

Chapter 5

Wire harness

WIRES & COMPONENTS

Wire colours

Wire colour coding was formalised under British Standard AU7: 1963. However, the colour system found in British cars seems to have been established long before, probably by Lucas-Rists, which dominated the market and actually designed many car electrical systems for the manufacturer around its components.

The standard is based on a system whereby the wires have a base colour that defines the primary function of the circuit as listed below.

Brown	Battery fed (no fuse)
Purple	Battery fed (fused)
White	Ignition fed (no fuse)
Green	Ignition fed (fused)
Blue	Headlamps
Red	Side lamps
Yellow	Overdrive
Orange	Wipers
Black	Earth

Subordinate circuits have tracer or stripe colours added to the base colours. For example, the panel lamp operate only when the side lamps (parking) lamps are on and so the wiring can be said to be subordinate to the side lamp circuit. The panel lamps wires have an added white tracer stripe. Similarly, the map lamp is also subordinate to the red circuit and its

wires also have a tracer stripe, in this case purple.

A British Standard is not the law of the land and so, for various reasons, it was not absolutely adhered to. In some cases a conflict arose. For example, the windscreen wiper circuit is supposed to be based on orange but if it did not have its own fuse, using instead the green accessory circuit to supply it, should it be based on orange or green? Some car makers had their own long established systems or were dictated to by foreign parent companies and so they followed the standard only to a degree or sometimes not at all, especially after their vehicle designs, and eventually manufacture, came from the USA or Germany, as was sometimes the case for Ford and Vauxhall. In addition, as time went by, new vehicle functions emerged, such as power locks, that were inconceivable in 1963, and so no colour standard existed.

Triumph followed the code but sometimes thought it knew better, substituting, for example, black/white, the correct colour for the hydraulic brake pressure warning system for black/purple, the latter having the code BP, which to them better described brake pressure on a circuit diagram. At Ford of Dagenham, on the other hand,

there must have been an electrical design team that was split in two, one half of which followed BS AU7, while the other half thought that when Henry Ford said that customers could have any colour so long as it is black, he was referring to the wiring.

Shorthand colour codes are necessary in circuit diagrams and are not always immediately obvious. Having three colours, black, brown and blue all starting with 'b' does not help. The following letter codes are generally accepted.

B	Black
G	Green
K	Pink
LG	Light Green
N	Brown
O	Orange
P	Purple
R	Red
S	Slate or grey
U	Blue
Y	Yellow

Colour codes for wires with tracers are written as base-colour/tracer-colour when space allows or simply as the letter code for the base colour followed directly by that for the tracer if applicable. Thus a red wire with a light-green tracer would be written as red/light-green or simply as RLG.

CONVENTIONS

Colour codes

BS AU7 is followed where practical in the circuits in this book. Otherwise, if there is a wire not described in the specification, the most logical colour, used by at least one of the car companies, is used instead.

Wires in this book may not look exactly like those in your car. During wire manufacture, the tracer can be added to the insulation by co-extrusion of the two colours or by printing using a wheel that dips into ink at its bottom edge and transfers it to the wire, which is rolled over the top of the wheel. These methods produce tracers that look like those labelled 1 and 2 in Figure 5.1.

Another method is to pulse spray the ink onto the moving wire, which produces a pattern rather like that labelled 3. As most classic car enthusiasts are men and some 10 per cent of them are, like the author, colour blind, this is the system that shows the trace colour most clearly and has been selected for use here. To identify the

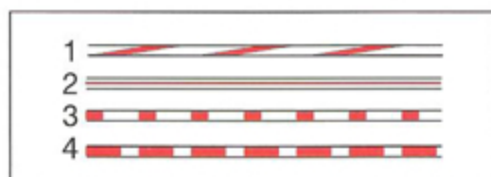


Figure 5.1. Various wire tracer colour representations.

base colour, look for the longest dash. Wire 3, in Figure 5.1 is a white/red wire and wire 4 is red/white.

Component codes

BMC used certain numbers to identify components in circuit diagrams where there was not room to fully label each one. Unfortunately, it was neither totally consistent nor comprehensive but as the best system around, an adapted version is used throughout the circuit diagrams. Table 5.2 provides the full listing.

EXAMPLE CIRCUIT

The circuit diagram in Figure 5.2 would be 90 per cent accurate for any car made in the late 1950s or early 1960s. At the same time it is probably not 100 per cent representative of any single one.

