Chapter 12
Body electrical system

Contents

Degrees of difficulty

Easy, suitable for novice with little experience 

Fairly easy, suitable for beginner with some experience 

Fairly difficult, suitable for competent DIY mechanic 

Difficult, suitable for experienced DIY mechanic 

Very difficult, suitable for expert DIY or professional 

Specifications

General

System type	12-volt negative earth

Main fuses (two-fuse fuse block)

Fuse connecting	Rating (amp)	Circuits protected
1 and 2	35	Interior light, horn and auxiliary units which operate with the ignition switched on or off
3 and 4	35	Direction indicators, windscreen wiper motor, heater blower, stop lights and auxiliary units which operate only when the ignition is switched on

Note: *The fitting of additional accessories which are required to operate independently of the ignition circuit should be connected to the "2" terminal; accessories which are required to operate only when the ignition is switched on should be connected to the "4" terminal.*

Line fuses (two-fuse fuse block)

Rating (amp)	Circuits protected
8	Side and tail lights
35	Hazard flasher

Main fuses (four-fuse fuse block - early models)

Fuse connecting	Rating (amp)	Circuits protected
1 and 2	35	Stop lights, reversing lights, direction indicators, heated rear window. These systems will only operate with the ignition switch at position II
3 and 4	25	Horn, headlight flasher, brake failure circuit. These systems operate independently of the ignition switch
5 and 6	25	Heater blower motor, windscreen wipers/ washers, radio. These systems will operate with the ignition switch at position I or II
7 and 8	15	Side and tail lights, instrument panel lights

Note: *The fitting of additional accessories which are required to operate independently of the ignition circuit should be connected to the "4" terminal.*

Line fuses (four-fuse fuse block - early models)

Rating (amp)	Circuits protected
15	Hazard flashers, interior light
-	Radio (rating to be as specified by the manufacturer)

Main fuses (four-fuse fuse block - later models)

Fuse connecting	Rating (amp)	Circuits protected
1 and 2	35	Stop lights, reversing lights, direction indicator relay, heated rear window, headlight dim-dip relay. These systems will only operate with the ignition switch at position II
3 and 4	25	Horn, headlight flasher, brake failure circuit, radio memory. These systems operate independently of the ignition switch
5 and 6	25	Heater blower motor, windscreen wipers/ washers, instruments. These systems will operate with the ignition switch at position I or II
7 and 8	15	Left-hand side and tail lights, instrument panel lights, headlight dim-dip relay

Note: *The fitting of additional accessories which are required to operate independently of the ignition circuit should be connected to the "4" terminal*

Line fuses (four-fuse fuse block - later models)

Rating (amp)	Circuits protected
15	Right-hand side and tail lights
10	Direction indicators/hazard flashers, interior light
15	Dim-dip lighting
10	Rear fog light

Fuses (twenty four-fuse fuse block)

Fuse number	Rating (amp)	Circuits protected
1	15	Heated rear window
2	15	Reversing lights, stop lights, headlight dim/dip*, direction indicator relay
3	15	Auxiliary cooling fan
4	15	Headlight dim/dip*
5	15	Heater blower motor, sunroof motor*
6	15	Wipers/ washers
7	20	Headlight flasher, horn, anti-theft alarm*
8	10	Tachometer*, engine management ECU*, fuel pump relay*, anti-theft alarm*
9	10	Radio/cassette, cooling fan relay, automatic gear selector light*
10	10	Radio memory*, interior light, direction indicators, hazard flasher, anti-theft alarm LED* brake test circuit*
11	10	Fuel pump*
12	10	Starter signal
13	10	Left-hand, side and tail lights
14	10	Right-hand, side and tail lights, instrument illumination
15	10	Left-hand headlight main beam
16	10	Right-hand headlight main beam, main beam warning light
17	10	Left-hand headlight dip beam
18	10	Right-hand headlight dip beam
19	20	Not used
20	15	Not used
21	10	Not used
22	20	Not used
23	Not used	
24	10	Rear fog light

* depending on model

Bulbs

	Wattage	Type
Headlights, LHD (except Europe - dip right)	50/40	415
Headlights, Europe (except France - dip vertical)	45/40	410
Headlights, France - dip vertical	45/40	411
Sealed beam headlight units:		
Sealed beam with sidelights, dip left (UK only)	60/45	104
Sealed beam without sidelight, dip left (not UK)	60/54	101
Auxiliary driving lights	55	453
Sidelights (bayonet type)	5	989
Sidelights (capless type)	5	501
Sidelights and front direction indicators	21/5	380
Direction indicators - front	21	382
Direction indicators - rear	21	382
Direction indicator side repeaters	5	501
Number plate light (Saloon)	6	254
Number plate light (Estate, Van and Pick-up)	5	989

Bulbs (continued)	Wattage	Type
Rear foglight	21	382
Panel and warning lights	2.2	987
Stop/tail lights	21/5	380
Reversing lights	21	382
Interior light (early models)	6	254
Interior light (later models)	10	245
Glovebox light	10	245
Footwell light	5	239
Illuminated switches	0.75	284

Windscreen wiper motor	
Brush spring pressure	140 to 200 g
Minimum brush length	4.8 mm
Armature endfloat	0.05 to 0.02 mm
Maximum pull to move rack in guide tubes	2.7 kg

1 General information and precautions

General information

The electrical system is of 12-volt negative earth type. Power for the lights and all electrical accessories is supplied by a lead/acid battery which is charged by the dynamo or alternator.

