the extra manufacturing processes involved. Initially pin blanks were being automatically sawn to the required length, from multiple bars all clamped together at the one level, in big Kasto reciprocating hacksaws. These 1016 material peeled steel bars were only either 1” or 1 1/8” diameter, thus 7 or 8 bars could be sawn at a time in each saw. From memory the saw cut was about 3mm wide so up to about 500mm of every bar was wasted as saw cut swarf, plus there were also short stubs that couldn’t be cut any shorter at the very end of each bar. Each slug/ pin blank always had a burr on one end that also needed to be removed, by rumbling in a barrel, just one of the very noisy processes that couldn’t be done at night due to occupied houses just across the narrow side road.

Repco Research came up with a faster way of producing the blanks, with much less wastage. It was by cropping. Only one bar of steel at a time was fed into the dies and it used a spark plug ignited, LPG-fuelled charge to operate the shearing process: an accurate blank (by weight) was produced at the rate of about 20 per minute, with no burr, no coolant residue and even less stub wasted at the end. The grain structure right at the end surfaces was slightly curved from the cropping pressure, but it wasn’t detrimental to the following processes when the pin was forged. The gases from the LPG-ignited gas exhausted into a long length of water pipe that exited the building through the roof, with a pop, pop, pop, noise that also had to cease at night. Fortunately, this process was so efficient that it didn’t need to be run more than on just day shift to make enough blanks.

Saw cut and rumbled, or just cropped, the blanks were all annealed in a furnace before being sent through a series of baths to clean them by acid etch, phosphate them and then soap them, all done in rotating stainless-steel barrels, another very noisy process. Now the blanks were ready for ‘Stage One’ of forging. Repco Research had built and developed a number of hydraulic presses, rated at up to about 60 tonnes. These were compact and each had its own power pack. The blank was loaded into a die of a bore diameter to match the blank. A punch was pushed into the blank, leaving a plug of about 6mm at the bottom, the only wastage. The phosphate on the end was the only lubricant for the punch, as the slug grew in length by the punching process, from about 32mm to about 48mm. From there the plug wastage was punched out of the end on a mechanical crank press, another noisy process and the parts needed to be oriented so that the plug to be removed was always

punched out at the bottom. These completed Stage One slugs now needed to be annealed again, then processed through all the baths, for phosphating and soaping all over, inside and out.

'Stage Two' was the process of ironing the outside of the blank down to whatever smaller size was required, while having the hole supported on a rod that passed through it. Each blank was only pushed half way through the ironing die, with the next blank always being used to finish pushing the previous blank all the way through the die. This process enabled a cheap grade of steel to be used, by manipulating the grain structure to be what was really required. Obviously, with various size pins being made, for all the different pistons, there were many sets of tooling required for outside pin diameters and pin bores. Additionally, the pins were always cropped to weight, because all Holden V-8 pins are longer, a larger diameter and weigh more than a 6-cylinder Holden 202 pin.

The pin blanks were then end machined by using radius and chamfer cutting heads that operated simultaneously in a machine designed for this process. Only then could the pins be case hardened to the required specification. After case hardening, the pins were then centreless ground to extremely accurate tolerances, where gauge masters were all kept in the same coolant so any air temperature variation wouldn't have any influence on the accurate pin sizing. Diameter, taper and surface finish were always regularly checked by the operators, as well as by roving inspectors.

Long ago the 202 XU-1s that raced at the Sandown 500 had a regulation (pressed in) pin move in the connecting rod. With only a few weeks before Bathurst, Harry Firth wanted to slightly increase the interference fit on the pins for the HDT XU-1s. Now, XU-1s used a special steel material connecting rod forging, and the piston pins were made out of EN-36A steel. GM-H were not about to make him a special batch of rods and as GM-H were a very big customer of Repco, it was agreed that Repco would have to find a way to solve the problem. With insufficient time to manufacture a special batch of pins for Harry, it was conceived that some XU-1 pins would be pulled out of the warehouse, put through a centreless grinder to make them smaller, chrome plate the pins overnight to build up sufficient diameter, then put them through the grinder again to grind them to the slightly larger diameter. In only a few days the new Bathurst pins were completed and delivered to the HDT workshop in Hawthorn. With the increased interference fit of the pin in the connecting rods, Harry was happy and the successful Bathurst engines were assembled, probably by Ian Tate. Paul England was the reconditioning company that did all the machining and balancing for HDT, at that time. If they had heated the small end of the rod too hot (a popular method for press-in pins) then that would explain a pin moving during the Sandown 500. The interference fit might have relaxed a bit.

Not every internal combustion engine has a flexible joint between the piston and the connecting rod. About 40 years ago the Scalzo company designed and built engines that had the piston bolted to the top of the rod. The Scalzo engine could change capacity while running and I built quite a few pistons for these engines, at that time. The CMC engine was another rigid piston design, with the Melbourne University Engineering Department contracted to develop the engine to commercial reality. Sensibly they used Subaru cylinder heads and had test engines running on the street in Subaru vehicles. That was about 25 years ago. Regretfully, both the Scalzo and the CMC projects have not made it into production, despite having successful progressive performance results.

Conventional piston machining will quite sensibly usually make use of the pin hole for most orientation of the piston and clamping it into jigs and fixtures, so when there is no pin hole to locate off or clamp through, it certainly makes you have to rethink the whole machining process.

So, like all engine components, some knowledge about the design, application and metallurgy can enhance your new engine build, and save you from coming home with an expensive lump of scrap!

The battered object photo at left is of a forged aluminium piston that has been in an engine failure, where not much was salvageable after dismantling and inspection. The sump oil had pieces of piston, rings, pin and circlips in it. This was possibly caused by a massive over-rev on a down-change, while chasing a lap time or a quicker car. I think the keyhole hole through the crown was caused by a piece of pin. Apart from some shrapnel damage, the other three pistons and con-rods survived.

Totally good advice.

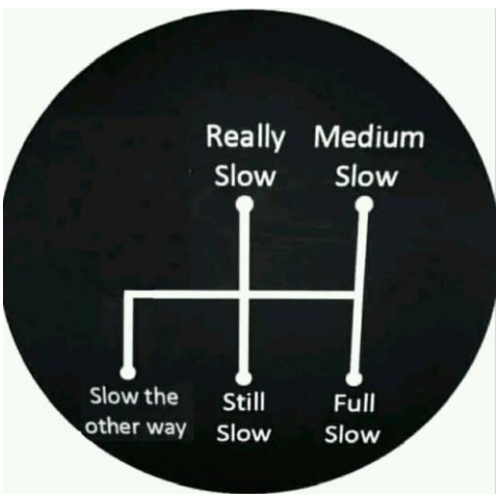
Will Rogers, who died in a 1935 plane crash in Alaska with bush pilot Wiley Post, was one of the greatest political country/cowboy sages this country (USA) has ever known. Some of his sayings:

1. Never slap a man who's chewing tobacco.
2. Never kick a cow chip on a hot day.
3. There are two theories to arguing with a woman. Neither works.
4. Never miss a good chance to shut up.
5. Always drink upstream from the herd.
6. If you find yourself in a hole, stop digging.
7. The quickest way to double your money is to fold it and put it back into your pocket.
8. There are three kinds of men:
   >The ones that learn by reading.
   >The few who learn by observation.
   >The rest of them have to pee on the electric fence and find out for themselves.
9. Good judgment comes from experience, and a lot of that comes from bad judgment.
10. If you're riding' ahead of the herd, take a look back every now and then to make sure it's still there.
11. Lettin' the cat outta the bag is a whole lot easier'n puttin' it back.
12. After eating an entire bull, a mountain lion felt so good he started roaring.
He kept it up until a hunter came along and shot him.
The moral: When you're full of bull, keep your mouth shut.

ABOUT GROWING OLDER...

