



STAG NEWS



Magazine of the Triumph Stag Club USA
Fall 2020 | Issue 109



4.4 Litre Leyland V8 Stag

Stag-powered Triumph 2000 • Bench testing • Cold Metal Spraying

Triumph Stag Club USA

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Submissions should preferably be non-formatted MS Word documents. Articles of 1,500-2,000 words are preferable but larger submissions can be accommodated. The Editor reserves the right to make changes to any submission for layout purposes. Photographs or diagrams should be sent separately as high-definition JPG files (>4000KB) with appropriate cut-line/caption descriptions. The author should provide a short biography. Send by e-mail to the Editor ahead of the deadline dates of March 1, June 1, September 1 and December 1 for inclusion in a future issue.

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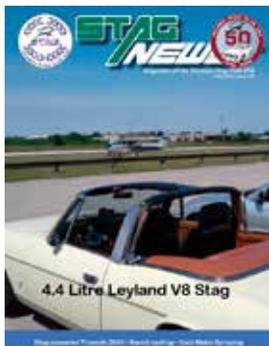
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Our website URL's is: tscusa.org

On the Cover

The Editor's Jasmine Stag at Guelph Airport, ON on one of a few post-COVID lockdown drives
Photo: Terence McKillen



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PLEASE CONSIDER CONTRIBUTING

Producing a magazine dedicated to a single classic car model issue after issue, as we do at Stag News, can be challenging. In order to keep providing interesting articles and stories, we need to hear from more of our membership. Thanks to those who have already stepped up to the plate and prepared a once off submission or have become regular contributors.

Please consider sending us an illustrated article about your Triumph Stags; the hunt for a suitable model, the restoration projects completed or underway, the modifications you have made, the difficulties faced, why you still love them, the outings and trips you take, the shows and events that you attend, the friends and associates with whom you share this passion.

We would like to hear from members in as many different States and Provinces (and internationally) as possible in order to keep the content regionally balanced.

Renew your membership ON-LINE at
www.tscusa.org/join.asp

NEW MEMBERS
Since Summer Issue #108

Paul Amaranth, Manchester, MI

Derrick Bailey, Plano, TX (rejoined from 10/2017)

Bill Bentley, Chicago, IL

Rob Borsari, Knoxville, TN

Corey Buchik, Phoenix, AZ

Don Cheema, Dublin, CA

Kevin Cherrington, Ramsey, NJ

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David Gillespie, Palathka, FL

Dominic Greene, Olivette, MO

Steven Hansen, Los Gatos, CA (rejoined from 02/2019)

Christopher Kennedy, San Diego, CA

John Middlemiss, Holland Landing, ON, CANADA

William Minard, Mendham, NJ (rejoined from 07/2017)

Douglas Parker, Burbank, CA

William Parnell, Medina, OH

Richard Pilipchuk, Waterloo, IA (Rejoined from 09/2019)

Dennis Popowich, Langley, BC, CANADA

Ranbir Sidhu, Santa Rosa, CA

DEADLINE

The deadline for the next issue of

STAG NEWS is:

Dec. 1, 2020

To submit material for publication refer to details on inside front cover

On the Road Again!

*Here we go, on the road again
Like a band of Gypsies we go down the highway
We're the best of friends
Insisting that the world keep turnin' our way*



Willie Nelson's 1979 hit lyrics capture the feeling of being back again behind the wheel of a top-down Triumph Stag. However, we must remain vigilant in the fight against the COVID-19 virus. Let's hope that with proper social practices (avoiding crowded spaces, proper distancing, masks, gloves and careful hand washing) and perhaps the beginning of mass vaccinations, 2021 will prove to be a better year, when we might celebrate the 50th anniversary of the Stag's introduction to the American market.

In this issue, we have two somewhat related stories of owners replacing their Stag's original power plant with a donor engine. Clay Adams describes his 1971 Stag back in New South Wales, Australia in which he fitted a staggering 4.4 litre Leyland P76 V8 replacement which provided him with pretty trouble-free motoring over a 10-year period; while Stag Owners Club (UK) member, Ian Hull describes his unique Triumph 2000 saloon which came from the factory powered by a Stag V8 engine. Tony Fox explains the merits of running a rebuilt engine on a test frame prior to reinserting back into the car; and Ted Roberts and John Green introduce us to the cold metal spraying technique used to rebuild dodgy Stag heads, while Sue Lowe provides a Stag report from New Zealand.

See you on the road again. Stay safe!

Terence McKillen

Top - Ian Hull's unique Stag-engined Triumph 2000 Mk2 | Centre - Tony Fox's 13th Stag (Magenta) | Bottom - Clay Adam's Stag with the Leyland P76 V8 engine

Founder's Corner

Autumn 2020

Fall or Autumn is here and the leaves are dropping on our lovely Stags! Our gatherings this year were almost completely compromised by the worldwide pandemic. I hope this issue of Stagn Nws finds all our members and their families, friends, etc. in good physical health and looking forward to better days ahead.

As you will note on the inside front cover our membership has grown quite well and I welcome all our new members and those renewing their membership. Do let us know how and/or when we can be of assistance to you with your Stag(s). The only wrong question is the one not asked!

Club officers and myself have been discussing the club website and agree that a major overhaul is needed and those responsible are beginning plans for such an upgrade in early- to mid-2021. Your input will be appreciated, so contact our Web Master and/or our Editor/Publisher with your comments, suggestions, etc. Contact details are on the inside front cover of Stag News.

