



'Need to Know' Series No 2... BS AU 7 (classic vehicle wiring standard)

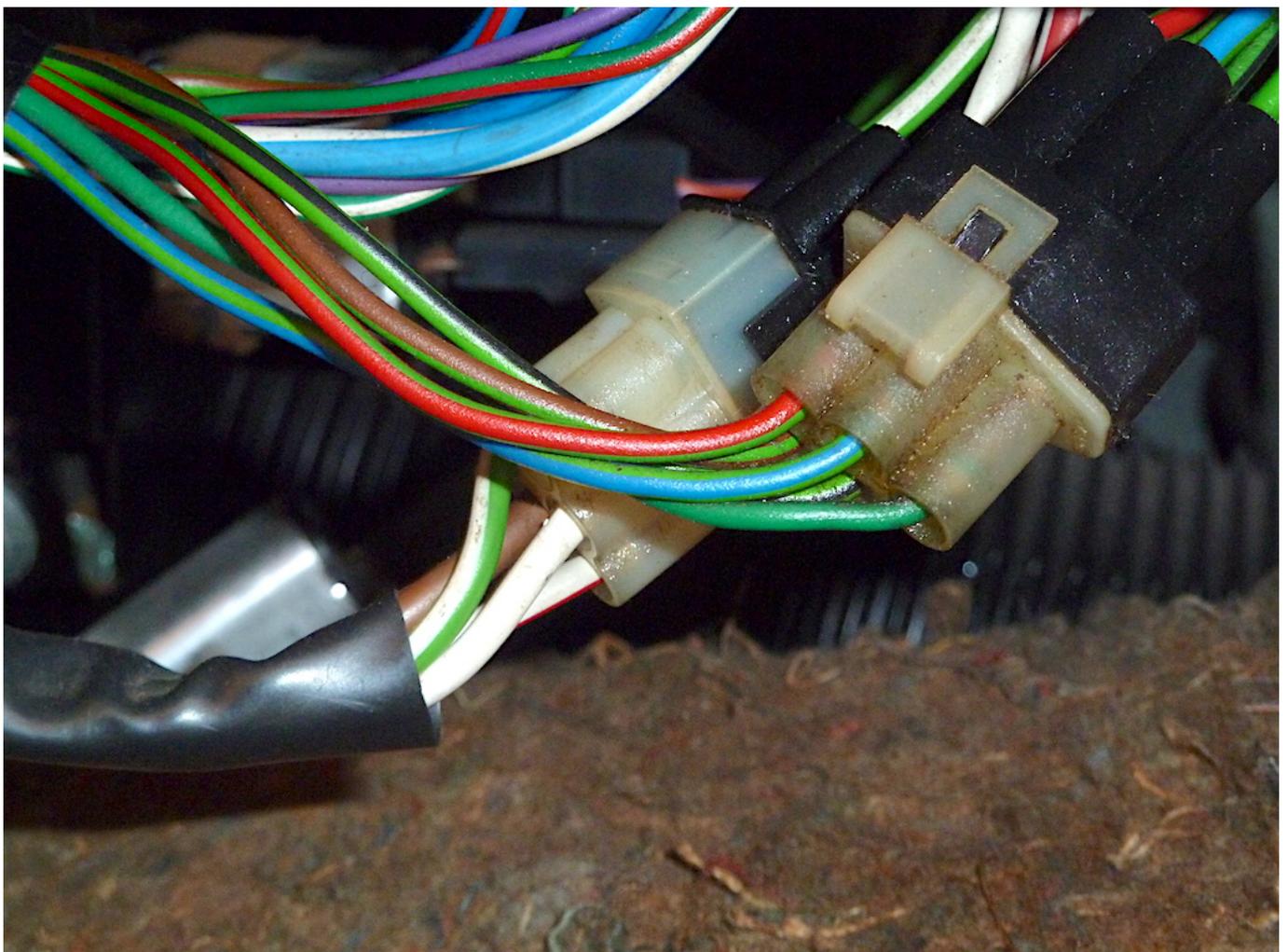
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'Need to Know' Series No 2...

BS AU 7 (British classic vehicle wiring standard) – Dave Moss explains all...





Note from Kim: Our 'Need to Know' Series aims to provide information about various (and sometimes-overlooked!) aspects of classic car design and construction, to help owners today in better understanding, maintaining and enjoying their vehicles. Watch this space for further articles in the series. Here is the second from Dave Moss...