This chapter covers repair and service procedures for the various electrical components and systems generally not associated with the engine. Information on the battery, ignition system, dynamo, alternator and starter motor can be found in the relevant Parts of Chapter 5.

Precautions

Warning: Before carrying out any work on the electrical system, read through the precautions given in "Safety first!" at the beginning of this manual and in Chapter 5. Caution: Prior to working on any component in the electrical system, the battery negative lead should first be disconnected, to prevent the possibility of electrical short-circuits and/or fires. If a radio/cassette player with anti-theft security code is fitted, or if the vehicle is equipped with anti-theft alarm system, refer to the information given in the reference sections of this manual before disconnecting the battery.

2 Electrical fault finding - general information

Note: *Refer to the precautions given in "Safety first!" and in Section 1 of this Chapter before starting work. The following tests relate to testing of the main electrical circuits, and should not be used to test delicate electronic circuits, particularly where an electronic control unit is used.*

General

1 A typical electrical circuit consists of an electrical component, any switches, relays, motors, fuses, fusible links or circuit breakers related to that component, and the wiring and connectors which link the component to both the battery and the chassis. To help to pinpoint a problem in an electrical circuit, wiring diagrams are included at the end of this manual.

2 Before attempting to diagnose an electrical fault, first study the appropriate wiring diagram, to obtain a complete understanding of the components included in the particular circuit concerned. The possible sources of a fault can be narrowed down by noting if other components related to the circuit are operating properly. If several components or circuits fail at one time, the problem is likely to be related to a shared fuse or earth connection.

3 Electrical problems usually stem from simple causes, such as loose or corroded connections, a faulty earth connection, a blown fuse, a melted fusible link, or a faulty relay. Visually inspect the condition of all fuses, wires and connections in a problem circuit before testing the components. Use the wiring diagrams to determine which terminal connections will need to be checked in order to pinpoint the trouble-spot.

4 The basic tools required for electrical fault-finding include a circuit tester or voltmeter (a 12-volt bulb with a set of test leads can also be used for certain tests); an ohmmeter (to measure resistance and check for continuity); a battery and set of test leads; and a jumper wire, preferably with a circuit breaker or fuse incorporated, which can be used to bypass suspect wires or electrical components. Before attempting to locate a problem with test instruments, use the wiring diagram to determine where to make the connections.

5 To find the source of an intermittent wiring fault (usually due to a poor or dirty connection, or damaged wiring insulation), a "wiggle" test can be performed on the wiring. This involves wiggling the wiring by hand to see if the fault occurs as the wiring is moved. It should be possible to narrow down the source of the fault to a particular section of wiring. This method of testing can be used in conjunction with any of the tests described in the following sub-Sections.

6 Apart from problems due to poor connections, two basic types of fault can occur in an electrical circuit - open-circuit, or short-circuit.

7 Open-circuit faults are caused by a break somewhere in the circuit, which prevents current from flowing. An open-circuit fault will prevent a component from working.

8 Short-circuit faults are caused by a "short" somewhere in the circuit, which allows the current flowing in the circuit to "escape" along an alternative route, usually to earth. Short-circuit faults are normally caused by a breakdown in wiring insulation, which allows a feed wire to touch either another wire, or an earthed component such as the bodyshell. A short-circuit fault will normally cause the relevant circuit fuse to blow.

Finding an open-circuit

9 To check for an open-circuit, connect one lead of a circuit tester or the negative lead of a voltmeter either to the battery negative terminal or to a known good earth.

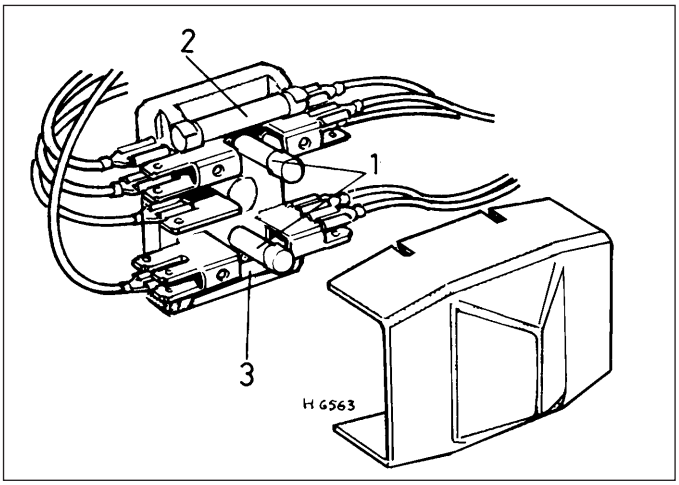
10 Connect the other lead to a connector in the circuit being tested, preferably nearest to the battery or fuse. At this point, battery voltage should be present, unless the lead from the battery or the fuse itself is faulty (bearing in mind that some circuits are live only when the ignition switch is moved to a particular position).