First ~ Eventually you will reach a point when you stop lying about your age and start bragging about it.
Second ~ The older we get, the fewer things seem worth waiting in line for.
Third ~ Some people try to turn back their odometers. Not me; I want people to know 'why' I look this way. I've travelled a long way, and some of the roads weren't paved.
Fourth ~ When you are dissatisfied and would like to go back to youth, think of Algebra.
Fifth ~ You know you are getting old when everything either dries up or leaks.
Sixth ~ I don't know how I got over the hill without getting to the top.
Seventh ~ One of the many things no one tells you about aging is that it's such a nice change from being young.
Eighth ~ One must wait until evening to see how splendid the day has been.
Ninth ~ Being young is beautiful, but being old is comfortable and relaxed.
Tenth ~ Long ago, when men cursed and beat the ground with sticks, it was called witchcraft. Today it's called golf.
And, finally ~ If you don't learn to laugh at trouble, you won't have anything to laugh at when you're old.

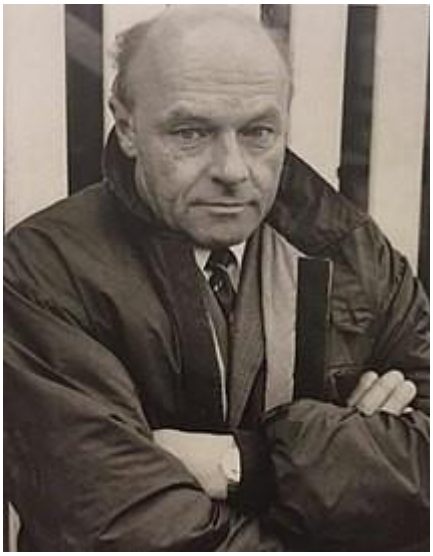
Gearshift pattern for older cars →



Ed: Peter Kerr is a long-term member of the Peugeot Car Club (amongst others). In the 1980s he designed and built a remarkable hillclimb car called the Cheetah, unconventionally powered by a two-stroke outboard motor, and this is the story behind the build. I have been quietly waiting for some time for Peter to complete this article, and he has compensated by delving into substantial and absorbing detail. This has resulted in a most welcome and fascinating article that showcases Peter's ingenuity and period processes. While it is an item longer than would normally be included in one edition of VB, I have done so as I was uncertain at the time of what was happening with VB in future – so you don't have to wait a month to hear how the car turned out!

I believe this is the first time this story has been recounted, so I thank Peter for allowing us this privilege.

CHEETAH TWO STROKE HILLCLIMB CAR 1980-1990



Walter Kaaden

Why two strokes? It's quite a story. As a youth I was fascinated by the story of the post-WWII rise of the East German 2-strokes, with the romance of Walter Kaaden, with scant resources in Zschopau, building a world-beating racing 2-stroke bike.
Walter Kaaden (1-9-1919 to 3-6-1966) qualified as an engineer in 1940, so was drafted straight into the Reich's War Machine. He was sent to Peenemunde and there worked on the design and construction of a radio-controlled flying bomb (No HS293) with a pulse jet engine that was designed to carry a large bomb. It was delivered by aircraft and, when dropped and its ramjet ignited, it was guided onto the target by an operator with a joy stick (rather like modern computer games). A number of ships in the Mediterranean were sunk in 1943 by HS 293s. As the war progressed Peenemunde was bombed out of existence so Walter was moved, with the rocket and jet program, to the underground factories in the Hartz Mountains where he finished the war and was captured by the Americans. Walter chose to be returned to his home country Saxony and to Schopau in the eastern zone. Here he used his engineering training to design and fabricate timber trusses to feed the need to repair damaged buildings. In about 1950 he developed a race bike as a hobby; it was based on the DKW RT 125, as were many others at the time. In 1951 DKW had produced a 3-cylinder 350cc 2-stroke with expansion chambers designed by Engineer Eric Wolf. By 1953 Walter's successes, also using an expansion chamber, had been noticed, so he was asked to take over the East German Government Racing Department's bike program. Also at this time another East German, Daniel Zimmerman, was rather successfully racing another DKW RT 125 derivative but with his own rotary inlet valve fitted to the crankcase. The Government made sure that Walter Kaaden was also supplied with all the data on the rotary valve. Walter's skill and experience with radio control and pulse jet engines allowed him to build his own valve type of oscilloscope so that now he could commence to study the pressure waves (pulses) in the exhaust, rather like his own earlier pulse jet engine pipe. Now Walter had the means to optimise both inlet and exhaust. By 1954 Walter's 125 2-stroke was producing over 110 bhp per litre by combining the rotary valve, early exhaust expansion chambers and a new extra transfer port similar to the Schneurle loop scavenge.

By 1956, the Racing Department had morphed into the MZ Company and was dominant in East German racing and eventually was able to break out of its Soviet perimeter and compete internationally. After initial great promise this became a disaster, as in 1961 MZ's main rider and development engineer Earnst Degner, while a contender for the World 250cc championship, defected to the West from the second-last GP at Kristianstad in Sweden and immediately joined Suzuki. This made the MZ factory's position rather delicate east of the new Berlin Wall and under the eye of the Stasi. Even so, the 1966 MZ RE 250 developed over 200 BHP per litre. (Four-strokes eat your hearts out).

Suzuki became pre-eminent in the 250cc class, winning the world's title in 1962 with Earnst Degner riding his MZ copy. This produced a change at Yamaha as they had been having success in Japan with a 2-stroke based on the German Adler (like the BSA Bantam) and now they couldn't keep up with Suzuki. Yamaha went cap-in-hand to the Tokyo University, with whom they had a strong relationship through their manufacture of excellent musical instruments (particularly organs as in churches), and asked for help. The result was that Tokyo University supplied Yamaha with two mechanical engineering professors being Naito and Namura who made a great team with one becoming the in-factory boffin and the other the in-field boffin to re-discover all Walter Kaaden's work and more. They were eventually so successful that 2-strokes have been outlawed in the premier bike class (from 2001).

Naito and Namura's work produced the type of bikes that took men like Gardner and Doohan to tame, with about 300 bhp per litre and power turning on like a switch. Naito and Namura's agreement with Yamaha gave them the right to publish their results in the SAE (Society of American Engineers) papers twelve months after being used in competition. Slowly the secrets discovered by Walter Kaaden's genius were revealed to the public. Once out of the bottle, the genie stayed out.

My 2-stroke journey started as a teenager without parental support as I secretly modified Dad's Victa lawn mower against his explicit instructions. He was away for a few days so I got busy with some short lengths of files to open out and smooth the inlet port, the transfer port, extended around the bore and round the ends of the exhaust port. Dad was surprised to find that now the Victa would effortlessly cut long wet grass which stalled it before, also the exhaust made a deeper note. I got the third degree and had to admit to my transgression. I was told never to do it again (I refrained from pointing out that once done it didn't need to be done again), but Dad was divided as to whether to kick my bottom or to pat me on my head.

My next 2-stoke was a Vespa 125 scooter which was my daily transport after I had left school and was working for Industrial and Domestic Equipment Company at Fisherman's bend. IDEC distributed all GM's non-automotive parts. Unfortunately, I caught mumps and was off work for about a week. The Vespa came apart and the transfer port was enlarged by about 20%. The inlet port was cleaned up and enlarged, but the king hit was that I raised the top of the exhaust port just a few thou after extending it around the bore and rounding the ends to give the ring some chance to get stuffed back into place after hanging out into the port as it passed. The result was a Q-scooter. The clue was that the idle was very uneven (it four-stroked) however, when it attained about 2,000 rpm it leapt to its

factory maximum of 5,900 revs (125 Vespas didn't last very long above this speed). The result was a Vespa 125 that was great fun and could startle a Vespa 175 Grand Sport.