(A link to our 'Need to Know No. 1' feature, on voltage stabiliser units, is included at the end of this article).

If BS AU 7 looks to you suspiciously like a foreign car registration number, you could well be right... but if you own a post-war British classic car it's useful to know that it indicates a frequently found vehicle wiring standard. As such it's a key to various electrical system secrets, though its evolution is a surprisingly long story, much of it heavily obscured by the mists of time. Yet its development, if not exactly pre-ordained, was near-inevitable as electrical wiring moved forward from its most basic, electric lighting became standard, and pre-constructed wiring harnesses were introduced to speed up production lines. It is known that Lucas was identifying some cables by colour early in the 1930s, and as one of the British car industry's fastest growing suppliers, devised its own seven-colour wiring standard. This allowed for subsidiary markers in the remaining six colours to be added to any cable to indicate destination connections.

Particular circuit groupings had specific colours, broadly...

Black: Anything connected to the chassis earth;

Brown: Main battery distribution circuits, containing no fuses and no switches;

Red: Side, tail and instrument lighting; number plate illumination;

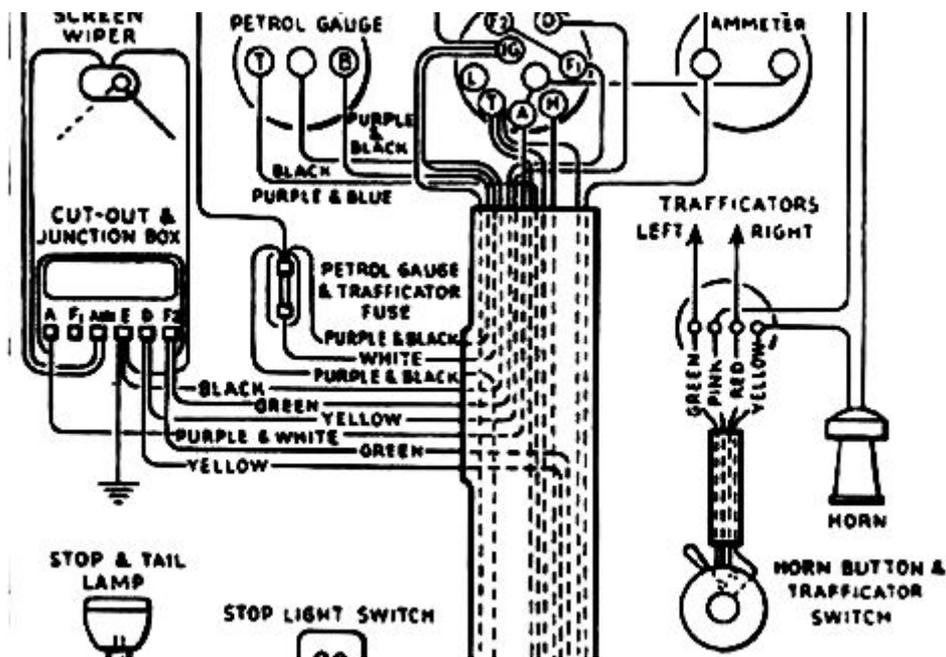
Blue: Headlamps;

White: An unfused feed, live only with ignition switch on;

Green: A fused feed, live only when the ignition switch is on;

Yellow: Circuits involved in or related to battery charging: dynamo, voltage regulator.