11 Switch on the circuit, then connect the tester lead to the connector nearest the circuit switch on the component side.

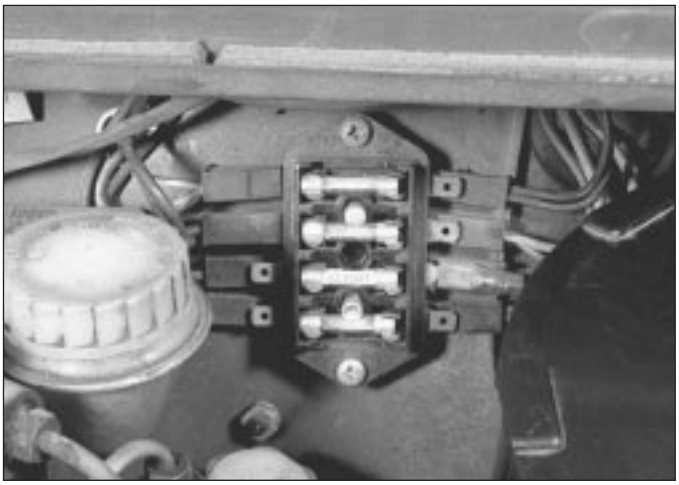
12 If voltage is present (indicated either by the tester bulb lighting or a voltmeter reading, as applicable), this means that the section of the circuit between the relevant connector and the switch is problem-free.

13 Continue to check the remainder of the circuit in the same fashion.

14 When a point is reached at which no voltage is present, the problem must lie between that point and the previous test point with voltage. Most problems can be traced to a broken, corroded or loose connection.



3.1a Two-fuse type fuse block details



3.1b Four-fuse type fusebox location

1 Spare fuses 2 35 amp fuse 3 35 amp fuse

Finding a short-circuit

15 To check for a short-circuit, first disconnect the load(s) from the circuit (loads are the components which draw current from a circuit, such as bulbs, motors, heating elements, etc).

16 Remove the relevant fuse from the circuit, and connect a circuit tester or voltmeter to the fuse connections.

17 Switch on the circuit, bearing in mind that some circuits are live only when the ignition switch is moved to a particular position.

18 If voltage is present (indicated either by the tester bulb lighting or a voltmeter reading, as applicable), this means that there is a short-circuit.

19 If no voltage is present during this test, but the fuse still blows with the load(s) reconnected, this indicates an internal fault in the load(s).

Finding an earth fault

20 The battery negative terminal is connected to "earth" - the metal of the engine/transmission and the vehicle body - and many systems are wired so that they only receive a positive feed, the current returning via the metal of the car body. This means that the component mounting and the body form part of that circuit. Loose or corroded mountings can therefore cause a range of electrical faults, ranging from total failure of a circuit, to a puzzling partial failure. In particular, lights may shine dimly (especially when another circuit sharing the same earth point is in operation), motors (eg wiper motors) may run slowly, and the operation of one circuit may have an apparently-unrelated effect on another. Note that on many vehicles, earth straps are used between certain components, such as the engine/transmission and the body, usually where there is no metal-to-metal contact between components, due to flexible rubber mountings, etc.

21 To check whether a component is properly earthed, disconnect the battery and connect one lead of an ohmmeter to a known good earth point. Connect the other lead to the wire or earth connection being tested. The resistance reading should be zero; if not, check the connection as follows.