The next few years were barren of 2-strokes as I did an architecture course at Melbourne Uni, played hockey and got a job and even spent a summer in the Antarctic. However, I regularly visited Templestowe Hill Climb and photographed John Wynn with his Adler-based 2-stroke cars: also Bruce Walton, Lex Davison, Peter Holinger (Holinger Vincent) and even Paul England's single VW-engined car (it predated the twin-engined and four-wheel drive car). The fuse was again lit however I decided to race with somebody else's money. Through my daily drive FIAT 600 I met and got to know Agostino Feruccio (Ben) Beninca and was able to assist him with his relationship with the CAMS administration as he was supporting a customer's Alfa Romeo racing, so I drifted into race car management. I commenced managing touring cars in Group C and also helped with service and development. Later, when I was managing a Mazda RX3 Savanah Coupe I designed and constructed an expansion chamber exhaust to use the port-generated exhaust sound pulse from the rotary. It took two men most of a weekend to cut, jig and fit this monster beneath the car with a standard-looking end-pipe exit. The result was not as good as hoped for but it did give rather more midrange torque, sharper bark and a four-metre flame under overrun. I did Group C for 10 years including six Bathursts with some success, however, the pressure of sponsors became too much and I decided to go hill climbing on my own, where I could control everything. All I needed was a car (ex formula) and a suitable 2-stroke engine.
First, I chased a car so a visit to someone whom I trusted and respected; Brian Shead. He was amused but took me seriously and we both started looking. Soon Brian called as he knew of his first production line chassis which he had raced as a Formula 3 and had been lost for some years due to being hidden in various barns in the country to shield it from a divorce battle, and now it was free and in the hands of a mechanic working for Peter Macrow. Brian was not sure that a sale was imminent but advised me to give it a try. After a long negotiation a deal was consummated and an incomplete chassis with some serious faults was mine.

Obtaining an engine was a game of cat and mouse. As a result of the reported success of a Johnson V4 engine in the Mexican Baja in a buggy I was hot on the trail. My visit to Outboard Marine Corporation offices in Melbourne was no success as I was actually shown the door and kicked out by the executive, no less. The next step was to approach the various dealers to measure their interest. The first two mirrored the company policy so I continued. The third dealer, Eric Barrow, was interested but said he might be able to help in a couple of weeks. After several weeks I got a call to say that I should visit to see an engine in bits. Thoughts of a blown engine crossed my mind; however, the engine was a surprise as it was a brand new V4 'stinger' (performance version) which had not been assembled. The owner was not named as he wished to be at arm's length. Perhaps he did not want the executive at Outboard Marine Corporation to know about the deal as I suspected he was racing with their support. The whole charade went belly up when a small boy walked into Eric Barrow's workshop and I observed that he had to be the son of Ronnie H with whom I had attended primary school. Eric looked most upset, ushered the small boy off and said he would have to talk further to the owner before any deal could be done. Shortly

A Johnson 'Stinger' outboard motor from the early 1980s

(*Source: pinterest*)

after, the motor was mine and I never spoke to the owner who did turn out to be the original Ronnie H. Eric was now super enthusiastic and very helpful.

Now the big decisions had to be made. How to mount the engine; how to feed it fuel, water, oil, and ignition; and how to feed the power to the wheels? After a few false starts I decided that the most logical way to mount the engine was crankshaft horizontal to connect to the gearbox and the rear of the motor (as an outboard) upwards to give the exhaust easy exit upwards and the spark plugs upwards on the top of the angled heads each side of the block. This left the carburettors under the engine in the dirt. There must be a better way; perhaps the carbies on one side and the exhaust out the other side? This was not likely as the proposed expansion chambers would compromise one side of the chassis and the rear suspension and the four carbies would be mixed up in the chassis tubes on the other side. The exhaust-up appeared to be the optimum for potential power generation so a new arrangement for the carbies had to be found. The carbies were fed into the crankcase through reed valves, two on each side and facing forward in marine use; that is, downwards in the race car. With the engine in the chassis I just had room to make an adapter tube for each carbie within the chassis and at the bottom of the engine but pointing horizontally sideways just above the bottom chassis tube. This adapter needed a square flat plate to bolt and sandwich the reed valve and the outboard end, and after turning through 45 degrees, was machined as a round tube to fit the proposed Lectron flat-slide motorbike-style of carbie. I made the patterns and had them cast by a local foundry, then I machined and finished them.
The original reed valves were too small for any increase in power and, being steel and uncushioned, commonly suffered from tip failure to the detriment of the engine, so I obtained some nice large Kawasaki neoprene-covered ones and took the lot over to Phil Irving as he had agreed to consult on the project but only after he had given me an extensive interrogation about my knowledge of 2-strokes. He looked at the layout and agreed that it should work but could not produce a precedent. “It should work, just give it a go!” So, I got sketching and discussed it further with Phil: his advice on machining, casting and assembly was literally worth quids. In order to protect the engine from debris the carbie trumpets were included in folded aluminium boxes which extended up outside the chassis on both sides with a large paper filter topping the boxes.

Lectron supplied the carbies direct from the States and I was lucky as the carbie designer was still working there and he questioned me in detail about the motor before sending the perfect carbies as they could not be improved on by any adjustment on dyno. I chose Lectron because they were the only carbie regularly beating the Johnson factory fuel-injected motors in boat racing in California. I guess that the Lectron carbies supplied were the same as those used in racing in California. In order to combine the four throttle cables of the carbies I visited my local motor bike shop. He was the Australian agent for Lectron and was somewhat miffed at my direct purchase, however, he offered me the usual motorbike solution to more than one throttle cable which is a slide box joining two or more cables into one. I was appalled at the friction and the potential for jamming so returned to the drawing board and produced a two-groove pulley wheel that took two pairs of cables attached to the grooves at 180 degrees apart and a lever arm bolted to the top of the pulley of the correct length to allow for the longer stroke of the accelerator pedal cable. The pulley only needed to turn less than 90 degrees and there was a screw stop under the pedal so that fully-open throttle could be attained without damaging the carbies.

The gear box was purchased from Peter Holinger and when his wife Beverly checked my suggested gear ratios she dryly observed that I wanted a perfect progression of ratios, and how had I come to this choice? When I explained that I had calculated them, both Peter and Bev showed even more interest in the project.

The project was coming together now as the chassis was mounted on convenient height stands; the repairs to cracked tubes were resolved; the missing wishbones were fabricated; and new rear uprights and rear axles purchased. The gearbox was in position and the connections to the engine were on the drawing board. On advice, a single-plate Girlock sintered-metal racing clutch was purchased and placed between the motor and the 'box. As the crankshaft looked very like an Austin seven shaft, I felt the need to check the load of the clutch thrust bearing on the timing end of the crankshaft (crankshaft thrust bearing was on the other end of the shaft). The timing end flange was the best and chosen place to put a clutch. Sure enough, the end load of the clutch release bearing was enough to flex the crankshaft endways. In order to halve the end load on the crank, I converted to a double-plate clutch and half the spring pressure. Girlock had already supplied their lightest clutch disc spring and couldn't help. Eventually, I found a Toyota Corolla clutch spring disc that was a bit lighter than the original one but still a bit strong. I machined about 16mm off the outer edge of the clutch disc spring and it was now half the load of the original spring and didn't deflect the crankshaft. The choice to use the ignition end of the crank for power output was because of the long taper, keyway, and large nut on the other end used to mount the flywheel for marine use: this would have added about 100mm to the engine/gearbox unit's length to mount a purpose-made automotive flywheel. By comparison, the timing end of the crankshaft had a neat flange on its end for the timing and this was a perfect mount for the small used flywheel that I obtained from Brian Shead, which only required a minimum of machining.

The brakes were Girlock: the fronts were the same type that Jack Brabham won his World Championships with, while the rears were from Formula Ford. Both front and rear discs were very thin, to save weight, being about 6 mm thick. For lightness, there was no starter motor and all the bolts but the smallest, I rifle-bored with the heads counter-bored and the other ends counter-bored to the depth of the nylon ring in the nyloc nuts. The springs were a bone of contention, as Brian Shead recommended that I use the same as he used on circuits. As a driver unused to the responsiveness of a formula car and aware of the roughness of hill climbs, I chose a spring rate only about 2/3rds of the track specification and never changed them throughout the car's life.

