Fasteners on British Cars, Specifically Austin Healeys from 1953-1967 *by Curt Arndt, Austin Healey Concours Registry Committee* *DRAFT*

Introduction and Overview

One of the unique but easily overlooked aspects of British cars from the 1950's and 1960's are the sometimes subtle differences and idiosyncrasies in the fasteners, i.e. nuts, bolts, screws, and washers, etc., that hold everything together. Whether you are doing a full "nut & bolt" Concours restoration or just want to keep your classic car running well, a basic understanding of these fastening systems is important. For those like me who do not find the sometimes quirky British fasteners as interesting as I do, I will not go into details that the average owner does not need to know. So while I will cover the basics in this article, a more detailed discussion will be outlined in an upcoming Fastener Supplement to the 2017 Austin Healey Concours Guidelines.

We will begin our study into British fasteners with an overview of basic fastening systems, thread forms, and nomenclature and how they relate to most vehicles, and then specifically British cars which will of course include Austin Healeys. From what little messing around I've done with other Marques, e.g., Jaguar, MG, and Triumph, the observations I make with regard to Austin Healeys will, for the most part, be applicable to most other British cars of the same era.

Next we will discuss a brief history of the British fastener industry, which will cover the now obsolete British thread forms which will include both "Whitworth", "British Association" and I will even discuss the much misunderstood "British Standard Cycle" threads since there appears to be some very limited British Standard Cycle threads used on some Healeys. And then the finally the transition in the 1950's to a common "Unified" fastener system that should be familiar to most mechanically inclined owners of Austin Healeys.

Finally, we will cover the specifics of fasteners on Big Healeys and Sprites throughout their nearly 20-year production run.

The Basics of Fasteners - Sir Joseph Whitworth & William Sellers

The first person to create a thread standard was the English engineer Sir Joseph Whitworth in about 1841. Whitworth screw sizes are still used today, both for repairing old machinery and where a coarser thread than the metric fastener thread is required. Whitworth became British Standard Whitworth, abbreviated to BSW (BS 84:1956) and the British Standard Fine (BSF) thread was introduced in 1908 because the Whitworth thread was too coarse for some applications. The thread angle was 55° degrees, and the depth and pitch varied with the diameter of the thread (i.e., the bigger the bolt, the coarser the thread). Spanners for Whitworth bolts are marked with the size of the bolt, not the distance across the flats of the screw head.

About the same time, an American named William Sellers developed a screw thread system based on a 60°-degree thread angle, which was originally called the Sellers thread, then the United States Standard or USS thread, and finally in 1948 the Unified National Series, including UNC (coarse), UNF (fine), and UNEF (extra-fine). The UNF series is sometimes called SAE (for Society of Automotive Engineers) or ANF (for American National Fine). These threads have flat peaks and roots, with the depth of the thread being d=0.649519 x pitch.

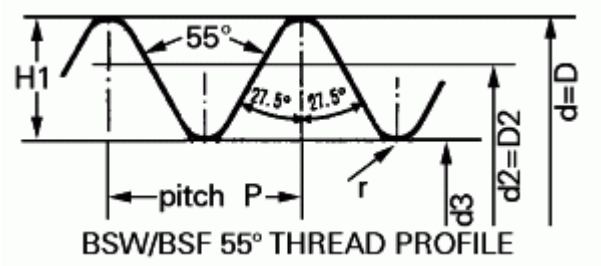
Fasteners on Austin Healeys - A brief overview of British fasteners for the Austin Healey owner.

Throughout the 18-year production period of Big Healeys and Sprites there were quite a number of thread forms used, with the earlier cars having the greatest variety of these various threads. In 1953

when the Austin Healey 100 was first being produced, British manufacturing was undergoing a transition from Whitworth Fasteners and other uniquely British thread forms to Unified Fasteners.

Whitworth

For those who aren't familiar, by definition, Whitworth thread forms are those where the angle of the threads is 55° versus the 60° of most modern threads, or specifically… ***a thread form and system of standard sizes, proposed by Sir Joseph Whitworth in 1841 and adopted as standard in the U.K., having a flank angle of 55° and a rounded top (crest) and foot (root).***



Therefore the five major Whitworth Thread Forms that we need to be concerned with include...

British Standard Whitworth (BSW) - Used on the front generator bracket and not exclusive to the 100s since it was also used on the Bugeyes as well in this location. Also used in BN1 transmissions.

British Standard Fine (BSF) - Most engine, transmission & suspension bolts on 100s.

British Standard Pipe Parallel (BSP) or (BSPP) - Brass drain plugs and valves, fuel and brake line fittings on most Healeys.

British Standard Pipe Tapered (BSPT) - As above but tapered, used on the transmission drain plug on BN1s and Bugeye Sprites.