Such an undertaking will take time and dollars. Our club treasury is in decent shape, but such an upgrade will cost significant dollars. As the only income comes from membership dues, we must consider increasing annual membership dues which we will address in greater detail as the process continues into next year. Enjoy the Holiday season!

Take care of yourselves my friends and enjoy the Autumn colors as you drive your Stag.

Michael Coffey - Founder

Stag with a 4.4L Leyland P76 Engine

by Clay Adams



Under the bonnet of the author's former 1971 Australian Stag sits a 4.4L Leyland P76 V8

While British Leyland struggled for its life in the early-1970s, on the other side of the globe another arm of the company was waging its own fight for survival. It was a fight that would give the Stag an unexpected boost.

In June 1973, Leyland Motor Corporation of Australia unveiled its great hope for the future. A new family sedan in six and eight cylinder versions – the Leyland P76. Although station wagon and coupé versions were designed, they were never mass produced.

The P76 was heralded as the car that would totally change the motoring landscape. *Wheels Magazine* actually named it Car of the Year in 1973, labeling it as “a dynamic and remarkably fine motor car, surely destined to push Leyland up the ladder, both in Australia and in export markets.” I remember as a young lad in suburban Melbourne watching the *Wheels COTY* television special late one Sunday evening in resplendent black

and white.

It boasted features like concealed wipers, standard front disc brakes, a crush-proof bonnet (hood), side door intrusion bars for crash protection, and even an isolated fuel tank to meet public concerns about car safety. All were innovative for the time, as too was the ability to even carry a 44-gallon (194 litre) drum in the boot (trunk) in an effort to sway Aussie farmers away from their beloved Holden utes, Ford Falcons, Holden Kingwoods, or Chrysler Valiants.

Alas, the P76 failed to live up to its hype. Quality control was a major issue as doors failed to fit correctly, dashboards came loose and water seals failed to, well, seal. Add to that rising petrol (gas) prices and a shift away from large vehicles to smaller, more economical models and Leyland's great Aussie hope became hopeless. Production ceased in November 1974 with just shy of 18,000 leaving the Sydney plant.

The P76 was relegated to a footnote in Australian motoring history, a staple for teens seeking cheap beaters and the butt of jokes.

But other than sharing styling by the legendary Giovanni Michelotti, the P76 would prove to share something else with the Triumph Stag. Well, other than being victim to questionable engineering, poor production standards and dubious decision making in exalted boardrooms. That similarity was the engine. The P76 V8 to be exact.

The P76 engine was a unique 4.4 litre (270 cubic inch) version of the Rover (Buick) 3.5 litre V8. While everything built around it fell apart, the P76 engine was an engineering gem. Its lightweight alloy body produced 200 hp and 280 pounds of torque. For the mechanically minded out there, it was a square engine with the bore and the stroke 88.9 mm × 88.9 mm (3.50 in × 3.50 in). The block deck height was extended and

longer conrods were fitted 158.75 mm (6.25 in) between centres. Not only was the engine fitted in the P76, it was also a staple in Leyland Terrier Trucks due to its power-to-weight ratio.

And, like its 3.5L parent, it found a home in many Aussie Stags; including mine. In the late 1970s to mid 1980s, many a Stag engine was ripped out in favor of the more reliable P76 4.4L V8. My first Stag, purchased in Sydney in the early 1980s, suffered from a blown engine and an owner who thought you filled oil to the top like coolant in a radiator. I kid you not!

In those days, General & Sporting Automotive in North Melbourne, had a solid and respectable trade swapping dead or dying Stag engines for P76 conversions. The cost was a meagre \$5,000 AUD, not much less than what I paid for my used Stag.

Their conversions were a piece of art. Mounted low, they merged perfectly with the BW35 transmission, had a neatly



The Leyland P76 was awarded Car of the Year in 1973 but it never lived up to the reputation of its V8 power train



The Leyland P76 V8 as fitted in the original vehicle

slotted electric thermostatic fan, and retained the magical Stag burble. Fitted with a 350 Holley carburettor, rather than the two-barrel Stromberg fitted to the original P76, it sat low enough that no bonnet bulge was needed. Close the bonnet, turn the key and even the most dedicated Stag fan couldn't tell the difference (a point proven at several Triumph Sports Owners NSW branch meetings).

As years progressed, the idiosyncrasies of the Stag V8 were ironed out and more owners chose to repair rather than replace. But the P76 helped keep the Stag viable for many an early owner who would otherwise have cast the vehicle aside in mechanical frustration.

I have no idea what happened to General & Sporting Automotive. I suspect it shut down or reinvented itself decades ago. Only a few years ago I learnt the company was actually contracted by Leyland Australia to replace blown Stag engines as warranty work for frustrated owners. How times had changed.

My Aussie Stag (NSW LMH-421) was my daily driver for almost a decade, notching over 200,000 km (125,000 miles) ranging from crawling Harbour Bridge traffic to coastal road trips. It rarely missed a beat and bidding it farewell when it was time to move to Canada was truly heartbreaking. Last word was it is still alive and well with an owner in Victoria, something that speaks volumes, not just for the appeal of the Stag, but the P76 engine.

