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READERS' CONTRIBUTIONS

"Service Tools For Australia"

An article by Mark Paget

Repair tools for Australian produced;

- Austin Freeway - all models and badge variants,
- Morris Major - all models and badge variants,
- MG A, B, Midget – all,
- Sprite – all,
- Mini – all,
- 1100, 1300, 1500, Nomad – all,
- 1800 – all,
- Tasman/Kimberly – all,
- Marina – all,
- P76 – all,

plus certain models of/tasks for;

- Morris Minor,
- Land-Rover, Range-Rover,
- SD1,
- TR7 and the commercial range; Leyland, Scammell, Austin, Morris, BMC...

Since the post war years the automotive industry in Australia has been primarily foreign owned. At various levels relying on overseas models, design, support, technology, management, procedures and markets to sustain Australian production. Exceptions to this being Lightburn and their Zeta range. Oddly, owners of Australian made Ford and GM products tend to ignore and deny this reality. VW Australia would eventually produce the Country Buggy to rival BMC's Moke. Although based on pre war Ferdinand Porsche ingenuity, it still exceeded the local content, technology level and creativity of the American manufacturers in Australia at the time. What the Americans were up to on some of their home market cars (front wheel drive, mid engine, horizontally opposed, turbocharged, independent rear suspension...) wasn't exported to Australia in either vehicles, components or technology.

All companies achieved varying levels of local content with BMC-Australia being at the forefront for many years. As a result, local content spilled over into supporting industries and products. The BMC period in particular pushed automotive technology for the mass-produced car. This created an ever increasing requirement for task specific repair tools. To add context for the reader; coolant corrosion inhibitor was an alien concept to most drivers in Australia until the late 1980s. TAFE (apprentice training) Colleges in Australia taught that; 'only modern cars had rack and pinion steering' well into the 1990s. Obviously the Morris Minor wasn't released in 1948 and never sold how many million units internationally????

Rubber suspension arrived in 1961, fluid was about to and Citroen's hydro-pneumatic system was already here. If the car of the future didn't float on fluid, it certainly rode on rubber. Service standards and client expectations also started to rise. As part of the earlier BMC reorganisation in Australia, dealer rights were withdrawn, reorganised and reallocated to larger concerns in major areas. Except for regional centres, the local garage was no longer the source for Morris-Nuffield products, approved parts or repairs.

Dealers in a given model were now required to purchase mandatory service equipment. Typically these were supplied by V.L. Churchill (VLC) through their Australian outlet. At which point Healing Industries with their AUSTALOY brand enters the story. By contractual agreement tools were not supplied through BMC-Australia.

AUSTALOY history isn't well documented. However they would become the prominent brand name of service tools for the major Australian car manufacturers of the 1960s. AUSTALOY tools for Australian General Motors vehicles still regularly appear for sale in the 21st century. Federal legislation pushed the need for local content, which in turn stimulated creation of Australian made service equipment. For the BMC Australia network, three major product lines are now created and maintained;

- tools supplied solely by VLC (through Healing Industries) where no local equivalent exists,
- Healing Industry's locally made version of VLC tools (listed under their original VLC tool/BMC part number) supplied as direct substitutes for the VLC item, and
- tools by Healing Industries redesigned for improved/changed repair procedures or different tasks. These are typically identified by the inclusion of 'A' to the identification number's prefix (18G-xxxx becomes 18GA-xxxx).

Plus anything that may have carried over from the Morris-Nuffield or Austin days. This provided efficient and effective repair equipment for the most comprehensive and diversified new car fleet in Australia available from one manufacturer. Combined with light, medium and heavy commercials, all wheel drives, light agricultural, stationary and marine engines, Lucas fuel systems, Perkins diesels and more. All from BMC Australia.

The further possibility arises for Dealers or individuals to back order specific VLC tools through Healing Industries. In particular, items that BMC-A deemed to be not required or unnecessary to stock in Australia. A vague point arises as to who was involved in the local tool redesigning process. No one seems to raise the issue of accreditation and all continues as stated. Notable differences in construction include the use of plastic in certain AUSTALOY seal protectors. Corrosion is no longer a problem and blemishes are less critical and easily removed. A storage container would have made an ideal compliment but didn't eventuate. BMC-A also revised the use of some tools. Whether this was through issue of a design to;

- manufacturer an additional bracket to allow Mini's spring compressor to suit MG-B coil springs,
- modify the existing flywheel puller to accept torque converters,
- spring compressor adaptor plates to be used with 18GA574 for P76 or,
- additional bracing to stop the legs of the Hydrolastic pump bending in service.

From 8th August 1958 BMC Australia issued Service Tool (ST) bulletins. Certainly for the 1960s, BMC-A's use of their Service Tool bulletin program was fairly detailed. Something which degrades the further we move into the 1970s. With the loss of Victoria Park the separate topic of Service Tools seems to have been absorbed into general bulletins.

With the possible exception of Litchfield, none of the approved manufacturers covered in this paper created an unabridged product list. Or at least not one that was publicly available. This creates considerable difficulty for the tool user and researcher. BMC/Churchill start to, with publications such as BMC Service Tool Catalogue VLC/168/65. But then fail to improve as Standard, Rover and Jaguar enter the fold. As far as I'm aware, no one has even researched and published a master list of prefixes;

- 18G – BMC et al,
- 18GA – BMC Australia modified tool,
- RG – Rootes Group,
- JD – Jaguar Daimler,
- CA – Chrysler Australia,
- S – Standard,
- CBW – Borg Warner,
- L – Laycock-DeNormanville,
- DB – David Brown Tractors,
- STU – Cummins for Ford,
- Numerical prefixes – Ford, plus

- C, GA, M, MS, P, RTR, SL and many, many more...

Many dealerships are known to have changed or possessed multiple franchises as the years passed. Though not to the level of one stop retail outlets for almost anything, as you might have found in England. BMC and Ford Australia sales wouldn't have coexisted at the same outlet. However some BMC-A dealers held Japanese franchises in addition to Rover, Jaguar, Standard or Rolls Royce. Potentially creating an assortment of tools as years passed, which may have no clear use or means of identification. Let alone what might have found their way to garages or private collections. What would the uninitiated make of the sub-frame alignment tool for early Mini? Essentially nothing but a 5' x ½" diameter steel rod. This allows the user to confirm both trailing arms rotate on the same axis, proving the sub-frame is straight in the process. An item, which appears to have been dropped as a service tool well before 1965.

After the stagnation of the BL period and separation of Land-Rover, tool documentation is split to reflect models and brands. An all encompassing British Leyland tool list up to this point never appears to have been compiled or published. Certainly Churchill produced some comprehensive publications under specific banners; BMC, BL, Austin-Rover... But there is no go to whoa master list. Some include commercials, some don't. Some include Jaguar, some don't. Some include Rover... Some encompass only current vehicles...

