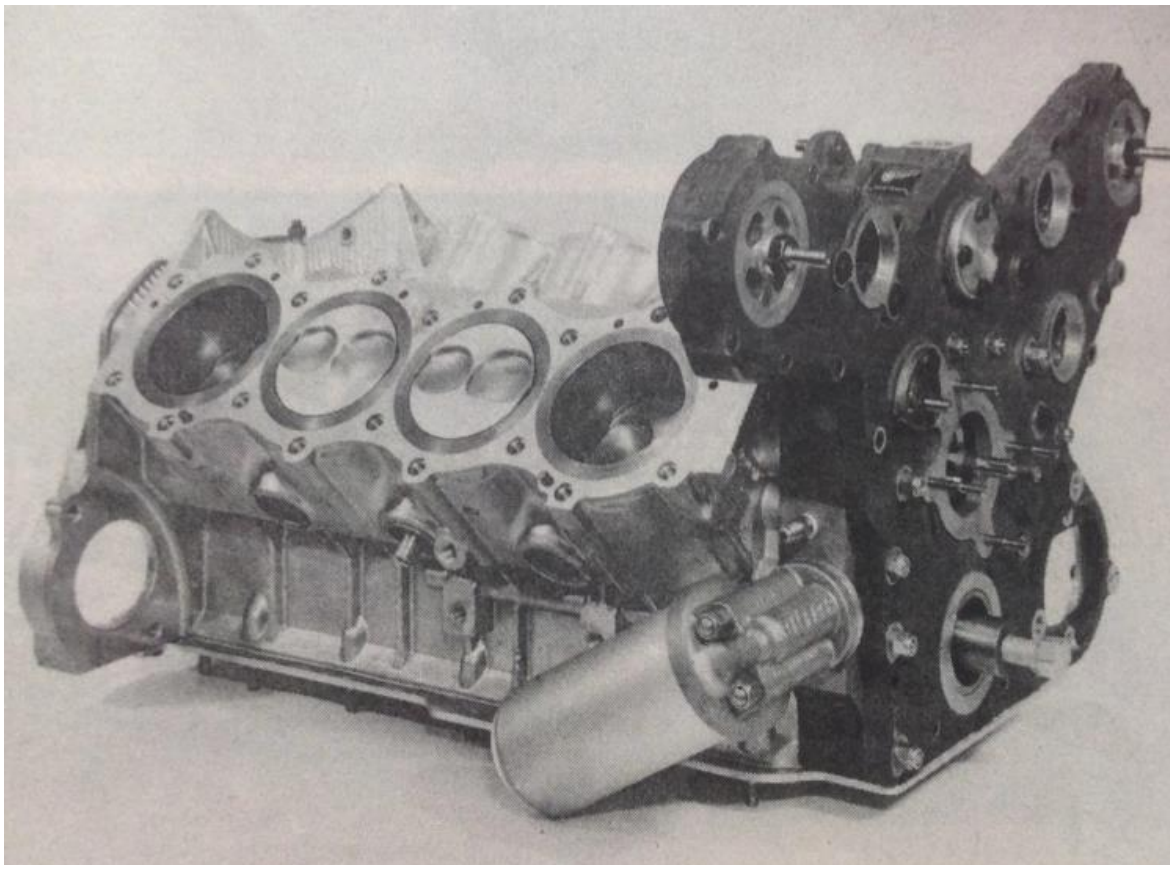
VALVE BOUNCE

SEPTEMBER, 2021



You may not recognise this motor from the photo here – but this would go on to become famous as the RB620 – the motor that powered Sir Jack Brabham's Formula 1 car to his first World Championship. Inside this edition is part one of contemporaries Rodway Wolfe and Mark Bisset's account of how it evolved from a little-used Oldsmobile design to a world-beater.

Photo: Repco

In this edition: coming events; khanacross review; GCC Championship point scoring; successful grant application for club equipment; valve guide considerations, 1967 Formula 1 engine review by Phil Irving; and the RB600.

- 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
2021-2 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	Yvette Stolk ystolk@gmail.com	0411 166 628
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	Ian Maud icfm710@gmail.com	0414 580921
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 & Paul Hickey Jillracer727@gmail.com	0409 412452
CAMS DELEGATE		

MAGAZINE CONTRIBUTIONS Forward by email to icfm710@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 2021

SEPTEMBER

Friday to Sunday, 10/12	South Australian Hill Climb Championship at Collingrove
Saturday to Sunday, 11/12	Nugget Nationals at Winton
Sunday 12	MSCA Sprints at Phillip Island **CANCELLED**
Sunday 12	***GCC Khanacross at Bryant Park***
Tuesday 14	Board Meeting, 7.00 p.m.
Friday to Sunday 17/19	Shannons Nationals/TCR Australia at Sandown **CANCELLED**
Friday to Sunday, 17/19	Super Trucks at Winton **CANCELLED**
SATURDAY 18	**WORKING BEE/CLUB PRACTICE DAY**
Saturday to Sunday, 18/19	PIARC Supersprint Round 4 at Phillip Island
Sunday 19	M&DCC Boisdale Hill Climb Short Track
Saturday to Sunday, 25/26	Victorian State Race Series Round 5 at Phillip Island
Saturday 25	Honda Nationals at Winton
Sunday 26	**VHCC Round 2 at Bryant Park**

OCTOBER

Saturday to Sunday, 2/3	Supercars at Winton
Sunday 3	NSW Hill Climb Championship Round 9 at Fairbairn Park **CANCELLED**
Sunday 3	MGCC Interclub Hill Climb Round 3 at Rob Roy
Sunday 3	Australian National Show and Shine – Euroa **CANCELLED**
Sunday 3	*Kyneton Car Club track hire at Bryant Park*
Tuesday 5	Valve Bounce collation
Saturday 9	MSCA Sprints at Sandown
Tuesday 12	Board Meeting, 7.00 p.m.
Friday to Sunday 15/17	Shannons Nationals at The Bend
Saturday to Sunday, 16/17	AROCA 12 Hour Relay at Winton
Saturday to Sunday, 16/17	Mt Tarrengower Historic Hill Climb **CANCELLED**
Saturday 16	M&DCC Boisdale Twilight Hill Climb Long Track
Saturday 16	*MG Car Club track hire at Bryant Park*
Sunday 17	**GCC Multiclub Hill Climb at Bryant Park**
Friday to Sunday, 22/24	Shannons Nationals at The Bend
Friday to Sunday, 22/24	Australian MotoGP at Phillip Island **CANCELLED**
Saturday to Sunday, 23/24	Supercars at Phillip Island
Saturday to Sunday, 23/24	Formula Vee Nationals at Winton
Sunday 24	MG Car Club Youth Challenge at Rob Roy
Friday to Sunday, 29/31	Saloon Fest at Winton
Sunday 31	***GCC Khanacross at Bryant Park***

NOVEMBER

TBA November or December	TCR Australia Bathurst International
Wednesday 3	Valve Bounce collation
Thursday to Sunday, 4/7	Bathurst 1000
Friday to Sunday, 5/7	Excel Enduros at Winton
Saturday 6	**GCC Multiclub Hill Climb at Bryant Park**
Sunday 7	**GCC Multiclub Hill Climb at Bryant Park**
Sunday 7	MSCA sprints at Winton
Tuesday 9	Board Meeting, 7.00 p.m.
Thursday to Tuesday, 11/16	Bathurst Challenge
Friday to Sunday, 12/14	Australian Motor Race Series at Winton
Saturday 13	M&DCC Boisdale Hill Climb (Noel Burley Memorial) Short Track
Saturday to Sunday, 13/14	PIARC Supersprints Round 5 at Phillip Island
Sunday 14	AROCA Sprints at Winton
Wednesday 17	*Targa Florio at Bryant Park*
Thursday to Sunday, 18/21	Australian Grand Prix at Albert Park **CANCELLED**
Friday to Sunday, 19/21	Supercars at Sydney Motorsport Park

Saturday 20	Winton 300
Sunday 21	*Sporting Register at Bryant Park*
Saturday to Saturday, 20/27	RACV Alpine Trial Centenary **CANCELLED**
Thursday to Sunday, 25/28	Australian Hill Climb Championship, Mt Cotton, Queensland **NOTE NEW DATE**
Friday to Sunday, 26/28	Bathurst International
Friday to Sunday, 26/28	HQ Enduro at Winton
Friday to Sunday, 26/28	Geelong Revival Motoring Festival
Saturday 27	*Nugget Nationals track hire at Bryant Park*
Saturday to Sunday, 27/28	Island Magic at Phillip Island
Sunday 28	*CCRMIT track hire at Bryant Park*

DECEMBER

Friday to Sunday, 3/5	Supercars at Surfers Paradise, Qld
Saturday 4	**GCC Multiclub Twilight Hill Climb at Bryant Park**
Sunday 5	MSCA sprint at Sandown
Tuesday 7	Valve Bounce collation
Sunday 12	AROCA Sprints at Phillip Island (TBC)
Sunday 12	***GCC Khanacross at Bryant Park***
Tuesday 14	Board Meeting, 7.00 p.m.

CALENDAR 2022

FEBRUARY

Saturday	**VHCC Round 2 at Bryant Park (Twilight Event)**

MARCH

Sunday 6	*Porsche Club of Victoria track hire*

APRIL

Thursday to Sunday, 7/10	Australian Grand Prix at Albert Park

OCTOBER

Saturday to Saturday, 15/23	RACV Alpine Trial Centenary
Sunday 30	*Kyneton Car Club track hire at Bryant Park*

DECEMBER

Saturday 3	**GCC Multiclub Twilight Hill Climb 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.

Vale: John Curley

9/08/1939 – 1/08/2021

Sadly, my much-loved Uncle, John Curley (of Traralgon) passed away suddenly from a heart attack on Sunday 1st August at the age of 82.

John was one of the very early members of the Gippsland Car Club and great mates of Ray Ikin and Ben Guzzardi, both well-known competitors at the Morwell Hill Climb.

As a young boy and already car-mad by the age of eight, I vividly remember a sizable B&W photo on John's sideboard of his '57 Pontiac Super Chief (347ci V8) power-sliding at much speed around the Morwell Hill Climb track on a left-hand turn. I suspect it would have been taken in 1963 – 64, because he set the FTD "fastest time of the day", so this makes it pre-Mini Cooper days (when they began to dominate). However, according to John, he was never awarded the prestige of the FTD as apparently, due to a timing error or mix up, it was given to a chap in an Austin Westminster, but John decrees that car was one of the slower competitors of the day. I hope one day that Marina can unearth this photo for publication in VB.

In later years with his brother Des, John continued his racing career on the speedway track with a very successful Ford Zephyr called "Yippee Bean." It was named after the pep-up pills that truck drivers used to stay awake on long interstate hauls, both Des and Johns' profession at the time.

John was a very proficient "wheel man" and always ran fast cars. As a consequence of this, I acquired my love for Jaguars (having now owned 8 of them) from John's beautiful British Racing Green 3.8 Mark II Jaguar, that he owned in the mid-1960s.

John, you will be greatly missed but never forgotten by your family and friends.

-By Gary Tate

Editorial Ponderings:

Between a rock and a hard place…

Clubs such as the GCC form in response to a need or interest. In our case, I believe the common links between members are a passion for motorsport; the thrill of testing yourself and your car at the country's premier hillclimb track; the on-going challenge of trying to do something better than last time; an interest in fellow competitors' machinery; the camaraderie of 'belonging,' and doing something you enjoy in the company of other like-minded people (apologies if I've missed your particular interest).
So, these are the 'glue' that binds our club together.
One of the insidious and overlooked casualties of this COVID lockdown is the eroding of this glue. Glancing back through the list, it seems that few of these factors can continue in a prolonged lockdown – not just for the GCC, but for other car clubs, and in fact, most clubs of any nature.

A motoring enthusiast's opium is that occasional opportunity to go for a drive, when the weather is fine, the road winds luringly before you, and the car co-operates in a synthesis that generates more mental health reward and endorphin release than you will ever get ingesting daytime TV. As members will be painfully aware, not only is your travelling range curtailed at present, but those whose competition car is not road-registered can't take them out at all – hence depriving them of this much-needed 'hit.' I am personally aware that mental health is a quite real condition, and what seems common to its various treatments is you need to regularly do something for *you* – something of interest, excitement - something that lifts the soul. In our petrol-headed community, that often amounts to firing up the pride and joy and going for a blast: a therapy sadly not widely available at present.

A short-term lockdown is a preventative measure that represents little more than an annoying hiccup: what is the hidden outcome of extended lockdowns? Do people become disconnected from their interest and drift away from clubs? Hopefully, the reverse will be more likely. While we're partly insulated in Gippsland from extended stay-at-home rules, I feel for our brethren in the metropolitan area who don't have the magnificent spaces we're surrounded by, to recharge the spirit. I would like to think these people are out in the garage, polishing and fettling their competition cars, itching for the declaration of mobility so they can once more buzz down the freeway and join us in tackling Bryant Park, amongst other tracks. These lockdowns *will* end, even if we have to reset our boundaries a little. To all GCC members: hang in there – we look forward to having you all back together in Gippsland, where we can once again talk together, test our mettle and exaggerate the outcome!

Looking across this edition of VB, I'm very much aware of the role and importance of a club magazine. I have been in several clubs over my years, and in a (brief) moment of clarity, I realized

that any club, group or whatever is only going to be as strong as its communication between members. While nowadays we have group texts and electronic media, for many the monthly magazine is still where they like to keep in touch with fellow members, see what's coming up, read of others' exploits, and so forth. In these times of numerous and prolonged lockdowns when members can't actually gather face-to-face, the role of the club magazine takes on new importance. If preserving members' interest (and sanity?) now largely falls on the magazine, the role of Editor is a little daunting. What to include? What appeals to members? What should be the balance of articles? A crystal ball should be an essential accessory to the Editor's keyboard!

We would all like to read of GCC events, but for obvious reasons, that isn't always possible at present. Indeed, the steady flow of GCC events – together with associated planning and reviews – has reduced to an incontinent dribble, with again just the one khanacross to report on for the month. Until we can return to more regular events, Valve Bounce needs to be filled from outside sources. I'm always delighted when I receive an article from a GCC contributor, as this generally ensures content relevant to our membership. In the absence of these, I have tried in past months to provide a range of articles that would appeal to motorsport, motoring and driving enthusiasts. Where possible, I've tried to also focus on the people involved: some are exceptional in technical areas, but motorsport also seems to attract some great characters! Whatever the current blend, please feel free to suggest what might be included in future editions of VB. I'm hoping these sizeable editions at least provide an enjoyable distraction from lockdown for a while, but the content is always up for review. Remember, like they used to say in a banking advertisement: it's *your* magazine, Ralph!
Enjoy.

-IM. The Ed

What do you need to know now?

- **CLUB CHAMPIONSHIP 2021:**

- **Next GCC HILLCLIMB:**
  - Sunday, October 17th (multiclub) GCC Championship

- **Next GCC KHANACROSS:**
  - Sunday, September 12th GCC Championship

- **VICTORIAN HILL CLIMB CHAMPIONSHIP 2021 - next round:**
  - Sunday, September 26th at Bryant Park (Rd 2-rescheduled)

Chairman's report, September, 2021 - Rhys Yeomans

The positives are we are now in spring, the days are getting longer and there is a nice warm breeze coming through the open window as I type this. I might even have my first swim at the beach this afternoon, thankfully 4.65km from my house!
The car remains in the garage though, covered in a layer of dust that looks like it'll remain for a few more weeks at least!!