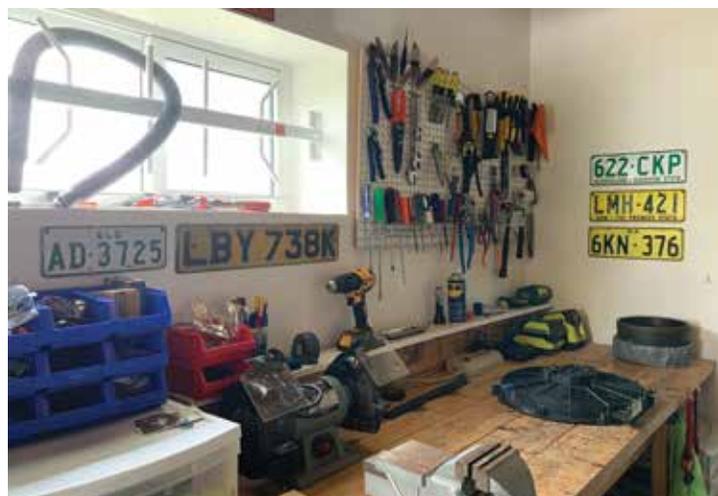
While purists abhor replacement engines, beauty is truly in the eye of the



One of the features of the ill-fated P76 was a boot capable of holding a 44 gallon drum; because doesn't everyone need to carry one?

beholder. My current white Stag, here in British Columbia, is powered by the 3.5L Rover V8 which, sadly, wasn't installed with the same level of engineering skill as the P76 engine

But the beauty of the Stag is as much its look and feel, as what's under the bonnet. Which is why I wonder what it would take to install a long-range electric engine in my Stag. That, however, will be another story. 🐾



The author's current workshop in Port Coquitlam, British Columbia, is keeping the memory of his Australian Stag alive through plates NSW LMH-421 and its original UK plate LBY 738K

Bench testing a rebuilt Stag engine

by Tony Fox

I purchased my thirteenth Stag at the end of last year. It is a 1973 Magenta on black; and yet another project.

A friend had bought the car with the knowledge it had a 'noise' in the power train which had not been diagnosed as to the cause. He was hopeful it was of a minor nature but it turned out to be anything but. On examination, I found as the oil warmed up, around five minutes or so, #5 big end bearing knocked very badly, sadly not good news for him.

At this point he determined it was beyond his capabilities for a number of reasons, one being he did not have the room to work on a project of this magnitude. So, I agreed to become the next owner with the understanding an engine rebuild was required. My son and I decided we needed another joint project so this filled that need.

Knowing full well that one bearing was well beyond repair I thought there could possibly be more that had worn so we flushed the engine a couple of times to get rid of debris before dismantling it. After pulling the engine from the car and removing the oil pan, the extent of damage to number five rod bearing was revealed; it was very badly worn and the crank journal oval by 0.015 ins. It might clean up on a regrind with under size bearings, but it was a mess. Three other journals were almost as bad and near the point of starting to knock I would think, with badly worn shells and journals.

So, a bit of a mystery as the engine had done only around 2,000 miles since a full rebuild. To determine the cause of this rapid wear I considered that a lack of oil supply could be a potential cause. However, by checking oil flow to the crankshaft we found abundant oil to all the crank oil supply galleries. This was checked by running the oil pump with an electric drill while feeding the pump intake from an oil reservoir. Therefore, this was not likely the issue. The other possibility was to check the crank for hardness and indeed found it severely lacking in that regard. I checked

back with the prior rebuilder and was told it had supposedly been cryogenically hardened. Obviously, someone had dropped the ball and this step was never completed or incorrectly done, a real pity.

A correctly hardened replacement crankshaft was fitted together with new bearings, timing chains etc. and the engine rebuilt.

As anyone who has rebuilt a Stag engine (or any other engine in fact) will know, the perils of installing an untested, rebuilt engine back into the car is fraught with dangers. There are possible oil or coolant leaks after the unit is in the car. Some of these problems are easy to fix, however there are some that are potentially quite difficult to reach and retro-fix.

The Stag in particular, leaks from the oil pump and oil transfer housing are both difficult to diagnose and to fix once in the car. These both require working under the car once the right hand exhaust down pipe and the oil filter housing have been removed. Leaks from the rear main bearing seal or torque converter seal are even more challenging as it will need the transmission to be removed at the very least.

To overcome issues like this, bench testing makes any such potential leak easy to find and easy to rectify before installation in the car. I would suggest any engine rebuilder consider this step before installing an engine back in the car.

I was fortunate in this regard as good friend and fellow Stag aficionado, Dave Lawrence donated an engine test stand to me that he had built to rectify some nagging problems on his own Stag engine. This allowed the engine to be run up to operating temperature and checked for oil and coolant leaks before installing it in the car.

The whole exercise turned out to be extremely fortunate as I found oil leaking from the oil transfer housing which would have been a nightmare to resolve in the



car. Anyone who has worked on this area of the Stag engine will know how difficult it is to see, never mind about work on it. So, a big job in the car but done in two minutes thanks to Dave's test rig (actually mine now, he tells me).

We set the test stand up with choke controls, oil pressure and coolant temperature gauges to monitor the running condition of the engine. We ran it up to operating temperatures several times to make sure all was well for installation in the car. We also re-torqued the heads, not too difficult to do in the car but certainly a lot quicker at this juncture.