As yet I haven't struck any publications from Healing Industries. Except for the Litchfield catalogue, BMC-A and its heirs are reliant on British publications as the major reference material. By the end of the 1960s this included and ever growing number of vehicle and models never seen in Australia;

- Maxi,
- Marina with a camshaft in the block,
- Allegro,
- six cylinder SD1,
- another reincarnation of Princess,
- Metro, Maestro and Montego,
- Rover 100, 200…

With the start of the 1980s, such publications progressively introduced new and otherwise unseen brand names and marketing styles for Austin-Rover and later Rover Group. Apparently importing such publications for general distribution was cheaper than compiling an abridged version for local consumption. This created and excess of information for anyone needing to reference a specific tool. All tools can be separated into two general areas;

- common or basic, such as the main part of a slide hammer or handle for seal installers (18G134), and
- vehicle/task specific.

Various catalogues further separate vehicle tools into sub categories (suspension, steering...). However many tools have multiple rolls and for multiple vehicles. Oddly, two of the better catalogues appear in the BL period. Neither of these appears to have been utilised in Australia.

New vehicles continue to arrive and evolve which means any catalogues are continually out dated. Further tools are introduced or existing tools reissued to a slightly different design. Usually indicated by the addition of a suffix to the original number. 18G-703 will eventually progress to suffix 'X'. Though not all suffixes directly address the pump and there is thought to be two of suffix 'C' for completely different items. For suspension pumps the alphabetical suffix is more of an evolutionary indicator. Generally a letter suffix indicates a new, supplementary component to an existing tool. Such as a:

- new adaptor end to an existing puller, or
- new seal installer in the 18G 134 series.

Whereas a numerical suffix identifies a major component of a multi-piece assembly. The use of full stops, spaces, slashes or hyphens varies dramatically as years pass and is of no bearing.

The arrival of outside technology and company transition further complicates matters, whether it is; Ducellior electrics, VW gearboxes, Honda, Ford or BMW motors. Plus the arrival of advanced electronics and the required diagnostic systems. Although heavy commercials always were a Meccano collection of in-house and external components. Jaguar Rover Australia's Quintet appears to have been entirely Honda sourced, including Honda workshop manual for a Honda. What input Honda Australia had if any, is unclear. Whereas Austin-Rover's venture from Triumph Acclaim onwards seems to have been UK supported, including VLC service tools. Part of the subsequent Honda powered, Rover small car range was sold in Australia. The eventual result of all this is changing

tool numbering systems. For Land-Rover (which still operates as a separate entity) the end user can now be confronted with;

- original Rover tool numbers;
  - RO.xxxx,
- additional BMC/Leyland tool numbers;
  - 18G-xxxx,
- entirely new numbering system under Ford's control;
  - .xxxx (LST.xxxx without the 'LST' prefix),
  - LST.xxxx,
  - then LRT-xxxx,
- yet more changes under BMW, and
- NSN for most equipment purchased by the military.

Generally Land-Rover would allocate a 'LRT' to override that of the original application. This of course makes everything so much easier for the repairer!?! There was a short period where hand tools were stamped with both old and new numbers. My own tool selection stops at this point and I have no idea what influence TaTa have made. A 21st century produced clutch aligner for Rover V8/Isuzu 3.9 et al is;

- made in Italy,
- bright (silver) zinc plated,
- SPX boxed,
- Land-Rover labelled LRT-12-001 plus the NSN 5120-99-820-6912 and,
- etched into the tool is 303-823 and AG-1024.

I'm not sure where the last two numbers come from but they are nevertheless present. You might have thought they would have etched the LRT number into the tool instead of just a label on the cardboard box.

Many seal installers for Australian 110 were supplied in nylon and without a manufacturer's name or part number, save for a hand engraved NSN for military items. For the 1960s and '70s there doesn't appear to be any formal organisation of workshop tools. No shadow boards or roll cabs with partitioned drawers or any other simple means to identify what's missing from a set. Alternately, what's supposed to be in a set, save for reading the workshop manual or Service Bulletin. The BMC Dealer in Hay (NSW) utilised a peg board and glued on the aluminium identification tags. I've also encountered a set of AP automatic seal tools for which someone had made a rather exceptional set of wooden boxes. Once more finished off with the appropriate identification tags. This is the sort of container such seal tools should have been issued with; a mandatory tool, multi-piece, little used, easily damaged.

Thread repair was addressed in the early years with Helicoil as the chosen supplier. The only major difference today is that they come in plastic trays instead of tin. Pilot nose taps were a later option not taken up. I have definitely found these of use in certain repairs such as stripped sump plugs. The tap is guided in by the three or four threads that always remain undamaged. However most thread repair manufacturers have dropped Unified pilot nose taps from their range. This also raises the issue of specific repairs not addressed in manuals or Service Bulletins. Cast aluminium sumps in transverse applications are strong but can be stripped. So to XJ40 sumps and I never found an oversized bolt to be the tidiest repair option. Nevertheless I can account for fitting several and they were just a large set screw. No reduced head, almost twice the length of the plug they replaced, no magnet and tapped by eye.

There is the further area of Lucas/Smiths equipment; in particular the gauge test unit from the 1960s. A small wooden box containing enough kit to test most electrical problems associated with traditional Smiths/Jaeger instruments. An item that was current until the 1980s. This may well have been supplied through Lucas Australia as required. BMC-A/Leyland-A generally avoided repairs tools for vehicle electrics. Instead, deferring to the nearest Lucas/Preslite/Email agent for warranty repairs. Whereas GM specifically ordered AUSTALOY tools for in house repair of starters, dynamos and alternators. VW Australia had diagnostic plugs on Superbug! Something BL wouldn't adopt until EFI was introduced.

Various Lucas test units would be standard for Jaguar in the later 1970s and again probably sourced through Lucas Australia. Other electrical test kit did exist and in various brands. Such as the ultrasonic unit for solving P76 dust intrusion problems. This one item and its use being well covered by Leyland-A service bulletins. The odd other piece of kit pops up such as the Dunlop optic wheel aligner. These were available internationally as a general workshop tool and still are today.

As the years passed, Australian service tooling generally reverted to overseas origin. There are exceptions, either locally sourced to an overseas design or created entirely within Australia. This includes;

- the long shafted burr and plastic pilot from Jaguar Australia to modify XJ40 air conditioning evaporators or,
- Rover Australia special rear main seal and installation tool to finally fix endemic oil leaks on Isuzu 3.9 diesels (EYA3737).

As yet I haven't encountered any data on what Jaguar, Rover or Standard was using for repair tools prior to joining BLMC-A. Standard/Triumph was part of AMI (Australian Motor Industries) which included Toyota, Chrysler Australia and others. Rover and BMC had a shared interest in Pressed Metals with early MG-B bodies assembled along with Land-Rovers.

There are six further areas specifically not covered by this paper. All worthy of note and each could support a paper of its own. Therefore six tangents we will try and avoid for now.

1. A selection of generally one-off tools was produced by or for the Competition Department. This included a variety of quick lift jacks and in-car suspension pumps. Quick-lift floor jacks or a local version may well have appeared in some Dealerships. Especially those which sustained an active motorsport interest. Aftermarket equivalents were also available as can be viewed in period car magazines.

Other items may have arrived as a result of actual Works cars ending their life in Australia (London to Sydney 1800s etc.). However this paper is concerned with the general repair tools pictured at the end of your workshop manual.