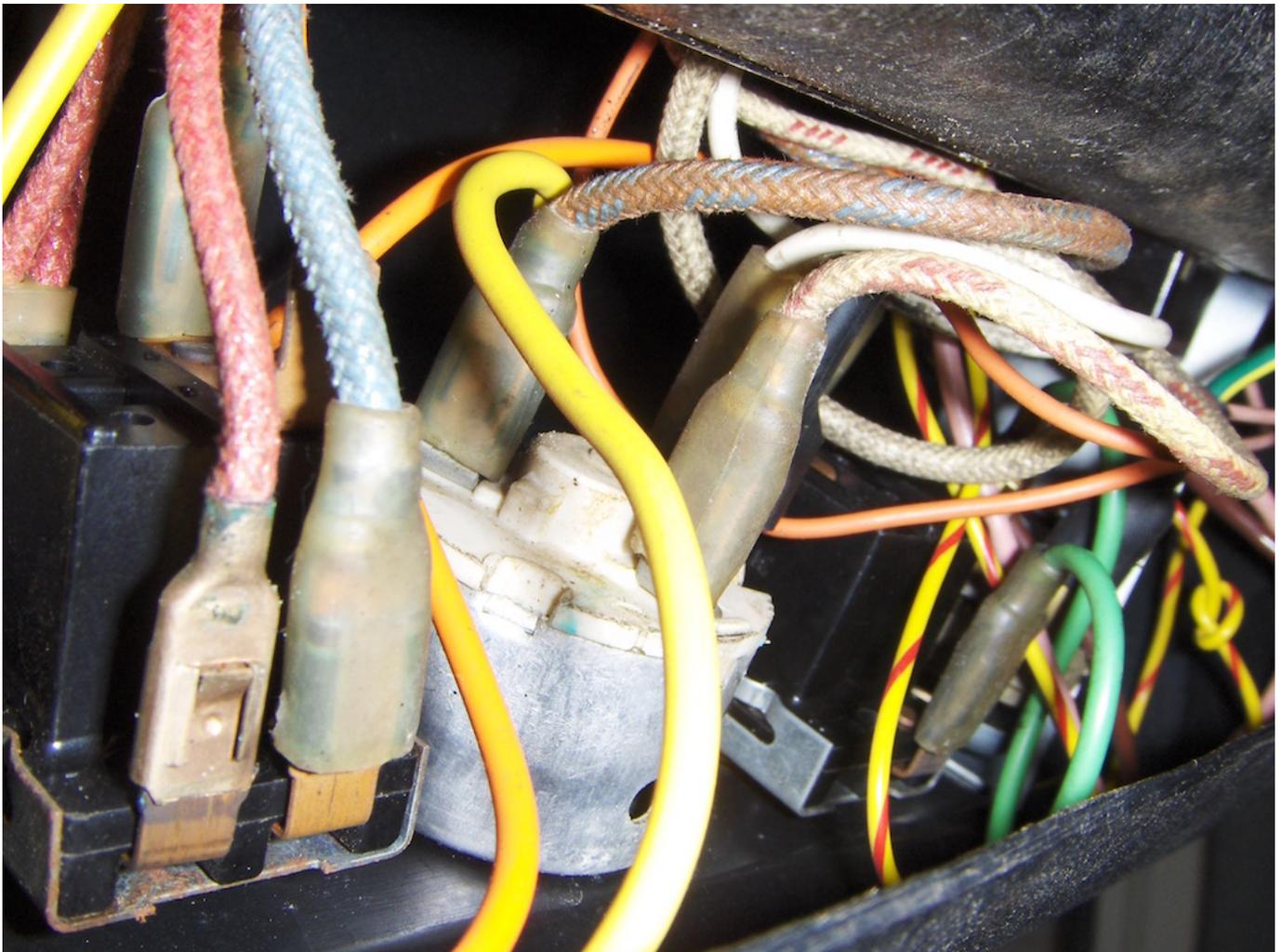
This coding technique reputedly first entered the British automotive mainstream in the 1934 season Austin 7 range, which had an owner's manual including an electrical circuit diagram - and some key coloured cabling. Some colours didn't immediately follow the Lucas convention: Brown was absent for instance, and pink is shown, while some cables had no indicated colour - also Purple was used for fused auxiliary power feeds from the vehicle battery.



An excerpt from an Austin 7 owners manual wiring diagram, showing only some cables colour coded. Note also that some indicated colours don't follow the Lucas convention of the time: e.g. The horn, plus left and right trafficators.

With no significant high profile alternative, the informal Lucas standard became widespread, though not universal, and wiring diagrams appeared in ever more driver