These issues are not unique to the Stag engine. Making a test rig like this would work well for any classic car engine rebuilder. It is not an expensive undertaking and can be built by anyone with metal/wood working skills. In this particular case, 1½ inch steel tubing was used to make the frame which picked up the front engine mounts and then at the rear a rubber mounted cross-ember connected with the bell housing. In this instance, the unit is mounted on a wooden frame with caster wheels. This isn't essential but makes it more mobile.

Proper ventilation of the workspace is essential when running an engine in an



The Magenta Stag's engine running on the test stand

enclosed space. I attached long lengths of plastic flex tubing to the two exhaust pipes and ran them through the door well clear of the building to ensure no fumes could circulate back into the work space. Of course, one also has to be mindful of the safety concerns relating to the fuel supply, which in our case was a two-gallon plastic gas can with electric pump.

I know magenta is not everyone's favorite color but I am finding a growing interest in it of late - and it is a very period 1970s color.

So, one previous owner had spent a lot of time, effort and money restoring this car some years back; the next owner became frustrated with his purchase, all because the crankshaft wasn't hardened properly. The fault lies with the mechanic chosen by the earlier owner who in good faith believed what he had been told. However, with the engine now rectified this is going to be an excellent car going forward. 🐾



Tony added coolant temperature and oil pressure gauges to the rig



Scoring on the crank journal and bearing shells was responsible for the knocking noise from the #5 big end



A Wolf in Sheep's Clothing

An unusual Triumph 2000 Mk2 factory-fitted with a Stag engine

by Ian Hull

A wolf in sheep's clothing is what our local Stag Owners Club coordinator calls my Triumph 2000 Mk2. When you first see FOL 361L it looks like any other 2000 Mk2 except for its paint work and wheels. It is painted a dark blue metallic colour, non-standard for the time it was manufactured, and the wheels are the Triumph Stag five-spoke alloys. However, it could have been repainted and the wheels could have been changed some time after it was manufactured. Look closer and you see other things that suggest that this car is not all that it seems. The wheel centres each display a capital D; walk round the back of the car and two stainless steel tailpipes stick out under the bumper; look at the front grill there is no grill badge of any sort and a close examination of the grill suggests there never has been one fitted.

Open the driver's door and there is a complete Triumph PI instrumentation. Time to open the bonnet and see if there are any surprises there and what confronts you is a Triumph V8 engine. Up front is what looks like a later Stag radiator. Look closely and you can see that the filler has been shortened and rewelded and in addition to allow the bonnet to close over the modified filler a piece has been removed from one of the bonnet ribs. Finally, a very neat two-piece, pressed steel cowl fits snugly around the fan.

Time to look underneath the car to see what is going on there. Everything underneath the car is pure Stag. Dual circuit brakes, bigger front discs, bigger rear drums and modified rear sub-frame to take the twin exhaust system.

A visit to the British Motor Museum at Gaydon and an examination of the production records of the time turns up some more surprises. The car was built on the November 27, 1972 with a two litre straight-6 engine, to home market specification. The original colour was a non-standard metallic blue, no paint code was recorded on the records or the commission plate. Extras were listed as heater, Borg Warner automatic transmission, heated rear window, inertia reel seat belts and



Sundym glass. So, when did the Stag V8 engine appear?

Now, back to the paperwork that came with the car when I acquired it in April 2016. First, a copy of the original V5 document (*a document issued by the Driver and Vehicle Licensing Agency (DVLA) to the registered keeper of a vehicle which is used to confirm proof of ownership and the specific details of a vehicle. It's also used to inform the DVLA of a change of ownership, a change of name and address, or if a vehicle has been modified, scrapped or written-off -Ed.*). The vehicle registration number FOL361L was issued to British Leyland Ltd., Austin Morris Group, on the December 1, 1972 just 4 days after the car was built. That same day, the car was transferred to British Leyland, Power and Transmission Division, Longbridge where it remained until October 1981. Was this where it received its V8 engine along with the various other Stag-related items such as the behind headlights battery tray? In October 1981, the car was transferred to British Leyland Heritage Ltd. at Castle Road, Studley and signed for by a Mr Ronald Whitehead (the manager at Studley?)

Then in 1990 British Leyland Heritage became the British Motor Industry Trust and moved to its present site at Gaydon

and FOL361L went with it still in the charge of Ronald Whitehead. There the car remained mostly in store until it was sold in a reduction sale on June 29, 2003. By this stage the engine was seized solid and its windows were broken, apparently caused by some vandals who had broken into the store. Two subsequent owners failed to revive the car and not until Yorkshire Triumph acquired the car in 2015 was the engine rebuilt and the car returned to its former glory. I then acquired it in 2016 and have used it ever since.

Returning to the car's life at British Leyland, the original MOT certificates tell an interesting story. FOL went for its first test on March 12, 1976 just 3 months after its 3rd birthday. The odometer recording after three years was just 3,628 miles, not a lot! Perhaps more interesting is that the cylinder capacity of the car was recorded as 3,500 cc although the car was still registered as 2,000 cc, presumably the tester had opened the bonnet to check the VIN number and looking at the engine had decided it was a Rover V8. The next Test Certificate raises more questions than it answers. The next certificate number 440855

is identical to certificate no 440849 except it is clearly marked "duplicate certificate" dated March 13 and the cubic capacity is now 2,000 cc! For all the remaining test certificates whilst the car was at British Leyland there was a running battle over the cubic capacity of the engine, testers putting it down as 3,000 cc and then rather heavily and clearly changing it to 2,000 cc. What were the Power and Transmission trying to do; hiding what they had done to the car and from whom? The only time there was no dispute was when BL Heritage put it through its MOT.