2. A wide variety of hand tools were created in the factory to aid mass production and rapid assembly. This would include modified Vice Grips to quickly allow P76 exhaust flanges to be connected to pipes on the engine dynameters.

3. Various hand tools not included as service/repair items that need to be created to perform certain jobs. Frequently as a result of grinding, heating and bending an existing tool;

- thin faced open end spanner for Mini clutch boss and nut,
- open end, 'Z' bend spanner for Jaguar six cylinder, oil pressure sender,
- Land-Rover shackle bush remover and replacer,
- gearbox holding brackets for various models to stop them flopping around the workbench,
- gearbox jack adaptors (cradles) for the safe removal/refitting of boxes,
- flywheel jammers,
- thin wall socket for the Place head set screws, MG-B brake rotor to bearing carrier...

Some of these are specifically mentioned in manuals or bulletins as needing to be created in the workplace, such as;

- wooden 'L' blocks for removing pistons from Lockheed four piston callipers,
- wooden wedges to fit under front upper suspension arms while dealing with swivel hubs on various models,
- the wooden jack adaptor for the front of Mini, which only appears in the first generation of shop manuals,
- tin plate Morris 1100 headlining tool,
- 'A' series transverse gearbox locking tool, made from an old idler gear,
- threaded rod to compress Spridget front springs...

4. Other hand tools which are outside the range of a basic set. As with 3, not issued as a repair tool;

- crow's foot spanner for MG-B clutch hose at the body,
- wire ring hose clamp pliers, various sizes of such clips being used by BMC-A throughout the 1960s (heater hose, fuel hose),
- crescent spanner (banana, not CRESCENT brand) for MG-B master cylinder mounting bolts,
- ½ AF crescent (obstruction) spanner for Mini master cylinders, depending on individual cylinder orientation,
- flare nut spanners in countless sizes, lengths and inclines for various pipe fittings and gauge capillary tubes,
- a bolster chisel (brick splitter) to separate Moulton rubber springs from the aluminium trumpet they sit in,

- BS hex fittings on all pre-metric flexible brake hoses (regardless of the threads being UNF), for whatever reason hex bar stock continued in BS sizes,
- BS fittings that continued on countless steering boxes and other filler and drain bungs,
- numerous general BS fittings that continued on Land-Rover in particular till the 1980s,
- the transition to Metric in the 1970s after AF had become the established standard,
- thin wall spanners for Land-Rover and various other driveshaft nuts and bolts,
- breaker bar big enough to undo Mini hub nuts, ball joints or differential pinions,
- a workshop alternative to the flogging spanner for either design of wire wheel spinner,
- tension bars (torque wrenches) for mid and upper range readings,
- an effective and designed filler extension/funnel for countless Lockheed master cylinders,
- 'Lift the Dot', press stud and bifurcated rivet tools,
- electrical terminal pliers to suit any size or style of terminal (Lucar, Douglas…),
- pin tools to suit later multi-pin wiring plugs,
- feeler strips that are bent, narrow, curled, tapered or long for countless specific applications,
- fine point pop rivet guns for various BMC seal and trim retainers (MG-B windscreen pillar seals, Cooper door moulds...),
- an effective and designed filler extension/funnel for countless steering boxes,
- deep wall socket for Lucas hydraulic stop light switch in Mini and other applications, or
- bearing installers for countless applications, especially as tapered bearings become more prevalent. Items that Timken in particular used to offer.

5. A small selection of new (non genuine) tools have popped up that address specific tasks the factory never did. Alternately, reclamation repairs of older components. These are either bespoke items or a modern adaptation of an existing implement.

- Oil pump primers for Rover V8.
- Pilot nose taps for spiral wire thread repairs (Recoil, Heli-Coil).
- Reamers and bushes for carburettor bodies.
- Rivet squeezers (giant pliers) for Land-Rover door seal rivets.
- Brake pressure bleeder adaptors for various Lockheed master cylinders (Blue point/Snap-On)

6. During the 1970s and early 80s Leyland/Jaguar Rover Australia became agents for other products. Whether this was Peugeot 505 or Japanese outboard motors where State Offices held parts stock.

In stating this I don't remember having looked at a 505 Compliance Plate to see who is listed as manufacturer.

Undoubtedly points 3 and 4 could be applied to almost any vehicle model creating a specific list of service tool deficiencies. Both 3 and 4 are made decidedly worse by a distinct lack of information contained in workshop manuals. Such as what size a given fitting will be. An oversight which a few of BMC's competitors didn't miss and BMC Australia failed to improve upon. How many MG-B front axle caps have been destroyed because of this lack of detail? How many Pozi-drive screws have been destroyed simply because no effort is made to identify that Pozi-drive is not Phillips and there's no Phillips-drive in the vehicle!

Plus various pulleys and balancers which appear to have puller provision but there's no matching tool or thread identification. Common editorial problems, across all brands, that don't even start to be addressed until the late 1990s. Of course the pleasures of BMC et al shop manuals could fill an entire paper on their own. BMC-A Service Tool bulletins did evaluate certain generic workshop equipment and distribute the information to dealers for perusal (hoists, brake pressure bleeders...). However there were still large gaps in the tool area which no one took responsibility for.

Torque wrenches for lower readings in automatic transmissions are catered for. The rest of the tightening scale tends to be ignored. Flywheel jammers are totally ignored until the late 1980s when suddenly every new model of car had one. Undoubtedly someone performed an OH&S assessment of what had actually been going on up till then. There doesn't appear to be effort made by BMC et al to support their repair staff in acquiring basic BS, AF or Metric hand tools or any of the other items listed above. Despite the clear presence of all of these sizes, shapes and tasks in the workplace. To be fair to BMC, this avoidance tended to be industry-wide practise. Although not part of the fold until the creation of BL, Land-Rover was probably the worst offender. Series III was BS and AF at inception and had heavily incorporated Metric by end of production.

Can we make this more complex? Yes! There are a variety of Orphans in Australia for which no technical support is present. Similarly we have parts suppliers coming up with job lots of bargain buys for which there is also no support. One good example is new, genuine Land-Rover distributors made by Ducellior. Items which were never fitted to Leyland Australia or JRA vehicles. The 'bargain buy' wasn't matched by any quantity of Ducellior points adjusting tools.

To go off the track, a little, again, there are various tasks for any specific model that were never, or not adequately addressed by the vehicle's manufacturer. Staying within the Australian context, Land-Rover 6x6 alone:

- brake pedal dive after cornering,
- brake bleeding after the ingress of air,
- master cylinder piston adjustment,
- calliper sky hooks for hub repairs…

Solving such tasks in the workplace generated improvised tools and procedures such as a bench tester for PBR master cylinders. This will all be down to the individual reader to research or for the future repairer to reinvent. Tool manufacturer timeline;

- V.L. Churchill,
- Healing Industries (AUSTALOY), A.G.H. Manufacturing P/L Preston, Victoria,
- Geo. H. Sample & Sons Pty. Ltd.,
- Litchfield,
- CARTOOL, SPX, Liquid Levers, BMW et al plus,
- other brands; Sykes-Pickavant, Coxhead...