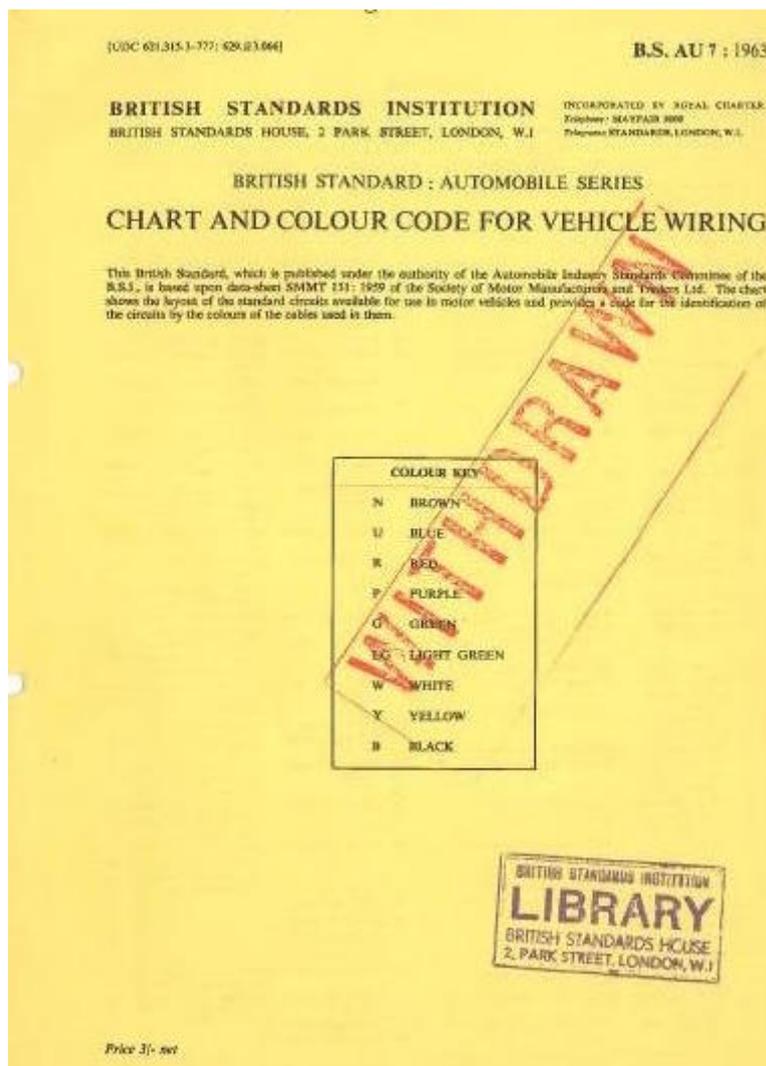
handbooks. At this stage the familiar PVC insulated cable widely found in later vehicles was not yet in use, and early cables usually had a main outer cotton-covering colour, with any secondary colour usually carried in a zig-zag, herringbone or intermittent marker pattern woven into the cotton. This arrangement proved long-lasting, still being found on higher-current British vehicle cables well into the 1960s. Their propensity to fade with age can make cable tracing today an interesting and time consuming occupation...



Interior switch panel wiring in a 1967 Mini showing cotton type cable insulation complete with typical marker patterns. Though colours were readily distinguishable when cables were new, they faded with age and difficult environmental conditions (e.g. underbonnet). Here red and blue are easily distinguished, as is brown with blue and white with red... but what's that cable at the back?



The system was modified over time: For instance in post war years yellow cable functions were gradually merged with brown. By the 1950s, with vehicle numbers growing, electrical systems becoming more complex, and exports rising rapidly, calls for a clearer, more uniformly cohesive approach to vehicle wiring began. Preparation of a suitable standard took some years, undertaken by Technical Committee AUE/16 of the British Standards Institute (BSI). Published in February 1963 as BS AU 7, it was the work of representatives from the Society of Motor Manufacturers and Traders, The Department of Transport, the Electric Cable Makers' Confederation, the National Caravan Council, and the Association of Trailer Manufacturers, and was underpinned by the now long-familiar Lucas wiring convention.





The front cover of the first BS AU 7 wiring standard, issued in February 1963.

This was probably a wise decision, to avoid major upheaval and confusion, since the company was then arguably the dominant supplier of automotive electrical components to British vehicle manufacturers, with equipment and wiring practices familiar to mechanics and auto electricians across the world. However the new British Standard wasn't identical, acknowledging a range of external factors - and the possibility of more sophisticated vehicle electrical systems in future.