The mileage over this period was also interesting having only done about 3,000 miles in its first three years, the car then clocked up almost 38,000 miles in year four and in subsequent years only did between 1,000 and 5,000 each year. One suggestion was that the car might have been round the clock by the time of its first MOT but then someone else said that if it had, its body work would have been in very bad state and that's not the case.

So, what was the car used for whilst at the Power and Transmission Division of BL? I am starting to lose count of the various suggestions. Bonhams, when selling the car in 2003, described it as a V8 engineering prototype. An apprentice exercise was another suggestion and a manager's perk another. Graham Robson said it could not have been a prototype as the commission number was wrong but then I read an article recently suggesting that a lot of the prototypes were not given X-numbers.

Another possibility was that the unusual radiator and cowl suggested that the car was being used as a mule to test improvements for the Stag's cooling system but this seems a bit pointless as any change would need to be tested on an actual Stag. One seemingly far out possibility was that the car was a mule to test Lucas fuel injection equipment.

Maybe there is someone still around who remembers the car from its time in the Power and Transmission Division. If there is, I would dearly love to hear from them. My e-mail contact is:- lan.hmctraining@gmail.com.

One thing is certain, every time I drive the car I think, why did they build it? A completely rebuilt and sorted out 3.0 litre Stag engine is a sheer joy to drive.

If you look at the photo of the engine bay, you will see that when the engine was out it was repainted, and some detailing done. The colour is not a perfect match

but the closest we could get is Hyundai Atlantic Blue. Also, if you look closely at the photo you can just see the top of the fan cowl.

We probably have more to discover about the car and maybe some surprises are yet in store. As an example, there are two lights and a knob on the dash which have no clear function, they must have been put there for some purpose. We had to get the radiator repaired as it was leaking slightly and the workshop doing it said the only way was to recore it. We then discovered that the radiator was four row and a completely non-standard size. The replacement had to be specially built. Certainly, whatever has been done to the cooling system it works well. The temperature gauge sits very steady even in a slow moving traffic jam. Getting admission into the Kilbroney vintage car show (Co. Down, Northern Ireland) on one of the hottest days in June 2018, the gauge sat steady, well below half-way and that was without an electric cooling fan. I have to admit to being slightly naughty at times, not exactly breaking the law mind you, but when I see a car behind me going from side to side obviously intrigued by the twin exhaust pipes and trying to see more, I let him sit there for a while then just hit kickdown and watch him disappear in my rear view mirror. The torque curve on that engine is such that no matter what speed you are at,



The Stag engine fits nicely in the engine bay of the 2000

it just goes, with no delay.

Since writing the original article first published in the SOC magazine (Issue 450, May 2020), some more things have come to light. Peter Robinson is certain that the car was built for the then sales director of British Leyland who was based at Longbridge. This certainly fits in with Graham Robson's assertion that FOL was a Birmingham registration and that the car probably never was at Coventry. At present, nobody can remember the name of the then Sales Director, but company records should bring this to light. The capital D in the centre of each wheel might offer a clue; perhaps a first letter of an initial or surname. For a long time, I kept thinking that the D looked familiar and then it dawned on me, it is the same as the D on the rear quarter panel of the Dolomite cars. Taken from the parts box at assembly?

The engine number prefixes with the letters ESS. I have two possible definitions of ESS, engine supplied separately or engine service spares. I suppose take your pick. Regarding the lights and switch on the dashboard, it looks like the right-hand one was the brake warning light as on the Stag. The shuttle valve is fitted on the near-side inner wing but there is no electrical connection. The left-hand light is probably a warning light for trailer or caravan indicators, two lighting sockets are fitted beside the towbar. There is no longer a radio or stereo in the car, but it looks as if the knob was a balance control for the speakers.

We will probably never get all the answers, especially as the car is now almost 48-years old and many of the people who decided to build it, worked on it or used it are now deceased. I am determined to keep using this car and maintain it. It is I feel, a significant piece of Triumph history and thanks to Lloyd Reed of South Wales Triumphs, I can get replacement panels if the dreaded tin worm starts to have an effect. 

Ian operates a family farm near Banbridge, County Down, Northern Ireland. He is a member of the Stag Owners Club (UK). In addition to his unique Stag-engined Triumph 2000 Mk2, Ian also owns a more standard 1973 Wedgewood blue 2000 Mk 2 as well as a lovely 1972 Pimento red Stag.

[An earlier, less complete version of Ian's story first appeared in the SOC magazine, Issue 450, June 2020 - with kind permission of Editor Carl Fuss - Ed.]



1972 Pimento red Stag



Ian's standard Wedgewood blue 1973 Triumph 2000 Mk2



There are two lights and a knob on the dash which have no clear function

PHOENIX HEADS

A VIABLE PROCESS TO RECOVER CORRODED, DAMAGED OR OVER-SKIMMED TRIUMPH STAG CYLINDER HEADS USING COLD METAL SPRAYING TECHNOLOGY

By Ted Roberts & John Green

If you have a cylinder head that is unable to be used due to over skimming, corrosion or damage, there is now a process that can be used to make the head serviceable again.