V.L. Churchill

VLC has their own distinct evolution and diversity. Most British vehicle manufacturers have chosen VLC for service tools (BMC, Rootes Group, Jaguar, Ford...). In addition, VLC supplied general industry equipment including diesel compression testers.

Early hand tools typically have an aluminium identification tool number tag, secured to the major component by two blind twist rivets. This was superseded by stamping and finally hand engraving.

Finish for many steel hand tools continued as blueing throughout production. Whether hot blue, cold blue or phosphating, I'm not sure. However it was consistently black. Whereas certain tools such as the Hydrolastic pumps were a combination of painted frames and Marviplate panels. The majority of metal components appear to have been made in-house by VLC.

UK supplied tools from the 1960s can be found in BMC retail boxes and include an etched plastic wall tag and Quality Control label. Presumably all stock for Australia was sourced from VLC (via Healing Industries). A small selection of multi-piece tools such as cam bearing reamers were supplied with a synthetic cardboard, folded and riveted storage box. Survival rates are poor.

First generation electronic diagnostic tools were supplied to Jaguar Rover Australia for Jaguar, Rover cars and four wheel drives. However these are usually Austin-Rover boxed and supplied through the company for dealer only use. Some of these are boxed as Churchill but in fact come from an ever increasing variety of suppliers. Most of this series of Test-Book kit is supplied in plastic folder type containers. Intended to be shelved with the spine label outwards for easy identification. Most are straightforward, fixed, circuit testers with LED display and one or three alternate functions. Typically with a printed circuit ribbon, or protected cabling and multi-pin plug to suit the application. Vehicles applications include EFI Range-Rover and Rover 3500 (post SD1 title). These allowed the user to perform straightforward functions tests on components or circuits (air conditioning, throttle pods, gauges...).

Generic Churchill industry tools continued to be available in Australia till the 1980s. As with Churchill brake test meters in their hammer finish, silver transit cases. Although generally removed from the Australian repair tool scene, Churchill continued to progress. Creating service tools for Ford and Mazda UK. The question arises as to what Ford Australia used for Mondeo?

Healing Industries (AUSTALOY)

In addition to providing VLC tools in Australia, AUSTALOY was an established brand name for general hand tools (spanners, sockets...). Therefore a fairly straightforward extension to creating specialist automotive tools. Healing Industries appears to have been a notable rival to Siddons Australia (SIDCHROME) in the hand tool

market. This was in the days before SIDCHROME's chrome used to flake off in razor sharp slivers as a regular event.

Small BMC-A items are typically in a silver electroplated finish. Either zinc or more likely cadmium plating due to its longevity/durability. Medium to large sized items can be found with hammer finish blue or green paint. Standard colours that are still readily available in aerosol form. Blueing is also present and probably reflects and evolutionary process. Service tools are typically stamped AUSTALOY and accompanied by the tool number.

Using Standard Triumph's fit everything small gearbox as an example; the main-shaft puller and circlip tools were identical to the Churchill items. Save for colour (finish) and brand name. Whereas the spring compressor for Mini could almost be overlooked as a different tool. Churchill used a ratchet arrangement and composite cast/drawn outer tube. Healing used a steel strip base, welded to a main tube. Additional spanners (not included) are now required to turn the main shaft. Despite thickness of the steel base, it still bends in use. A fault that was never addressed and isn't shared with the VLC unit.

Other deviations include various seal and bearing installers. Under VLC the generic handle (18G134) would secure in any of the task specific adaptors by means of a detent. Many if not all AUSTALOY units come complete with handle. Although made as two parts, the handle is lightly knurled and pressed into the specific adaptor at the factory. Examples include:

- 18GA 134 CA Idler gear bearing installer,
- 18GA 134 BP Inner hub seal installer,
- 18GA 134 BN Hub seal installer and,
- 18GA 134 BQ Crank seal installer.

Note the 'A' suffix included within the 18G prefix. Indicating a locally modified design, which in this instance is nothing more than a permanently affixed handle. The 'A' is the only character out of place from a VLC identifier. Evolution is present in certain tools but nothing dramatic. The AUSTALOY version of the Hydrolastic service unit (18G703) is essentially VLC internals within a locally fabricated frame, panelling, gauges and fixed legs. The item appears and operates as per the Churchill part however it's no longer portable. Gauges are made by Floyd for AUSTALOY but there are at least two different designs. Pressure gauges indicate up to 600 psi instead of Churchill's 400. Front and back panels may or may not have holes punched for carry handles that aren't fitted. Metal instruction placards have provision for a serial number. A simple numerical sequence doesn't appear to have occurred. Instead, two completely different codes. Some units have the extra leg bracing, some have the trolley conversion...

Due to direct equivalent tools using the same part numbers as Churchill, it's hard to know how extensive local content was. Just by assessing my own collection it would appear to be significant. I'd speculate that mainstream BMC/LA cars from 1965 – '73 could expect at least 80% of their service tools to be AUSTALOY.

Many BMC-A tools from this period were supplied with a screen printed aluminium tag. Plastic, with white lettering, similar to that of VLC have also been noted. Packaging was a plain cardboard box, a pasted-on generic AUSTALOY label with the BMC tool number rubber stamped in place. There were no formal storage boxes (tin, wood etc.) for BMC-A kit. GM items are retailed in NASCO labeled cardboard boxes and include the same style of aluminium identification tag as BMC-A.

Geo. H. Sample & Sons Pty. Ltd.

As yet I haven't located an item specifically from this period. As best can be fathomed, established AUSTALOY products and procedures continued but with a new company profile. Sample & Sons were providing a repair service for the 18G-703 series of Hydrolastic units (BMC-A bulletin ST 2/70). I have no idea how comprehensive this repair service was or what identifiers if any were left on the unit. Nor what were the popular faults of 18G 703 units in their first few years of use.

Litchfield

Similarly I haven't established any Litchfield company history prior to 1973. Essentially another business name producing the same tools having acquired AUSTALOY manufacturing rights. Initially AUSTALOY stamped/named tools are packaged and sold under the Litchfield title with revised part numbers on the packaging. This may simply have been transferred old stock or that money just wasn't spent on modifying the tooling. Packaging for smaller items was nothing more than a clear plastic bag and stapled cardboard top creating a hang-pack display arrangement. Aluminium identification tags as an inclusion, appear to have been discontinued. Eventually Litchfield would introduce their name and part numbers to the tools themselves. Prominent examples can

be found on the more popular Australian Land-Rover equipment such as hub-nut tube spanners. The Litchfield catalogue for Leyland Australia tools neatly cross references part (tool) numbers.

BMC/Rover tool numbering remains as the sole reference in Australian produced workshop manuals. Litchfield's own mechanical flywheel puller for Mini et al (E or EF 5410) is notably different from the BMC version. This appears in their tool catalogue after the genuine item (EF304LX). The centre bearing does make the tool slightly easier to use. However this doesn't have torque converter provision. The included hammer attachment (flogging spanner) has arguable benefits.