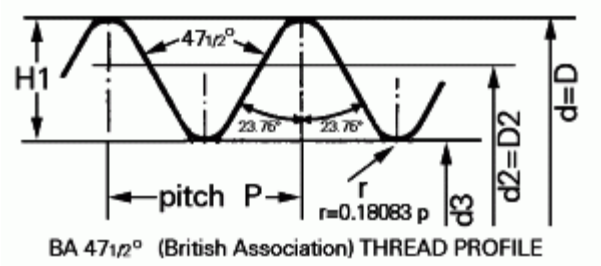
British Standard Brass (BSB) - Used in thin walled tubing and ALL have 26TPI no matter the diameter. The mounting posts on Lucas 700 series and SFT/SLT 576 driving lights use this thread form.

FWIW, other obscure Whitworth fasteners (not used on Austin Healeys) include… British Standard Conduit (BSCon), Model Engineers (ME), and British Standard Copper (BSCopper) and others too obscure to mention.

Non-Whitworth British Fasteners

Other British Fasteners that are NOT Whitworth include...

British Association (BA) - Used in Healey instruments and fuel pumps, plus other Lucas electrical equipment. This thread form has a 47 ½° angle of the threads.



BA 47½° (British Association) THREAD PROFILE

Similar to Unified numbered machine screws, BA threads are numbered, sequentially from 0 to 25, and the threads per inch are taken from a metric thread standard so they are very non standard when converted to inches. Also the numbering system is reversed from that the Unified numbered machine screws.

Unified numbered machine screws are just an extension of the standard UNC and UNF fasteners and come in both coarse and fine versions. They are numbered from no. 12, the largest to no. 0, the smallest. So, as the Unified Numbered Machine Screws numbers decrease so do their diameters, and as the British Association (BA) screws increase in number, their size (diameter) decreases.

Therefore, a standard no. 10 machine screw (10-32 fine and/or 10-24 coarse) that we are familiar with would be roughly equivalent size to a no. 2 BA. For example, a Unified standard no. 10-32 machine screw has a 60° thread pitch angle and 32 threads per inch (tpi) where as a similar sized No. 2 BA has the afore mentioned 47 ½° thread pitch and 31.4 tpi. A 10-32 nut will thread onto a 2BA screw and vice versa, however if the wrong screw is inserted into a tapped hole more than about 4 threads in depth, it will quickly bind up and if forced, will strip.

British Standard Cycle (BSC or BSCy) - Used on a lot of British motorcycles and bicycles and most but NOT ALL threads are 26 TPI as is often thought. The angle of the threads is 60°. Wikipedia lists BSC as Whitworth, and they are WRONG. Believe it or not, there is a least one BSC thread commonly used on most Big Healeys, the steering wheel retaining nut on all Big Healeys with non-adjustable steering columns.

Cycle engineers Institute (CEI) - Older cycle thread superseded by BSC. The angle of the threads is 60°. Not used on Austin Healeys.

The following two thread forms are what the British switched to after moving from the Whitworth standard.

Unified Coarse (UNC) - Identical to American SAE Coarse or American National Coarse (ANC) and interchangeable. The angle of the threads is 60°.

Unified Fine (UNF) - Identical to American SAE Fine or American National Fine (ANF) and interchangeable. The angle of the threads is 60°. These fasteners are the majority of those used on most British cars of the mid to late 1950s and beyond.

The only difference from British UNF and UNC and American SAE Fine and Coarse fasteners is that the crests and roots of the threads on British manufactured bolts and nuts are rounded versus the flat crests and roots on US manufactured fasteners.

How are British screw threads different than American?

Although the nominal sizes are similarly labeled the main difference lies in the thread profile and resultant relationship of the pitch diameters. Both systems identify their nominal diameters primarily by factional inches, however the British Whitworth use a 55°-degree thread angle with

radiused root and crest. The customary American profile is 60 degrees with angular root and crest. Even though you may find a diameter and pitch combination that may seem to match it should not be used. The resultant assembly will be significantly weaker since there will be excess play due to the different angles and the threads will be binding on the root and crest rather than the pitch diameters.

One good example of this on Austin Healey 100s, Bugeye Sprites and other British cars of the era (1950s through early 1960's) is the bolt used on the aluminum front plate of the generator (Bracket, drive end) which the adjusting link attaches to. This 5/16" BSW (coarse bolt) has the same 18 threads per inch as a common UNC or SAE coarse bolt that you can buy in any hardware store. However, these two bolts should not be interchanged. Yes, the 5/16 UNC or SAE coarse bolt will thread into the tapped hole on the aluminum bracket, but the difference in thread angles (60° versus 55°) will cause premature wear to this softer aluminum bracket and it can never be torqued to the proper value. In addition, these two bolts will require two different spanners (wrenches).

UNC bolt above, BSW bolt below, both 18 tpi.

Each requires a different spanner.