Phil Irving was not prepared to recommend the application of Naito and Namuras' expansion chambers, mainly because their design applied to 2-strokes of the Schneurle loop scavenge type and small bore while the Johnson was of the older deflector crown type of piston. Also, the bore was somewhat larger than those of racing bikes (about twice) that had been fitted with expansion chambers. I took a punt, assuming that the exhaust system was mainly relevant between the exhaust port and the end of the pipe. Being pig-headed I opted for expansion chambers and set out on a long and painful (for me) journey. Four days of calculations and the massive great chimneys were designed: all I had to do was build them. I pre-cut the steel sheet and begged for help from my local air-conditioning contractor to roll the various cones in his four-foot rollers. The appropriately-named Mr SWG Ford was absolutely tickled to have a graduate architect in his factory actually using his machinery to make something useful. Later on, he became an enthusiastic supporter.

Both exhaust and inlet had been solved but how to ignite this mobile bomb? I had looked at the original CDI ignition for the motor which was no longer applicable, as the ignition end of the crank was driving the clutch. Also, the ignition was very expensive and did not come with the engine, so I looked at some four-stroke systems and was attracted to Lunenition, an English optical points replacement kit, four of which were purchased. A stator plate was mounted around what had originally been the output end of the crank, carrying four optical ignition triggers at 90-degree intervals and a single blade cutter mounted on a flange mounted on the tapered end of the crankshaft. The four ignition coils would be critical and I had the answer as during my time with Beninca a number of coils had been tested and only two produced over 30KV reliably. Even Bosch

admitted that their magic GT 40 coil was no match. Beninca, of course, used the Magnetti Marelli sports coil so I chose the alternative Hitachi coil which was also far cheaper.

The next step was to dyno the motor, so I called the orchardist Jack Godbehear in Ringwood: an appointment was made and I arrived with the engine, some avgas and the massive exhaust chimneys, not yet cut to fit the car. The engine was installed on the dyno bed, the fuel was connected, the exhaust pipes were fitted into miles of 6-inch corrugated stainless steel tubing to take the exhaust off into the exhaust fan. The battery was hooked up and cooling water was connected. The moment had arrived, so Jack fired it up. It all sounded good so jack went through a short check procedure and then opened it up to 1000 revs then 1,500 revs and a bit of load. Jack worked the engine up slowly to 4,500 revs in small steps. It seemed like only seconds but several hours had passed and both time and fuel were short so we called it a day. As soon as we stopped, in walked Larry Perkins, who had been in an adjacent shed tuning his 10cc model aircraft motor for his first Shell economy car, and dryly commented, “that’s the cheapest DFV that I have ever heard”. A few days later we returned to the dyno and carried on to 6,500 revs as this was advised as a safe maximum by Eric Barrow who was excitedly involved in the tests. During this test we discovered that the pipes really worked, as at 5,200 revs about 74 hp was produced while at 5,300 we had 134 hp rising to about 150 hp at peak revs: not bad for a 1,470cc diecast 2-stroke!

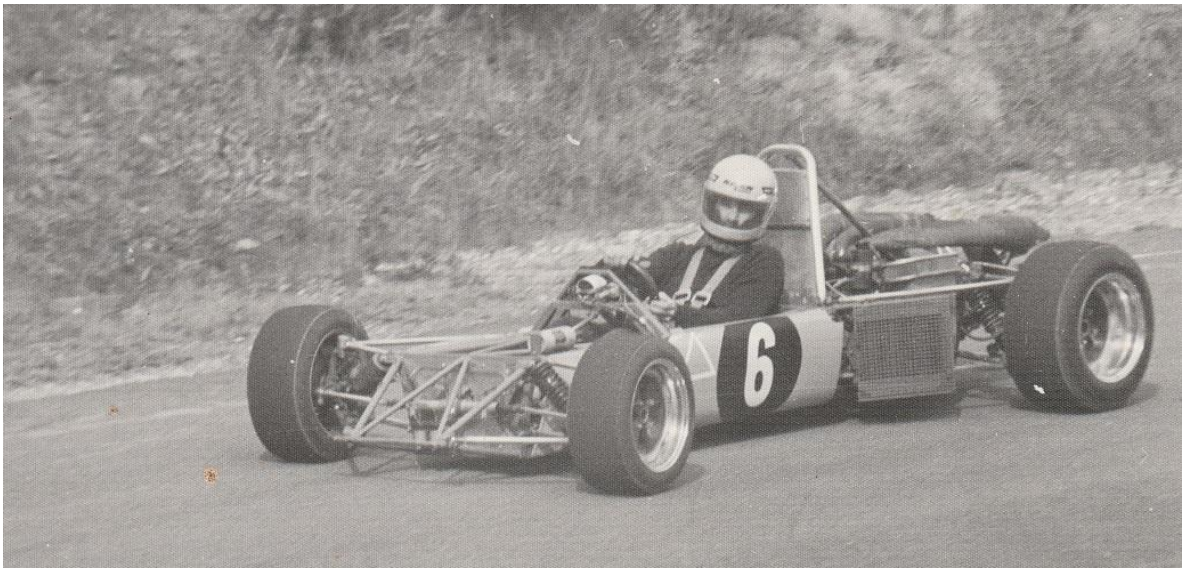
Installing the engine into the chassis required a whole lot of components to fit and run. Firstly, an adaptor plate was turned up to carry the gearbox bell housing and to connect to the engine block. Various brackets were fabricated to carry the engine off both the existing mounting points and also from some suspension anchors. The clutch slave cylinder and clutch lever of the VW box were used. Two new radiators from a Ford Anglia commercial were purchased and cut down to about 2/3rds of their height and re-tanked, then mounted one on each side of the cockpit with wire mesh guards and plumbed in sequence with a Hillman Imp water pump driven from the gearbox quill shaft by a notch belt. The fuel supply seemed simple: firstly, a fuel tank. This was a piece of 6in-diameter aluminium tube with ends plated; a filler pipe at chassis upper tube height; and a diaphragm internally in the middle with a pick-up at the hole in the centre bottom of the diaphragm - this ensured that fuel was picked up even in sharp corners. It was built by Rod Stevens and sat just behind the driver, between the bottom chassis frames. To supply fuel from the tank to the carbies, just connect an electric pump? Not so, as the pressure simply sank the floats in the carbies so the electric pump supplied fuel to an old SU float bowl, hung on the roll bar, and from there fed by gravity to the carbies. The large exhaust chimneys were fitted to the chassis and needed to be jogged to a lower level and the lower two dropped over the rear frame and were tucked up beside the gearbox. As a result of the step in the power graph, I chose to not use the tuned expansion chambers initially until I had a feel for the car, so the four pipes were joined into one and fed through a second-hand aluminium ex-Ford V8 (Murray Carter) racing sedan silencer.

Setting the car up on wheels had some problems as the man who spun rims for Brian Shead took an immediate dislike to me (it was mutual) and offered extended delivery time and high cost. As a result, I had thick steel sheet, in varying thicknesses, ground both sides and then flame-cut into the shapes I wanted while I was taught to spin aluminium by an eccentric named John, in a factory in West Heidelberg. Then the flame-cut chucks for the wheel rims were turned on my slow old lathe (a week’s work). Eventually I had all the bolt-together components to spin rims from an offset of 2 inches to 9 inches. My West Heidelberg teacher hated spinning aluminium so my rims were spun in Box Hill at Whitehorse Industries and when they moved to Lilydale they made a number of sets of rims that I was able to supply to other racers.