Litchfield also supplied tools to the remainder of the Australian automotive fleet; GMH, Ford Australia, Chrysler Australia (formerly Rootes Group) and their successor Mitsubishi Australia. However Leyland Australia orders were dropping dramatically by this period. Company re-organisation, plant relocation and reduced model range being notable influences.

Common tools remained readily available for Borg-Warner driveline components being used by much of the local automotive industry. Litchfield certainly targeted the garage repair trade in addition to vehicle manufacturers, their products being available through most major automotive parts retailers. In the late 1980s Litchfield supplied JRA with special wheel braces for Army Land-Rovers.

CARTOOL, SPX, Liquid Levers, BMW et al

I haven't located any information on the later history of VLC. However come the 1990s their role had been taken over by SPX/CARTOOL for most current production vehicles.

Much of which wasn't sold in Australia. Mini ended production in 1979 and Moke was gone by 1982. Peugot 505 and Rover/Honda Quintet became JRA's entry level and small car products for some time. Land-Rover 110, Range-Rover and Jaguar complete the range. Eventually Honda powered Rover 400s are introduced to fill the gaps left by Quintet and 505. Rover 75 wouldn't arrive until the 21st century, when it was almost at the end of its production lifespan. Disco and F popped up along the way.

During the Rover Group years Churchill catalogues and readily identifiable Churchill tools are still being produced. SPX appears as the listed Australian outlet and oddly the only overseas distributor under that title. Despite this local presence, there doesn't appear to be any effort being made to market product to the specialist garage and growing retail areas. Vehicles tend to move away from dealers once the warranty has expired and average vehicle life at the time was well over ten years. There was certainly a large (aging) product base that dealers would have had no interest in. Plus a selection of tooling for older cars that VLC still had available. However this didn't eventuate. Australian dealers for the late Rover/Honda products (416i etc.) or Jaguar (XJ40 onwards) were still using VLC tooling. This takes us through to the late 1980s and early 1990s.

However the traditional Churchill product is about to disappear. For Mini of course this meant a further extended availability of many service items (at least in the UK). Whereas anything that no longer had a current production vehicle to support was discontinued. Notable differences include the introduction of a raw finish to certain tools and simplistic heat sealed plastic bags as packaging.

I have no idea what happened to VLC, their tooling or remaining stock. Hydragas however had been allocated to Liquid Levers. At some stage the company was apparently awarded a warrant by Rover Group for the approved supply of Hydrolastic service equipment. According to Liquid Levers advertising they manufacture 'approved' Hydrolastic/Hydragas service equipment. Their main unit appears to be variation of the final Churchill assembly. Although vacuum is now optional. As yet I haven't been able to identify which service unit (Churchill or Liquid Levers) was supplied to Dealerships by MG-Rover Australia. F being the final wet suspension vehicle in Australia.

Austin-Rover's 'K' series engine was used in a variety of products from 1.1 Metro (Rover 100) through to 1.8 F, Rover 75 and Lotus Elise. Plus the similar diversity of BMW engines in Land-Rover, the Puma engine from Ford and South American Chrysler power unit for Rover Group's new Mini, just in time for BMW to take over the project.

BMW ownership, with the willing and unwilling use of certain BMW technology meant the use of BMW tooling. In Australia this was generally reflected in Land-Rover, Range-Rover and Disco 2 onwards. Both models no longer had the standard Land-Rover wheel stud pattern. This having been one of BMW's enforced changes.

Local tools have managed to continue through to the 21st century. However they are a rarity. Land-Rover Australia finally readdressed rear main seal leaks on Isuzu powered Land-Rovers. This resulted in a new (non Isuzu) seal and special installation tool. Oddly about the only tool to ever come as boxed set; in a green, plastic, labelled carry case.

Other (Sykes Pickavant, Coxhead...)

Several other companies have produced specialist repair tools with trade and retail as the intended market. Generally this targets the most popular specific tasks/repairs (Mini flywheel pullers etc.) as a supplement to their existing automotive or industrial equipment. Several of these companies no longer exist but did manufacture repair equipment for what were then popular cars moving beyond their warranty period. Other tool manufacturers are more recent. As with the ever increasing variety of brands of cam alignment tools presently available.

Coxhead

This is another general, small tool, maker from Australia. Usually identified by a cock's head icon, they manufactured four notable BMC tools:

- body service kit which was supplied as a BMC-A approved item (caulking gun, filler strip tool... in a tin boxed set),
- hydraulic flywheel puller for 'A' Series transverse power units, which was probably as good as you could get anywhere, and
- the matching (mechanical) primary gear puller.

Plus a variety of other products across the wider automotive range, in direct competition to AUSTALOY and Litchfield. Their vice mounted, brake shoe riveter is a handy item to keep in the drawer. However these are rarely found today with all three designs of punches. Let alone any of the surviving punches being in serviceable condition. I have never riveted a brake shoe but found this item useful for various other jobs. Although an extremely common tool, no one is reproducing any of the punch designs.

Sykes Pickavant (SP, Speediline)

Sykes Pickavant has been around for decades. If there was a popular car in the UK that required a specific repair tool, SP probably made one. By the late 1980s they offered a repair tool range for Mini that would rival Austin-Rover's. This was climaxed by a workshop set including a shadow board. Soon after this peak Mini items dropped off dramatically.

In Australia Sykes Pickavant is in essence a franchise. The franchise holder however, never pushed the entire product range and definitely not hand or vehicle specific automotive tools. Hence you frequently see puller sets in Australia and little else beyond the odd spot weld remover and valve spring compressor.

One of the more popular SP automotive items was a simplified suspension spring compressor for Mini. This undoubtedly inspired countless similar (ever simplified) designs including one direct copy. Of course this tool was intended for post 1976 production. Something SP doesn't mention. Therefore it requires modification for use on any Australian Mini. Many SP service tools are a touch delicate for regular workshop use:

- Mini spring compressors bend at their base during their first use.
    - Threaded tips are too soft to cut their way into older springs. You really need to buy a long shaft tap (dipped in grease) to prepare the spring first.
- Flywheel pullers, after their first use will no longer disassemble for storage.
    - Washers for the three main bolts are a fraction of the thickness they need to be. Modified 'B' series manifold washers come close to what is really required.
    - Main pulling bolts will need replacing after the fifth flywheel has been removed and,
    - The central set screw really needs a single-hex impact socket, in order to be used safely and maintain positive grip. Once fitted and the job complete, the socket won't want to be removed from the set screw's head.
- Cooling system pressure testers are primarily plastic. However they do seal and read better than Snap-On's metal equivalent.

Within the UK all this is undoubtedly compensated for by sales price. However retail cost once on the other side of the world makes the equipment a purchase that has to be considered and assessed. Parts for most items are still available through SP UK and technically available through Tridon Australia via back order. However the local motivation to sell isn't present and it's far quicker and cheaper to deal direct with a UK retailer.