RSB-Regis Screw and Bolt w/ "R" strength rating. UNC bolt on left has no marking so it's a Grade 2

Original BSW generator link bolt on my '60 Bugeye. No letter rating so therefore mild steel?

The early years, the Austin Healey 100s

These are the cars that were built during the transition from Whitworth thread form system to the new Unified thread form system, and as such will have the greatest variety of fastener thread forms. Since most of the mechanical components were already in production for many years when the 100 debuted, they carried over with their Whitworth fasteners, and in the case of the engine, it retained Whitworth fasteners until the end of BN2 production.

What this means for the 100 owner who either is going to restore his car or maintain it to a high standard is that he will need a set of Whitworth tools, spanners and sockets and set f taps and dies

for some of the most common British Standard Fine (BSF) fasteners and possibly o a few of the most common British Association (BA) screws, e.g., no. 2BA.

Early BN1s will have a higher percentage of Whitworth fasteners than the last BN2s or even the later BN1s. So how many thread forms are in a 100?

Whitworth
British Standard Fine (BSF)
British Standard Whitworth (BSW)
British Standard Pipe Parallel (BSPP)
British Standard Pipe Tapered (BSPT)
British Standard Brass (BSB)

Other British fasteners
British Association (BA)
British Standard Cycle (BSC)
Unified National Fine (UNF)
Unified National Coarse (UNC)
Unified Numbered Machine Screws. These machine screws are just an extension of UNF and UNC fasteners. (Most common are n. 10-32 Phillips head screws found extensively on all big Healeys and Sprites.)

Other miscellaneous thread forms
SAE Standard threads for spark plugs
Various wood and sheet metal screw threads
Tyre valve threads

The later years; the Austin Healey six-cylinder roadsters and convertibles

By the time that the six cylinder cars debuted in 1957 the transition from Whitworth to the Unified system was well underway. The new "C" series engine, as well as the suspension and rear axle were now using all Unified fasteners with certain exceptions. The early side-shift transmissions on the 100-six's and 3000's would still have had Whitworth fasteners. The Lucas and Smiths electrical components, starter, generator, fuel pump, etc… were still to a large degree using BA threads. The SU carburetors also retained their use of uniquely British thread forms all the way through the HD8's ion the 3000 MK III convertibles in 1967.

The "R" strength rating letter code on bolts was phased out in the early 1960's in favor of the slightly stronger "S" strength rating. Both of these strength ratings are roughly equivalent to a modern US Grade five strength rating, and will be discussed in detail later in this article. Also during the early '60's, the Philips head machine screws were phased out on favor of the "Pozidrive" style with its unique markings and requiring a special screwdriver.

Markings on British fasteners denoting thread form type

The markings on British fasteners can be quite unique, and somewhat of a mystery to the un-initiated, but from an engineering, and therefore a safety standpoint, they can be quite important. In addition, those restoring their car to Concours standards will also benefit from knowing what these various marking mean, what to look for during disassembly and reassembly.

These markings can vary from plain with no discernible markings to quite unique, with markings denoting the vendor/manufacturer, the strength rating, and whether the fastener is the older "Whitworth" thread form or the more modern "Unified" thread form.

When the British decided in the 1950's to convert to the Unified thread system, there had to be a way to mark threaded fasteners to easily distinguish them from the Whitworth fasteners that were still be used throughout out the Empire. There were various publications which described these markings starting with the various British Standards publications (B.S.), the Austin Service Journal; Vol. 25 – Cars, No. 23 & 24 – Repairs Data, and even my vintage Volume 16 of the Machinery's Handbook from 1959.

The following describes the various markings on Unified fasteners…

Hexagon Bolts

The heads on Whitworth fasteners (bolts) are typically flat, with or without the vendor name and possibly a letter, number or both denoting the strength rating if required (high tensile steel).

Bolt heads of Unified bolts were typically marked with a circular depression in the center, to easily distinguish them from Whitworth bolts. Bolts were referenced as also being marked with a line of small circles on indented one side of the hexagon flat and parallel to the nut axis. However, I have never seen a bolt marked in this fashion in over 40 years of working on British cars. They may also have had the vendor name and possibly a letter, number or both denoting the strength rating if required. These markings will be discussed later in this article.

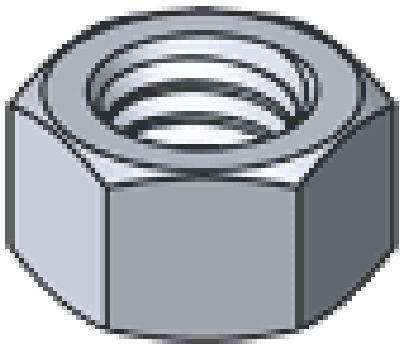
Hexagon Nuts

With regard to nuts, there were at least three distinctive ways to mark and denote a Unified fastener…

They were also marked with a line of small circles on one side of the hexagon flat. This was the most common marking method.

An inscribed circular depression on one face of the nut.