Because this is an electrical book, the circuit shows an electrical fuel pump, indicating perhaps a car from the Jaguar, Morris, MG or Austin-Healey stables. At this time, however, oil gauges and tachometers were not generally electrical and so these components won't be found in the diagram. An oil pressure warning system is included because it was a ubiquitous and necessary accessory.

The car represented is not a 'de-luxe' model and so such frills as a heater blower, cigar lighter, duotone horn, reversing lamps, hazard

flasher or radio won't be found. The circuit does include a courtesy light controlled directly from a manual switch at the dome lamp or by a door operated plunger.






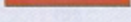



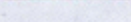















Though the circuit is a very basic one, even with coloured wiring, it is still a fairly complicated diagram to read. When originally published in driver manuals, the circuit diagrams were invariably in black and white, and the wires were represented by thin lines that criss-cross one another making them a headache to follow. Had a car from a decade later been represented, the circuit would have been far more difficult to squeeze onto a single page with any clarity. Modern cars are so electrically complex that their electrical systems have to be broken down into sections, one that the author recently studied covered over 500 pages for a single range of vehicles.

In this book, each circuit, be it lighting, ignition or whatever, is broken out separately so that it can be read, understood and if necessary diagnosed without the clutter of all the other functions around it. Nevertheless, the component codes and wire colours will remain consistent throughout so that, after a little use, the reader will become familiar with the fact that, for instance, component 38 is the ignition switch and that certain wire colours can be expected to be connected to it.

WIRE COLOUR CHART

Base/Tracer	Code	Image	From	To
Black	B		Any earthed component	Earth
Black/Blue	BU		Tachometer generator	Tachometer
Black/Brown	BN		Tachometer generator	Tachometer
Black/Green	BG		Relay	Radiator fan motor
Black/Orange	BO		Thermostat	Radiator fan motor
Black/White	BW		Brake warning switch	Brake warning lamp
Blue	U		Lighting switch	Dip switch (beam switch)
Blue/Black	UB		Dip switch (beam switch)	Headlamp fuse
Blue/Brown	UN		Headlamp fuse	Headlamp relay

CLASSIC BRITISH CAR ELECTRICAL SYSTEMS

Base/Tracer	Code	Image	From	To
Blue/Light Green	ULG		Windscreen wiper switch	Wiper motor high speed brush
Blue/Orange	UO		Fuse	RH headlamp dipped (low) beam
Blue/Pink	UK		Fuse	LH headlamp dipped (low) beam
Blue/Red	UR		Dip (beam) switch	Headlamp dipped (low) beam
Blue/White	UW		Dip (beam) switch	Headlamp full (high) beam
Brown	N		Main battery feed	All non-ignition unfused components
Brown/Black	NB		Alternator sensing wire	Battery
Brown/Blue	NU		Control box A1 terminal	Ignition and lighting switches
Brown/Green	NG		Dynamo field (F)	Control box field (F) terminal
Brown/Light Green	NLG		Windscreen wiper switch	Wiper motor auto park switch
Brown/Purple	NP		Alternator	Regulator
Brown/Slate	NS		Starter relay contact	Starter solenoid
Brown/White	NW		Ammeter	Control-box
Brown/Yellow	NY		Generator	Charge warning lamp
Green	G		Fuse block	Ignition switched fused accessories
Green/Black	GB		Fuel sender	Fuel gauge
Green/Blue	GU		Water temperature sender	Water temperature gauge
Green/Brown	GN		Reversing lamp switch	Reversing lamp
Green/Light Green	GLG		Hazard flasher module	Hazard pilot lamp
Green/Pink	GK		Fuse	Flasher module
Green/Purple	GP		Stop lamp switch	Stop lamps
Green/Red	GR		Turn signal switch	Left hand turn signal lamps
Green/Slate	GS		Heater switch	Heater motor high or second speed
Green/White	GW		Turn signal switch	Right hand turn signal lamps
Green/Yellow	GY		Heater switch	Heater motor low or single speed