Once more the lack of a consolidated automotive tool list hampers resale. Items such as Morris 1100 suspension tools typically end up being forgotten. Their identifying cardboard box is long since lost and there is no quick means of identifying the item by part number. SP continues to prosper and their products (new or used) remain in demand. Their card operated diagnostic equipment still holds value despite being dated (Rover Mini). SP

scan tools encompass MEMS systems found on other Rover products including MG-F. In general repair tools, Sykes manufacture two of the best automotive pipe flare tools available anywhere. One vice mounted with a selection of Imperial and Metric sized jaws (also sold under the Snap-On title), the other hand-held for brake work only. Their Australian shelf price however, still needs to be taken sitting down.

Other manufacturers/products

Several companies have manufactured Hydrolastic/Hydragas pumps (Alba, Liquid Levers, ENCO, Sterling Hydraulics, Scope Engineering...). With the possible exception of Liquid Levers (via Rover Australia), none have been commercially offered in Australia. There is/was an Australian outlet for Liquid Levers but they never stocked any item and would only order after payment was received.

Come turn of the century, countless manufacturers have supplied cam alignment and similar tools to the trade and retail. Many of course are copies of the genuine item however they are:

- affordable,
- readily available through online sellers and,
- usually in a formed plastic storage tray.

Other brands offer; code kickers, readers and scan tools applicable to later vehicles. Similarly, in the last 20 years there has been a dramatic change in availability of basic hand tools. Several service tools are nothing more than single-hex deep wall sockets. Many of which can now be purchased in a variety of tool brands/price ranges, with at worst a short back order period. You'll see your new socket inside a week if not next day from your local automotive or tool store.

- Mini ball joints,
- transverse 'A' series differential pinion nuts (1-1/2 AF),
- Land-Rover V8 harmonic balancer bolts (1-5/16 AF),

Even BS isn't a great issue with online catalogues and search engines:

- box (tube) spanners for Land-Rover hub nuts (1-1/4 W),
- countless other products with fully floating axles use a similar design of nut; Minor, big Healey, Spridgets, A30, A40, commercials...

Plus sizes of normal sockets that weren't traditionally stocked and no one wanted to back order because of the procedures and time involved;

- MG-B rear axle nuts for Salisbury units,
- Mini disc brake CV nuts,
- harmonic balancer bolts for 'A' and 'B' Series power units,
- camshaft timing gear nuts for 'A' and 'B' Series power units,
- transverse 'A' Series flywheel bolts (all are 1-5/16 AF).

Remembering of course that BMC made great moves towards adopting and standardising Unified thread forms. This is automatically accompanied by AF measurements. However I've encountered countless owner rants over the years about needing BS tools. In each and every case for tasks that contained no BS fittings! This of course again raises the lack of detail in shop manuals. Though such owners usually don't own manuals, let alone read them. While on this stream we also encounter many substandard tools sold as the correct item by supposed 'specialist' repairers and parts outlets. One very popular example is for Land-Rover hub nuts which are still 1-1/4 Whitworth to this day. For many years, less discerning owners in Australia have been fobbed off with thin wall, slop fit, Metric box spanners.

Export (from Australia)

Again there's no clear evidence. BMC-A had known contacts with BMC Suid Afrika, Motorcorp (NZMC) and Papua New Guinea was an Australian Territory until 1973.

Some AUSTALOY items are in New Zealand. However NZMC had a notable reputation for buying off everyone and anyone that suited their needs on any given day. Whereas New Zealand did have access to most of the Sykes Pickavant automotive range. Certainly other Australian tool manufacturers such as REPCO (Warren & Brown) were selling internationally. Many of their workshop/engine reconditioning tools being sold in Britain. REPCO valve spring testers seem to pop up everywhere.

Tools today

Company history is of little interest or use to most present owners or repairers. Aside from helping to identify and understand the product, as with what a ‘CA’ or ‘RG’ prefix might indicate or with the multitude of part numbers that may indicate the same tool. Present day surviving vehicles like Mini and MG-B may well be a train smash of technology. Requiring the owner or repairer to have knowledge far in excess of the original manual and parts list.

Many original tools have been destroyed or lost. Either used or misused and eventually binned with their original intent long since forgotten. Otherwise, relegated to the role of punch or press tool. Having worked in a Dealership which had changed and lost previous franchises, it was amazing what was still there and rotting. Many of the most popular items were missing or broken (scissor action ball joint splitters, basic slide hammers...). Along with some complete sets including shadow boards that were still boxed. Tools that no present staff member was trained in nor knew how to use. Simply waiting for someone to have a clean-out and throw them in the bin.

I haven’t been to any dealership where there has been a proper tool management plan. Despite the cost, they’re just left to decay and disappear. Unless they happen to be extremely important and in regular use. In which case they’re usually still in a poor state. Some have ended up in small (private) workshops, having been repeatedly patched up and used less frequently every year. Typically only one or two tools of what should be a set for a specific vehicle or repair task. Others have ended up in private hands in a similar condition. The general lack of proper, factory issued, storage containers hasn’t helped tool survival.

Would you care to hazard a guess what happened to all the JDS machines (Jaguar Diagnostic System)? The computer, monitor, pile of floppy discs, roll-cab and seemingly bottomless pile of adaptor cables for the XJS and XJ40 range. At best probably a dust gatherer like Vane and Sun scopes before them. In all three cases the cabinets beneath them usually rate greater attention.

There are some tool collection/preservation societies out there. But realistically our tools are nothing more than curios in as-is condition. At best wall ornaments never to be used again. This of course refers to hand tools. Such societies only deal in steel or iron and worship the god of steam. Plastic and electrickery are heresy to be ignored and despised. Bakelite and ceramics might be tolerated.

The Hydragas Register demonstrates some effort to consolidate information but tends to avoid tool details so far. For the rest of us, demand is still there. However there is no coordination of any type. Although most of my collection is utilised (if infrequently), I have tools that I will never touch such as a Black Cab suspension bush replacer. I’ve even approached marque specific clubs with surplus items to receive the generic yawn of disinterest. Reading or just looking at the pictures in a workshop manual would seem to be an alien concept.

Quite simply most of what’s out there will be knackered. Pleasant surprises do occur but rarely. The information needed to fix these tools properly either isn’t available and when it is, it’s not shared. I’ve been stuck before simply trying to work out what an original thread form was, only to be given the wrong information by a fitter. Apparently I could work out that 10-32 wasn’t 2BA, just not the Subject Matter Expert. In the month preceding me writing this article, I viewed one Australian website where the contributors were parroting the same 50 year old fantasies about Hydrolastic fluids and pumps. None had bothered to come up with any factual evidence or recent data. Another website contributor insisted that all hand held Hydrolastic pumps were just Tecalamit grease guns. I’ve never seen a hand held grease gun with a pressure relief valve! Miss-information is rife.

I have had some successes, including repairing and reproducing AUSTALOY flywheel/torque converter pullers and Land-Rover gearbox lifting brackets. Similarly my 18G695 hand held Hydrolastic pump needed an odd sized fibre washer to seal the reservoir. After some hair pulling it dawned on where I’d seen one before. A quick visit to someone who stocks overdrive parts and I was back in business. Whereas I haven’t managed to replicate the blued finish on most Churchill items. Chemical (cold) blues haven’t proved as durable as the original finish. Service tools were not designed to last forever. Many that have survived are only suitable for scrap and not even as a pattern or component salvage. A notable point which many owners and sellers fail to address.