Six notches in each of the six outside corners of the hexagon.



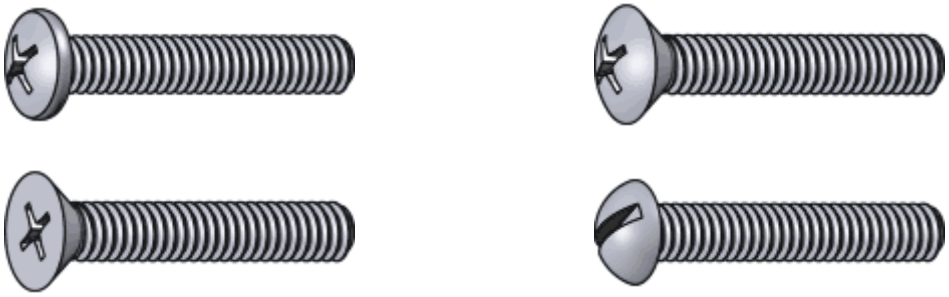
Bearing nut. Flat on one end and chamfered on the other.

INSERT PHOTOS OF ORIGINAL NUTS WITH THESE THREE MARKINGS

Machine Screws - Phillips Head

These are marked on the head with the four semi-circular arcs in between each notch of the Phillips opening. This does not demote a "Pozi-drive" screw as is often thought. The "Pozi-drive" screws had a unique opening and a distinct marking

Slotted screws were also marked in various ways, but they are not really applicable to the majority of British cars, and especially Austin Healeys.



Studs

UNF studs were denoted by the tip of the stud being machined to a small cylinder on top of the threads.

British Fastener Vendors of the 1950s and 60s

One of the more unique aspects of British fastener manufacturing is the fact that the vast majority of bolt heads have the manufacturers name stamped onto the bolt head. To the discerning eye, these fasteners can quickly denote either the originality of a car or the care taken in the restoration to bring everything back to the way the car left the factory.

During the heyday of the British Automotive Industry in the late 1940s through the 1960s there were over 39 distinct manufactures of fasteners who proudly placed their name or initials on their bolt heads. Here are the 39 plus manufactures that I have documented, and I'm certain that there are a few more that I am as of yet unaware.

ATLAS	APN
*AUTO	ARB (New manufacture?)

*BEES
*CRANES
FRAZER
*LINREAD
*MARWIN
*NEWALL (HT)
*NEWTON
RICHARDS
*RUBERY OWEN
*SPARTS
*TORRINGTON
*UNBRAKO
*WILEY
*WODEN

*BAX
*CL
CRF (New manufacture?)
CRS
*CSG
*FCF
FB
JF - (JACKSON FASTENERS?)
*GKN - (GUEST, KEEN, and NETTLEFOLDS)
GSF
LB
*LHN
RSB - (REGIS SCREW and BOLT)
*RO - (RUBERY OWEN)
*SA
SB
SN-JH
SN-MW
*TWL
WWE
WF
WI

Bolt heads marked with the number **15** or **17** (I don't know if these are a vendor designation or some other code) *I have seen bolt heads with this marking used on both 5/16" bolts and 3/8" BSF bolts on Austin Healey 100 suspension components.*

*Fasteners commonly found in Austin Healeys (Sprites & Big Healeys) 1953-1967

INSERT PHOTOS OF ALL THESE BOLT HEADS WITH THEIR RESPECTIVE VENDOR NAMES

British Strength Rating Codes Decoded-Finally

British strength rating codes were measured differently from the standard now used in the US and England. Many of you might be familiar with the more common US strength ratings… Grades 2, 5 and 8. The chart below shows the bolt heads and the marking (or lack thereof) that denote these strength ratings.

US Grade 2
Mild Steel

US Grade 5
High Tensile Steel

US Grade 8
High Tensile Steel

First let's discuss the types of steel used in fasteners.

Mild Steel: Any of a class of strong, tough, low-carbon steel, containing no more than 0.25 percent carbon and typically used for light duty bolts and screws and most nuts.

High Tensile Steel: Alloy steels that have been heat-treated to increase their strength.

US/SAE Grading Markings (Radial Lines)

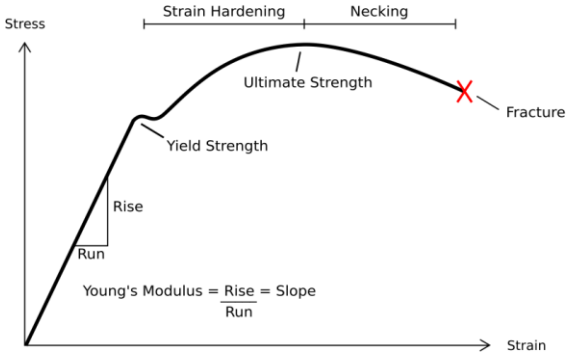
As stated above, in the USA, grading is by numbers, with the three most common Grades being 2, 5, & 8.