While the Board has been unable to meet face to face, we've met via phone conference to ensure the continual running of the club, calendar revisions and to focus on the Government grants currently available for Motorsport clubs and venues. Scott Seddon has detailed elsewhere in this publication where we have been successful with our Club Assistance grant submissions. Thank you to Scott for leading this submission, which will have a positive impact on the club and our events.

The Infrastructure grants previously mentioned in past issues of Valve Bounce have now opened, led by Ian Maud: we are confident in submitting and being successful in receiving this funding.

In regard to competition, we'll continue to run events as per the calendar when it is possible. Our last khanacross event in August was run as Regional only, which from a club perspective of having members competing in motorsport, was a success. An updated calendar is always available on our website and in each copy of Valve Bounce.

Otherwise, not much else for me to report! I look forward to seeing you all at Bryant Park sooner rather than later!!

Competition Secretary's Report -Rhys Yeomans

See above.

Some people have found new ways to publicly display their optimism: a tear-drop caravan, towed(?) by a 1953-1955 BMW Isetta 250.

Source: Facebook

Deputy Chairman's report, September, 2021 - Scott Seddon

It's exciting to be in a position to tell you that we have been successful in round 2 of the Motorsport Australia Club Assistance Grants. We applied for all 4 streams and were successful in each of them. So, what does this mean? It means we get some new gear, training and an event paid for by the state government.

So, what do we get, you ask? The 4 streams and their outcomes are:

- **Stream 1 – Khanacross Safety Upgrade**
  - Cones, Barriers, Timing system x 2, Waterproof Hi-Vis Jackets for officials

The new wireless timing system (left) and advanced timing system (right)

- **Stream 2 – Officials' Training**
  - Training for using the timing system

- **Stream 3 – Female Training**
  - St Johns First Aid training for female officials/volunteers

- **Stream 4 - 2022 VHC Round in Feb**
  - Costs to run the event, establishment of a new timing point to allow split times in runs.

The biggest improvement we will see are upgrades to our timing system. Motorkhanas will be run using two wireless timing sets (for when we break up into groups) that will plug into our exisiting timing system, allowing us to print results and get away from handheld stop watches!!! Hill climbs will now have the ability to display a split time in the scoring as well as being able to run reverse layouts with the Khanacross timing system. This is very exciting as it's been a long time since a reverse track layout has been used at the club.

Are you a female official/volunteer at the club? Would you like to be trained in first aid? If so, contact the secretary as we will have 8 spots available. If there isn't enough intertest to fill the spots we will move to juniors and then others. The course is done online with all the gear you need posted to you prior to the course so it's all done from the comfort of your home.

My goal is to get the timing systems on-site and set up in the next 2-3 months so we can have them tested and running for the Hill Climb and Khanacross in December. That way we can look forward to an improved and easier 2022.

Next GCC WORKING BEE

Upcoming Working Bee and Club practice – SATURDAY, SEPTEMBER 18th

These will be great opportunities for us to complete some of the major projects we've had running at Bryant Park in 2020, which includes the timing building and the new scrutineering shed extension.
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.**
PLEASE NOTE THE FOLLOWING:

- If no COVID lockdown state wide, the day will proceed.
- If metropolitan Melbourne is in COVID lockdown, the day will proceed as a *regional* event only.
- If there is a full state-wide COVID lockdown, the day will be cancelled.

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.

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.

➢ From the AOMC:

And more locally:

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. Last month there were 150+ cars on show! Everything from vintage to hot rods…even a restored tow truck!


American Motoring Show
SHARE THE PASSION
Sunday 26th September 2021
Yarra Glen Racecourse Armstrong Grove, Yarra Glen
Proudly presented by: Association of Motoring Cl
• Veteran • Vintage • Classics • Custom
• Fifties Fins • Sixties Cruisers
• Hot Rods • Comm
Admission:
Display Cars $15.00 includes all occupants
Spectators $8.00
Children Free
Enquiries: Iain on Mobi 0473 832 277
For updates, maps and information see website: www.aomc.asn.au Facebook: fb.com/infoaomc
Association of Motoring Clubs 21 Rosalie St, Springvale Vic 3171
ABN: 90 979 750 693
cancelled
IMPORTANT NOTE: Due to Covid requirements, admission to this show is by pre-booking only, via trybooking. Drivers and passengers must all be pre registered through this facility. To register and pay for your booking, go to trybooking at:
https://www.trybooking.com/BQTBJ


WINTON FESTIVAL OF SPEED
BACK ON TRACK THIS YEAR!
6,7,8 AUGUST 2021
cancelled


ALL HISTORIC RACING
BRAND NEW VENUE
20th, 21st, November 2021
PHEASANT WOOD CIRCUIT, MARULAN
Featuring Solo, Sidecars, Sportscars and
Racing Cars, Family and Club spectators discounts
A WEEKEND OF ACTION TO CELEBRATE THE ORIGINAL CONCEPT OF HISTORIC RACING
PHEASANT WOOD CIRCUIT
PUT YOURSELF FIRST
Call Scott: (02) 4841 1422 or
scott@pheasantwood.com.au
WE'RE COVID SAFE
8 Prairie Oak Road . Marulan NSW 2579

MOE PARKLANDS MOTEL

- Closest motel to Bryant Park!
- 3.5 stars
- Family restaurant next door
- Guest Laundry
- BBQ area
- Car and trailer parking
- Free wireless internet
- Solar heated pool

- At the Moe Parklands Motel, we invite you to picnic or use the guest barbeque in our delightful gardens.
- For your evening meal, Rookies Bar and Restaurant is next door.
- A dip in our solar-heated pool will relax you at the end of a day enjoying all that Moe and surrounds has to offer.

RECEPTION HOURS : 7.30 am to 9.30 pm

98 Narracan Drive, Moe, Victoria

Telephone 03 5127 3344

EMAIL: stay@moeparklandsmotel.com.au
WEBSITE: www.moeparklandsmotel.com

FOWLERS ASPHALTING

PO Box 199 Trafalgar Vic 3824

Bryant Park track was asphalted by Fowlers Asphalting
For domestic and industrial asphalting services, please call 03 56332918

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

- **CALENDAR.** Further changes!! How does one keep up?? At the moment, keeping track of what is happening is a virtual impossibility – the only known is that we seem to keep having lockdowns, and every time we do, our calendar is affected. We have had a number of cancellations in the past month, but we have actually had one event – a regional khanacross on August 15. We still have our events scheduled on their original dates, and will continue doing so in the hope that some or all of them might take place. The one thing that we have done is **ADD** an event on Saturday, November 6 **– YES – TWO EVENTS IN TWO DAYS!!** Will the khanacross on September 12 (next Sunday) take place – good question? What we have decided is that if the metropolitan lockdown continues, and the regional lockdown is lifted, the September 12 event will become a regional khanacross – the same as the event we had on August 15. The same will happen with any hill climb that is also affected with the metropolitan/regional divide. If this happened with our VHCC Round 2 scheduled for September 28, it would no longer be a VHCC round. Two rounds of the VHCC have been **CANCELLED** in recent times - One Tree Hill at Ararat and the Mini Club event that was to have been held at our track on August 29, and the Six Hour Relay scheduled for August 29 at Phillip Island was also **CANCELLED,** and will not be rescheduled this year. There are rumours to the effect that an additional VHCC round will be included (unlikely to be at our track) in the not too-distant future. As far as other events are concerned, who knows what will happen – the media seems to have a different date for Bathurst almost every day – in the meantime, motorsport keeps happening in Queensland, Tasmania, Western Australia and South Australia - I guess it will be our turn soon. **LATE NEWS**: The Mt Tarrengower hill climb in mid-October has been **CANCELLED**: Round 9 of the NSW Hill Climb Championship at Fairbairn Park in the ACT has been CANCELLED; The Australian Hill Climb Championship scheduled for Mt Cotton in Queensland has been moved from late October to late November in the hope that competitors from all states may be able to attend. **EVEN LATER NEWS** (September 2): It has just been announced that the current state-wide lock down will continue until September 23, but may end prior to that for us regional folk – as such, the khanacross scheduled for September 12 may be a regional event if country Victoria is let out prior to that time, otherwise it will be cancelled. The September 28 VHCC Round 2 may still go ahead if all of the state is let out of lockdown on September 23 – if not, and regional Victoria is "free", it will become a regional hill climb. If we are all still locked down it will be cancelled.

- **OLD TIMING BUILDING**. The old timing building has been sold! One mention in Valve Bounce and it was gone! The building is actually still there, as Covid restrictions make it extremely difficult to move it at this point in time, so it will stay in situ until such time as movements across the state are allowed.

- **KHANACROSS.** We have been extremely lucky in that we have had all of our scheduled khanacross events this year, which is more than we can say about hill climbs, but we are not necessarily looking good for September 12. If that date happens to be cancelled, we may look for another date, but we are fast running out of options.

- **MEMBERSHIP.** The latest membership list reveals that a number of members have **NOT** paid their 2021 subscriptions. Our membership year runs as per the Calendar year – January 1 to December 31. Any member not financial by the end of September will be removed from the membership list, and lose all privileges associated with Club membership, including the ability to be able to compete in Motorsport Australia events. If you have a vehicle subjected to a Club Permit, you need to check the rules about being a financial member of a Club.

COMMUNITY MOTORSPORT PROGRAM – INFRASTRUCTURE FUNDING - ROUND 2. A number of clubs received substantial amounts of funding via Round 1 of this program – we did not apply. We are applying this time. Some time has been spent at recent Board meetings discussing this proposal, and Ian Maud offered to spearhead the proposal, which hopefully you can read about elsewhere in this Valve Bounce. Meanwhile, Scott Seddon prepared an application for the Community Motorsport Program, and we were lucky enough to have our grant application approved and we have now received $20,000 for a range of items for the Club. Scott has set these out elsewhere in this edition. Many thanks to both Scott and Ian for the work that they have or are doing here, and to Ken Neilson for chasing around obtaining various quotes.

NEW OLD STOCK. Those of you who watch any of the different 'pickers' shows on 7 Mate will notice how the pickers salivate when they come across New Old Stock in their travels – almost like gold to them. As it turns out – I have some!! I discovered (or is it rediscovered) these items when I was doing a garage clean up during recent wet weather. Some of what I have is worth a bit of money, some not necessarily so. It was suggested that I throw it all at the tip, or give it all away. What I am actually going to do is give some of it away, and attempt to sell the stuff that is worth a bit. As such, the next time I am able to go to the Club when we have an event, I am going to take the freebies with me for anyone to take – what is not taken will end up in the dumpster at the track. The freebies include many windscreen wipers and blades, trailer plugs, globes and lights (one looks suspiciously like an LH Torana headlight) and other assorted bits and pieces.

A COUNTRY KHANACROSS

-John Bryant

The last khanacross scheduled for August 15 was all set to go with 34 entries lodged a week before the event, and the promise of many more to come, but then came the metropolitan lockdown, whilst those of us in the regions were still relatively free. What do we do with the event? Two possibilities – cancel altogether, or run it as a regional event only – we chose the latter, so the event went ahead on August 15, albeit with significantly less entries than otherwise would have been the case.

Up until recent years, our khanacross events have only attracted about 15 to 30 entries, but in recent times, the numbers have grown significantly - this event had 16 entries, so we were not at all concerned, as more than half of the field normally comes from the areas locked down at the time. We had eleven GCC members, five from other clubs, and four juniors, and all had the opportunity of completing eight tests on the day. The day dawned fine and mild in Traralgon, but when I reached the track, there was the worst wind I have ever experienced at the place – it was almost impossible to stand up at times, and I was certainly glad to spend the day in the timing building, although it was shaking on its foundations for much of the day.

We did have a number of new cones on the day to mark the way, as many of the old ones were looking decidedly second-hand from being run over at various events – the new cones looked good, but the wind moved them around a bit at times.

The first two runs were the top loop of the track, both clockwise and anticlockwise. The next two were the carpark in both directions, followed by the complete track in both directions, and finishing off with the north start line to crossover and return, and the south start line to the crossover and return.

Matt Paulet set the pace all day, without hitting any cones or going the wrong way, and he was followed by Matthew Webb from the Mini Club, who lost 15 seconds from hitting cones. Sei Vella was not far behind in the Mazda MX5, although he could have finished second had he not incurred 20 seconds in penalties, and he was followed by the spectacular Brendan Linke from M&DCC in the Falcon Ute. The first junior driver was Declan Webb in the Mini, two seconds behind Brendan. Dylan Goodwin performed well in the immaculately presented Nissan 370Z, but only one second behind him was junior driver Ben Selwyn. Mazda Club member Rob Krygsma was not far away from Ben, whilst Travis Selwyn was close behind Rob. Following this lot were the sedate gentleman drivers, Ian Mayze, Peter Ferguson and Ray Vella – they do not spin wheels much, go quickly, but they all made a mistake or two which added to their times. Tyson Cull managed to hit a few cones and go the wrong way once, which slowed his time down somewhat. Peter Shinn managed to go the wrong way on three occasions, which did not do his score the world of good. Alyssa Perks was next in the Mazda MX5 – she managed a couple of minor indiscretions, but the consensus of opinion from all of the experts is that Alyssa drives better every time she appears, which is what we hope will occur with our junior competitors. Josh Hodson made his first appearance at a khanacross, and I suspect it was his first time driving a car with a manual transmission (may have even been his first drive ever!) – Josh made some mistakes, but was still smiling at the end of the day, the car was in one piece, and he learned a lot – I am sure he will be back for more.

We finished early, and all went home happy. Thanks to Rob Duncan for the excellent way in which he organises and conducts our khanacross events. Our next khanacross is scheduled for Sunday, September 12 –will it take place? Who knows the answer to that one, but hopefully it will. The results are included in this edition of Valve Bounce.

Guiding Considerations - Bill Freame

I regret to mention it, but we are reluctantly and inevitably heading towards an electric vehicle future in the next 10 or perhaps 20 years, and that means we will also all be that much older than we are now. Therefore, the vast range of spare parts available now, for existing internal combustion powered vehicles will probably start to dwindle, as will the supplying businesses, apart from the very specialist businesses that sell the parts and eventually the engine reconditioning servicing industry must also diminish. This won't happen quickly as there is a huge amount of industry that will continue to rely on internal combustion power until the whole vehicle needs to be replaced. Heavy duty trucks, classic cars and historic race cars have a future of sorts, while the spares for them exist. Anyone however already involved with the very earliest of motor vehicles, maintaining and restoring them can take many years, plus already usually involves a lot of making the parts yourself, often having to resort to copying from existing car parts that are already installed in another car, to replace missing bits on yours.

Understanding that for many of us reading this, those of us that are in the mid-afternoon to twilight years of our lives, internal combustion engine power is something we understand and will continue to play with, as long as we can source or adapt suitable spare parts for them. As such, we will then continue to rely on the surviving engine reconditioners, the ones that do quality repair work and always have a full order book, regardless of the state of the economy. These are the people who can solve problems. Some will just do all the cleaning and machining, leaving the assembly to you, while others will offer the full rebuild, even including installing it for a drive-away service. That requires full trust that no corners have been cut and quality parts and processes have been used.

Rebuilding your head:
A blown head gasket can be the opportunity to recondition just the cylinder head(s) providing the bottom end is in quite good condition. This will often involve a skim of the gasket face, new or reconditioned guides, a valve grind and perhaps valve seat inserts to restore the valves back to the correct height within the combustion chamber, for better breathing, unleaded fuels and valve operating mechanism adjustment. Plus, instead of needing a full engine gasket set, only a top end valve regrind set (VRS) is required, which should supply all the gaskets from the head gasket upwards and a full set of valve stem seals. It shouldn't be necessary to mention that all the old head gasket must be removed completely from the block, carefully, while making sure none of it can fall into the working bits of the engine; that's oil feeds, oil drains, timing chest, camshaft and cylinders. It will cost you more money if the reconditioner does all the work, including reassembly. However, if you decide to assemble the head(s) yourself, take note that valve stem seals come in sets, one for each valve. If you damage (ruin) one, you will need to purchase another full set, or hope the engine reconditioner has a broken set that he can and will supply you from. For FIAT heads I use a self-made fitting tool that ensures it instals the seal square to the alignment of the valve guide, every time!