As yet I haven’t encountered many clubs offering a tool resource to its members. Certainly no cross club support for common equipment. Similarly, no organisation offering tool information to help maintain the surviving equipment. Certainly there have been a handful of lovely reproduction tools coming out of the US. Not exact copies but perfectly functional and quality. As with the lock-ring tool for Lucas switches (18G671). This is double ended to accommodate toggle and ignition switches on the one tool.

Common faults

Very few retail owners or even tradesmen from other areas have any idea of what dealership tools actually get used for. Either from frequent use or as a result of the required tool not being found or simply not existing. Not, as is too frequently the retort; rough mechanics using tools incorrectly.

Employers usually have less of an idea of what's actually needed to fix cars. Management concepts such as productivity never encompass tool maintenance at our level. The pittance mechanics were and still are paid as 'tool allowance' is just enough to rent one quality spanner for one week. The employer almost never fills the gap between the tradesman's basic hand tools and specialist equipment. Whether this be the local garage or award winning dealership. The correct tool to use on a press or as a drift for a specific repair frequently never exists. Hence anything to hand ends up serving the purpose. In earlier years there used to be such things as flogging spanners. The reality of this still exists today. This is often as a result of nonsense instructions found in workshop publications suggesting a manual repair; 'tap gently with a soft faced mallet'. Whereas the actual process and non-existent special tool needs to be relegated to a press.

Many tools like pullers when used correctly, still require a further shock load on top of the tension already applied. Cylinder head stud removers common to Triumph's four and eight cylinder range are usually challenged to the extreme during every use. Seal tools roll off benches and are tossed into drawers when there is no specific storage device. Hydrolastic pumps frequently end up as workshop stands for brake fluid, if not actually filled with it. One of my pumps had been used as a drilling stand at some stage. Crankshaft locking pins for 2.5 Land-Rover engines should have a long red ribbon attached from new but don't. So to, steering rack centralising pins for XJ40. Guess what happens when they're forgotten about? All this on top of normal wear and tear.

Tension bars should be calibrated regularly depending on usage. In reality these are totally ignored until the next job after they break or until something major and expensive snaps off. Causing a straightforward job to blow-out dramatically in rectification work and embarrassing someone senior into dealing with the problem. At least many older designs can actually be repaired and recalibrated, my AUSTALOY inch-pound bar proving the point.

The difficulties encountered undoing some fittings is just as well ignored by many service procedures. At the other extreme, the comprehensive nature of mandatory tool levels, results in some equipment hanging on hooks for years. Gathering dust and happily rusting through lack of use or attention. Although the mandatory purchase scheme is perfectly logical, it tended to lack shop floor reality. A mechanical gudgeon pin remover may well never be used. Whereas a scissor action ball joint splitter will quickly be worn out with no provision for it to be replaced. One tool rusts while the other is binned or lives as a piece of scrap in a drawer, just so someone can say that it's still present. There doesn't appear to have been any formal tool feedback scheme imposed by BMC-A or its heirs.

BMC-A did have its mobile training buses, which regularly visited dealer workshops to update staff on new equipment and procedures. Though this would disappear as the years passed.

Why buy the correct tool?

There are various reasons including tool collections. Quite simply the correct tool usually makes the repair task quicker and easier, with less stress, buggery or butchery. Not always but usually. I've certainly never had any luck with the correct calliper piston tool and Lockheed seal retainers are frustrating at the best of times. The correct king-pin reamer such as 18G597 is stepped, so it will bore both bushes on the same centreline. Whereas using it and fitting the bushes is something that has to be practised.

Having worked for one 'specialist' workshop and parts supplier, the only special tools were a:

- blunt 'lift the dot punch',
- a single purpose clutch aligner for 'B' series motors,
- one of the two possible tools for adjusting Solex CD carburettor needles,
- an obstruction spanner for Rover V8 distributor clamps,
- Triumph gearbox circlip tool, and
- a single-throat carb balancer.

In five years I might have seen one Triumph gearbox apart, at best. There would usually be an octagonal spinner spanner and copper or lead mallet, if the boss hadn't sold them with one of his used cars. The rest was literally improvisation and luck to make specific repairs such as;

- removing/refitting oil pumps from LH overdrives,
- replacing starter motor inertia springs,
- pulling a TF apart without any BS spanners…

Replacing MG-B front coil springs or lower arm bushes involved a two-post hoist and a wooden beam. I still remember the day a primrose B tried to 'fly' from six feet in the air. Specialist repairers of any standard become harder to find as years pass. Therefore a lot of responsibility comes back to the vehicle owner.

Fully floating axles were a common design. BMC standardised all hub nut spanners with a support to rest inside the outer axle tube. Whereas Land-Rover still only rely on a conventional box (tube) spanner. In either case I've had countless instances where clients have had their repairs delayed, plus added expense, in replacing hub nuts. All had been previously 'adjusted' with chisels, punches and Stilsens.

Safety is and was a major consideration that is and was too frequently ignored and belittled. There are enough hazards when performing the repair properly with the correct tool:

- Removing a flywheel from a tapered crankshaft end can cause the flywheel and tool to launch. Not very far but certainly without warning.
- Small car half-shafts can take 20 tons of load before they will start to move out of their drive flange.

Without creating your own hazards:

- Compressing suspension coil springs in a press and strapping them because you don't have the correct on-car spring compressor.

Over the years the occasional drawing has popped up so as to manufacture an unavailable or expensive tool. In most cases the drawings are quite good. However the final interpretation of the repairer, frequently doesn't reflect the instructions. Obviously many repairs can be improvised especially when time isn't a consideration. Detents and springs can be fitted to selector hubs with a bit of a fiddle, some practise and having found where the balls shot off to once or thrice. However some repairers will be too cheap to even buy a large enough jubilee clip to make life easier. So you will have to apply your own value to having the correct tool and accept the consequences.

Buying (today)

New

Yes new. Depending on what you're interested in, a good selection of genuine tools are still available. Particularly for Land-Rover and Jaguar. Having personally dealt with the state of many used tools, I wouldn't disregard the new option if the tool is critical to the repair. As with fluid suspension; save up for a new Liquid Levers unit while they're still available. Certainly in the area of cam belt replacement there is a reasonable selection of proprietary brands at more than reasonable prices.

You will never convince the diehard penny-pincher of anything except new ways to out cheap themselves. However I've done the poverty end repairs with improvised tools and have the scars to prove it. Save up and buy the correct tool!

There are a handful of excellent tools being produced in the U.S. Mainly for MG A & B. The title of reproduction doesn't really suit. These are probably better classified as a quality, functional, direct replacement for the original. As with the ever handy Lucas switch ring tool. Screwdrivers burr lock rings and leave nasty scars in dashes. Alternately, use someone else's circlip pliers as the tips sometimes break off.