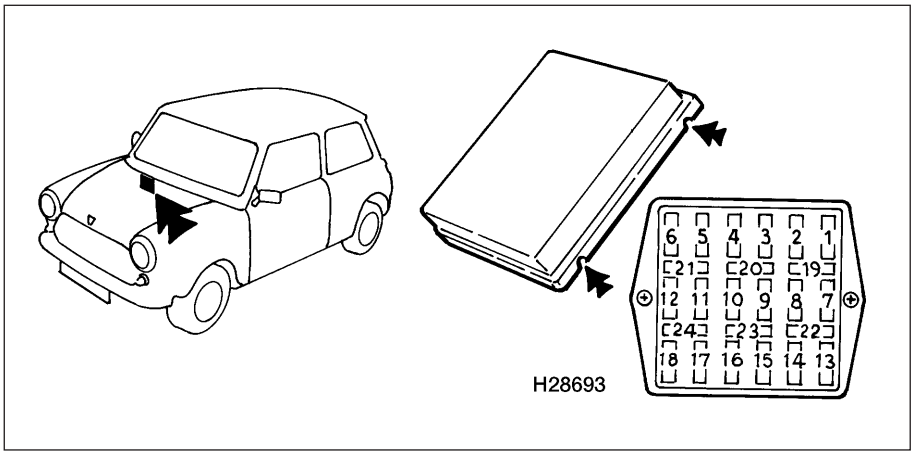
22 If an earth connection is thought to be faulty, dismantle the connection, and clean both the bodyshell and the wire terminal (or the component earth connection mating surface) back to bare metal. Be careful to remove all traces of dirt and corrosion, then use a knife to trim away any paint, so that a clean metal-to-metal joint is made. On reassembly, tighten the joint fasteners securely; if a wire terminal is being refitted, use serrated washers between the terminal and the bodyshell, to ensure a clean and secure connection. When the connection is remade, prevent the onset of corrosion in the future by applying a coat of petroleum jelly or silicone-based grease, or by spraying on (at regular intervals) a proprietary ignition sealer, or a water-dispersant lubricant.

3 **Fuses and relays** - general information

Main fuses

1 The main fuses are located in a block which is mounted on the right-hand wing valance on early models, and on the right-hand side of the engine compartment bulkhead on later models **(see illustrations)**. The fuse block is covered by a plastic push-on cover. Upon inspection it will be seen that there are two main fuses on early models and either four or twenty four main fuses on later versions. In both cases, spare fuses are contained within the fuse block or cover. The fuse positions and circuits protected are listed in the *Specifications*.

2 To remove a fuse, simply withdraw it from the contacts in the fuse block; the wire within the fuse should be visible; if the fuse is blown, the wire will be broken or melted. Before refitting a new fuse ensure that the contacts



3.1c Twenty-four fuse type fuse block location

Arrows indicate fuse block cover locating notches

are clean and free from corrosion. If necessary the contacts may be cleaned with a fine grade emery paper.

3 Always renew a fuse with one of an identical rating; never use a fuse with a different rating from the original or substitute anything else. Never renew a fuse more than once without tracing the source of the trouble.

4 Persistent blowing of a particular fuse indicates a fault in the circuit(s) protected. Where more than one circuit is involved, switch on one item at a time until the fuse blows, so showing in which circuit the fault lies.

5 Besides a fault in the electrical component concerned, a blown fuse can also be caused by a short-circuit in the wiring to the component. Look for trapped or frayed wires allowing a live wire to touch vehicle metal, and for loose or damaged connectors.

6 After renewing a fuse, refit the fuse block cover, ensuring that it is pushed fully into place. The cover for the twenty four fuse block, has two notches on one side to ensure that it is fitted correctly.

Line fuses

7 A line fuse is fitted to protect an individual unit or circuit. Line fuses are located in clusters on the engine compartment bulkhead, behind the facia or instrument panel, and under the bonnet lock platform. The number of fuses, and the circuits protected, depends on model and equipment fitted. To change a line fuse, hold one end of the container, press and twist off the other end.

Relays

8 A relay is an electrically-operated switch, which is used for the following reasons:

a) A relay can switch a heavy current remotely from the circuit in which the current is flowing, allowing the use of lighter gauge wiring and switch contacts.

b) A relay can receive more than one control input, unlike a mechanical switch.

4.5 Remove the securing screws and lift off the steering column shroud

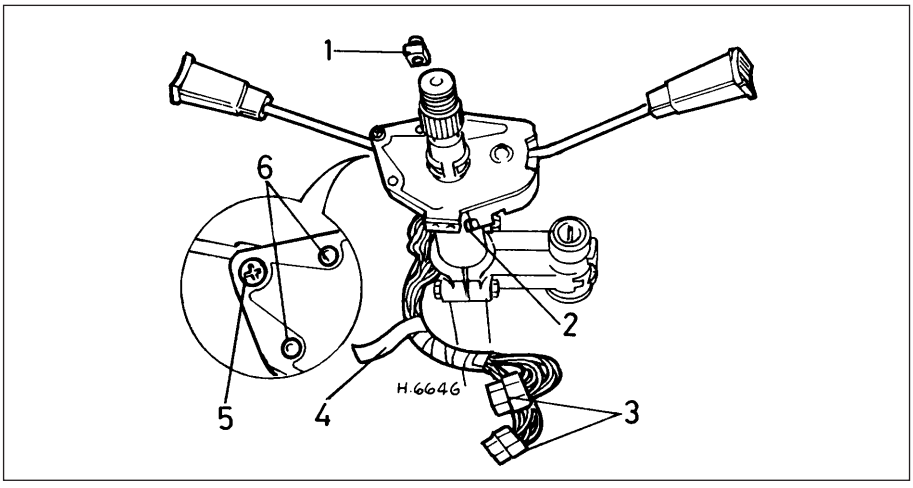
c) A relay can have a timer function - for example an intermittent wiper delay.