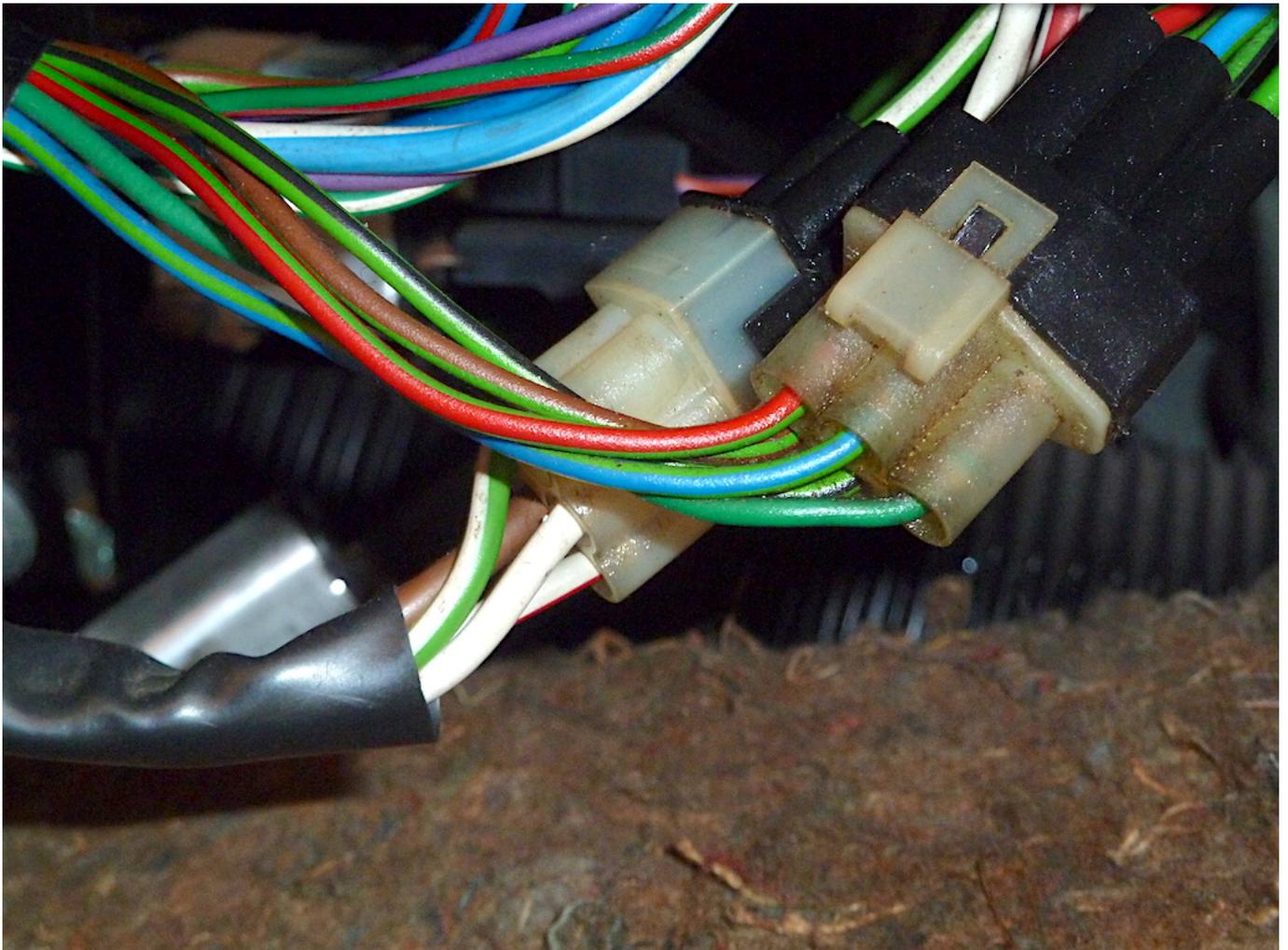
Like the Lucas arrangement, BS AU 7 was built on slightly nebulous "departmental" wiring identified by a solid colour, with "tracers" indicating subsidiary functions. However this relationship was often loosely interpreted: For instance, solid Black indicated vehicle chassis connections, but its tracers eventually ranged from windscreen wiper functions to radiator fan switching. Brown and its tracers related to main battery, generator and control box feeds, while Green indicated circuits powered only with the ignition switch on. White (initially) covered ignition system specifics. Red was used for lighting... excepting headlights, fog and driving lamps, covered by Blue. Purple identified equipment continuously receiving battery voltage, and three new colours appeared: Light green covered various new-fangled facilities, amongst them flashing indicators, electric screenwash and instrument voltage stabilisers. Yellow was originally introduced for electric overdrive circuitry, and Slate Grey for electric window functions.

With the new standard's arrival, easy identification of main and tracer colours on what were mostly black and white circuit diagrams became essential. Previous abbreviations such as Bk for black and Bn for brown were superseded by an abbreviation code indicating a cable's main body colour first, and any tracer second. Black was identified by "B," and Brown by "N" - its last letter, while "U" was used from Blue. Thus circuit diagrams showed brown cables with blue tracer as "NU." Purple retained its P, while unsurprisingly, Light green was "LG," and yellow "Y." To avoid confusion with Green, Grey was identified as "S" - for Slate. Oddly, BS AU 7 never formalised these abbreviations, despite their appearance on the standard's own example wiring diagrams. Nonetheless, they were widely adopted by



manufacturers from the 1960s onwards.