To change the valve guides in an aluminium head it should be heated to about 150 degrees Centigrade (spittle will sizzle) to remove them by driving them out with a stepped punch that locates neatly in the bore of the guide. It is highly recommended that with Porsche heads, the guides should be drilled out with a stepped drill to collapse the interference fit, with the drill smaller than the guide so the head

Bill's tool for inserting valve guides into FIAT heads.

Photo: Bill Freame

is not damaged! (What, doesn't everybody do their own repairs on their Porsche heads?) Always drive guides out from the combustion chamber side towards the spring/stem side. Guides are also fitted into the heated aluminium head, from the spring side, into the combustion chamber side.

Guides – choose carefully!

A range of valve guide shapes and sizes, from supplier Automotive Surplus P/L (with thanks)

Photo: Bill Freame

Worn integral valve guides in cast iron cylinder heads can be reconditioned by the installation of a very thin wall brass sleeve, best known under the trade name of 'K-Line,' and several other trade names as well. They must be correctly installed by the operator otherwise high oil consumption can be just one of their problems and regretfully they can also come loose. Whilst very popular within the reconditioning trade, I don't know of any engine manufacturer that uses these sleeves on the production line. *Repco* actually manufactured replacement thin wall cast iron guides that required the original guide hole machined out to a standard size (0.500") and the thin replacement pressed in at a slight interference fit. Slightly more expensive to use, but far superior to a thin bit of brass! But when K-Line sleeves are fitted to removable guides in an aluminium head, you know the trade has lost the plot! Besides, you can usually buy replacement valve guides as spare parts for most engines, either from the dealer, or from parts suppliers like *Repco*, *Bursons* and *Cooldrive*, to name just a few. For the more obscure requirement, *Automotive Surplus* can probably supply it.

In the many years I have been involved with the automotive trade, I have modified production valve guides to accept quality stem seals on one end and profiled the other end where they fit into the port. Sometimes, when nothing is available, it has been necessary to make cast iron guides for a very vintage engine and I've also made non-standard competition guides out of an aluminium bronze for some special projects. Why this material?

Valve head heat is transferred into the seat while the valve is closed, during the cycle. The stem handles and survives the remaining heat at all times, but especially when the engine is stopped with some valves open, thus it's always a good idea to idle the engine down for the valve heads to cool off for a few minutes before shutting the engine off. The heat transfer from the valve stems is faster and better through aluminium bronze than cast iron, an important consideration when very high boost turbocharging is involved. Additionally, and very importantly, you will probably need to make them yourself when you decide to change to smaller than standard diameter valve stems for a special project build.

It's amazing what you can do if you need to:

Following this theme, a very long time ago I was involved with helping a friend rebuild the engine of a side-valve Harley Davison vee twin, a second world war military model but scrounger Ken had managed to rescue a complete bike from somewhere. Quite by good fortune for this project, we had almost unlimited after-hours access, but for only six weeks, to a very well-equipped machine shop with excellent engineering machinery that we were both capable of operating, by combining our skill levels.

A Harley-Davidson 42WLA motorbike as used widely during WW2: very likely the type of bike Bill & mate Ken were trying to repair years later. This machine on display at the Australian War Memorial, Canberra.

739cc; top speed 105kph; 25hp @ 4,500rpm – and with a three-speed, hand-shift gearbox!

Source: Wikipedia

We were only concentrating on rebuilding the engine of the Harley, as the gearbox was a totally separate item, not an integral part of the crankcase like more modern motorcycles are. Having stripped it down to examine the condition of all the worn parts, it was found to be in a pretty sad state. Pistons, valves, guides and crank pins had all suffered. The barrels were bored and honed to accept some used pre-crossflow Ford Cortina piston assemblies we had purchased and we manufactured all new crank pins as well. The two inlet and two exhaust valves were able to be rescued by polishing the stems to reduce the taper and wear steps. The resident skilled welder was persuaded to use stellite to rebuild the heads of all the valves so we could grind a fresh seat on each of them. The Harley valve guides were all very worn and so we drove them out of the barrels to replace them with new ones. We probably could have purchased new ones from somewhere, but we were on a mission to spend as little money as possible, so we would make new ones, if we could find some suitable cast iron from somewhere. The township of Port Augusta that we were near had a wrecking yard that we visited, seeking out something cast iron we could utilize. A Holden flywheel was found in the yard and by relinquishing the ring gear we didn't need, we got it for less than half price. We paid only $2 for the Holden flywheel and $5 each for two (good) used Cortina pistons, with rings and pins!!!!!

Ken was amused when he observed me cutting the clutch plate area of the flywheel into square pieces in the bandsaw. The Harley valve guides had a flange that locates the guide to the correct depth protrusion into the ports plus it also has the valve spring seated upon it. Mounted in the four-jaw chuck in a centre lathe, each piece was machined close to the samples, except for the diameter where the guide is located in the barrel. The guides were centre drilled, then drilled with an undersize drill, finally finish-drilled with the correct size drill and with plenty of lubricating oil to gain a smooth finish and of the correct bore size. Then, with the guide mounted between centres in the lathe, light cuts were taken to machine it to the correct interference fit. This way the outside diameter should run dead true to the bore, thus the valve head should be in the middle of the seat.

Modern valve guides are parallel in section and are centreless ground on the outside, then held in a collet chuck in a lathe for drilling. But with the Harley guides having a spring seat flange, this was the best way to machine them to the finished diameter after making adjustments to the tailstock to have them machine parallel. I'm pleased to admit that those (flywheel cast iron) valve guides fitted perfectly. I remember grinding new rollers to the required oversize, using a valve grinding machine that is usually used for grinding only the seat on a valve head, but using it in this case to grind the rollers parallel together with a micrometer to measure and adjust out any taper, but that is a whole different story. We did get the Harley engine reassembled within the six-week timescale, but it was many, many years later that Ken eventually fired it up, before he then sold it.

Beware! It's your life. -Keith Charman, Elleton BMC Special

Not too long ago after a series of slips and slides at the wet tracks of Bryant Park and Rob Roy I decided to look for a set of wet track tyres. After a bit of research, I decided on a set of Hoosiers. I had a set of rims made and found a tyre supplier who could supply these tyres and had them fitted, a total investment of $2500.00.

After dutifully running them in at a club practice day, well worth a bit of gardening and mowing. Release agent removed and the shine taken off the treads I genuinely looked forward to a wet track to try out the tyres. Alas, dry tracks only so I put a set of custom covers on them then stored them in a tyre rack covered in foam and two tarps. Dry tracks then lockdown for a few months, so disappointing to put the car in the trailer on blocks and forget about hill climbs for a while and it turned out to be quite a while too.

Finally, lockdown is over but still relatively dry tracks so forget about the wets and use the dry track tyres.

Imagine my anticipation of a wet track (according to the weather forecast) at the horizontal hill climb to be held at the TAFE Logic Centre near Wodonga. So, I entered and was accepted. My thoughts were, I've got wet weather tyres, bring on the rain.

The new tyres and I are ready to go, the weather is freezing with fog or rain sometimes fog and rain, not pleasant at all but I've got wets to try out, so no worries.

First run, not quick to first corner because my visor is fogged, who wants to see anyway. I did notice that touching the brake the rear of the car wanted to overtake the front so I removed my foot from the brake and the car straightened. I will be a bit more careful after all the track is wet and it is raining. The next corner to get around is the Harold Roberts corner and with a touch of brake the rear of the car started to move faster than the front, remove foot from brake and continue through corner, get on accelerator at the exit and suddenly the rear does overtake the front and we go right round, but stay on the track. Spin one and this car feels all wrong. Back at the pits I check the tyre pressures and they are ok. I can't find a problem other than the drivers' confidence is diminishing, rapidly.

Second run, start ok but mercifully a clip on the accelerator cable lets go so I have to idle the car back to the pits. How much worse can this weekend get and I've got wet feet too. Race boots are apparently not designed to keep water out but the temperature has finally hit 7 degrees. All I can wish for is a dry warm garage at Bryant Park.

Third run, great start but the car is all over the track, plus side is that there is no understeer only massive oversteer. The rear of the car is sliding about so much I wondered if the tyres were coated in oil or is it that I just can't drive in the rain. It is raining again but with three antifog treatments I have adequate vision however I must remember to use Rainex on the outside of the visor next time. I managed to get around most of the circuit very untidily. Exiting a corner to a short straight frustration got the better of me and I applied full throttle. Next minute I am sideways and accelerating, so I take my foot off the accelerator push on the clutch pedal and let the car go where it wants and that is about 10 metres off the track,

in the mud. The engine is still running so I pick my way back on to the track. My treaded tyres are useful for getting out of the mud just not so good for staying on the bitumen. To make matters worse my big spin has been filmed and the comments are starting, my confidence is all but gone.

I have finally realised that the rear tyres have no grip at all and will change the rear wheels.

I am ready to try one more run.

This time I finish the run cleanly, not quick, but enough to improve my confidence and it was raining again but have to ask the question. Why can't I get around the track with wet tyres but can get around with 2 rear half worn dry tyres not known for their ability in the rain? Well, I got an answer to that question when someone made an alarming discovery. The rear tyres that I had paid $400.00 each from my trusted tyre supplier were dated 2508. They were manufactured the 25th week of 2008.They are 13 years old now and were 12 years old when I bought them. I have never checked the date of manufacture of any new tyres that I have bought, they look new therefore they must be new. I have paid full price for 13-year-old race tyres. I will personally check the date of any tyres I buy. It is my life and the only grip between the race track and my car is the small amount of contact between tyre and the bitumen.

If these tyres were on a road-registered car, they would be considered unroadworthy. When purchased the tyres looked new but after 3 runs, they are visually old and cracked in the treads not the look of new tyres. It makes you wonder what these tyres were coated with when I got them!

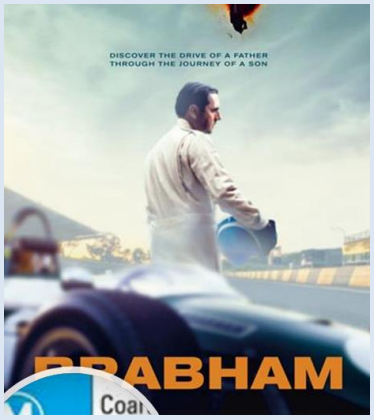
Oh, they were replaced with new tyres but very reluctantly and at some cost to me but at least I never have to drive on them again.

Jack Brabham biography follow-up -Fraser Faithful (GCC member)

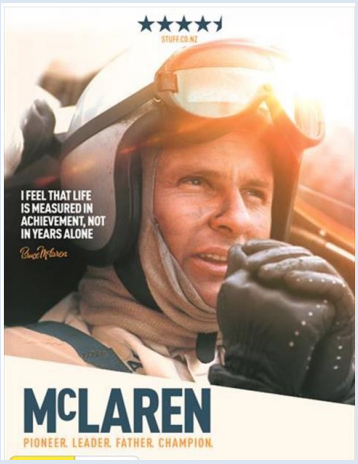
Ian Maud wrote a fascinating review of the recent Jack Brabham biography for the March 2021 edition of Valve Bounce. I totally agree with Ian: the book is a tremendous read.

Now hang on a moment… *But wait, there's more!*

Did you know there is a "Brabham" feature documentary also available, which includes significant input from the authors of the biography?



The doco was released last year, and perhaps might be best enjoyed as a supplement to the book published the year before. There are plenty of classic snippets, but the action footage and interviews as presented probably don't add up to an engaging narrative. The racing footage pretty much wraps up with Jack's third F1 world championship in 1966 so there is no vision of team mates Jochen Rindt racing in 1968 or Jackie Ickx in 1969, and barely a mention of Denny Hulme in 1966-67 either. Fortunately Dan Gurney gets a look in, since he won two GPs for the Brabham team in 1965 (the team's first F1 GP wins).



For a more polished story of antipodean driving flair and engineering nous you might like to revisit the Bruce McLaren film released back in 2017. Hey, I'm a Kiwi originally, so go Bruce!

As is widely known, the stories of Jack Brabham and Bruce McLaren are closely intertwined, from Jack's use of the McLaren family's Auckland workshop facilities while racing in NZ in the 1950s, to Jack mentoring Bruce through his early years with Cooper in England and the encouragement he provided in setting McLaren off on the path to establishing his own racing team in 1963.

For Jack Brabham fans and enthusiasts of mid-1960s motor racing there are at least three short films available free on YouTube that might prove as rewarding as the recent Brabham movie. Two are 1960s Repco promotional films and the third is a more recent compilation:

The c. late 1965 Repco-Brabham Story: https://www.youtube.com/watch?v=iZ_DIesr-94

and the c. late 1967 Repco-Brabham The Fantastic Year (1966): https://www.youtube.com/watch?v=XNfq310iOTI

Also the c. 2016 Legends on the Grid – Jack Brabham: https://www.youtube.com/watch?v=T-NBq3nq2aU

"The Repco-Brabham Story" essentially documents the Jan-Feb 1965 Tasman series featuring Pukekohe circuit in Auckland, then Warwick Farm in Sydney, Sandown in Melbourne and the classic Brabham vs McLaren tussle at Longford TAS that concluded the Tasman challenge. There is also a teaser about the new V8 engine developed by Repco for the 1966 F1 season.

“Repco-Brabham The Fantastic Year (1966)” briefly covers Jack Brabham’s F1 GP victories in Europe in 1966 then the Surfers Paradise Speed Week held August 1966, and finally the Warwick Farm and Sandown rounds of the Jan-Feb 1967 Tasman series. There is also a lot of in-house footage of manufacturing processes at Repco.

“Legends on the Grid - Jack Brabham” focuses more on Jack’s early dirt track racing and his road racing up to 1961 and then takes a jump to 1966 with footage perhaps borrowed from the 1967 Repco film. Commentators include Murray Walker, Phil Kerr (Jack’s business manager until 1968, when he joined McLaren in company with Denny Hulme) and Jack Brabham himself. The close and lasting relationship between Jack Brabham and Bruce McLaren is highlighted in this film.

One of the enduring puzzles of the 1966 F1 season and the move from 1.5 litre to 3 litre engines is how Jack Brabham got things so right with the Repco adaptation of Oldsmobile’s alloy pushrod 3.5 engine, and how Bruce McLaren got it so wrong with his team’s efforts to downsize Ford’s 4.2 twin cam Indy engine.

No surprise to discover “The Fantastic Year” credits Brabham’s newfound F1 domination to the precision engineering capabilities of Repco’s Australian manufacturing operations.

The journey to F1 success with 3 litre engines was a lot more complex for Bruce McLaren. Journalist Eoin Young wrote in his 2005 memoir “McLaren Memories” (he was there with Bruce at the beginning, from around 1962) that the McLaren team received 4 Ford Indy engines in 1965 at no cost and hoped to get further support from Ford to modify the engines. Never mind that an October 1965 Road and Track report on the Dutch F1 GP, in a brief aside on F1 engine development for 1966, recorded that “Ford has allegedly tried shrinking the Indy engine with poor results”. Apparently the cylinder head design just wasn’t conducive to downsizing, and with the considerable physical size and weight of the engine, not to mention the very narrow power band in 3 litre form, the whole exercise proved a dead end. What’s more, Traco Engineering in Los Angeles had already built a 3 litre version of the aluminium Oldsmobile engine – presumably still pushrod - for the McLaren team in early 1965 (this is according to Eoin Young in 2005). Still, with F1 engine problems dragging on through 1966 and into 1967 (the team also tried Serenissima and BRM power units before obtaining Ford Cosworth V8s for 1968), the McLaren team had the opportunity to concentrate on building their Chev-powered 1967 Can Am contender, the legendary M6A. Fame and financial reward via years of success in the US / Canadian sports car series were just over the horizon.