9 On later Mini models, relays are used to operate a number of circuits, mainly in the engine management and emission control systems. The engine management system relays are contained in a sealed module mounted on the engine compartment bulkhead - these cannot be individually renewed and in the event of a fault in this area, the complete module must be renewed. A relay for the Lambda (oxygen) sensor is mounted separately, also on the bulkhead. Further information on the engine management system relays will be found in Chapter 4B and 4C.

10 Relays for circuits such as the direction indicator/hazard flasher system, and auxiliary cooling fan are also used according to model, year, and equipment fitted.

11 If a circuit which includes a relay develops a fault, remember that the relay itself could be faulty. Testing is by substitution of a known good relay. Do not assume that relays which look similar are necessarily identical for purposes of substitution.

12 Make sure that the ignition is switched off, then pull the relay from its socket. Push the new relay firmly in to refit.



4.7 Steering column multifunction switch

1 Cancelling ring drive block
2 Clamp screw
3 Multi-plug connectors
4 Insulating tape
5 Screw
6 Rivet

4 **Switches** - removal and refitting

Note: *Disconnect the battery negative lead before removing any switch and reconnect the lead after refitting the switch.*

Steering column multifunction switch

Early type switches incorporating direction indicator, horn and headlight main beam control

1 Undo and remove the screws securing the two halves of the steering column shroud to the column and lift off the two halves.

2 Undo and remove the two screws securing the switch retaining strap and lift the switch off the column.

3 Disconnect the wiring harness connector under the parcel shell and lift away the switch.

4 Refitting is the reverse sequence to removal.

Later type switches incorporating direction indicator, horn, headlight main beam and windscreen washer/wiper control

5 Undo and remove the retaining screws and lift off the two halves of the steering column shroud **(see illustration)**.

6 Refer to Chapter 10 and remove the steering wheel.

7 Disconnect the two switch multiplug connectors under the parcel shelf **(see illustration)**.

8 Undo and remove the retaining screw and lift out the direction indicator cancelling block.

9 Slacken the switch clamp screw and slide the switch off the end of the steering column.

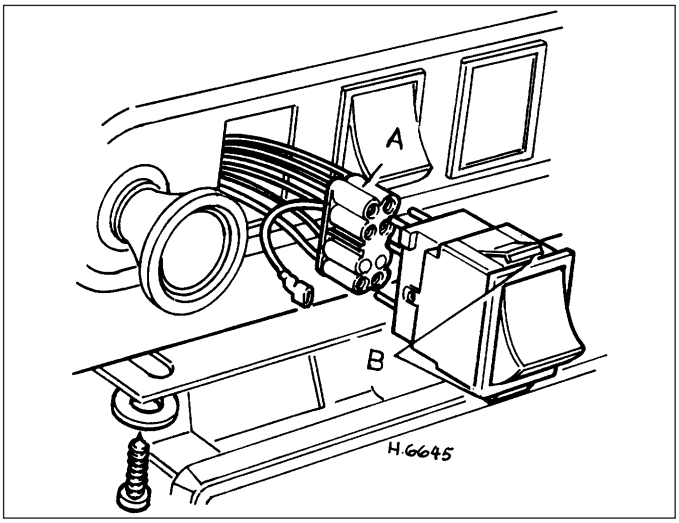
10 If it is wished to renew either of the switches they may be renewed as a complete assembly or individually. If they are to be renewed individually, it will be necessary to drill out the two rivets securing the windscreen washer/wiper switch to the mounting plate and unwrap the insulating tape securing the harness together.

11 Refitting is the reverse sequence to removal. Ensure that the striker dog on the nylon switch centre is in line with and adjacent to the direction indicator switch stalk.

Facia switches

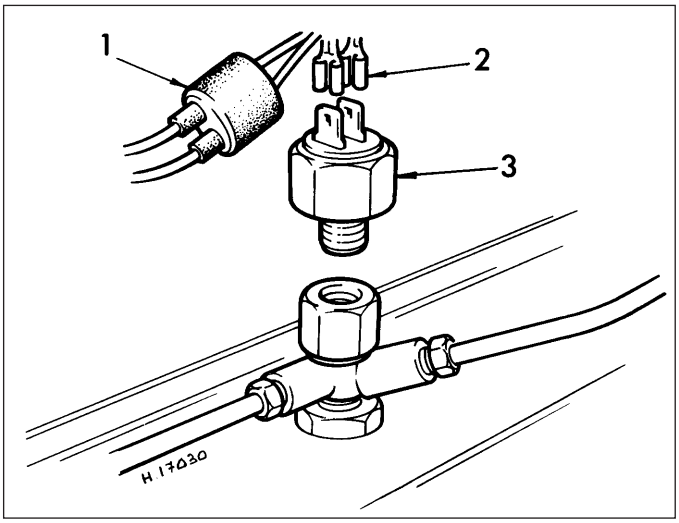
12 Undo and remove the lower heater retaining nut and the two screws securing the front of the heater to the parcel shelf. Lower the heater to the floor. **Note:** *On models fitted with a centre console, it will be necessary to remove the console and facia glovebox retaining screws to allow the console to be moved if necessary for access.*

13 On models fitted with toggle switches, unscrew the locking ring securing the switch to the panel and withdraw the switch to the rear. Make a note of the electrical connections at the rear of the switch and disconnect them.