Mild steel, Grade 2 specifies minimum tensile strength of 74,000 psi, and there are no markings on the heads of Grade 2 (mild steel) bolts.

High tensile hex bolts or screws were marked with radial lines: 3 equally spaced lines (pointing to corners) for grade 5, and 6 lines (pointing to the 6 corners) for grade 8.

Grade 5 minimum tensile strength = 120,000 psi.
Grade 8 minimum tensile strength = 150,000 psi.

Now what does **Minimum Tensile Strength** (also called **Yield Strength**) mean? Very simply it's the stress at which a material begins to deform plastically. Prior to the yield point the material will deform elastically and will return to its original shape when the applied stress is removed. Once the yield point is passed, some fraction of the deformation will be permanent and non-reversible.



Bolts that have exceeded both their Yield Strength and Ultimate Strength, and have begun "Necking" (see the graph right). These examples are 1/4 & 5/16 BSF Grade "B" (Mild steel). The example on the far left has indeed stretched permanently since this is as far as the nut will smoothly screw onto the threads.

British fasteners however use a letter rating system to denote strength grade, and you will typically see this letter on the heads of bolts, most commonly a B, R, S, T or V although there are quite a few more. Instead of measuring these values in pounds per square inch (psi), they are instead measured in Ton-force per square inch (tsi) or tons tensile (TT). Now lest you think this is easy, remember we are dealing with British tons, so while a US ton is 2,000 pounds, a British ton, a.k.a. "Long" ton is 2,240 lbs. Additionally, the British also rated their fasteners at **Minimum Tensile Strength** or **Yield Strength** on the low end but also **Ultimate Tensile Strength (UTS), often shortened to Tensile Strength (TS) or Ultimate Strength** on the high end – This higher value is simply the maximum resistance to fracture, as once again referenced on the graph above.

Therefore, each letter grade corresponds to two `force measurements, e.g., a Grade "**R**" is rated at **45**/**55** tsi. Given the comparisons with US graded fasteners, the first number, in this case 45, is the Yield Strength and the second number, 55 is the Ultimate Tensile Strength. Simple multiplication of these values by 2,240 lbs. will give you an equivalent in pounds per square inch.

<u>Conversion Chart</u>

28 ton/square inch [long] = 62,720 pound/square inch
35 ton/square inch [long] = 78,400 pound/square inch

45 ton/square inch [long] = 100,800 pound/square inch
50 ton/square inch [long] = 112,000 pound/square inch
55 ton/square inch [long] = 123,200 pound/square inch
60 ton/square inch [long] = 134,400 pound/square inch
65 ton/square inch [long] = 145,600 pound/square inch
75 ton/square inch [long] = 168,000 pound/square inch

Now, the heads of British mild steel bolts, like US bolts are either unmarked or they may have the letter "B" pressed into them. Therefore, a "**B**" strength rating code is 28/35 tsi or 62,720 psi/78,400 psi or roughly equivalent (but weaker) than the 74,000 psi of a US Grade 2 mild steel bolt. Now, bolts with unmarked heads, or marked with the letter "B" are found throughout Austin Healeys and other British cars of the '50s and '60s, typically in low stress applications.

Starting after 1950, British High Tensile Steel bolts are numbered from "R" sequentially through "X", however we will concentrate only on the four grades found predominately on Austin Healeys, i.e., **R**, **S**, **T** and **V**, and not cover U, W and X.

A Grade "**R**" strength rating is 45/55 tsi or 100,800 psi/123,200 psi. Venders typically just marked the letter while some vendors even marked their bolts with both the "Letter" rating and the "Numerical" ratings, e.g., **45R55.**

The R rating was used throughout the 1950s and early '60s when it was replaced by the "S" rating code. Most AH 100s, 100-sixs and early 3000s will have these "R" rated bolts.

A Grade "**S**" strength rating is 50/60 tsi or 112,000 psi/134,400 psi.

A Grade "**T**" strength rating is 55/65 tsi or 123,200 psi/145,600 psi

A Grade "**V**" strength rating is 65/75 tsi or 145,600 psi/168,000 psi

Torque Specifications for British Bolts

Now, how do we as restores make use of this information? Very simply, if we know that the typical flywheel bolt is a Grade "T" with the "WILEY" vendor name, then we should know that we would not want to substitute the same sized "WILEY" bolt with a "B" rating or, worse yet, no marking at all. Also if we cannot find a British Grade "T" bolt, we also know to use a proper grade new bolt, e.g., a Grade 8 SAE bolt. Better yet is to also know the proper torque for each bolt rating so that we do not exceed its Yield Strength.

Below is a standard chart with torque (Q) specifications for Whitworth Steel Bolts (coarse threads so therefore BSW). However, since this chart is for coarse fasteners, it is not applicable to British Standard Fine (BSF) bolts which is what you will find on most early Austin Healeys, BN1/2s. What is nice about this chart is that it gives equivalent psi ratings for the various British letter strength grades.