Another enduring mystery of the 1966 F1 season is how Phil Irving, the celebrated Australian engineer and designer of the first and most successful version of the Repco F1 V8, came to be more or less written out of the story. Ian Maud comments on this unfortunate episode in his March 2021 Valve Bounce review of the Brabham biography (see pages 212-224 and esp. 242-243). Admittedly Phil Irving was somehow or other employed as a “consulting engineer” for the venture yet to the public at large Repco’s Frank Hallam seemed to claim the kudos, perhaps in recognition of his crucial role as “the man in charge of the manufacturing project” (see the footage of Frank Hallam and Jack Brabham together at the Surfers Paradise inaugural Speed Week in “The Fantastic Year” film). The first version of the engine, as noted in an article by Bill Freame in July’s Valve Bounce, was known as the RB620, and successfully raced in 2500cc, 3000cc, 4200cc and even 5000cc capacities.

Phil Irving wrote an article, accompanied by wonderful photographs, for the March 1967 edition of Road & Track, “Where do we go from here in Grand Prix Engine Design”. Irving surveyed the current crop of F1 engines and concluded the Repco V8’s “combination of power, torque, weight and frontal area added up to the most successful combination during the 1966 Grand Prix season”. In contrast,

"Bruce McLaren's cut-down Indy Ford was something of a disappointment, but this was at bottom, a predictable result…"

Perhaps bringing Phil Irving on board (as far back as 1963, apparently) was just another example of Jack Brabham's practical engineering genius. As we well know, the results achieved through 1966 in a car bearing his own name guaranteed Jack Brabham's immortality in the annals of motor racing. And as far as top-notch motor racing movies go, I reckon you can't go wrong watching Ford v Ferrari at least one more time!

Ed: Thank you, Fraser. Appropriately, the article following on the next page about the development and evolution of the RB620 motor continues on this theme. Thanks again to Fraser for putting me on to it.

Not at all related to the Repco-Brabham program – some more likely at the other end of the engineering scale – here are some examples to make you think:

When you need a turbo big enough to suck up wildlife and small children....

Ed: Monowheels seem to have a resurgence every now and then. Here is one of the earlier creations: Italian inventor Davide Cislaghi driving his monowheel in France, 1933.
I believe they take quite some skill to ride…!

Ed: the following article appears on the 'Primotipo' website, amongst their other excellent items. Permission to reproduce it here was kindly given by co-author Mark Bisset. This is not the complete article, due to space restrictions.

'RB620' V8: Building The 1966 World F1 Champion Engine…by Rodway Wolfe and Mark Bisset

Jack Brabham, Repco engineer Nigel Tait, and Brabham BT19 Repco at Sandown Park Melbourne for its Tasman Series debut, January 1966. RB620 'E2' engine in 2.5 litre capacity. (Australian Post magazine)

(Ed: this BT19 is the same model as featured in Bill Freame's article that appeared in the April, 2020 edition of Valve Bounce.)

In this Repco article we start with a summary of the events leading to Repco's involvement in Grand Prix Racing, then identify key team members, the equipment used to build the engines and finally have a detailed account of the 1966 championship winning engines construction…

Why did Repco Commit to Grand Prix Racing?…

Younger readers may not know the background to Australian automotive company, Repco's involvement in Grand Prix racing in the mid-sixties.

Coventry Climax, the Cosworth Engineering of their day caused chaos for British GP teams when they announced they would not build an engine for the new 3 litre F1 commencing in 1966.

Repco had serviced the 2.5 litre Coventry Climax FPF four cylinder engines, the engine 'de jour' in local Tasman races, but were looking for an alternative to protect their competitive position, Jack Brabham suggested a production based V8 to them.

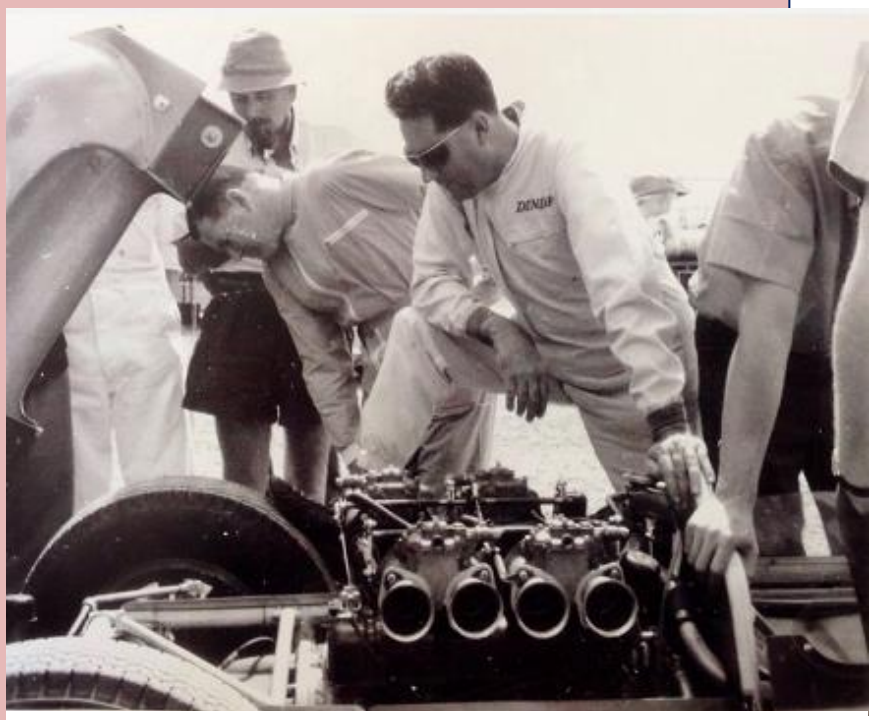
Brabham identified an alloy, linerless V8 GM Oldsmobile engine, a project which had been abandoned by them due to production costs. Jack pitched the notion of racing engines of 2.5 litre and 3 litre displacements using simple, chain driven SOHC, two valve heads to Repco's CEO Charles McGrath.

GM developed a family of engines comprising the F85 Oldsmobile and Buick 215. They were almost identical except that the F85 variant had six head studs per cylinder rather than the five of the 215 and was therefore Brabham's preferred competition option.

Jack had first seen the engine's potential racing against Chuck Daigh's Scarab Buick RE Intercontinental Formula mid-engined single seater in a one-off appearance by Lance Reventlow's outfit at Sandown, Australia, in early 1962.

The engine's competition credentials were further established at Indianapolis that year when Indy debutant Dan Gurney qualified Mickey Thomson's 215 engined car eighth, the car failing with transmission problems after 92 laps. It was the first appearance of a stock block engined car at Indy since 1945.

Whilst the engine choice was not a 'sure thing' its competition potential was clear to Brabham, as astute as he was practical.



Jack Brabham looking carefully at the Buick 3.9 litre engine in the mid-engined Scarab RE at Sandown Park, Melbourne in 1962, filing the information away for future reference! (Doug Nye with Jack Brabham)

At the time the engine was the lightest mass production V8 in the world with a dry weight of 144 kg and compact external dimensions to boot. Its future at GM ended in 1963 due to high production costs and wastage rates on imperfectly cast blocks, about 400,000 engines had been built by that time.

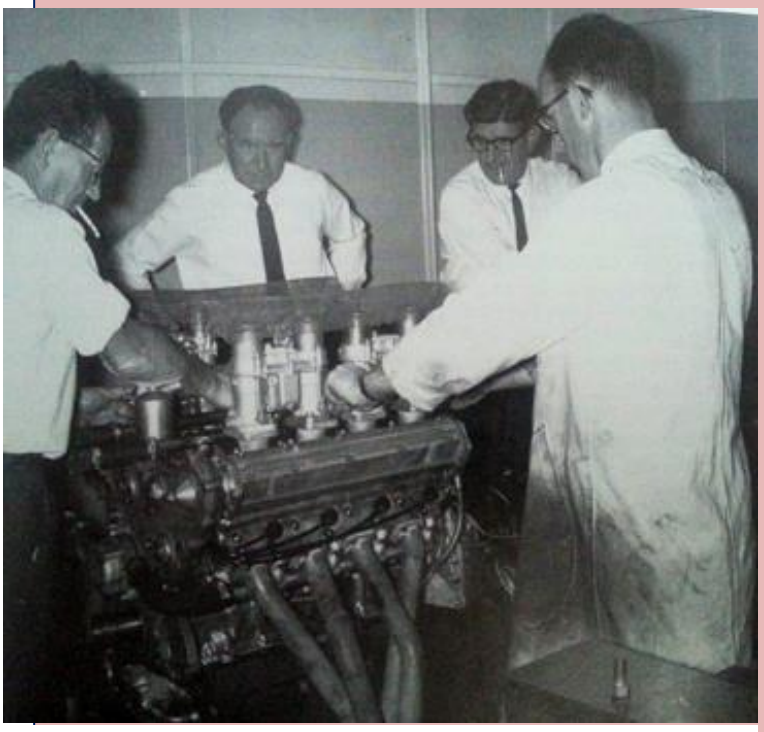
New Kid on the Block…

'Having talked my way into the Repco Brabham Engine Co with a promise of hard work and a 3 weeks trial I was very happy' recalls Rodway Wolfe.

I was given a nice grey dustcoat with a lovely Repco Brabham insignia on the pocket and shown around the factory and introduced to everyone- I was the seventh employee. Repco had picked the cream of their machinists from throughout the empire to work at RBE, they were great guys to work with and willing to share all their skills.

The three-week trial period was a gimmick, after a few days I had settled in as one of the team. After the trial my wage was increased to slightly higher than my previous job in the Repco merchandising company.'

People: Key Team Members…



L>R: Phil Irving, Bob Brown, Frank Hallam and Peter Holinger dyno testing the first 2.5 litre Tasman RB620 engine at Russell Manufacturing's engine test lab in Richmond in March 1965. Weber carbs borrowed from Bib Stillwell, the engine did not race in this form. The engine initially produced 235 bhp @ 8200 rpm, equivalent to a 2.5 Coventry Climax engine. 'Ciggies a wonderful period touch (Repco)

The first prototype RB engine was built at the Repco Engine Laboratory in Richmond, Victoria, an inner Melbourne suburb, then a hub of manufacturing now a desirable inner-city place to live, 1.5 km from the CBD.

It was designated the type 'RB620', which was the next file number of the various laboratory, research and development projects in process at the time.

'Frank Hallam was General Manager and Phil Irving was Project Engineer together with Nigel Tait and others. Peter Holinger made the components and Michael Gasking tested the engines. There were others involved before my time, those mentioned were involved at Richmond'.

As an industrial site using steel garages in Richmond the RB project received comment in various overseas publications as the 'World Championship Fl engine built in a tin shed in Australia'.

When I joined in late 1965 the project had just arrived at the Maidstone, Melbourne factory. (87 Mitchell Street, Maidstone, then an industrial Melbourne western suburb, 10 km from the CBD) The Manager was Frank Hallam. In the drawing office, the Chief Engineer was Phil Irving, the Production Manager Peter Holinger, Production Superintendent Kevin Davies and the machine shop leading hand was David Nash. We also had a Commercial Manager, Stan Johnson who came and went'.

'Around this time Michael Gasking also transferred from the Richmond Laboratory- he was Chief of Engine Assembly and Testing. Also on the machine tools was John Mepstead who was a great all rounder and later appointed to help Michael with engine assembly. He eventually joined Frank Matich to 'spanner' the 1969 Australian Sports Car Championship winning Matich SR4 Repco.

Frank Hallam arranged for me to attend RMIT night school, Repco picked up the bill. Those Tuesday and Thursday nights for 4 years helped me immensely, over the period I obtained a certificate in 'Capstan and Turret and Automatic Screw Machines' operation and a certificate in 'Product Drafting'. My status was as a First Class Machinist in the Repco Brabham factory.

If I had any queries I would also ask Phil Irving who loved a yarn and was a huge bank of knowledge. I felt so honoured to work for him, and learned so much'.

REPCO-BRABHAM ENGINES PTY. LTD. IS NEW COMPANY

Latest member of the Repco Group is a newly formed company, Repco-Brabham Engines Pty. Ltd. which was registered early in April, and forms part of the Engine Parts Group. Its function is to manufacture and market Repco-Brabham racing and sports car engines, as well as to develop other, high performance equipment for motor vehicles.

It is located at 87 Mitchell Street, Maidstone, Victoria, in one of the ACL buildings. The new plant houses a number of people from the pilot stage of the Repco-Brabham V8 engine project. They include Frank Hallam, Stan Johnson, Peter Holinger, Michael Gasking and David Nash.

Placing the new name sign on the factory.

Frank Hallam

Stan Johnson

Kevin Davies

Peter Holinger

Michael Gasking

The general manager is Frank Hallam, former divisional chief engineer of the Engine Parts Group, whose place has been taken by Peter Linden.

Stan Johnson, long identified with research and development at the laboratory at Richmond and more recently as service manager for the EPG, is commercial manager. The production engineer for the plant is Peter Holinger who began with Repco-Power in 1963. Peter served his apprenticeship with the Commonwealth Aircraft factory achieving best apprentice for the year during this time. Then after 3 years in their drawing office, Peter spent 6 years with Wickman (Aust.) as a service engineer and twice visited their overseas principals. He played a considerable role in the machining of the first Repco-Brabham V8 engine.

Michael Gasking as chief inspector started with Repco as an apprentice fitter and turner at RBC Launceston in 1956. In 1959 he was awarded a $200 bursary by the Tasmanian Apprenticeship Commission as the State's best apprentice. Michael was free to choose any mainland firm for a period of up to 6 months, and chose Russell Manufacturing to further his knowledge of engine parts. At the end of this time he transferred to the Repco Engine laboratory as a laboratory technician to study performance and testing of engines and parts. He began work in the initial stages of the Repco-Brabham tie-up preparing Coventry Climax engines for the Tasman races.

A new addition to the team is Kevin Davies who becomes production superintendent having joined ACL 22 years ago as an apprentice and prior to this appointment held the same position with the ACL Bearing Company.

Hereditary tendencies towards Repco engineering are represented by Howard Ring, son of Brenco's manager, Bill Ring, who has joined as draughtsman.

Because the production of this type of engine is necessarily in relatively small numbers and subject to detail modifications, the plant required differs from that in a mass production factory. All machine tools are of the latest type, and production is now building up.

The building in its pleasant setting of lawns looks a fitting home for what we hope will emerge eventually as a breed of champions.

JACK BRABHAM HONOURED BY QUEEN

Jack Brabham was awarded the OBE (Officer of the British Empire) in the Birthday Honours of 1966 for services in international motor racing.

He will be heartily congratulated by Australia, and in particular all at Repco, together with the British Motor Industry as well as everybody in motor sport.

Besides the courage and skill which have made him a great driver, Jack has the intelligence which has put him in the forefront of racing car designers and the largest racing car manufacturer in the world. He has in fact proved himself a great Australian.

12

'Repco Record', the internal Repco staff magazine announces the formation of Repco Brabham Engines Pty. Ltd. (Repco)

Machine Tools…

'Frank Hallam was a machine tool enthusiast.