4.14 Removal of rocker type facia switch

A Multi-plug connector *B Switch retaining tabs*



4.19 Hydraulic stop light switch removal

1 Rubber cover (where fitted) *2 Electrical leads* *3 Stop light switch*

14 On models fitted with rocker switches simply push the switch out of the panel and detach the multiplug **(see illustration)**.
15 In both cases refitting is the reverse sequence to removal.

Door pillar switch

16 The interior light door pillar switches are retained by either being a push fit in the pillars, or by a single securing screw. Prise out the push fit type or remove the screw, disconnect the electrical lead and lift away the switch.

> **HAYNES HiNT** ***Tape the wiring to the door pillar, to prevent it falling back into the pillar. Alternatively, tie a piece of string to the wiring to retrieve it.***

17 The switch is refitted in the reverse way.

Stop light switch

Note: *The stop lights are operated either hydraulically by a pressure sensitive switch incorporated in the braking system or electrically by an on/off switch mounted above the brake pedal.*

Hydraulically operated type

18 Remove the brake master cylinder filler cap and place a piece of polythene over the filler neck. Now refit the cap. This will prevent loss of hydraulic fluid when the stop light switch is removed.
19 Lift up the rubber cover, if fitted, and disconnect the two wires from the stop light switch located on the right-hand side of the front subframe beneath the flywheel housing **(see illustration)**.
20 Using a large socket and extension bar, remove the switch from the pipe connector.
21 Refitting the switch is the reverse sequence to removal. If precautions were taken to prevent fluid loss, it should not be necessary to bleed the hydraulic system. However, if the brake pedal now feels spongy, bleed the system as described in Chapter 9.

Electrically operated type

22 Disconnect the two wires at the switch, accessible from below the parcel shelf.
23 Undo and remove the locknut and then withdraw the switch from its mounting bracket.
24 Refitting is the reverse sequence to removal. Adjust the position of the switch and locknuts so that the stop lights operate after 6.3 mm of brake pedal travel.

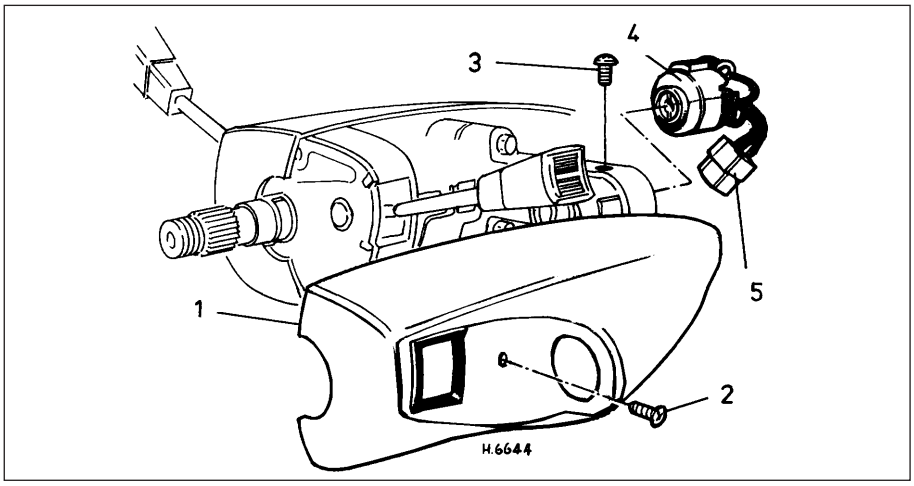
Ignition switch

25 Undo and remove the securing screws and lift off the two halves of the steering column shroud.

26 Disconnect the ignition switch multiplug connector **(see illustration)**.
27 Inspect the top of the ignition switch housing, and if a small screw is present, unscrew it. The ignition switch can now be withdrawn from the steering lock housing.
28 If a small retaining screw is not visible, then the ignition switch is of the sealed type and can only be removed with the steering lock housing as a complete assembly. This procedure is described fully in Chapter 10 Section 24.
29 Refitting the ignition switch is the reverse sequence to removal.