<u>British Form Spring or Lock Washers</u>

Many of the British form lock or "Spring" washers as they are called are quite unique in regard to size and design. There are several basic types of spring washers used on British cars of the period; the "Square" profile washers as I call them, and the more traditional flat style of washers, similar to what you can purchase at any hardware store, or fastener supply vendor. A unique variation of these flat washers may have a pattern on one or both of their faces as pictured below.

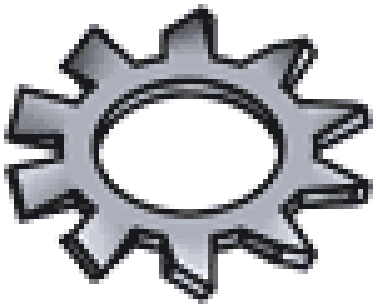

3/8", 5/16" and 1/4" radial pattern Spring washers. Close up of the same radial pattern washer.

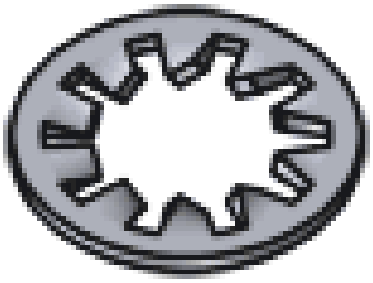

What I term as the "Basket Weave" washer pattern. As you can see from these photos there is quite a variation on the tightness of the weave in these patterns.


While you'll never see these washer patterns once they are installed on a car, this is just too nice of a detail to ignore, and loose to history as these cars are restored.

MORE PHOTOS TO BE ADDED

Internal and External tooth lock washers





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British Form Flat Washers

British form flat washers are very much like SAE pattern washers in that they have a tighter fit on the bolt and a smaller outside diameter.

INSERT TEXT AND PHOTOS

Locking Nuts

As an alternative to split-pins or tab-washers, self-locking nuts prevent a joint from loosening usually by elastic deflection of part of the nut. These are also known as prevailing torque nuts, since the locking part of the nut grips the bolt/stud thread and a residual torque remains after the joint has been tightened.

Self-Locking Nut with Fibre Insert

These are fairly self-explanatory. A red fibre insert in the nut grips the bolt/stud thread. As a relatively soft material, the fibre renders the nut unfit for re-use.

Self-Locking Nut with Nylon Insert / Nyloc

This is the more modern equivalent of the fibre insert nut, and are actually re-useable to some extent. However, for safety critical or highly stressed joints, new nuts should be employed. These nuts are not suitable for high temperature applications (above approx. 120 deg. C), where all-metal self-locking nuts should be fitted instead.

All-Metal Self-Locking Nuts

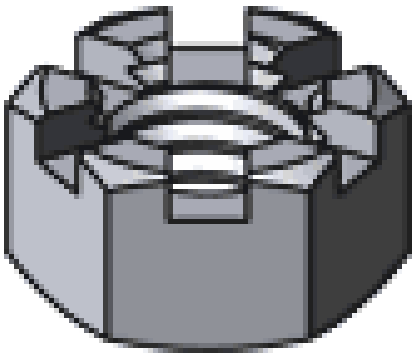
There is a bewildering range of nuts in this category due to many manufacturers coming up with their own designs. G.K.N. used to supply the fasteners for a great many British cars, and their Autolok nut was their answer to the self-locking problem. These are used extensively on the AC 2 Litre, but are no longer available.

Common (in the UK at least) alternatives are Binx, Aerotight, Phillidas and Cleveloc nuts.

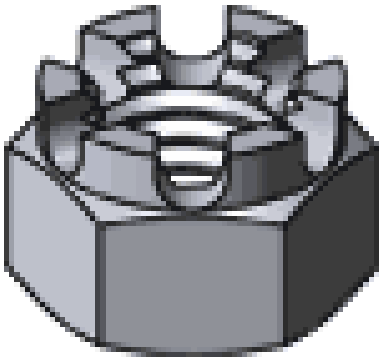
BN1/2 Generator pillar with a sampling of various fasteners; Bearing surface BSF nut, square profile spring washer, British pattern flat washer, "Basket weave" patterned spring washer and red fiber lock nut.

Slotted Nuts

British cars of the period used slotted nuts on much of the suspension and other components. These nuts were held in place by a Cotter or "Split" pin as the British called them. Now these nuts are similar to but not exactly the same as Castellated or "Castle" nuts as some British car owners mistakenly call them. As you can see from the diagrams below Castle nuts have a machined rounded section above the main hex nut. Castellated nuts were not used on Austin Healeys.



Slotted nuts are used in conjunction with a cotter pin on drilled shank fasteners to prevent loosening.