Base/Tracer	Code	Image	From	To
Light Green	LG		Instrument voltage regulator	Fuel and water temperature gauges
Light Green/Black	LGB		Ignition fuse	Windscreen washer pump motor
Light Green/Brown	LGN		Turn signal module	Turn signal switch
Light Green/Green	LGG		Instrument voltage regulator	Instrument gauge
Light Green/Purple	LGP		Turn signal module	Turn signal indicator lamp
Purple	P		Fuse block	All non-ignition fused components
Purple/Black	PB		Horn	Horn push switch
Purple/Blue	PU		Heated backlight relay ,switch & lamp	Fuse
Purple/Green	PG		Fuse	Hazard flasher
Purple/Pink	PK		Heated rear backlight switch or relay	Heated rear backlight
Purple/Red	PR		Dome or courtesy lamp	Dome or courtesy lamp switches
Purple/Slate	PS		Radio	Aerial lift motor
Purple/White	PW		Courtesy lamp switch	Courtesy lamps
Red	R		Lighting fuse	Right hand-side/park lamps
Red/Black	RB		Lighting fuse	Left hand-side/park lamps
Red/Green	RG		Lighting switch or fuse block	Side lamp fuse(s) and panel lamp
Red/Light Green	RLG		Windscreen wiper switch	Wiper motor normal speed brush
Red/White	RW		Lighting switch or panel lamp control	Panel lamps
Red/Yellow	RY		Fog or driving lamp switch	Fog or driving lamp
White	W		Ignition switch	Unfused ignition fed components
White/Black	WB		Ignition coil	Distributor contact breaker
White/Brown	WN		Oil pressure switch	Oil pressure warning lamp
White/Green	WG		Ignition switch accessory position	Accessory position loads
White/Red	WR		Ignition start switch	Ignition solenoid or relay
White/Slate	WS		Current driven tachometer	Ignition coil


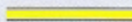


Base/Tracer	Code	Image	From	To
White/Yellow	WY		Ballast resistor or starter solenoid	Ignition coil
Yellow	Y		Overdrive driver's switch	Overdrive gear switch
Yellow/Green	YG		Overdrive relay	Overdrive driver's switch
Yellow/Purple	YP		Overdrive gear switch or relay	Overdrive solenoid

Table 5.1. Wire colour codes and purpose.

ELECTRICAL COMPONENT CHART

Code	Component
1	Alternator or generator
2	Alternator or generator control box
3	Batteries
4	Starter solenoid
5	Starter
6	Lighting switch
7	Dip (low) beam switch
8	Right hand headlamp
9	Left hand headlamp
10	Full (high) beam warning lamp
11	Right hand front parking lamp
12	Left hand front parking lamp
13	Panel lamp switch or dimmer rheostat
14	Panel lamps
15	Number plate lamp
16	Right hand stop/tail lamp
17	Left hand stop/tail lamp
18	Stop lamp switch
19	Fuse block
20	Courtesy or map lamp
21	Right hand door switch
22	Left hand door switch
23	Horn
24	Horn switch
25	Direction flasher module
26	Flasher/dip/horn switch
27	Flasher indicator lamp

Code	Component
28	Right hand front flasher lamp
29	Left hand front flasher lamp
30	Right hand rear flasher lamp
31	Left hand rear flasher lamp
32	Heater motor switch
33	Heater motor
34	Fuel gauge
35	Fuel level sender
36	Windscreen wiper motor switch
37	Wiper motor
38	Ignition switch
39	Ignition coil
40	Distributor contact breaker
41	Fuel pump
42	Ignition relay
43	Oil pressure gauge
44	Ignition warning lamp
45	Ignition warning lamp controller
46	Coolant temperature gauge
47	Coolant temperature sender
48	Oil pressure warning lamp
49	Reversing lamp switch
50	Reversing lamp
51	Flasher relay box
53	Fog lamp switch
54	Driving lamp
55	Fog lamp

Code	Component	Code	Component
56	Ignition ballast resistor	117	Heated backlight relay
57	Cigar lighter	118	Heated backlight lamp
58	Driving lamp switch	131	Automatic transmission safety switch
59	Ignition relay	147	Oil pressure switch or sender
60	Radio	152	Hazard warning lamp
61	Electronic distributor resistor	153	Hazard flasher switch
62	Speedometer	154	Hazard flasher module
64	Instrument voltage regulator	159	Brake pressure warning switch
65	Boot lamp switch	160	Brake differential pressure switch
66	Boot lamp	170	Right hand front side marker
67	Line fuse	171	Left hand front side marker
68	Ammeter	172	Right hand rear side marker
69	Voltmeter	173	Left hand rear side marker
70	Fuel cut-off switch	174	Starter solenoid relay
71	Overdrive solenoid	196	Running on control valve
72	Overdrive manual switch	201	Inhibitor switch
73	Overdrive gear switch	203	Blocking diode
74	Overdrive hold switch	204	Handbrake switch
75	Overdrive relay	205	Brake warning lamp
76	Overdrive centrifugal switch	208	Cigar lighter illumination
77	Windscreen washer pump motor	245	Radiator fan circuit-breaker
78	Windscreen wash-wipe switch	246	Radiator fan thermostat
95	Tachometer	247	Radiator fan motor
115	Heated backlight switch	249	Vacuum advance micro switch
116	Heated backlight	250	Vacuum advance valve

Table 5.2. Component codes.