It was a big help, he made sure we worshipped our machines, blowing away the swarf with an air hose. I learned respect and cleanliness of all machine tools. Few machine shops were as clean or free of swarf and mess everywhere with the exception of Holinger Engineering, Peter was also fastidious.

We were lucky to have top machines in the workshop. Our biggest was an Ikegai horizontal boring machine. RBE had two lathes- a Dean Smith & Grace English machine and also a Tovaglieri Italian unit.

We had a small Deckel horizontal borer and a couple of mills- a Bridgeport and a French Vernier. The older machine was a Herbert capstan lathe, I used this to make every stud for all the future Repco Brabham engines- main bearing and cylinder head studs, a very big variety in different steel types, it was repetitive stuff that would normally be boring but I didn't care, we were winning the World Championship'…

'When he drew a new design of stud, Phil Irving would come out and check my thoughts on being able to make it with what we had and other various things. We would do a yield point test in a vice where we measured the length of the new stud after I made a sample and then tension it to a nominated foot pound tension and we would keep increasing the tension until the stud refused to return to the original length. That tension was known as the yield point so Phil would pick a tension somewhere in a safe range under that yield point'.

Not the sharpest of shots but a rare one showing the 'production' Olds and RB620 engines. RB620 on the right. The engine was the lightest production V8 in the world at the time (unattributed)

RB620 Series Engine: Machining and Modification of the Oldsmobile F85 block…

'When I arrived there were a lot of aluminium cylinder blocks along one factory wall. Repco acquired twenty-six Oldsmobile cylinder blocks from General Motors in the US. (2 of the 26 were prototype engines E1 and E2 which were built up in Richmond)

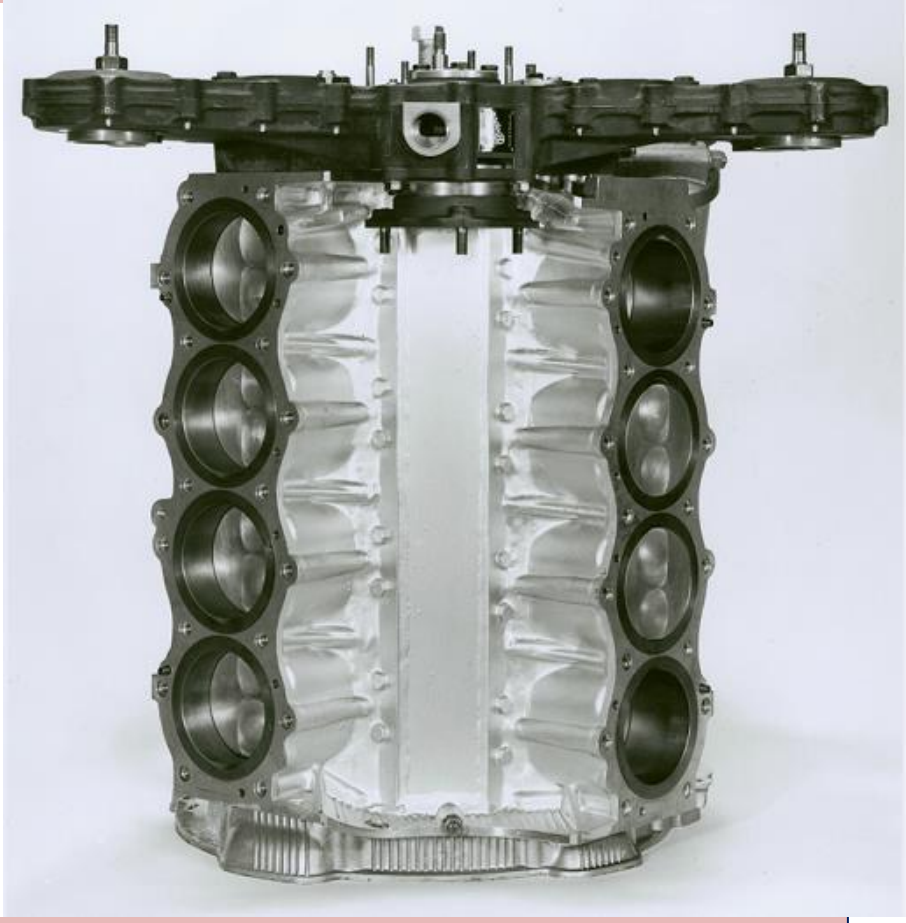
One of my first jobs was to remove all the piston assemblies from those twenty-four blocks. They were not short blocks as known in Australia (here they are complete without sump or cylinder heads) but these were not complete to that stage. They had crank bearings in place, all main bearing caps and the 3.5 inch liners were cast into the block. We didn't use the cast iron main bearing caps or bolts, replacing them with steel caps and high strength studs.

The RB 620 used the original 3.5 inch cast in sleeves but practically everything else was changed.

All surfaces were re-machined for accuracy, all bolt thread holes re-tapped and recessed to accept studs of superior material. The camshaft bearings were in the valley of the block of course but we pressed them out and rotated them 45 degrees and pressed them back in place to cut off the original oil galleries as our engine ran twin overhead camshafts, one per cylinder bank.

The front original camshaft bearing was left intact and the second camshaft bearing was removed and fitted was a sleeve with an INA roller bearing.

We made up little jackshafts which were driven from the crankshaft by a duplex chain, which also drove the single row chain driving the overhead camshafts. These jackshafts used the first original Oldsmobile slipper bearing and a small roller type bearing in the second original cam bearing location. The chains etc, were all enclosed inside the RB chain-case.



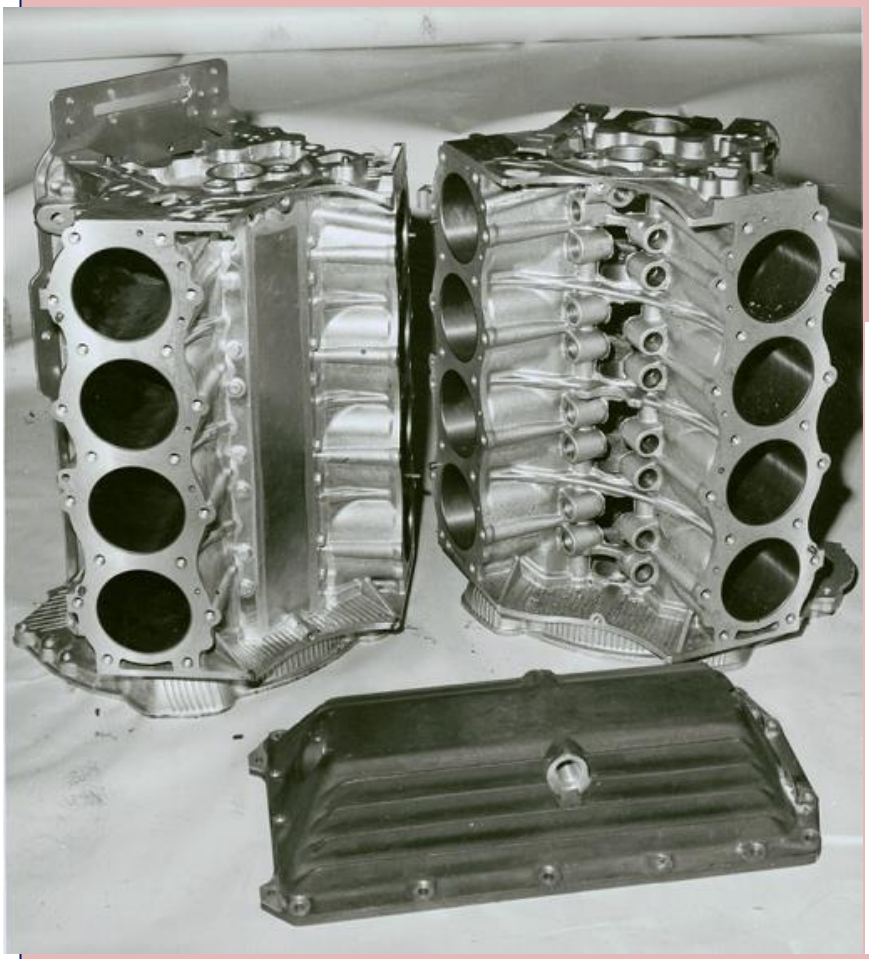
RB600 F85 Olds block from above. Note the valley cover of aluminium sealed 'with a sea of Araldite then painted over with Silverfros- those blocks which are still in service today still retain the Araldited plate and still do not leak' comments ex RBE engineer Nigel Tait. Phil Irving's design had lots of clever bits including the timing chain arrangement which allowed the heads to be removed in the field without disturbing the engine timing- and was also clever in that the same head could be used on either side of the engine (Tait/Repco)

‘A lot of people in 1966, including the international motoring writers, did not realise the extent of the machining required to the F85 Oldsmobile cylinder block to use as our race engine base. It was more work involved to adapt the F85 than in machining our new Repco cast blocks (700 and 800 Series) used later in the project.

It used to annoy all of us when our engine was referred to as ‘based on a Buick’ in various world motoring magazines. It also added insult to injury by them adding ‘Built in a tin shed in Australia’!

We then had to close up the large cavity in the valley where there used to be a cover plate, pushrods and cam followers in the original engine.

We spent many hours fettling aluminium plates by hand and fitting them into the valleys to cover the original cam followers and holes etc. When we had a very good fit of these plates we mixed two pot resin (Araldite) with additional aluminium powder and filled up the valley seams around the plate.



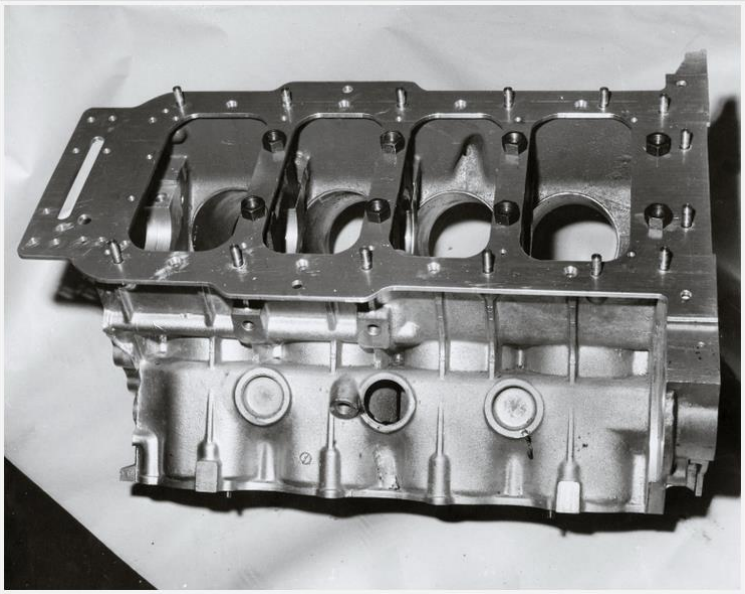
Then with some elaborate heating systems we invented, we dried the Araldite in place. This also gained us the reputation of the ‘The Grand Prix engine held together with Araldite’ in various magazine articles!’

RB600 block on the left, Olds’ F85 unmodified block on the right. The 600 block has the pushrod holes covered with the Araldited aluminium plate. ‘The 1/4 inch thick block stiffener plate protrudes from the top of the modified block. This gives the effect of cross bolting…note also the Repco designed magnesium sump’ notes Tait (Tait/Repco)

‘I finished the job of dismantling the blocks, we only worked on two or three at a time during the early months of 1966. Unless the parts were an easy item or required substantial machine set up we only made a few of each component as design changes were ongoing. Not critical large changes but small subtle ones’.

‘We didn’t have any problems with the Oldsmobile block by there was one race in 1966 when a cylinder liner failed. As explained, we used the cast in liners and retained the 3.5-inch bore.

BRO, (Brabham Racing Organisation) sent back the failed engine block and we bored out the remains of the cylinder liner. There was a casting cavity behind the liner which caused the weakness and failure. This was a problem that could not be dealt with without boring out all the liners and fitting sleeves. Otherwise there could be more failures due to bad castings. From that date we used dry liners and eradicated the risk of it occurring again.’



Jack and Phil specified this aluminium plate to add stiffness to the production F85 Olds block, big holes to provide rod clearance obviously. ‘This block would have had dry sleeves which led to considerable blowby problems due to distortion and eventually wet sleeves were specified by Phil Irving’ notes Nigel Tait (Tait/Repco)

UK Components: Crankshaft etc…

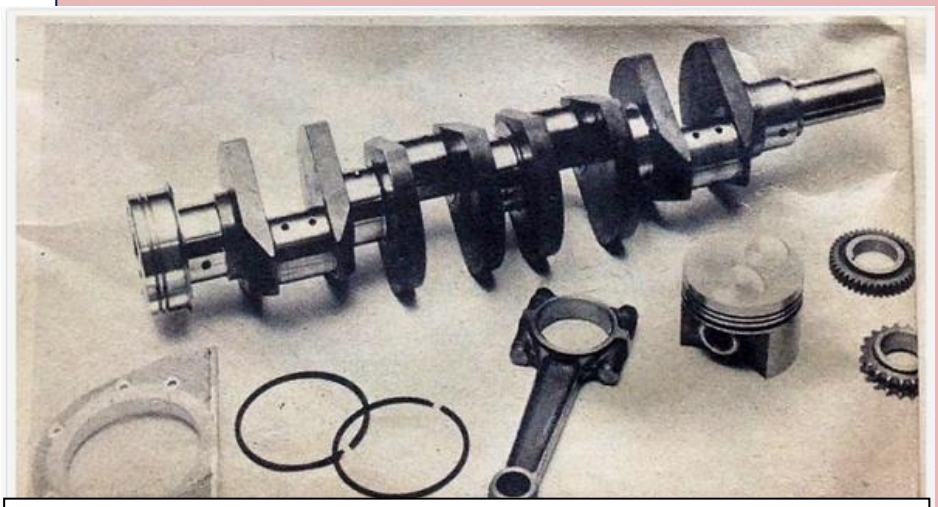
Phil Irving completed most of the design of the engine in England, he rented a flat in Clapham in January 1964 close to BRO and together with Jack they settled on a relatively simple single overhead camshaft configuration compatible with the block and fitment into the unused Brabham BT19 spaceframe chassis. This simple specification is what Jack pitched to the Repco board at the project’s outset.

The BT19 frame had remained unused throughout 1965 when the engine for which it was designed, the Flat-16 Coventry Climax FWMW, was not released to Brabham, Lotus and Cooper as planned.

To expedite things in the UK, whilst simultaneously mailing drawings to Australia, Phil commissioned Sterling Metals to cast the heads. Prior to his return to Australia in September 1964, HRG machined an initial batch of six heads, fitting valves and seats to Irving’s specifications.

‘Laystall in the UK also made the crankshaft. Constructed from a single steel billet the ‘flat’ nitrided crankshaft was a wonderful Irving design. I don’t recall any updates or changes to the design of the crankshaft over the years the RB engines were built. It was supplied in 2.5, 3 litre and 4.2 litres for the Indy engines- also 4.4, 4.8 and 5 litre sportscar versions. All crankshafts were of the same bearing dimensions etc’.

‘The term ‘flat-crank’ refers to the connecting rod journals being opposite each other and not in multi-plane configuration as is usual in production V8s. It meant the engine was not such a well-balanced unit at low revolutions but it actually converted the engine to virtually two four-cylinder units and either cylinder bank would run quite smoothly on its own. The layout also enabled the superior use of exhaust configuration eliminating the need for crossover exhaust pipes to obtain full extraction effect’.



Crankshaft was made by Laystall to Phil Irving’s design, pistons and rings by Repco subsidiaries. (Repco)

Pistons…

‘Repco is a piston ring manufacturer and very experienced in ring design which meant that we were well ahead in that regard.