If it is damaged or corroded the cost can be comparable to welding but without the disadvantages caused by the high heat used to make the repairs. If the damage is due to over skimming the cost is much higher than a second-hand head but saves scrapping what is becoming hard to replace part of the Stag.

The process itself was developed from the Russian Space Program where it was observed that there was a deposit on the capsule itself after recovery which was impossible to remove. An investigation found that some of the heat-shield supports had vaporised during re-entry and small particles of the metal had condensed and mechanically bonded to the spacecraft.

This process was recreated and refined into a practical cold spraying machine, manufactured under license worldwide. The machine used in this example is made by Dycomet Ltd. and the Managing Director Mr. Nick Gilfillan and engine specialist Mr. Paul Speakman the proprietor of Engine Tekniks who has considerable experience in rebuilding Stag V8s have kindly provided all the information and facilities for this article. **Figure 1** shows this machine.

I will try to describe very simply the technology using aluminium as the metal being sprayed.

The machine is fed with compressed air at 80 psi (5.6 Bar), this compressed air is heated to 600°C which is then passed through a venturi which picks up microscopically small aluminium ball-shaped particles. These particles are only 15-microns in diameter. 15 microns is about a fifth the width of a human hair or only 3 times the diameter of a blood cell. This mixture of hot air and aluminium exits through a 6mm bore spray nozzle at a



velocity of 1,342 mph (600 m/sec).

The spray nozzle is held close to the workpiece (in our case a cylinder head) at an angle of about 90°, when the particles hit the workpiece they first erode away the oxide layer cleaning it. Then due to the velocity and temperature of the airstream the aluminium particles melt and bond to the workpiece, they do not melt the workpiece but bond mechanically to it. Layers of Aluminium can be built up then machined to size.

Figure 2 shows a strip of aluminium that has been built up 3mm using a CNC traversing machine and next to it a similar strip built-up by hand then filed smooth.

The compressive strength of the bond is as strong as the parent metal but does not have the same tensile strength as welding because the parent metal is not melted. The main benefits are:

i). The cold spraying process prevents distortion in the cylinder head.

- ii). There is no heat-affected zone with its characteristic dip in the surface between the weld and the workpiece requiring additional metal to be removed during machining.
- iii). Improved corrosion properties because the sprayed metal is very pure, has low permeability/porosity, excludes Oxygen and is not affected by impurities in the casting.
- iv). It can be used in conjunction with welding on critical areas to increase tensile strength.
- (v). Working life is equal to that of the parent metal.



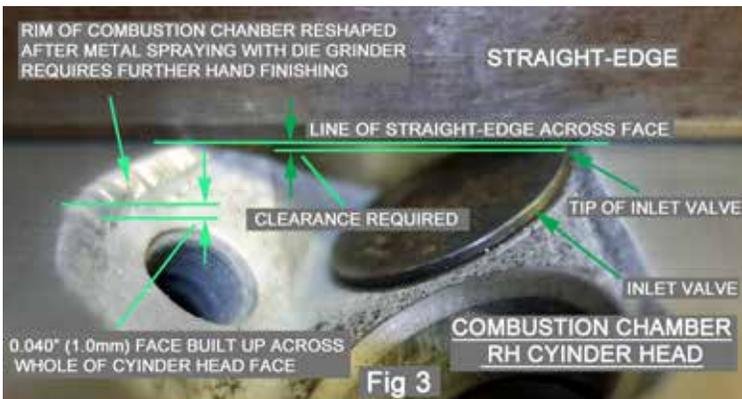
I decided to go ahead with this process on two cylinder heads, a Right Hand (RH)-Head that had been over skimmed and required 0.040" (1.0mm) build-up over the whole surface of the head and a Left Hand (LH)-Head showing signs of porosity and surface corrosion near the fire ring. There was enough metal to allow just grinding out the deep corrosion and building up locally before final finishing using a Polycrystalline Diamond Cutter. Engine Tekniks recommended cold metal spraying over welding for the LH-Head because impurities and inclusions in the low quality of the aluminium used for Stag cylinder heads can cause irreparable blowholes.

Figure 3 shows the RH-Head after it had been built-up illustrating the rule of thumb method of checking if there is enough metal on the head. Paul says that a standard head has a clearance of around 0.020" (0.5mm). If the gap between the valve and straight edge is close it is recom-

circles of corrosion around the combustion chambers).

Figure 5 shows a localised repair after first skimming. A final minimum skim is needed to complete the repair.