The car was now standing on its Holinger magnesium wheel centres, my rims and new M & H slicks mounted. When buying the slicks I phoned Marvin, the M of M & H (Harry) and he was rattling away on a keyboard to check on stock of the various slicks being considered. This was the first time I had heard a computer at work in a commercial situation. So now it was time to drive further than up and down the drive, so off to Calder with Eric Barrow in tow. To my surprise, everything worked well. The gearing was about right as peak revs could be obtained in top gear about half way down the straight and corner exit could be very quick. It didn't boil; it didn't mumble; it just got up, went and stopped. After a few laps I put Eric into the car and he drove it with a bit more verve than I expected and came back with his eyes on stalks and was very happy. After some more laps the car was loaded and towed home with enormous smiles all round. Shortly after Calder, Winton was visited as it gave more corner variance and shorter straights. Also, I knew the circuit well. An afternoon at Winton revealed the cars excellent cornering ability, good brakes and again the gearing was too short, as a lap could comfortably be run using only 4th and 5th gear at a lap time similar, but a bit quicker, than the Alfa 105-series GTV, which I had managed and driven a couple of years prior. It was now time to go hill climbing.

The first hill climb was at the old Morwell circuit (*Ed: Gippsland Park*), about 1½ miles (2.5 Km) north of Morwell. The first practice run was almost OK but with some skittishness both entering and leaving the carrousel. The second run was a bit quicker and very exciting at the carrousel as the rear end was skipping everywhere. After a chat with Peter Holinger, he watched my next practice run and suggested that the rear end was hitting the rubber stops and to raise the rear end about ½ an inch. After the fix the car was a joy to drive. As I became surer of the car and my driving I was going faster at each meeting. My first driving problem was that I sustained bruising to my lower back at the first couple of meetings. I discussed this with Brian Shead and he threw his head back and laughingly said all you touring car types are the same and have to sit up straight, why not lie back and enjoy the hammock seat. His advice cured the problem. It took until the second season that I was quick enough that I became constantly aware of the speed loss due to spinning the inside rear wheel during corner exits. After discussions with Peter Holinger he suggested that, if I bought one of Allan Moffat's spare RX-7 Salisbury-type of limited slip differentials, the problem would be solved. So, a trip to Allan's garage in Toorak and Mick Webb had just what I needed. Peter Holinger modified the diff to fit into the gear box and a whole new era of speed was realised as I was not only competitive but I was convinced that I could now win my class if my driving was good enough.

With my ego in the ascendancy, I obtained a super-soft set of Avon slicks. They were so soft that on warm days they were too soft to last the length of even our short hill climbs so I grooved them on the Goodyear pattern that had just appeared and kept them for a rainy day. At a super-wet day at Gippsland I had a lucky first and only outright win on the soft slicks (the big boys weren't there) and late in the day as the track dried the sports sedans got very close to my time. I think it was the next climb at Ararat that the day was overcast but warm and at the drivers' briefing I had commented unfavourably on some wires mounted on the tops of white marker posts on the right side of the road after the first left corner, at about neck level. My first run arrived and I lined up on slicks, as the track was dry. A great start, and round the first corner I hit a vertical wall of water. It was raining heavily on the top of the hill. I was a passenger as the car slowly rotated and preceded backwards up the road at great speed. Thinking of the neck high wires I hung my head as low as possible away from the wires. Just before stopping I took out one of the white posts holding the wires, tore out miles of wires and came to a stop with the gear change and its housing knocked off the box as it had despatched the post. As I was loading the car into the trailer to come home and put a new back on the gearbox, the Clerk of Course suggested that I might have taken the wires out on purpose. At the time I didn't think it was much of a joke.



The Cheetah, 2-stroke powered, with Peter at the wheel in the 1980s. Note the complex exhaust system.

After four years of competitive events and now winning quite a few at class level, I started looking over my shoulder and found some new competitive machines threatening. At the same time I had fortuitously met a boat racer who had factory support from Mercury Marine and he was keen that I looked at one of their 2-litre (1970cc) V6 engines: ”Much better than a Johno,” he said. Eventually I was introduced to the service manager at Mercury in Dandenong, who quizzed me on my 2-stroke knowledge before he would commit to assist me. This was rather easier than my previous interrogation by Phil Irving. After passing this test he produced the Assistant Service Manager who had an extensive photo record of my car and they were both very enthusiastic. I parted with a request to phone within a couple of weeks. Two weeks later I was presented with a damaged block from, what I suspected was an insurance write off. The outside face of the block, being the outside of the water jacket, had been cracked and forced back until it touched the outside face of the cylinder. I assumed the engine while standing on its leg had fallen over and thus the impact damage. I showed this to a close friend of mine who was a keen scuba diver and he said he might be able to help - without expanding. Shortly after, I arrived home from work to find a complete but very corroded 6-cylinder 2-litre Mercury engine sitting on my front porch. The story was that my friend plus some of his mates witnessed an engine fall off the back of a racing boat near Black Rock some months prior about 1 Km off shore. They had always intended to see if it was still there, having taken bearings on its location, so off they went and rescued it by walking it ashore along the sea bottom. The leg and propeller were recovered and sold, but the engine was too far gone…and so the gift! The corroded engine supplied a replacement piece of the block about 80mm X 50mm so that I could cut out all the impact damage. The cuts were between all the small cast lettering on the side of the block so that when the weld was ground off and the repair painted to match the adjacent, it was hard to find. Mercury’s Service manager could not find the repair and had to check the block number to be sure it was the one that he had given me. As a result, my aircraft welder got all Mercury’s repair welding, and I got the rest of the engine.

While evaluating the new engine my mind turned to how much more power I would have available. I estimated about 170 hp, so how to get this on a temporary basis with the Johno? The obvious choice was chemical supercharge as there would be no penalty in my classification. Two bottles of nitrous oxide were purchased, and a test bench set up to test injector flow rates for both the nitrous gas and the necessary extra petrol to use up all the extra oxygen. A lot of nitrous and petrol was spilled as I tested the flow rates until I got my home-made jets right, getting a matched flow. The system was

fitted to the Johno motor with a pair of injectors aimed into the throat of each carbie (within the air boxes). The gas and extra petrol were electrically triggered at 5/8th throttle and at the same time a yellow light lit on the top of the dashboard so that I knew that the system was live. The result was as if being catapulted up the track by a large rubber band with the rear tyres scrabbling for grip. In fact, wheelspin became a bit of a problem.

The first nitrous run was at Morwell and the wheelspin on the back straight was quite a handful. Coming off the carousel was always difficult as to when to open up the throttle, but now it was critical. Too soon, and the run was lost fighting the car all the way up the back straight. Morwell's short straights did not allow the full advantage of the nitrous to be used. Camperdown, with its longer straights, showed more gain and at Collingrove in South Australia I counted eighteen times that the nitrous light lit up, and times were better. Perhaps I was getting better at managing this switch-on horsepower. The conclusion was that bigger tyres were needed to put down the expected horsepower of the new six-cylinder Mercury.

While all this exciting driving was going on, the workshop was designing and building all the bits to convert the car: the first problem was which way up to place the engine. The Mercury configuration decided the orientation of the motor. The engine exhausted its three cylinders from each V into a cast-in divided plenum at the rear of the motor with two exhausts down the leg. With more than 360 degrees of exhaust port opening into each plenum, a pair of expansion chambers would not work and the hours and effort necessary to modify the engine to six exhaust pipes would have been horrendous. So, the original exhaust plenums and twin exhaust pipes were used. Thus, the motor could be mounted with the exhaust underneath and modifications to the inlet tract on the top could proceed. As with the Johno, reed valves were upgraded and fortunately the Mercury engine had a big sister cast in the same diecast moulds but without the iron cylinder sleeves. This 2.2-litre motor was also raced; and also had bigger reed valves than the 'cooking' 2.2-litre motor; also much bigger than the reed valves available for the 2.0-litre motor (mine). The Service Manager laughed when I asked for the biggest reed valves for the 2.2-litre and said they are too big to work in the little motor (oh, yeah?!...) On top of each reed valve was a manifold that carried a single carbie with 27mm chokes. The proposed 40mm Lectron carbies would neither fit on the factory manifold, nor work vertically down, so a cross-over manifold was designed, consisting of six identical but separate pipes, cast in aluminium. Thus, three Lectron carbies were above and on each side of the block, bolted to the reed valve on the opposite side one end, and with a horizontal tube for mounting the carbie on the other. The components for the crossover manifold were cast locally, and I machined them. The spark plugs were down under the sides of the engine. The ignition was just the Johno plus 50% and the six carbie cables were joined up on a three-row pulley similar to the Johno.