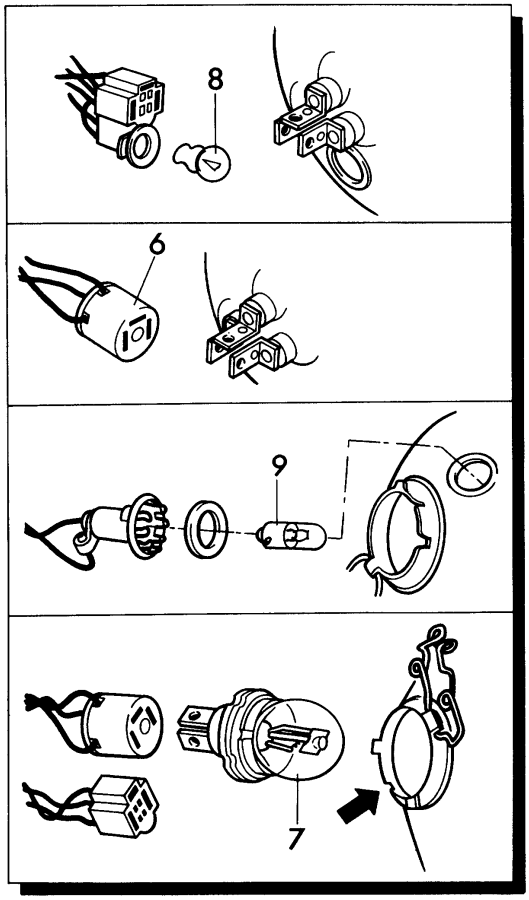
Reversing light switch (manual transmission models)

Note: *The following procedures apply to later Mini Saloon models having reversing lights incorporated in the rear light clusters. The*

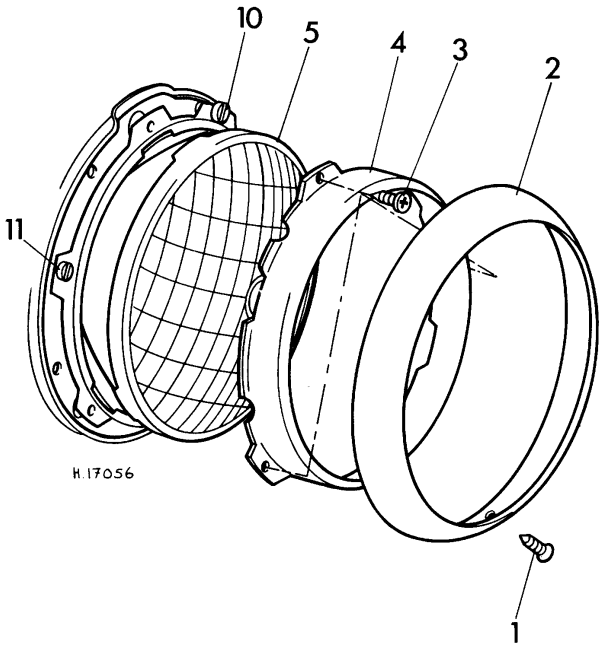


4.26 The later type ignition/starter switch

1 Steering column shroud *3 Ignition switch securing screw* *4 Ignition switch*
2 Shroud retaining screw *5 Multiplug connector*



5.1 Headlight bulb assemblies



1 Outer rim retaining screw
2 Outer rim
3 Inner rim retaining screw
4 Inner rim
5 Light unit
6 Three-pin connector
7 Headlight bulb
8 Sidelight bulb (used with sealed beam light unit)
9 Sidelight bulb (used with bulb type light unit)
10 Vertical adjustment screw
11 Horizontal adjustment screw

switch is located in the gearchange remote control housing and is actuated by the gearchange lever when reverse is selected.

30 Chock the rear wheels then jack up the front of the car and support it on axle stands (see *"Jacking and vehicle support"*).

31 Working underneath the car, disconnect the two switch wires, slacken the locknut and unscrew the switch from the remote control housing.

32 Refitting is the reverse sequence to removal.

33 Adjustment is carried out as follows. With the wires disconnected, screw the switch into the housing until slight resistance is felt.

34 Connect the wires, select reverse gear and switch on the ignition. Continue screwing the switch in until the reversing lights just come on and then screw the switch in a further quarter of a turn.

35 Tighten the locknut and check that the reversing lights are illuminated with the gear lever in reverse and extinguished in all other gear positions. Lower the car to the ground on completion.

Reversing light switch (automatic transmission models)

36 Refer to Chapter 7B.

Starter inhibitor switch (automatic transmission models)

37 Refer to Chapter 7B.

5 Bulbs (exterior lights) - renewal

Note: *With all light bulbs, remember that if they have just been in use, they may be very hot. Switch off the power before renewing a bulb. With quartz halogen bulbs (headlights and similar applications), use a tissue or clean cloth when handling the bulb; do not touch the bulb glass with the fingers. Even small quantities of grease from the fingers will cause blackening and premature failure. If a bulb is accidentally touched, clean it with methylated spirit and a clean rag.*

Headlight

1 Either sealed beam or renewable bulb light units are fitted to all Minis, depending on model type and year of manufacture **(see illustration)**.

2 To remove the headlight unit on Clubman and 1275 GT models, undo and remove the four screws and lift off the grille panel extension around the light unit. On all other models undo and remove the outer rim securing screw and ease the bottom of the outer rim forwards, lift it up and off the retaining lugs at the top of the light unit **(see illustrations)**.