I'd recommend perusing parts supplier catalogues such as those from MOSS (U.S. & Europe). Especially for things like stepped king-pin reamers. These are not always best priced but do offer an off the shelf answer to your immediate repair problem. One South African company created a combination tool that allows you to replace various Land-Rover suspension bushes, on car and without a press. Some years ago I placed a bespoke order for a tap to suit transverse crankshaft threads. Whereas Minimania (U.S.A.) now stock these as a shelf item.

There are other alternatives to certain tools that remain unknown because owner/repairers don't bother to look. Birfield pliers for CV joint bands are hard to come by and have only ordinary performance when available. Several Asian manufacturers offer very affordable strapping tools that allow you to tension and hold universal CV straps, so you can bend and lock them in place. These can be purchased from your local auto store along with the generic stainless bands. Generic bearing/bush/seal installer sets are readily available these days. You may only find one or two components in the set that actually suit what you want. Alternately an item that can be machined to suit a given task and visualised by the machinist without the need for crayons, butcher's paper and supervision. I find these sets useful for installing wheel bearings instead of the traditional 'walking in' with a pin punch.

General workshop tools such as Dunlop optic wheel aligner also appear in many factory workshop manuals as a special tool. They are still available new and tend to be ignored these days as being too primitive. In fact, when combined with a flat floor they still perform well. Countless models have toe as the only ready adjustment.

Used

Obviously, know what you're looking at. For example; Hydrolastic pumps generally sell for a fortune in poor condition. Usually with the outward impression of being more or less complete. This is primarily due to buyers not having a clue as to what goes wrong and how difficult they can be to fix. So to, Coxhead hydraulic flywheel pullers. Although appreciative buyers are far more scarce. In this case studs are usually stripped, bent, broken or missing and extremely difficult to replace.

There are of course various specific curios for countless other cars that attract notable attention when and if they appear. However the vast majority of surviving tools are ignored. The owner/seller doesn't know what it's for and is frequently too lazy to find out. In Australia tools for; Honda powered Rover, F, Rover 75, XJ40 etc. rarely appear for sale at all. Similarly, certain tools are common with other products or brands and the would be user can't be bothered with basic research that would increase opportunity. How many vehicle manufacturers utilised Laycock-DeNormaville products? Jaguar, Rootes Group, BMC, Standard, Volvo, Winnebago…

Pricing for used tools seems to range from pocket money to fantasy with little in between. Sellers either have no idea and price accordingly or apply total fantasy. Frequently for something that is either knackered or in need of major repair. One online seller advertising for most of 2012 would repeatedly fill an entire description page with irrelevant waffle about 'Works Tools'. Somewhere in the middle of this mess you would eventually find a one line description of the item. This would be accompanied by one only picture of the tool or component and two totally irrelevant pictures of the Abingdon floor. Repeat the same process for every tool he had for sale. Everything of course was just standard BMC, BL, AR service items made by Churchill. I've never heard of a 'Works' Maestro, Montego or Triumph Acclaim! Let alone any secret, special, Masonic, 'Works' service tools for them.

In general you need to have a common sense approach, whether for pricing or inspection.

- Seal guides need to be unmarked save for where the blueing has worn (not rusted or scratched) off.
- Anything with a thread needs to have all threads unmarked.
- Anything with previous major repairs should be avoided.
- Any multi-piece tool needs to be complete. The bit that's missing or broken will be what's wrong with all of them.
- Rust may not be a sales point but it's all too easy to spot something that has been raped by a wire wheel just before it was offered for sale.
- Internal bearing pullers should be disassembled to confirm all parts are present. Jaws should be inspected to confirm both main lips are in place. One or more are usually broken off. Also that the coil spring waste band is present and still has tension.
- Reamers need to be un-chipped, not blunt and accompanied by any pilots. The only real way to test them is to use them.

Realistically, expect to buy more than one of any given used tool. Either as a learning curve or parts donor for your previous purchase. Internet access has provided a dramatic improvement in tool availability (new and used).

Caveat Emptor

None of the manufacturers mentioned in this paper use any proper means of storage preparation. No tools are dipped in Cosmoline prior to being packaged! Do not hesitate to unwrap and/or disassemble any item (new, new old stock or used) prior to accepting it. Some corrosion may be inevitable but if you're paying full price for the item...

When required, I post tools interstate to be re-blued by a gunsmith. This isn't cheap but is affordable and has reclaimed several unserviceable tools.

Regretfully, due to the almost universal lack of interest I can't suggest visiting your relevant vehicle club. There have been a couple over the passing years, which have made some effort to make certain tools available to their members. However these organisations are few and far between.

Similarly the owner fantasy level encountered on most internet forums precludes this avenue as well. A stigma which would appear to be prolific across this growing media. True knowledge will simply be gained through hard copy research, trial, error and experience. I have had some repeated success by simply Googling the tool number or repair task. However the broader your search criteria, the less accurate the data gained. Key points covered so far?

- The diversity of vehicles manufactured and sold in Australia under the one company's lineage; BMC Australia, Leyland Australia, Jaguar Rover... which continues on today.
- The growing array of service tools.

- Commonality of many items.
- Changing part numbers.
- What was imported.
- Local tool production and differences in design and use.

All this generated an immense collection of tools from a variety of manufacturers. Many of these tools are still out there and their matching vehicles still require repair. The condition of this equipment can vary as dramatically as the vehicle's they serve. Local content of the tools and vehicles, at least for the late 1960s would match or exceeded that of other vehicle manufacturers.

All of which requires the present day owner/user to think outside of the box in order to acquire the correct item. Unintentionally this paper has raised more questions than it sought to answer. Hopefully it still contains enough information to help the next generation of tool users. Visit your club's library and start reading now!

WEAR PPE!

It wasn't until the mid 1990s that Rover Group started printing PPE warnings in workshop manuals. Just because your 1959 publication doesn't mention safety, doesn't mean that you shouldn't be safe or anyone around you!

The author certainly recommends anyone reading BMC Australia Service Tool (ST) and other concurrent bulletins. However one in particular suggests a totally unsafe situation. This recommends the construction of a stand made from DEXION, for Mini et al gearbox repairs. Although the concept is brilliant, the design is flawed and will NOT bear the stresses involved in certain repair procedures!

Suggested further reading;

- BMC Australia Service Tool (ST) bulletins (details on tools and suppliers).
- BMC Australia Service bulletins, various areas depending on your vehicle (details on repair procedures and component changes).
- Hydrolastic Repair, Paget 2010 (details on Hydrolastic & Hydragas service equipment).
- Hydragas Register website (details on Hydrolastic & Hydragas service equipment).
- The correct workshop manual for your vehicle (service tools and their use).
- The histories of;
    - Australian Motor Industries (AMI),
    - BMC Australia (BMC-Australia, BLMC-Australia, Leyland Australia, Jaguar Rover Australia, MG Rover Australia, Rover Australia),
    - Ford Australia,
    - General Motor's Holdens (Vauxhall, Bedford… in Australia),
    - Jeep Australia (up to closure of their Rocklea Plant {formerly Austin}),
    - Nissan/Datsun Australia,
    - Renault Australia,
    - Rootes Group Australia (Chrysler Australia, Mitsubishi Australia),
    - Toyota Australia,
    - VW Australia…