Over the years, braided cotton insulation material for vehicle cables gave way to plastic/PVC, used widely from the late 1960s, and in many cases such later cables have proved to be more flexible, durable and easier to identify as the colours are less prone to fading than is the case with their predecessors, which were also prone to brittleness. Plastic insulation is also easier to wipe clean (VERY gently!) to aid identification of the colours. However, any wiring more than a very few years old can suffer from heat build-up in underbonnet situations (for example), also from exposure to sunlight, so it is prudent to check frequently and regularly for brittleness.





The plastic/PVC insulation material used on the cables of more recent classics (in this case a Morris Ital built in 1982) tends to survive well and the original colours are easier to identify than those on older cotton-braided insulation.

Wiring protocol updates and amendments have happened along the way, but the last major change was an increase in cable count to 133, through twelve newly added allocations with orange as the main body colour - plus a solitary pink with white tracer. On December 30th 1983 these were formalised into BS AU 7a - which remains valid today, placing it amongst the oldest active vehicle-related British Standards.

However, while some elements may linger on modern vehicles, much of the current-carrying "point to point" wiring for which this standard was designed is now yesterday's technology. Newer, much more complex standards nowadays apply to the digital systems central to new car electrical systems, known by acronyms like CAN-bus, LIN, FlexRay and JASPAR to name a few... and they are definitely a topic for another day....

Extract from the current British Standard Specification for colour codes for road vehicle electrical cables, BS AU 7a:1983 (with 1968 BS AU 7 for comparison)...



Ref.	Cable colour	Cable destination in 1983 BS AU7a	Destination in 1968 BS AU 7
97	Black	All earth connections	All earth connections
98	Black w. brown	Tachometer generator to tacho	Tachometer generator to tacho
99	Black w. blue	Tachometer generator to tacho	Tachometer generator to tacho
100	Black w. red	Electric or electronic speedometer to sensor.	Electric speedometer
101	Black w. purple	Temperature switch to warning light	Spare
102	Black w. green	Relay to radiator fan motor	Wiper switch to wiper (single speed)
102	Black w. green		Relay to radiator fan motor
103	Black w. light green	Vacuum brake switch or brake	Vac. brake switch to warning
...		differential pressure valve to warning	light/buzzer
...		light and/or buzzer	
104	Black w. white	Brake fluid level warning light to switch	Brake fluid level warning light to
...		and handbrake switch; or radio to speakers	switch and handbrake switch
105	Black w. yellow	Electric speedometer	Electric speedometer
106	Black w. pink	Spare	Spare
107	Black w. slate	Spare	Spare
108	Black w. orange	Radiator fan motor to thermal switch	Radiator fan motor to thermal switch

An extract from the latest version of BS AU7a issued in 1983 covering all cables with a



black base colour. Note the changes to cable allocations after 1968 as vehicle electrical systems became more sophisticated.

Permission to reproduce extracts from BS AU 7a is granted by BSI. British Standards can be obtained in PDF or hard copy formats from the BSI online shop:

www.bsigroup.com/Shop or by contacting BSI Customer Services for hardcopies only: Tel: +44 345 086 9001, Email: cservices@bsigroup.com

References

For further reading on this subject, please have a look at these links:

The first link in this list will take you to an archived page on the BSI website, about Standards development, and containing much information about vehicle standards. Within its contents there is more about the BSI sub-committee AUE/16 Data Communication (Road vehicles) that was overseeing various British motor vehicle electrical standards in 2016. There is also a list of current and withdrawn standards which came within this committee's remit at that time...

www.stagbytriumph.co.uk/ (select "parts" then "BS AU 7 wiring diagram.")

[The Mini Forum - BS-Au7 Full Wiring Code/Colours](#)

A full wiring diagram contained in a 1937 Austin Seven Handbook (Publication No 1400D) is [here](#)

Austin7.org - [Wiring Diagram for ARR Ruby & Variants](#)

Lots more about British Standards and the areas covered by them can be found on Wikipedia - [here](#):

[Wikipedia - British Standards](#)

With thanks to Chris Roberts, Chairman of BSI committee AUE/16 - Data Communication (Road Vehicles) for background information used in the preparation of this feature.



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To read the first of our 'Need to Know' features by Dave Moss, covering voltage stabiliser units and published on 22nd November 2016, please click [HERE](#).