Castle nuts are similar to slotted nuts but with slots in a rounded section above the main nut.

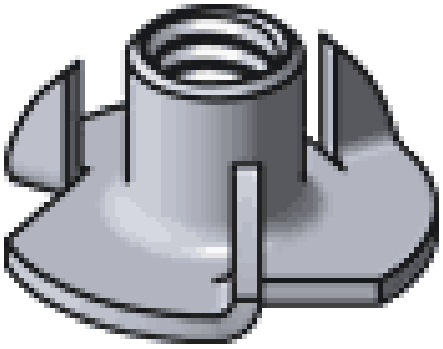
Carriage Bolts


Austin Healey 100 bumper over-rider 7/16" UNF Carriage bolts.

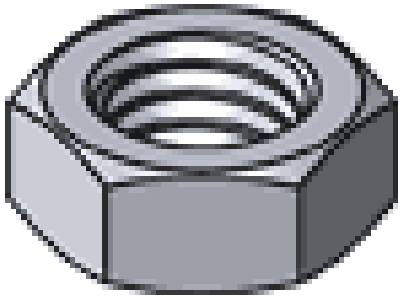
Dowel Bolts


Engine to transmission 3/8" BSF hex bolts (6) and 3/8" BSF Dowel bolts (2).

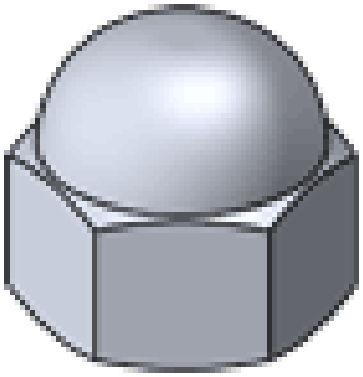
Special Fasteners



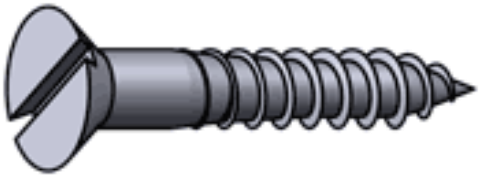
"T"–nuts. Used in the wooden seat tracks on BN1/2s

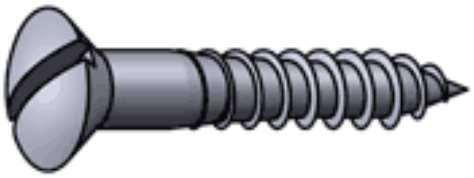


Jam nuts

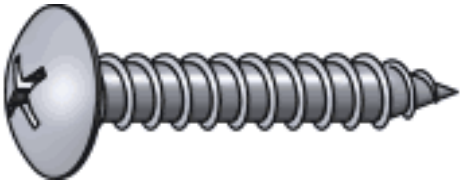


Cap or Acorn nuts. Used for the 5/16" seat back to frame hinge bolts. Also used on the 100s, 10-32 hood frame latch screws and 1/4" BSF latch pivot screws (pictured above).