The famous SS55 oil rings were well known already around the world. The pistons were Repco Products.

No other F1 engine constructor of the sixties made their own pistons. The experience we gained with the supply of Coventry Climax pistons and rings contributed to this success.’

Bearings: Vandervell Interlopers and ‘Racing Improves the Breed’…

‘Repco was already supplying engine bearings to various manufacturers globally from the Tasmanian-based Repco Bearing Company: we obtained these components as required.

During 1966 an advert appeared in a British motoring magazine, ‘French Grand Prix won on Vandervell bearings.’ Vandervell are, of course, a British bearing company, Repco were furious and telex messages to and from BRO (Brabham Racing Organization) revealed that Jack Brabham was not happy with the depth of the lead overlay on our copper/lead crankshaft bearings. Our bearings had a lead overlay of .001 inch and the Vandervell bearings an overlay of .0005. So I was instructed to pack away all our existing bearings and mark them not for use, our bearing company came up with the improved design bearings with the lesser overlay in time for the next GP. Racing certainly improves the product!

Before I transferred to the RB project, I worked in Repco merchandising and received brochures and information about a new Repco alumina/tin bearing known as the ‘Alutin’ and advertised by Repco as a new high performance product. Repco were promoting them as a breakthrough design.

I learned these new bearings had been unsatisfactory under test in the F1 engine and within a short period no more was said about the new product ‘Alutin’. They were inclined to ‘pick up’ on the journals at high rpm – another example of how racing improves the product. This problem had not been evident in the engine testing of the product by Repco to that date.’

Ed: …and we’ll leave it there for this month – to be continued.

Ed: As mentioned in his earlier article, Fraser has also provided us with the following review of contemporary Formula 1 engines – this appearing in the March, 1967 edition of 'Road & Track' magazine.

Where do we go from here in GRAND PRIX ENGINE DESIGN

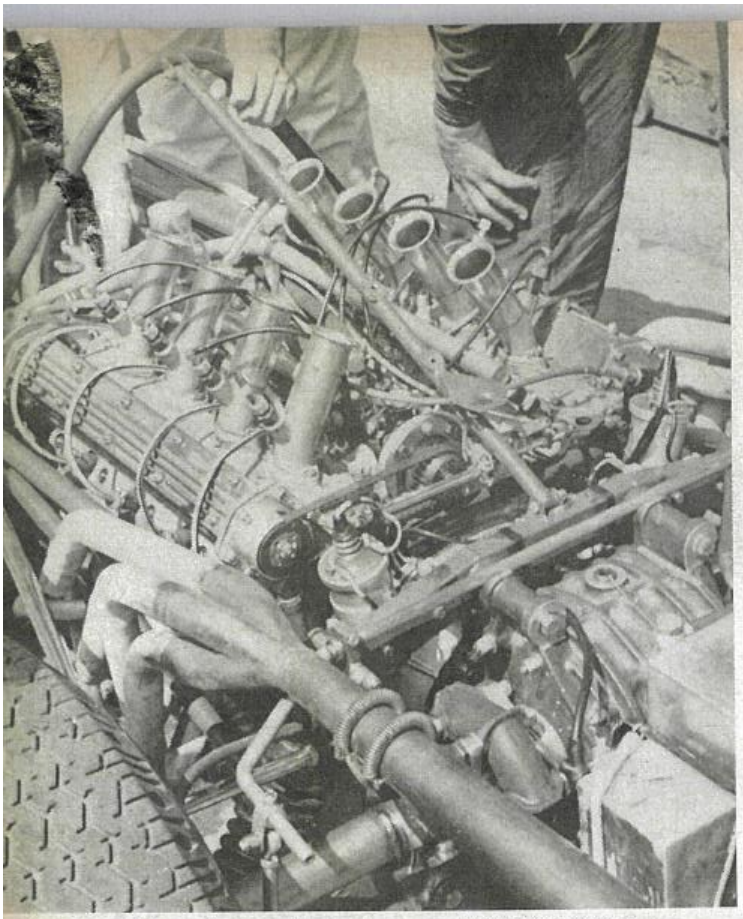
GEOFFREY GODDARD PHOTOS

BY PHIL IRVING

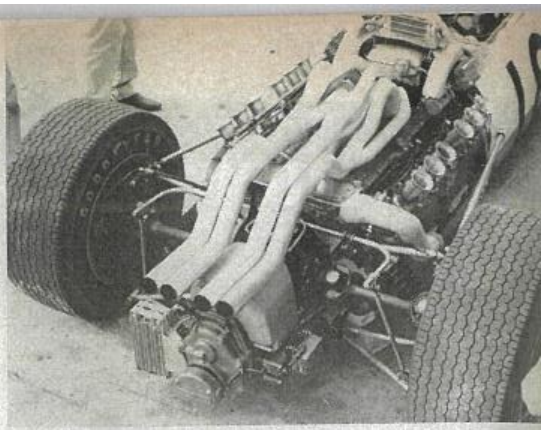
CHANGES IN GRAND PRIX formulas are always announced a couple of years before the existing one is due to come to an end, and the reactions by the manufacturers concerned have become almost stereotyped in their adherence to a well defined pattern. One or two makers say flatly they don't like the new rules and won't play; nobody believes them but sometimes the threat comes true. Others say they will just have to coast along with existing powerplants, stretched or compressed according to the relative capacities of the two formulas, until they can find the time or the money (or both) to build new ones. Other builders announce they are quite happy and sound off about engines they either have already, or will shortly build, which have enough power to be able to beat the trousers off any foreseeable opposition, producing figures of their own to prove it.

The opening of the new formula in 1966 ran true to form with one exception; although this is generally referred to as a "3-liter" formula, the fact that it also permits 1.5-liter supercharged engines seems to have been almost disregarded —a point which will be touched upon at the conclusion. The exception noted was, of course, that a totally unknown and unpretentious engine entered the fray with little or no ballyhoo. Indeed, it soon became the target of many remarks of a derogatory nature. Yet as everyone knows, the Repco V-8 walked off with the championship in no uncertain fashion. It chalked up nearly double the points of any of its rivals, plus the majority of pole positions, fastest laps and race records to ram home the fact that the win was no mere fluke, neither by default nor luck. Naturally, an engine can't win a solitary race, let alone a series, all by itself and in this instance it was fitted to the Brabham chassis, endowed with superb handling characteristics by designer Ron Tauranac. Jack Brabham, even if he lacks in some small degree the dash and fire of some of his younger and more exuberant rivals, has a wealth of experience behind him, never takes unnecessary risks and is quite content to win by a wheel instead of trying to lap the entire field. Moreover, he is a master tactician who can think a race out as it goes along. Come to that, his number-two driver Denny Hulme didn't do so badly either; with a bit less teamwork by the Italians and a bit more by the Brabham stable, he might have finished higher in the points table.

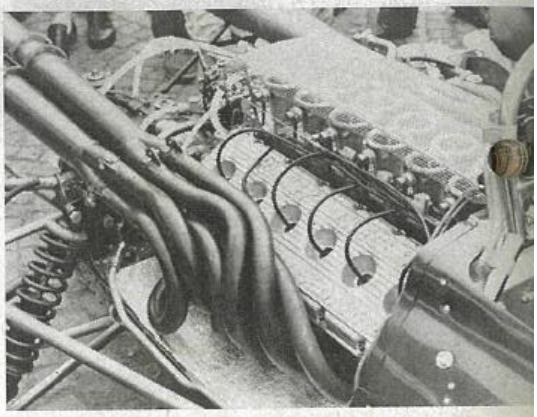
Strangely enough, this outcome was totally unexpected, even though some slight amount of wall-writing could have been discerned after a couple of Formula 1 events before the championship races got under way. Early Brabham successes were greeted in some quarters with the air of pained astonishment similar to that bestowed upon a non-seeded player who knocks out the reigning champion in the first round at Wimbledon, and then goes on to win the whole series. Adjectives like "underpowered" or "unsophisticated" have been freely bandied about, and while it is no doubt true that the Repco-Brabham develops less peak power than some of its rivals, and very considerably less than several others are reputed to do, it appeared to be sufficient for the job, for this season anyway. As for being "unsophisticated," a misuse of the English language which presumably must refer to its simplicity of construction with only eight cylinders and one camshaft per bank, what's wrong with that? In my view, blind worship at the shrine of the super-complicated is a thing to be eschewed with vigor; the simpler a thing can be made, provided it gets results, the better. For confirmation of that, ask any racing mechanic which sort of engine he would rather work on, but don't pick a moment when he has matchsticks wedged between his eyelids trying to finish the job on time at the end of a couple of all-night pre-race sessions caused by a blow-up in practice. That is the time when attention wanders, when the fine edge vanishes from the intense concentration on detail which race preparation requires, and something gets forgotten. Result, a DNF and background ⟹



Repco V-8 combination of power, torque, weight and frontal area added up to most successful combination during 1966 Grand Prix season.



Although of same weight-to-power ratio as Repco, weight and bulk of Honda V-12 was serious detriment.



Gurney-Weslake V-12 with 4 valves per cylinder and small bulk should be big threat in 1967.

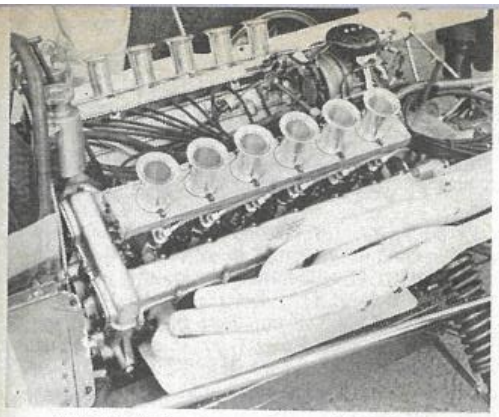
ENGINE DESIGN

chorus of "bad luck," whereas in most cases it isn't that at all; a lot of the so-called bad luck in racing boils down to bad design, bad preparation, or bad pit work.

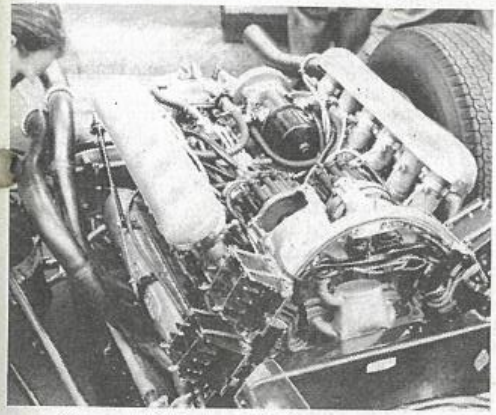
Now, just let's have a look at this matter of power. Without being too explicit, the Repco engine gives off around 300 bhp, little enough one might think against the 360-plus attributed in printer's ink to the Maserati and Ferrari. These latter figures, which cannot be checked easily, are open to doubt to put it mildly; but the trouble is that once someone claims a figure and it gets published, he's stuck with it and cannot very well claim less power for a later edition which in theory (because it's more complicated perhaps?) should give more, even if it doesn't go like it. Besides, anyone with experience of dynamometer-testing knows that in any batch of engines there'll be one crackerjack, some average and one which if it isn't actually a lemon, has a distinct flavor of citric acid about it. The higher the state of tune, the more likely this is to occur. Also, an engine may poke out more power one day than it will on another, but apparently similar, day so what are you going to choose as the figure to hand out? The out-and-out best? The average of the lot? The worst? Or do you rake a figure out of the air which doesn't look too improbable, add a 10% fright factor, and try to fox the opposition with that? This is a form of psychological warfare which has been practiced by Italian makers for years and on one occasion even bluffed a very famous English concern into throwing what could have been a highly successful prime-mover into the discard—the 2.5-liter Climax V-8 of 1954.

In any case, sheer top-end power isn't everything, at least not on the slower GP circuits. An engine may be tuned to give, say, 350 bhp but produce high torque over only a very narrow speed-band; below that, the bottom falls out of it and the car has to be rowed around a tricky course with the gear-stick. This or another engine could be tuned in a way which would knock perhaps 30 hp off the maximum, but give a considerable increase in torque in the middle register. This will mean less gear-changing on a twisty circuit and better handling by throttle control in difficult circumstances, and may (as it actually does in the case of the Repco) mean that the maximum power speed is well below bursting speed. It is when these two speeds begin to coincide that the monumental blow-ups start to occur, and besides losing races, these expensive mechanical derangements have a depressing effect on the morale of the équipe and, ultimately, on those who put up the gold.

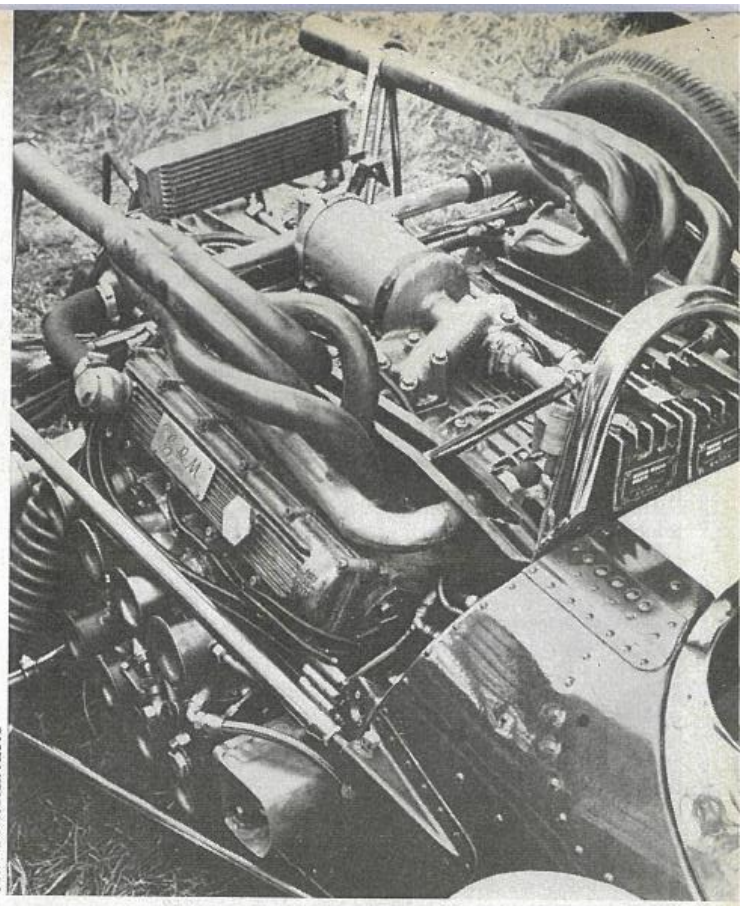
Another point: Lap speed is dependent to a large extent both on power-weight ratio and on frontal area, which is one of the reasons why the small, light, 2-liter BRM V-8 did not do at all badly against more powerful but also heavier and bulkier cars, even including its stablemate, the H-16. On practice times (admittedly not always reliable guides, but at least providing a hook to hang an argument on) Jimmy Clark, using a Lotus with the 2-liter BRM at Watkins Glen, was only 1.5 seconds in 70 slower than he was with the 3-liter engine despite the fact that on paper the big one had 60% more power. Brabham, with a power output somewhere midway between the two, returned lap times in practice and also in the race which were faster than both BRM editions; the answer is that the Brabham combination of power, torque, weight and frontal area adds up to a very well balanced ensemble.



Ferrari, thanks to experience with V-12 design, was more reliable than most during '66 season.



Maserati V-12, though bulky, proved to be reliable and won season finale in Mexico.