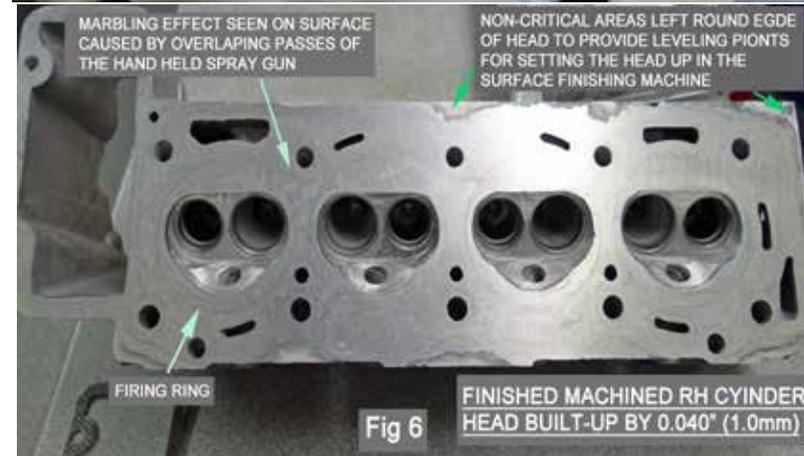
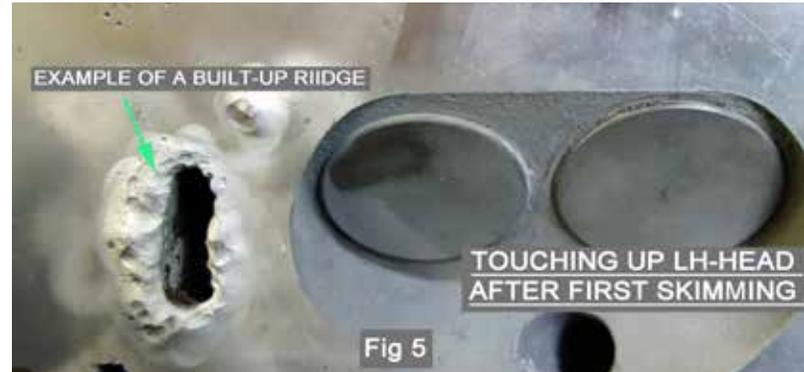
Figure 6 shows the finished RH-Head built up by 0.040" (1.0 mm) across the whole surface. Notice that bits of the head near the edges have not been built-up. These areas are used as reference points so that the head can be set-up in the surface finishing machine multiple



mended that a Thick Head gasket should be used. (We couldn't find Triumphs official recommended minimum gap specification if it exists). Note if the valves and seats have been recut in a previous repair this will need to be given consideration.

Figure 4 shows the LH-Head before metal spraying, you can see clearly the pitting around the fire-ring positions (the

ble proposition in recovering and repairing heads which had previously been considered scrap. As far as we know the Dycomet technology cold spraying method is the only method available of building up the whole of the face of the cylinder head,. The process is continually improving so please don't throw heads away. An alternative method of building up the RH-Head



times in exactly the same position if additional work has to be done.

Figure 7 shows the Finished machined LH-head

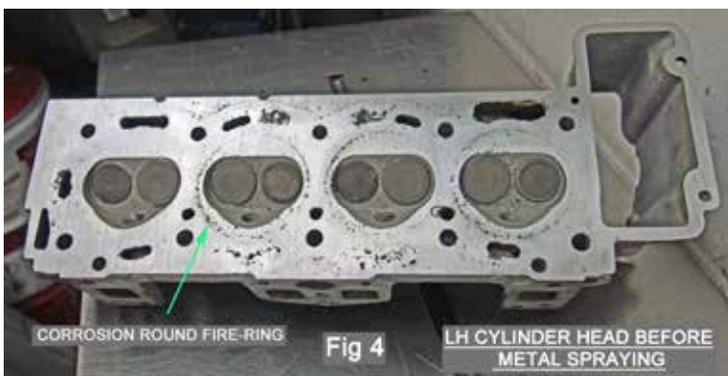
In conclusion, the process has proved to be a via-

using an additional stainless steel 0.040" Gosnay's SaverShims gasket was considered but rejected. It was felt that it would compromise the originality and integrity of the Stag engine, be a source of premature gasket failure and possibly unbalance the two banks of cylinders.

Dycomet Ltd's sister company, Chase Engines Ltd, Newcastle-Under-Lyme, Staffordshire specialises in restoring rare engines and has been using the cold spraying process successfully for several years to recover irreplaceable parts.

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Staggering Around New Zealand

Sue Lowe, past-President of the Stag Owners' Club of New Zealand has shared a report of some of the Stag events she attended in early 2020 before the COVID-19 pandemic hit New Zealand.

Life Before Lockdown 2020 was going to be a big year for me with the Stag's 50th Anniversary, my fourth trip to England and the big tour of Egypt which I had been dreaming of since I was a teenager.

It started out well. The 6th of February was the date of the Classic Car Show at Ellerslie (Auckland), probably the biggest car show in New Zealand for all the various car clubs. Each year the show committee chooses a display theme for the clubs to interpret and present and this year the theme was "CARNIVAL". Well, that was an easy one for me to do – a front and back display – the front being a Celebration of things British – a Pimento, White and Sapphire Stag, lots of Union Jack Bunting and a few British characters.

The back of the display was to have two Yellow Stags, Yellow and Gold bunting and gold balloons with "Celebrating 50 Years of the Stag 1970



-2020" printed on them. Then, a yellow Stag, which was undergoing a rebuild, ran into some major technical difficulties and wouldn't be finished in time. Oh well, I did try and find a replacement but, one is better than none, so it was a four car show! It was a lovely day, everyone pitched in and we were ready in costume just before the judges arrived to see our display. We were busy all day chatting to the punters and before we knew it, it was 3:00 pm and prize giving. And to my utter surprise, we came third for our little display!