Slotted wood screws, flat and oval head

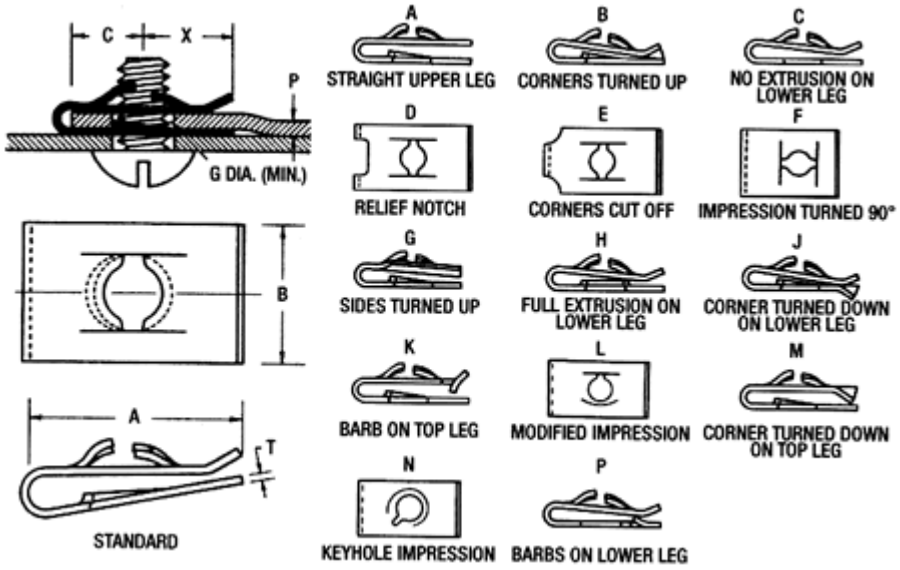


Truss head sheet metal screws

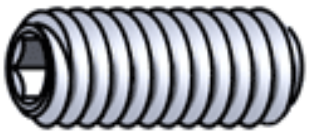
Countersunk Phillips oval head screws

Pan head sheet metal screws

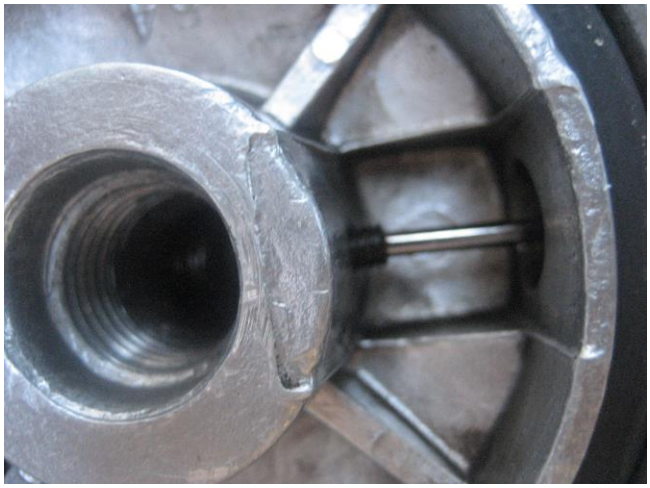
Spire nuts. Commonly used with special flat threaded hex nuts to attach fenders on British cars.



Speed nuts. Commonly used to attach badges to body panels



Set screws.



Set screw in an early 1953 BN1 Tecalemit oil filter head.

INSERT TEXT AND MORE PHOTOS

British Fasteners Finishes

Self Colour
Material left bare without any coatings or treatment for either protection or appearance. It is suspected, but not confirmed that some fasteners on very early BN1s were not plated.

Chemically Blackened / Bluing

This is an oxidizing process that leaves a blue-black appearance, and may provide some slight protection against rust, in the case of steel. The majority of the Whitworth (BSF) fasteners used on the BN1s and 2s originally had this black phosphate finish. *To replicate this finish at home, see the supplement article on "Blackening" tools and fasteners.*

Note: While the normal delivery condition of fasteners may sometimes be referred to as Black Oxide, rarely is that the actual finish. It is generally used in a broad form to distinguish them from plated fasteners. The actual finish is more of a **phosphate and oil** ("phos & oil") preservation. Actual **"Black Oxide"** and **"Parkerizing"** are proprietary finishes.

Zinc-Plated (Electro-plated)

Not to be confused with "galvanizing" electro-plated zinc provides rust resistance for steel. The plating material deteriorates (is sacrificed) in the process of saving the steel underneath by electrolytic corrosion. The majority of fasteners on an Austin Healey were zinc plated as per the build specifications. However, the modern hardware store fasteners are a "Bright" zinc and if you have your fasteners re-plated ensure that they plating shop does not bright zinc plate them.

Cadmium Plated

This material is often associated with high grade bolts. It offers superior corrosion resistance (three times that of Zinc plating) and also reduces friction in threads, but is expensive. While the fasteners used on Austin Healeys were zinc plated, the original zinc plating was no where near as bright as modern zinc plated finishes. In fact, white Cadmium plating in appearance is very similar to the original zinc plating of 55 years ago.

Restorers note: A good alternative for the home restorer is "Caswell's Copy Cad" home plating kits. The Eastwood Company also offers a tin/zinc plating kit that produces good results for certain applications and appears to be a bit less labor intensive.

Original 1/4" zinc plated bolts on the left versus a 5/16" bolt on right re-plated with Caswell's "Copy Cad".

Two original 1/4" zinc plated bolts in the center and four 5/16" bracket bolts re-plated with Caswell's "Copy Cad".

"Butler" Chrome

Butler chrome is a process from the early days of automobile…

Nickel Plated

This is an attractive form of plating with some degree of rust protection when used on steel, and is also commonly used for brass and bronze. This was the standard vehicle plating prior to the widespread introduction of production chrome plating in the 1920's.

Chromium Plated

For appearance, chromium gives the best results, although it offers limited protection against corrosion. For steel, three layers of metal plating are normally required: Copper, nickel and then chromium (which is where the term "triple chrome plating" comes from). Commonly used for steel and brass (the latter with just the nickel and chromium layers).

MORE PHOTOS TO BE ADDED

Thread Maintenance and Repair

Tap and Die Sets for the Home and Professional Restorer

INSERT TEXT AND PHOTOS

Thread Repair

INSERT TEXT AND PHOTOS

Any good mechanical thread repair method will result in a stronger female thread that the standard hole. The "Helicoil" representative used to do a demonstration with a sheet of aluminum and a grade 8 bolt. He would screw the bolt in the hole, and strip the threads.

He would then install a "Helicoil" and screw the same bolt in and proceed to break the grade 8 bolt and the new larger diameter thread. The thread repair was stronger than the original bolt.