GUNTHER MOLTER PHOTO

BRM H-16. Though complicated and suffering from development problems, engine astounded critics by winning U.S. GP installed in Lotus chassis.

Pursuing the matter of power-to-weight a bit further, the much-feared Honda is reputed to scale 1630 lb and, with a load of fuel enough to supply circa 400 bhp for a couple of hours, around 2000 lb. Against that the Brabham, which needs only 30 gallons on top of its tare weight of 1200 lb, would gross only around 1500 lb, so the power-weight ratios of the two are almost identical, but the Honda is a much larger and less wieldy vehicle. It is a little difficult to understand just why the Japanese device *is* so heavy, although judging by the photographs, the powerplant does seem to occupy an awful lot of *lebensraum*. Of course, a V-12 is bound to be longer than a V-8, but there may be another significant factor. One of the tenets of Honda's engineering faith is that thin-walled cylinders vibrate, permitting excessive blow-by, but that thick ones retain their circularity; there may well be some truth in these contentions, because Honda racing motorcycles all have thick, heavily flanged liners shrunk into rigid cylinder blocks, and the astounding capabilities of these machines are known to one and all. Thick liners mean not only more weight but increased cylinder center-distances and a longer crankshaft—and the whole thing snowballs, as far as weight and size is concerned. Honda also thinks nothing of eight or ten gearbox ratios on a motorcycle with foot change, whereby you can play tunes without having to take hand or foot off the navigational controls. Consequently they also think in terms of high revs and narrow speed ranges, but this philosophy is not quite so apt when applied to four wheels.

One excuse which has been put forward for the defeat of the old guard is its tardiness in preparation; in fact, one journalist—and an Australian at that—has stated in print that the Repco-Brabham's success "has largely been possible because of the failure of the opposition to get ready in time." Well, that may be a reason, but it's not an excuse; everyone had the same amount of notice. The recognized contenders were all fully equipped and staffed to design and build engines, and all had background knowledge and know-how, but the Repco concern, despite its large facilities for manufacturing engine components, had never built a complete engine of any sort, had no real facilities for doing so, and moreover didn't seriously get into the act until the middle of 1965. Despite this, the first 3-liter engine Repco built nearly won in South Africa in January 1966. This was the first appearance of any new unit for the new Formula, although Italian factories have been building this size of engine for years and the Cooper-Maserati was in existence and had been running at Goodwood. It is much more likely that they simply discounted the possibility of an outsider doing well and that they also hoped, with some reason, that the H-16 BRM would not be race-worthy, for the season at least.

After all this preliminary skirmishing, we've arrived back at the title question: "Where do we go from here?" The true answer as far as I am concerned is "I don't know." Nevertheless, it is possible to hazard a few guesses and do a little unlicensed crystal-gazing into a situation which must be causing a lot of people in five countries a great deal of serious thinking.

It is fairly clear that to hold its position, the Repco engine needs a lot more power, which has led to wild speculation as to what form it will take. My own view was that, given a few months of the intensive development which the original design never had (because there simply wasn't the time or the manpower available) another 10% more power could be screwed out of it and a few pounds could be taken off its present 340 with no increase of size or loss of reliability, and the thing would still be in the hunt. Whatever does happen,

ENGINE DESIGN

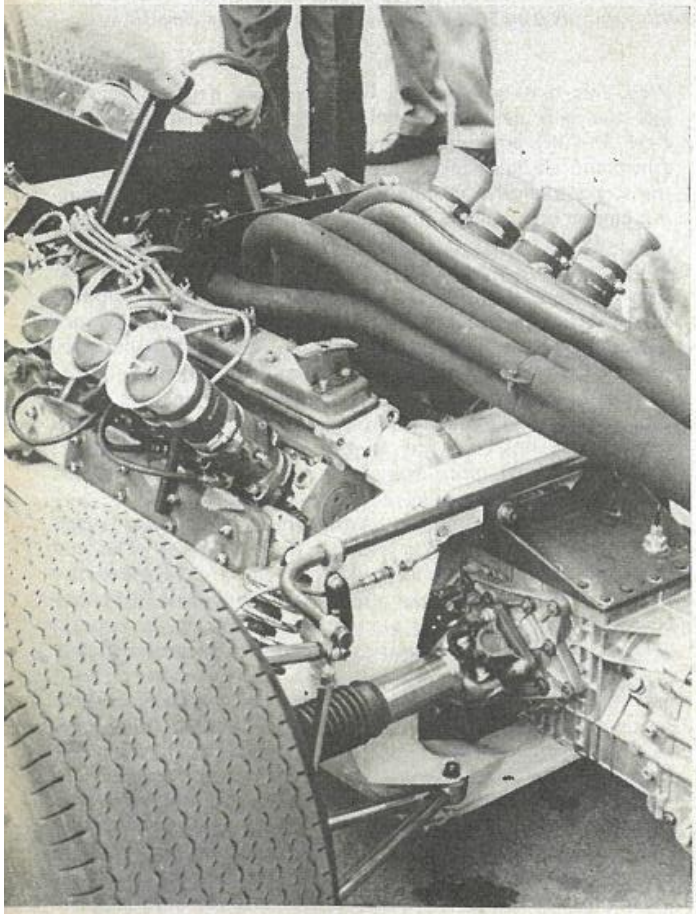
it will remain a V-8, but how much modified cannot be said at this stage. No doubt, it will have a locally designed block; the F-85, good though it is, was designed primarily for a pushrod engine and needed an awful lot of work to convert it. Besides, the cast-in thin iron cylinder liners gave serious trouble and the new block will doubtless have wet sleeves similar to the Coventry-Climax. Repco is in a fortunate position here in that most of the components which engine-builders normally buy from outside suppliers—pistons, rings, sleeves, gaskets and bearings—are all made in its own factories in Australia; thus the company is not dependent on outside suppliers for such components. Incidentally, all these home-grown items ran through the season without serious trouble.

Talking about engines in general, history may be bunk, as Henry Ford is reported to have said, but nevertheless, looking back down the years is by no means an unprofitable occupation when you recall that the double overhead camshaft and desmodromic valve operation concepts originated back in 1911. One significant fact which emerges from the archives is that the most successful Continental and American racing engines have all had eight cylinders, and the next most successful have had four. This situation exists at the present moment and it may be worthwhile to seek out why, bearing in mind two oft-stated theories. One, which was strongly advocated by the late Laurence Pomeroy, is that maximum power from any given capacity can be obtained only from an engine with the maximum piston area, which put into simple language means either enlarging the bore and shortening the stroke indefinitely, or using a large number of cylinders: It is this theory which prompts the design of engines with 16 or more cylinders.

The other theory is that for geometrically similar engines of equal capacity, the power output is proportional to the cube root of the number of cylinders. Reducing this to everyday terms, the cube roots of 1, 2, 4, 6, 8, 12 and 16 are 1, 1.25, 1.6, 1.8, 2.3 and 2.5, and from these figures it can be deduced that an "eight" should give twice the power of an equivalent single-cylinder, a "twelve" should give 1.15 times the power of an "eight," a "sixteen" should give 1.56 times the power of a "four" or 1.25 times the power of an "eight" and all sorts of fascinating comparisons. The trouble is that in practice, things just don't work out that way; if they did, to get 10 times as much power, all you would want is 1000 thimble-sized cylinders, a rather far-fetched example dragged in merely to show that there must be a limit somewhere at which the theory becomes difficult or even impossible to translate into workable practice.

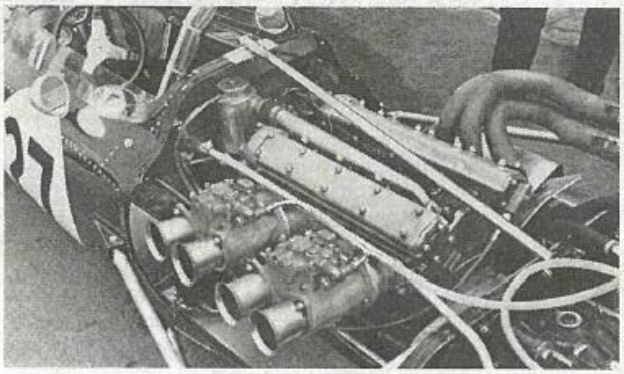
Getting back to earth, although increasing the number of cylinders does give a power increase because it allows higher rotational speed in safety, the gain is never as much as theory indicates that it should be. One reason for this fact is that the theory stipulates "geometrically similar" cylinders: this similarity cannot be maintained beyond a certain point because of scale effect, the physical limitations of minimum practicable wall thicknesses, plug and screw thread sizes and so on. Also, the high specific outputs attained today are largely dependent upon the action of pressure waves in the inlet and exhaust systems, which in turn depends upon the

Attempt to destroke dohc 4.2-liter Ford V-8 for use by McLaren was disappointing as engine never ran properly during 1966.

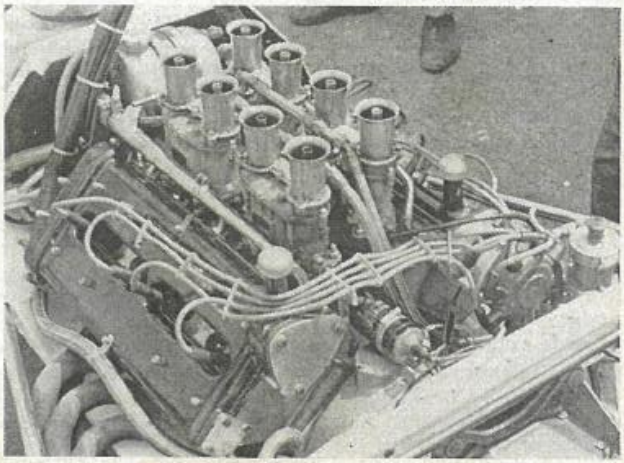


GUNTHER MOLTER PHOTO

Venerable 4-cyl, 2.7-liter Climax served as interim powerplant for several teams during first year of 3-liter formula.



Serenissima V-8 with 2.5-liter displacement was also tried by McLaren during season but didn't offer sufficient power.



Phil Irving

ENGINE DESIGNER Phil Irving, born in Melbourne in 1903, was educated in Australia and after several years of motorcycle competition arrived in England as half the crew of a Vincent HRD sidecar racing outfit. In the 1930s he designed several motorcycle engines for the Vincent HRD Co., the best known of which was perhaps the Series A Rapide built in 1937.

During WW II while doing war work for Veloce, Ltd., of Birmingham, Irving was wounded by what he refers to as "one of A. Hitler's bombs." It was while convalescing from these injuries that he laid down the design of the Velocette "LE" model, a water-cooled twin that is still in production.

After the war, back with Vincent again, he designed the Series B and Series C Rapide engines as well as the Black Shadow and Black Lightning models. The Black Lightning, one of the most successful motorcycle engines ever designed, set a record of over 150 mph at Bonneville and is still the basis of most successful sprint bikes in England.

He returned to Australia in 1949 and worked as chief engineer on the design of kerosene and diesel tractors for Chamberlain Industries. In 1954 he began the association with Repco Research that led to his design of the highly successful Repco head for the Holden engine that was to dominate Australian sedan racing for several years. In 1959 he returned to England, mainly to concentrate on writing technical books, and then commuted back and forth to Australia until 1964 when he began the design of the Repco Brabham V-8 that was to carry Jack Brabham to the World Championship in 1966.

speed of sound; *this* does not conveniently vary to suit the number of cylinders, nor the rotational speed, which of course rises as the cylinder size is reduced. It is true that some motorcycle engines have cylinders of only 25 cc which develop their power at around 18,000 rpm, but even the enterprising Honda firm stops at 12 cylinders for car engines, and these have not been nearly so reliable as Honda 4-cylinder 1-liter engines built for the old style Formula 2 series. Finally, it should be obvious that as the number of cylinders increases, so does friction.

From the development angle, the fewer cylinders there are, the better. Not only is the engine simpler and quicker to work on, but there is more chance of getting all cylinders to pull together. Anyone who has built and tested a number of seemingly identical racing singles has found that no two are *exactly* alike when turned to the limit. They may all turn out the same power, give or take a couple of percent, but the valve and ignition timings and the jet setting for maximum performance may vary quite a bit, and the speeds at which peak power and torque are developed will not always be the same. Now, if you couple a row of these together, but all sharing the same camshafts, ignition and fuel injection systems which can only be varied to suit the engine as a whole and not to suit individual cylinders, the power attained will be less than the total output from all the separately tuned engines. Moreover, the more cylinders there are, the more difficult it becomes to detect the laggards and/or to whip a bit more life into them when found.

If, in pursuance of high revs at any cost, 16 cylinders are employed, about the only feasible construction is the flat or "boxer" engine, which however attractive it looks externally, is a difficult, complicated thing to make in the first place and can be absolute hell to service; even a routine check on the condition of bearings or rings necessitates almost a complete strip-down. Geared crankshafts have some problems all their own, too, but even supposing all the mechanical difficulties could be solved as near to 100% as they ever can be in a racing engine, the H-16 form selected by BRM is not only heavy and very broad in the beam, but has almost exactly twice the number of parts to go wrong as the 1.5-liter V-8, because the ignition, fuel injection and water pump installations have to be duplicated also. In fact, it is hard to see why this form was selected at first, in preference to the more obvious solution of adding 4 cylinders to the existing 2-liter V-8, which should have resulted in an output of around 360 bhp for a weight of perhaps 350 lb, no increase in width and a length increase of about 7 in. It is now reported that an engine such as this will be produced for private owners this year; it will be interesting to see how it performs.

One engine which legitimately arrived late in the field is the 12-cyl Gurney-Weslake with four valves per cylinder installed at a narrow angle. It has not yet had time to show its true form, but being designed and built by a firm with a tremendous backlog of experience, it should provide some formidable opposition. At least its air intakes are where they ought to be, well out of the way of flying stones and water and not subjected to gusting from stray side winds.

The two Italian V-12 engines have been very reliable, but not a great deal faster on the straights than any others. Maybe they can dig up a little more urge from somewhere but both engines have had a good deal of development already with the benefit of many years' experience with engines of this size and type, and one would be entitled to think that they already had as much put into them as the makers know how.

Bruce McLaren's cut-down Indy Ford was something of a disappointment, but this was at bottom, a predictable result.

ENGINE DESIGN

In its original 4.2-liter form, this engine is a real beauty, but to bring the capacity down to 3-liters without making other extensive modifications amounting almost to a redesign, was asking a bit too much and resulted merely in "a thing of sound and fury," weighing just as much and being just as large as the original. What does look like a real menance is the proposed 4-valve V-8 Cosworth Ford, designed on the lines of the 1600-cc 4-cylinder Formula 2 engine from the same stable which is reputed to develop 200 bhp for a weight of 265 lb. On this basis, a 3-liter should give 375 bhp and weigh, at a guess, not far off 400 lb.

Remember that in the opening paragraphs the point was raised that this formula includes 1.5-liter supercharged engines? It seems a bit odd that nobody has tried blowing one of the obsolete 1.5s, which would be a relatively inexpensive exercise. Admittedly, the last excursion along these lines could scarcely be termed successful, but that was at a period when there was a 3:1 capacity ratio in favor of the atmospheric engine and that meant aiming at 400 bhp. Today, with only a 2:1 ratio, the position is much more favorable; in atmospheric form, the 1.5s were turning out around 210 bhp at the end of their racing life, and after some modification to valve timing and lowering of compression ratio should develop around 280 bhp on 10 lb blow, without overstraining the mechanism and with a weight increase little more than that of the blower. This would be 40 hp more than the existing 2-liters are giving, but the area under the power curve would be much greater and it is that which affords good torque.