After that event, my Stag made a visit to the local transmission shop to remedy a very annoying clunk when engaging reverse. I recall a conversation with the

mechanic about not interfering with the kick down as he was doing some last minute adjustments. I had no chance to test drive before my next main event. On 27th February the cat sitters arrived and I packed up the Stag and headed North to Mangawhai Heads to be official Chauffeur and Bridesmaid at my friends' wedding on the 29th. It was Mel's (the Groom) 14th birthday (*leap years - Ed.*) and I think he had cunningly chosen his birthday date to save on Anniversary presents in the future.

To my utter embarrassment, going up a hill and coming upon a slow vehicle – kick down did not occur but a lot of swearing did!! Upon arrival at Mangawhai, the car had to be cleaned for the event

and ribbon applied and whilst cleaning, the radio aerial went up and down a few times (on its own accord) then fizzed and crackled and that was the end of radio/stereo function.

Needless to say, the wedding was great, the car looked great and behaved herself and the next





new one fitted (the old one was somewhat oil soaked due to a previous outing when I had checked the oil and topped up but neglected to put the oil cap back on). Ray also supplied me with a pair of door handle rubbers and a cover for the fuses. The fuses had been naked since the resto was completed in 2004 – the one we'd bought from Rimmer's hadn't fitted.

The car show on the 8th March was a great success (apart from a nasty scratch that appeared on the back wing on the driver's side) and I stayed on in Hastings for a few more days before driving home.

Upon my return home (and a snub from my cat) I contacted my mechanic friend to organise the jobs that needed sorting on the car and, before anything could be done, we were in lock down.

Now we are out of lock down, I'm in a mad rush to get things sorted before I head off to Gisborne to help celebrate our club's oldest member's 90th birthday.



Sue's Stag as the wedding car

day, feeling slightly crapulent (**clearly a NZ word - Ed.**), I headed south to stay the night with my sister and brother-in-law on their farm in the Waikato.

My sister kindly moved her car out of the garage so I could park the Stag inside and the cats greatly appreciated the new and different place to sleep on the back tonneau cover.

I love driving with the top down and the stereo blasting but alas, with the radio broken, I had to listen to the engine instead. Look, I love that V8 burble, but when you're driving a very long way and you have absolutely no mechanical skills, you start to get jumpy at the merest change of pitch or the slightest clunk. I don't know how I did it but I managed to stay relatively calm for the whole four hours it took to drive the 300 kms from Pirongia to Hastings.

Hastings is in the Hawkes Bay and this was where our Club was to have its North Island get together for the 50th Anniversary. The South Island group had something planned for later in the year and I'm not sure whether this has been cancelled or rescheduled or what. Just before the car show, a substantial oil leak was detected which had my hosts and I scouring the area for a piece of oil resist hose which was eventually found and fitted. The club had also purchased a bulk lot of bonnet blankets and I had a date with Ray, the club parts man, to get my



With eight days to go, I have the door handle rubbers on – that was a mission – and the hard top is on. I have the car booked to get the radio sorted and the brake fluid to be changed on the 29th. I will be visiting the transmission shop today and making the 30-minute drive to the Panel and Paint shop to get the scratch looked at later in the week.

This trip to Gisborne had better be an uneventful one!! 🐾



Sue's cat on the tonneau cover

Tonneau Latch

by Michael Link

Ever consider what you'd have to do if the tonneau cover / center rear latch release lever were pulled, and instead of the familiar 'pop' as it released, you instead got a sickening snap from a cable break or had a latch failure?

Your first response would likely be your heart sinking into your stomach, right? At that point there is a good chance getting the tonneau open would be difficult, potentially resulting with some damage to your Stag.

Here are a couple of ideas to preemptively address this scenario, both accomplished through changing how the rear seatback is held in place. With the seatback removed, access can be gained to the latches and the cables.

The rear seatback was designed to be held to its support frame primarily with two ¼-inch bolts near the seatback's top, through the frame into captive female threads in the seatback. There are also two hook tabs on the frame near its bottom, which slide through a corresponding loop in the seatback. The bolts are undone, the seatback is lifted vertically to clear its lower hooks then tipped forward to remove.

One solution is cutting a key-hole shape to the hole in the frame where the seat-back is bolted. This method is to cut the holes where the two bolts pass through the support frame, elongating them vertically with a large enough opening at one end so the seatback can be moved then tipped forward and removed. The hole put at the end of the new elongation is made large enough for the bolt heads to pass through. The use of bolts to attach the seatback is retained, though they must not be too tight. There may be a need to cut the lower tabs that hook into the lower loops, shortening them so the seatback need not move as far vertically, be sure to check this before doing any cutting or drilling.

A different solution is to use Velcro. With this approach, the two bolts attaching the seatback are removed, Velcro is put in their place to hold the seatback from



moving. The seatback support frame is flat, as is the seatback's 1.00-inch by 1.25-inch square tab with the captive threads for the attachment bolts. A Velcro version that is not just for light indoor use is needed, one that will remain attached and not fail. With this solution, you just grab the seatback and pull it forward, then lift it to release the lower hook tabs. Velcro is easy to find whether at a hobby shop, a home improvement store, or at Amazon. Velcro is a brand name, that type of product is properly called "hook and loop" and any brand of it will work.

Whatever solution is used to address the scenario, be sure to test it a few times before the matter is closed in your mind. You want to prove it will work as intended, should the day come when you need it to.



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