The time had come to dyno this larger lump of an engine so off to Jack Godbehear in his orchard. The Mercury was mounted and fired up. Jack spent some time working her up the rev and load range. I had chosen Jack as his reputation was that he was the most careful and gentle engine tester: the right man for a one-off!

The engine was giving good results but Jack was concerned as it was leaning out at the higher revs. 2-strokes that lean out under load often devour their piston crowns within seconds, so the test was suspended and a slightly different profile needle was ordered from Lectron in America. With the new needles in, Jack was leaning on the load, and smiling. The engine sounded great; like a 4-stroke V12, and was producing the goods; 180 foot-pounds of torque and 184 horse power at just below the 6,500 RPM safe factory limit.

After the dyno session I had a talk with the Mercury Service Manager who wanted to put the engine on his boat dyno as he said that he had comparative figures for their race motors. So, the motor was mounted on a leg as the dyno was a fluid coupling that bolted onto the propeller-splined shaft. This system was used in the engine test tank so the leg pumped water through the engine and the water cooled the dyno. Having seen fluid couplings on large diesel engines I wondered if this dyno was man enough for the job. The carbies were turned through 90 degrees with the motor standing on its end and we were ready to roll. The Service Manager took control; after all it was his dyno. The engine was started and was idling nicely when the throttle was mashed to full open. The motor quickly rushed through about 4,500 and then broke free and jumped to 6,500 at which the white-faced Service Manager let go of the throttle and the motor dropped back to a comfortable idle, and he said to me; "What happened?" My answer was that the dyno had sheared (that is that the oil is no longer able to resist the load and has given up its job to resist the motor's input). The Service Manager enquired, "Can it be fixed?" My reply was to gently blip the throttle to show that the fluid coupling was again doing its job at low load, and nothing had actually broken. If Mercury had figures on their race motors on that dyno which my motor overpowered at about 4,500 RPM, then there was plenty of room for development of their race motors.

The engine output was even better than I had hoped for so some new decisions had to be defined and addressed; bigger wheels and tyres, and a stronger gear box. New rims were spun by Whitehorse on my chucks and Peter Holinger supplied a stronger gear box with a clutch pack diff in it. Russell Stuckey supplied the tyres which were a bit wider than I wanted but they were the next available size up, as used in formula 2.

The next couple of months were taken up with stripping the car of the old motor and gear box and then installing the new items. The first hill climb was again at Morwell, and the car felt completely different. More grunt, yes, but so much more adhesion and no discernable transition from grip to completely lost.

As soon as the engine was installed in the car, I took it out to Mercury in Dandenong to demonstrate it to the company. We unloaded onto the concrete truck parking area behind the factory, the exhaust was pointed at the offices and it was push started. The bark and roar had instant results as all of the executive and most of the staff rushed out to see what was going on. A full-racing start with two huge black lines across the truck park, then I nipped around the corner of the building out of sight, turned the car and sat doggo for nearly a minute, then dribbled back round the corner to be greeted by two of the service crew running towards me, in panic, to see what had happened. The drama was most effective and everyone wanted to see and hear the car

The first meeting was one of discovery and no heroics. At the second meeting at Collingrove on a plus 30-degree day I was having fun with the new sticky tyres; two starts with the front wheels off the ground in first and again in second. On the third start it went nowhere as the VW differential casing had been burst apart by all those lovely horses. The car went bang and sat on the start line in a sea of oil with the diff housing in two parts and the gearbox on the ground. The poor old VW casing had had enough. The wreck was trailered home from South Australia and the survey commenced. There were two spare VW boxes in stock, in fact one still is. Peter Holinger advised me to turn the gear box over to load the stronger side of the casing. In addition to turning over the gear box I designed, made patterns, and had cast, external re-enforcement plates to be attached to the sides of the diff housing. The engine timing was re-set so that the engine turned the other way to match the inverted gear box (another benefit of 2-strokes). The engine was fired up and it didn't run very well. It stumbled on idle and would not rev so I talked to Mercury and their service manager did not seem troubled and asked me to bring the engine for a fix. When I arrived the Serve Manager inspected the crank with some factory jigs and concluded that I had "aerialed the motor". What he

meant was that the shock stop had wound up the crankshaft and was a common problem when a race boat 'aerials' off a wave then drops its propeller back into the water. He just pulled a new crankshaft out of stock and gave it to me. When re-assembling the engine-to-gearbox connection I found that the attachment bulges to the block had cracked at the top of the block. This was the result of the torque lifting the front wheels so the attachments were ground off and two much larger aluminium blocks were welded on and threaded to take bigger bolts (1/2 in aircraft cap screws instead of 5/16 in bolts). This fixed the problem.

Having repaired all the damage from the gear box explosion the car was reliable again. All I had to do was to learn to drive it carefully with much more adhesion and I was disappointed as I could no longer chuck the car as I could not discern the sudden point when slide became total loss. Even so, I was steadily going faster at each meeting and enjoying flirting with the point of no return. Eventually work responsibilities absorbed my time for hill climbing so in, I think, 1991 or 92, I sadly sold the car on. However, I didn't abandon motor sports as I joined a rally service crew and spent the next 25 years chasing a rally car.

So that is the second chapter of Brian Shead's first production Formula 3 chassis with two different two-stroke motors and going quicker than ever before.

AWARDS.

1981.
V.H.C C 3RD outright, 1st 1501 to 2000.
S.A.H.C C. 1st 1501 to 2000.

1982.
V.H.C C. 3rd outright, 1st 1501 to 2000.
S.A.H.C.C. 1st 1501 to 2000.

(I have been unable to obtain access to MSA Records to recover the results for 1983 to 1987)

V.H.C. C. 3rd outright, 1st 1501 to 2000.

1988.
V.H.C C. 1st 1501 to 2000.

1989.
V.H.C C. 1st 1501 to 2000.

1990.
V.H.C.C. 1st 1501 to 2000.

Was That the Final Targa Tasmania? - By Bill Freame

If I had a dollar for every time I have heard somebody say, "I'm going to do Targa one day," I would be quite wealthy. I know they mean Targa Tasmania and that they don't realize how tough and tiring an event it is. If you were one of those who were going to do it, well, you may now have missed your opportunity, at least on a Motorsport Australia permit! You see, there were three deaths during Targa Tasmania in 2021, followed up by yet another one in 2022: yes, this year. That's four deaths too many for any of us involved in this style of motorsport. There was an extremely comprehensive report handed down after last year that had recommended many changes and improvements that were implemented for the next events: Targa High Country and Targa Tasmania, which have both been held this year. As these Targa events are conducted on closed stage challenging public tourist roads that twist and turn across the countryside, there is always going to be the possibility of serious crashes happening, especially if the driver runs out of talent, the navigator makes a wrong call or the car is set up more for race track work than bumpy, patched and cambered public roads. There is also considerable expense involved in doing a Targa Tasmania competition, thus it attracts some wealthy competitors who can afford the risk of trashing an expensive, competitive late model car, if the worst happens. It's a tough six-day event that covers about 2000km around Tasmania.

Jack Waldron and Vin Gregory (low budget competitors) were entered this year in their Mitsubishi Sigma, ably supported by the service crew of John Wicking, Ian Maud and Bill Freame. Jack, Vin and John had accompanied the Sigma on the ferry to Devonport, Tasmania, while Ian and Bill flew directly into Launceston, having been transported to Tullamarine by Shayne Williams, with the crew all arriving on Sunday morning, 24th April. Scrutiny of all the cars was progressively conducted at the Silverdome and they were then all parked together on the basketball courts that are inside the building. The Sigma passed scrutiny and was ready for the start on Tuesday, 26th April. A very comprehensive crew briefing, at a venue in Launceston, was a compulsory attendance occasion and covered far more topics than in previous years. Car #402 and crew were ready.