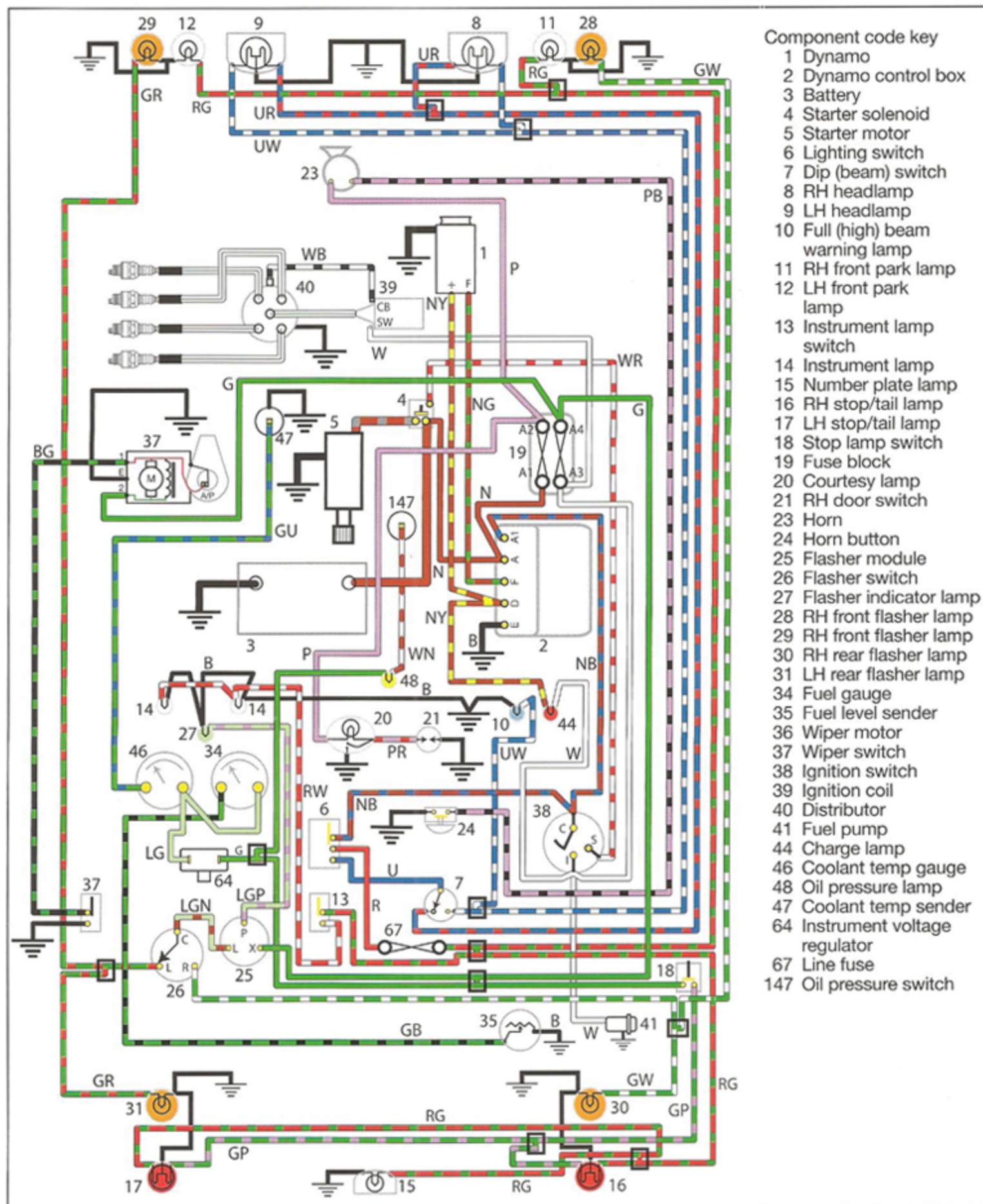


Figure 5.2. A typical late 1950s to early 1960s wiring diagram.