One difficulty which beset blown engines in which the blower drew mixture through a carburetor was to achieve accurate distribution of fuel to each cylinder. This difficulty, which frequently led to piston failure, would be entirely overcome by allowing the supercharger to handle pure air only and retaining the existing Lucas fuel injection system, and fuel economy would be improved by timing the injection so that there was no possibility of fuel being lost through the exhaust during the valve overlap period. I don't suppose that this would really be a championship engine, but would stand a better chance than a 2.5 or 2.7-liter Climax and it does seem surprising that nobody has even tried it.

- Dorian (blue) and charger $200
- Quick-lift jack $150
- Corner weight gauge $150

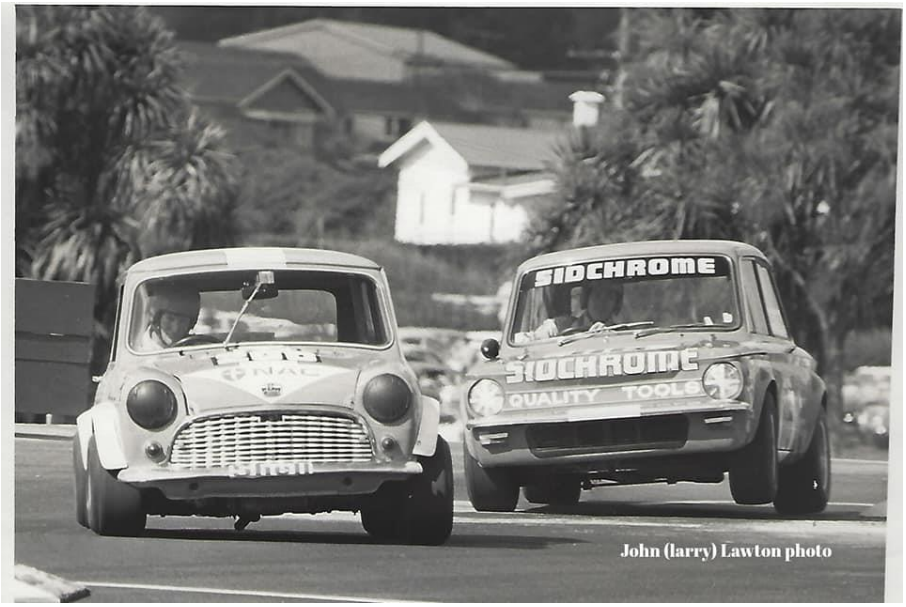
Phone: Hugh Gartley (5155 3755)

-Lakes Entrance

When your car is cold in the morning.

Words to live by:
Racecar backwards, is racecar. Racecar upside down, is expensive.

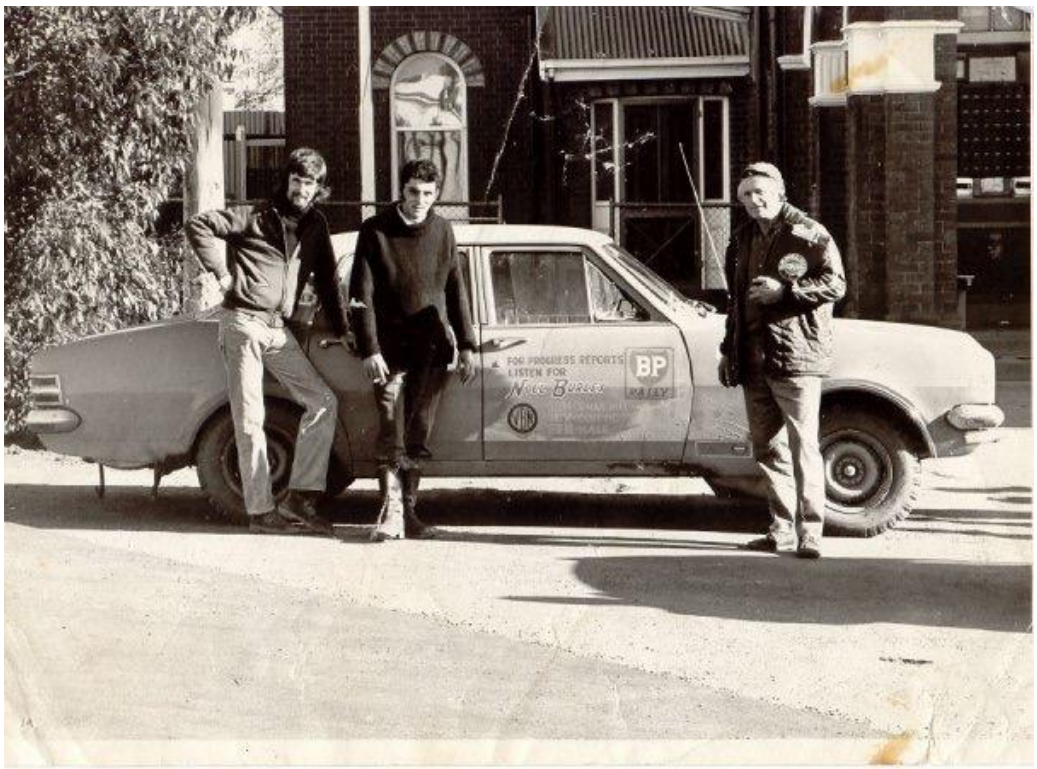
...and a couple of parting shots:



Before we came to know him, this photo shows Reg Cook heading off the great Jim Richards through the chicane at Pukekohe, NZ. It also shows Jim didn't always drive big-horsepower beasts.
Interestingly, both Reg Cook and Jim Richards were "old boys" of Manurewa High School in the mid-1960s.

Photo: John Lawton, via Facebook

A couple of locals:



L to R: David Osborne, Norm Wagner and Noel Burley. 1972 BP Rally Media Coverage for 3TR radio station. Kingswood driven by Norm Wagner. He drove a super lightweight mini at the Maffra Hillclimb and won many events. He drove the rally Kingswood just as hard. The only time I was sick as a navigator.

Facebook contributor: Peter Burley

GIPPSLAND CAR CLUB

KHANACROSS August 15, 2021

RESULTS

Outright Place	NAME	CLUB	VEHICLE	CLASS	Rank	RUN 1 Short CW Time	Penalty	RUN 2 Short ACW Time	Penalty	RUN 3 Carpark A Time	Penalty	RUN 4 Carpark B Time	Penalty	RUN 5 Long CW Time	Penalty	RUN 6 Lomg ACW Time	Penalty	RUN 7 T&B North Time	Penalty	RUN 8 0 Time	Penalty	TOTAL
1	Matthew Paulet	GCC	Hyundai Excel	F	1	67.44		68.93		29.81		29.71		86.56		88.41		43.18		83.27		497.31
2	Mathew Webb	VMC	Leyland Mini	C	1	76.28	F	68.93		28.79		29.21		89.56		96.78	F	44.25		93.78	F	527.58
3	Sei Vella	GCC	Mazda MX-5	C	2	70.59		70.19		30.12		30.13		102.47	2F	89.75		49.38	T	91.44	T	534.07
4	Brendan Linke	MDCC	Ford XR8 ute	D	1	74.93		75.65		45.12		34.38		97.01		99.41		48.53		105.46	T	580.49
5	Declan Webb	VMC	Leyland Mini	J	1	90.22		90.56	F	30.87		30.00		97.63		105.81		45.80		91.72		582.61
6	Dylan Goodwin	GCC	Nissan 370z	D	2	77.92		75.22		WD		42.35		95.47		98.87		62.09	T	90.91		592.95
7	Ben Selwyn	GCC	Hyundai Accent	J	2	79.25		79.34		35.69		34.76		102.56		103.12		54.75		103.56	F	593.03
8	Robert Krygsman	MX5VT	Mazda MX-5	C	3	82.69		80.50		34.26		33.28		104.75		106.35		52.22		104.22		598.27
9	Travis Selwyn	GCC	Hyundai Accent	C	4	76.13		73.49		WD		WD		95.63		101.86	F	47.29		110.87	F	602.74
10	Ian Mayze	GCC	MGB Roadster	C	5	81.00		WD		36.86		36.19		101.81		107.55		WD		95.82		606.82
11	Peter Ferguson	GCC	Mazda MX-5	C	6	76.12		77.72		WD		33.40		101.32		FS		49.64		100.94		611.18
12	Raymond Vella	GCC	Mazda MX-5	C	7	76.52		76.16		WD		34.12		FS		98.00		FS		93.63		613.72
13	Tyson Cull	GCC	Ford Falcon	D	3	79.55	F	70.86		38.18	F	46.53	F	FS		WD		FS		88.19		630.40
14	Peter Shinn	MX5VT	Mazda MX-5	C	8	WD		WD		42.53		40.28		118.08		116.92		WD		110.22		674.74
15	Alyssa Perks	GCC	Mazda MX-5	J	3	100.38		99.51	T	52.35		38.47		128.94	F	130.26		69.13		121.00		740.04
16	Josh Hodson	GCC	Hyundai Excel	J	4	220.52		225.04		DNS		DNS		WD		WD		WD		DNS		1,043.71

Penalties noted in TIME column have Slowest Time + Penalty Applied

Slowest Time Used	**(slowest or twice fastest)**	82.69	80.50	45.12	42.35	118.08	116.92	57.09	110.22
Slowest Time Junior	**(slowest or twice fastest)**	158.50	158.68	52.35	38.47	123.94	130.26	69.13	121.00

Penalties Legend

F	Strike course flag/cone	Time +5 secs per marker
T	Leaving Track bounds	Time + 5 secs per incident
X	Finishing with part of vehicle outside garage	Time + 5 secs
FS	Failure to Stop in Garage	ST + 5 secs
WD	Wrong Direction	ST + 5 secs
FC	Failure to Complete the Test	ST + 5 secs
DNS	Did not attempt test	ST + 10 secs

CLASSES

C	Production 2WD up to 2000 capacity
D	Production 2WD 2001 and over
G	Production 4WD
F	Special
J	Junior

HIGHLIGTED TIME INDICATES FASTEST TIME OF RUN (Including any penalties)

NEXT GCC KHANACROSS: September 12, 2021

2021 GCC KHANACROSS CHAMPIONSHIP

		R1 21-Feb	R2 28-Mar	R3 23-May	R4 27-Jun	R5 15-Aug	R6 12-Sep	R7 31-Oct	R8 12-Dec	Total
					OUTRIGHT					
1	Matthew Paulet	20	20	20	20	20				100
2	Scott Seddon	17	15	17	15					64
3	Peter Ferguson	10	17		13	9				49
4	Sei Vella			13	11	17				41
5	Benjamin Selwyn	1	7	6	7	13				34
6	Byron Townsend	4	8	15	3					30
7	Mitchell Newton	7	1	11	10					29
8	William Roshier	6	6	8	8					28
9	Neil Roshier	5	9	4	9					27
10	Mark Newton	2	11	9						22
11	Raymond Vella			7	5	8				20
12	Ian Maud				17					17
13	William Morgan		2	10	4					16
14	Sean Priestly	15								15
15	Ian Mayze		4		1	10				15
16	David Thirlwall	13								13
17	Dean Evans		13							13
18	Blake Coady	11								11
19	Terry Selwyn	3	3	5						11
20	Travis Selwyn					11				11
21	Thomas Foley		10							10
22	Rhys Yeomans	9								9
23	Carrie Thirlwall	8								8
24	Tyson Cull					7				7
25	Jarrod Bryant				6					6
26	Alyssa Perks					6				6
27	Tom Green		5							5
28	Josh Hodson					5				5
29	Sarah Seddon			3						3
30	Emily Newton			2						2
31	Dylan Goodwin				2					2
32	Jack Priestly									0
33	Zara Priestly									0
					Production 2WD up to 2000 capacity					
1	Peter Ferguson	20	20		17	13				70
2	William Roshier	15	15	15	11					56
3	Sei Vella			20	15	20				55
4	Neil Roshier	13	17	10	13					53
5	William Morgan		10	17	8					35
6	Ian Mayze		13		7	15				35
7	Terry Selwyn	11	11	11						33
8	Raymond Vella			13	9	11				33
9	Ian Maud				20					20
10	Rhys Yeomans	17								17
11	Travis Selwyn					17				17
12	Jarrod Bryant				10					10
										0
					Production 2WD 2001 and over					
1	Mitchell Newton	13	13	20	20					66
2	Mark Newton	11	17	17	13					58
3	Emily Newton		11	15	15					41
4	Dylan Goodwin				17	20				37
5	Sean Priestly	20								20
6	Dean Evans		20							20
7	Blake Coady	17								17
8	Tyson Cull					17				17
9	Carrie Thirlwall	15								15
10	Tom Green		15							15
					Production 4WD					
1	Scott Seddon	20	20	20	20					80
2	Thomas Foley		17							17
					SPECIAL					
1	Matthew Paulet	20	20	20	20	20				100
2	Byron Townsend	15	17	17	17					66
3	David Thirlwall	17								17
					JUNIOR					
1	Benjamin Selwyn	20	20	20	20	20				100
2	Alyssa Perks	17	17		17	17				68
3	Sarah Seddon			17	15					32
4	Zara Priestly	15	13							28
5	Jack Priestly		15							15
6	Josh Hodson					15				15

GIPPSLAND CAR CLUB

KHANACROSS August 15, 2021

GCC KHANACROSS CHAMPIONSHIP SCORING

Outright Place	NAME		Time	OUTRIGHT POINTS	C up to 2000 capacity		D Production 2WD 2001 and over		G Production 4WD		F Special		J Junior	
					Place	Points	Place	Points	Place	Points	Place	Points	Place	Points
1	Matthew Paulet	Hyundai Excel	497.31	20							1	20		
2	Sei Vella	Mazda MX-5	534.07	17	1	20								
3	Dylan Goodwin	Nissan 370z	592.95	15			1	20						
4	Ben Selwyn	Hyundai Accent	593.03	13									1	20
5	Travis Selwyn	Hyundai Accent	602.74	11	2	17								
6	Ian Mayze	MGB Roadster	606.82	10	3	15								
7	Peter Ferguson	Mazda MX-5	611.18	9	4	13								
8	Raymond Vella	Mazda MX-5	613.72	8	5	11								
9	Tyson Cull	Ford Falcon	630.40	7			2	17						
10	Alyssa Perks	Mazda MX-5	740.04	6									2	17
11	Josh Hodson	Hyundai Excel	1,043.71	5									3	15

SUPPORTERS AND ADVERTISERS INDEX

These businesses support our club!! Make sure we support them!

Name	Product	Contact Details
Moe Parklands Motel	Accommodation	03 5127 3344 stay@moeparklandsmotel.com.au
BTR Machining and Cylinder heads	Dyno tuning, engine rebuilds, race prep, general repairs	03 5134 4023 simon@btrmorwell.com.au
Penrite Oils	Oils and lubricants	www.penritetopclass.com.au
Fowlers Asphalting	Roadmaking	03 5633 2918 admin@fowlersasphalting.com.au
Arrow Linemarking	Linemarking	0458 882 353 arrowlinemarking@y7mail.com
Alfa Motorsport Fibreglass	Automotive repairs	info@alfamotorsportfibreglass.com.au
O'Connell's tyres	Suspension, front end, brakes, shocks	03 5126 2822 Facebook presence https://oconnellstyres.weebly.com/
James Lambert	Photography	James Lambert @SJLambert6
Jim Jones	Photography	Jim Jones Jamar Imaging.net
SPIN Media	Photography and video	ncardwell@spinmelbourne.com
Trafalgar Auto Elec	Auto Electrics	56332062
Capaldo Automotive Repairs	Mechanical, alignment and MX 5 specialist	5134 4328 Ask for Steve
Peter Weaver Msport Photography	Photography	0438 109 027 peter.weaver@speedway.net.au