Giocattolo and Lancia Stratos replica waiting in parc ferme in the Silverdome, Launceston. (The photo isn't distorted – that's a banked velodrome behind them!)
Photo: Bill Freame

Tuesday morning (Day one) and Ian had an early 'phone call from his wife, Martine, advising him that his brother-in-law, Steve Schmidt, had passed away at home, a totally unexpected thing to have happen. Steve had serviced for the team at Targa High Country only eight weeks before with Ian, so was certainly an important and practical part of our team. Ian considered that he should fly back home on the first flight available, completely with the full support and understanding of our team but realised there was little to be gained and that Jenny was being well taken care of by family and friends. It was an awkward situation that Ian found himself in, but staying for the whole event in Tasmania was the right one, in my opinion. Steve would certainly agree that he should stay.

A portion of the Targa field housed in the Silverdome.
Photo: Ian Maud

Jack (left) and Vin (right) with the mighty Sigma: an ex-group C race car converted back into a capable Targa machine
Photo: Ian Maud

Day one of the event was dry, with a late start and with only two stages, the second to be through the streets of Georgetown and we knew that rain was coming for the remainder of the event. We serviced that night outside the Silverdome, as we usually do when it is not raining. We also filled the fuel tank of Vin's Mazda BT-50 service vehicle and filled the two 20-litre fuel churns. The Sigma was on contract to be fuelled by Vandenberg Motorsport, so that was one less job for Ian and Bill, however, we would carry some fuel in the service vehicle for the odd times that it would be better to top it off ourselves, as was to happen at the end of day 2, but more on that later.

Day two has the cars exploring the challenging road conditions to the north west of Launceston, with us waiting for a drive past at Elizabeth Town, on a servo forecourt. Our next drive past was at the approach to Latrobe, whereby we continued on to Sheffield, where there was a pause for lunch. After lunch the event continued with the Mt Roland and then the Paradise stages, before they returned through Sheffield to drive back to Launceston. It was wet for much of the day and we were told, once back in Launceston that the Targa-fest display, in Launceston CBD, was cancelled. We had serviced the Sigma in the shelter of a closed servo, in Hadspen. The Sigma needed the clutch cable replaced, which we all attended to, with Ian crawling underneath the car to connect it and adjustment made at the firewall. We had also topped up the Sigma from the Jerry cans, so the crew could drive straight into the Silverdome, to save late running time, after we had finished the servicing.

After the evening meal, while Jack and Vin were awaiting the next day report time to be texted to them, Ian and Bill drove into Launceston CBD to fill the BT-50 and refill the Jerry cans, ready for day three. As we cook an evening meal every night, Ian and Bill were also to grab more food on the return trip. It was a 'phone call from Paul, at about 9pm that advised us that there had been a fatal crash on the Mt Roland stage that afternoon. Jack was still waiting for his now very delayed report time for day three when we returned. All we knew from Paul was that it was a crew from Qld and that it had been on the evening news in Melbourne. No car description, or crew details were yet released. Being long time Targa competitors, Jack and Vin were really worried about who it might be, as they know so many of the crews from years past.

Myself being the supreme pessimist, I offered that serious 'discussions' would be taking place between the Premier, the Chief Commissioner of Police, Targa officials and Motorsport Australia senior officials. Mark Perry, representing Targa, would have been very busy trying to keep the event alive and able to continue. I have no doubt that Motorsport Australia would have been threatening to pull the event permit, which would have ended this Targa

Georgetown Targa stage, Day 1 of 2022 Targa Tasmania, and the Sigma takes this corner quickly and capably. The tyre marks ahead of it are from an ex-Group C Commodore: you may be able to see a break in the black lines, as it shifted gears and lit up the tyres again! The next three days were forecast to be wet – were looking forwards to seeing how the Commodore handled the rain, with that much horsepower!
Photo: Bill Freame

immediately. It would appear that some type of compromise was struck which enabled the event to continue, but only as a 'touring event' and with the stages still using closed roads, but posted speed limits to be obeyed at all times. Thus 100 kph would be the maximum speed that the cars would be permitted to drive at.

Jack and Vin, after careful consideration of all the facts, made the decision that they would continue in the event. Some of those sensible reasons were: all our remaining accommodation bookings were already paid for; Targa deserved our full support to be able to continue; service crew flights were arranged to depart from Hobart on the Monday; and it would have been impossible to move the return ferry trip to any time earlier. Meanwhile, with the competition element of Targa now ended, John had been able to book an earlier flight back home to Townsville on Friday morning.

Day three was mostly wet as we headed east to pass through St Mary's on the way to St Helen's, for the lunch break. We caught up with the Sigma and crew as it was being refuelled by Vandenberg's at St Helen's before they went into lunch. We returned to St Mary's for our lunch, then we waited for the cars to arrive from the road to the 'Chain of Lagoons' stage. With just a wave past, we followed them back to Fingal where they turned off to the north for their next stages, while we then waited for them to arrive at Avoca. Another quick service was performed and the Sigma returned to *'Parc Ferme'* in the Silverdome. Meanwhile, several of the top teams were loading their cars onto trailers or into trucks, obviously not planning on continuing any further; they were quitting the event.

Day four was a big one, with our whole 'caravan' needing to be packed aboard the service vehicle, yet still leave easy access to any tools or spares we may need to reach in a hurry. We were heading across to the west coast, at Strahan, making it to all the service points required while also towing the tandem trailer as well. Our plotted course would take us past Cradle Mountain, so we could get to the Waratah crossover with least distance travelled and within adequate travel time. With another wave past from the Sigma, we headed for Zeehan and on to Strahan. With the trailer parked and the luggage unloaded, we decided that the servicing would have to be in a picnic shelter we have used in previous years, because we were in a steady drizzle, in Strahan. The immediate problem to solve for the Sigma? Jack had nudged an earth bank with the right front corner and pushed the guard back onto the tyre slightly. Much leverage was applied to persuade the guard back to about where it should be and the suspension was thoroughly inspected to make sure there wasn't any damage. Plus, we made a good job of washing all the mud off the tyre, guard and wheel, so the damage would be less noticeable. It had been a long day and all this damage repair was eating into the late time and they still needed to fuel up via Vandenberg's, before booking in.

Day five, Saturday and we would loop back to Strahan, via Burnie on the north coast. We waited in Tullah for the wave past then followed them to the Waratah crossover, where we added 20 litres for them to drive through the Hellyer Gorge, while we continued on to Burnie via the Ridgley Hwy to catch them on the side of the highway on their way to their lunch in Penguin. We grabbed some BP fuel in Burnie to make sure we would always have 40 litres in the Jerry cans for our refuelling of the Sigma at Tarraleah on Sunday. The motto: 'Be prepared' comes readily to mind! While waiting at the Waratah crossover again, I reminded Ian to confirm our flights for Monday. Another quick service and my notes from then suggest we added 20 litres to the Sigma, but I think they had visited Vandenberg's to fill the tank. Ian and I filled the BT-50 with diesel, filled the empty jerry can with 98ulp and returned to our camp.

Day six, Sunday, and another long day ahead. My notes suggest we had to be packed and gone well before 7:00am, to stay ahead of the progressive road closures. That's all the luggage packed into the BT-50 and the trailer attached, too. It was raining as we packed the luggage and attached the trailer, so then it was, "See you at Tarraleah!" As we were a little ahead of our timing at Derwent Bridge, we

were able to grab a quick cuppa and something hot to eat. Then it was off to get through the last stage that could stop us - the drive through Tarraleah. We set up with our fuel churns at the ready, as there would be no 98ulp anywhere before New Norfolk. We got about 30 litres in the Sigma tank and they then continued. We packed up and drove through to Hobart, parked the trailer, unloaded all the luggage, then Ian drove into Hobart to collect Jack and Vin as the Sigma was now in '*Parc Ferme'*.

That night we enjoyed a traditional final dinner together at the 'Ball and Chain' in Salamanca Place. Monday morning Vin dropped us off at the Hobart airport for our flight home to Melbourne. Peter Kerr picked us up from Tullamarine and we chatted about this Targa all the way home. Peter had serviced for Jack and Vin at Targa for many years, so he well knows the hardship that serving entails.

On Tuesday I tested positive for COVID-19, as did Vin a couple of days later. Ian stayed virus-free, despite us travelling close together for over a week. Because of the positive test result, I was unable to attend two funerals while I was considered contagious and remained in quarantine, one of those funerals was for Steve. How Ian stayed 'clean' is anybody's guess?

Can Targa Tasmania survive? Well, if it does survive in the present format, it probably won't be on a Motorsport Australia permit, that's because their insurers don't want to continue insuring Targa-style events. I think Targa High Country (THC) can survive, but Tasmania is well known as the tourist state and I don't think they will want to have the reputation of having dangerous tourist roads. The fact that the fast cars can easily achieve the 130 & 200kph event-imposed limits on some of the stages that normally carry tourist traffic at 80-100kph seems irrelevant. I hope that Targa Tasmania can survive, but there will probably need to be further changes to how it operates.

As an aside to this Targa season, Jack and Vin have been announced as the 'Thoroughbred Trophy' winners for 2022. I can only imagine that points were awarded to all entries that completed Targa Tasmania this year and the Sigma crossed the finish line in Hobart. Well done guys, ably supported by John, Ian, Steve and Bill over those events.

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From UK Racing History, via Facebook:

Tazio Nuvolari – one of the greats

In 1930, Italian racer Tazio Nuvolari — wearing his typical yellow jersey and blue pants — battled arch rival Achille Varzi in the classic Mille Miglia (1,000 mile) motor race. Varzi, a fellow Italian, had been told repeatedly at each control point that he was comfortably in the lead. The dark of night still encompassed the Italian countryside, but with morning fast approaching, Varzi felt the race was his. After all, there were no headlights visible from behind. He was out front, all alone - until he wasn't.

Nuvolari, catching the complacent Varzi, had switched off his headlights. He tore through the public roads near Bologna at speeds of over 93 mph, reeling his rival in with every passing mile, despite the perils of darkness. One might assume that manhandling an Alfa Romeo 6C 1750 GS Spider Zagato in the pitch black of night, sleep-deprived and coated in oil and bugs, would be, well, distressing. But not "The Flying Mantuan." Nuvolari was afraid of nothing.

As a kid, growing up near Mantua, Italy, he built his own parachute using blankets. Naturally, he had to test his creation. So, he climbed onto the roof of his family home and proceeded to jump. The fall almost killed him. At age 23, he worked as a driver for the Italian army during World War I, piloting everything from staff cars to ambulances. On one occasion, with his ambulance filled with injured soldiers, Nuvolari drove so fast he lost control and crashed into a ditch. He was immediately relieved from his role, and told by an officer to "forget driving" and that he wasn't "cut out for the job."

Nuvolari ignored the advice. It was this utter disregard for personal safety, and a determination unlike any other, that made him one of the greatest racers to have ever lived—and yet he's rarely uttered in the same regard as the likes of Fangio, Schumacher, Villeneuve or Senna, despite Ferdinand Porsche declaring him the "the greatest driver of the past, the present and the future."

This is in part because Nuvolari was pre-Formula One, so his 24 Grand Prix victories lack the same notoriety. Still, five wins at the Coppa Ciano, two at the Mille Miglia, two victories at the Targa Florio, two RAC Tourist Trophies, a 24 Hours of Le Mans victory and a European Championship speak to the talent of this effervescent Italian.

Prior to his four-wheeled accolades, Nuvolari began racing on two, where, naturally, he was blindingly fast, netting a 350cc European Championship in 1925. That same year saw him test the Alfa Romeo P2 Grand Prix car at Monza. Attempting to impress by besting regular driver Antonio

Ascari's time, Nuvolari crashed heavily and was thrown from the car, sustaining numerous fractures and lacerations. Doctors informed the intrepid Italian that he'd be bed-ridden for a month. And yet less than a week later, bandaged in a fixed riding position, Nuvolari competed in the National Grand Prix motorcycle race. Due to the plaster corset he wore, he was unable to support himself on the bike, relying on his mechanic to keep him upright on the grid and during pit stops. And yet he claimed victory that day, snatching the lead in the closing laps. He then proceeded to pass out due to the pain.

And the tales don't stop there. He once threw himself out of a burning race car at 99 mph, breaking multiple bones in his body. In 1936, against doctor's wishes, he conducted a daring escape from a hospital to compete in a race the following day, once again donning a plaster corset. And as rumour has it, during the French Grand Prix, he even grabbed a joint of ham from a butcher's smashed window.

Perhaps his most prolific tale came during the 1948 Mile Miglia. First, the hood flew off his race car at speed, narrowly missing his head. Nuvolari's passenger (it was mandatory to have one back then) was, understandably, alarmed. The Italian tried to comfort his companion by assuring that this was actually a good thing: "The engine will cool more easily," he said. Next, Nuvolari's seat came loose. He nonchalantly threw it out, replacing it, as one does, with a sack of lemons and oranges sourced from a nearby shop.

Racing a hoodless Cisitalia 202 SMM, perched on a bag of fruit, Nuvolari continued, despite the team pleading for him to retire. The car would continue to fall apart as the race continued, and yet the Italian star would not give in. In the end, it took dramatic brake failure to force his retirement, such was his will to win.

With Nuvolari, though, it wasn't all theatrics. His greatest victory arrived in 1935 against Nazi Germany, driving an underpowered Alfa Romeo Tipo B. The Nazi government were in attendance at the Nurburgring Grand Prix that day, and with five Mercedes and four Auto Union machines competing, a German victory was all but assured; no other cars were capable of keeping pace, especially the little Alfa.

Except Nuvolari—the "inventor," Enzo Ferrari once said, of the all-wheel drift—didn't care what people said. Despite a terrible start and a multi-minute refueling delay, by the final lap, the considerably slower Alfa was in second place. The leader, Mafred von Brauchitsch—aboard his Mercedes-Benz W25B—had a 30-second lead. Nuvolari wheeled his machine at an unfathomable pace, catching the leader and passing him to claim what was described as an "impossible victory."

In many eyes, this ranks as the greatest victory of all time.

Nuvolari's career effectively ended when World War II broke out. He did return post-war, but severe asthma—a product from years of inhaling exhaust fumes—meant that his performances suffered. Nuvolari had publicly said he wanted to die at the wheel of a race car, such was the man. Having spent his life dancing with death, what sealed his fate was actually a stroke in 1952, leaving him partly paralyzed. The following year, he passed away in his bed.

Nuvolari was arguably the most courageous racer to have ever lived. His accomplishments certainly rival that of Senna, Fangio and Schumacher—without question the greatest of his era. 55,000 people lined the Mantua streets during his funeral, with Fangio, Alberto Ascari and Enzo Ferrari some of the many laying him to rest.

"Tazio Nuvolari was not simply a racing driver," said British motorsport historian, Cyril Posthumus. "To Italy he became an idol, a demi-god, a legend, epitomizing all that young Italy aspired to be; the man who 'did the impossible', not once but habitually, the David who slew the Goliaths in the great sport of motor racing. He was Il Maestro."

Even Varzi would likely agree. In the death of night he crept up from behind during the 1930 Mille Miglia—the Alfa's headlamps off to prevent his nemesis from noticing. Nuvolari caught his teammate with just three kilometers to go. At which point, he switched his headlamps back on, made a daring pass, and tore off into the distance.

Varzi, stunned, never saw him coming.

(main photo: PhotoLab, Article: Alex Lloyd)

...and a parting shot:

← Back to the days when motorsport was literally on your doorstep: here's a period photo from the Targa Florio, with V12 Ferraris and the like wailing as they flew at full pace through tiny Italian villages before returning to the windy mountain roads that gave this event its character. One can only imagine what a modern corporate box would cost, to get a view as fine as offered from these balconies. And… I guess you'd have to be careful when you went to bring in the milk!

But what a sound…!

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