3 Proceed as follows according to light unit type.

Sealed beam type

4 Undo and remove the three small inner rim securing screws and withdraw the inner rim **(see illustrations)**. Lift out the light unit.

5.2a On Clubman models remove the grille panel extension foe access to the headlight

5.2b On non-Clubman models, undo the outer rim securing screw . . .

5.2c . . . and lift the rim off the upper lugs

5.4a Unscrew the inner rim securing screws . . .

5 Withdraw the three pin connector from the rear of the reflector and lift away the complete unit **(see illustration)**.

6 Refitting is the reverse sequence to removal.

Renewable bulb type

7 Undo and remove the three small inner rim securing screws and withdraw the inner rim. Lift out the light unit.

8 Withdraw the three pin connector from the rear of the reflector and disengage the spring clip from the reflector lugs. Lift away the bulb. Note the locating pip on the reflector and mating indentation in the bulb rim.

9 Refitting is the reverse sequence to removal. Ensure that the indentation in the bulb rim locates over the locating pip on the reflector.

Alternative renewable bulb type

10 On certain models an alternative bulb type headlight assembly of slightly different design to the standard unit may be fitted **(see illustration)**.

11 To renew a bulb on these units, first remove the outer rim as described in paragraph 2.

12 Carefully pull the three adjusting screws one at a time out of their locations and lift out the reflector.

13 Withdraw the three pin connector from the rear of the reflector and disengage the spring clip from the reflector lugs. Lift away the bulb. Note the position of the projection on the bulb rim in relation to the bulb locator and ensure that the new bulb is fitted correctly.

14 Refitting is the reverse sequence to removal. Ensure that the projection on the bulb rim is correctly engaged with the bulb locator.

Auxiliary driving light - Cooper models

15 Undo and remove the screw and release the clamp securing the reflector to the light unit.

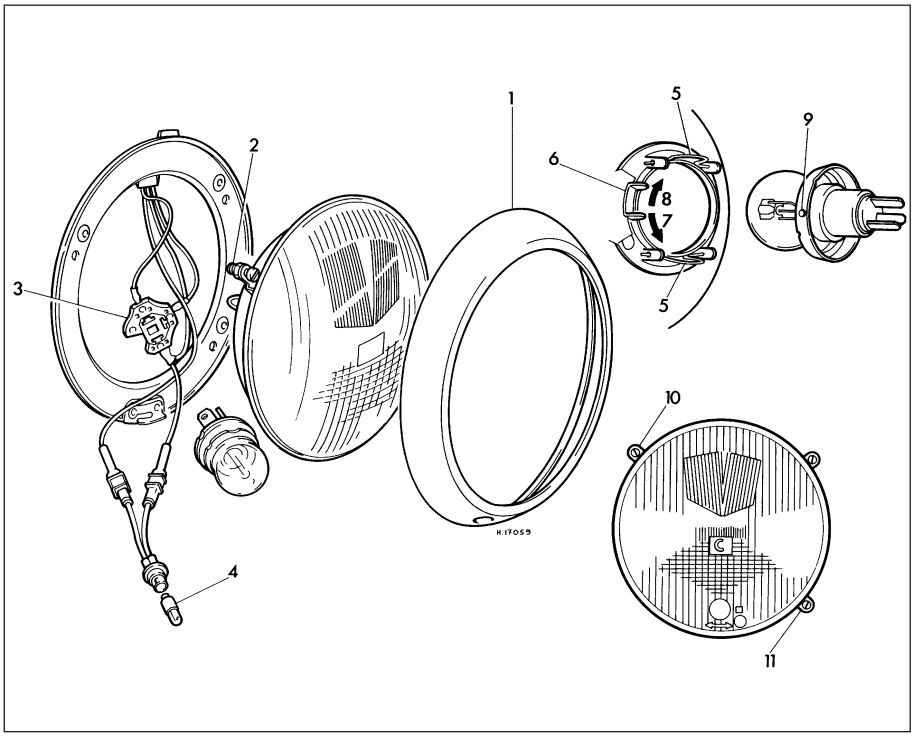
16 Withdraw the reflector and disconnect the bulb wiring connector.

17 Disengage the spring clip from the reflector lugs and lift away the bulb.

18 Refitting is the reverse sequence to removal.

5.4b . . . and lift off the inner rim

5.5 Detach the electrical connector and lift away the light unit



5.10 Alternative type headlight assembly

1 Outer rim
2 Adjusting screws
3 Three pin connector
4 Sidelight bulb
5 Spring clip
6 Bulb locator
7 Position of bulb locator for right-hand drive vehicles
8 Position of bulb locator for left-hand drive vehicles
9 Projection on bulb
10 Horizontal adjustment screw
11 Vertical adjustment screw

5.24 Undo the two screws and lift off the lens

5.27a Fold back the rubber flange and remove the rim . . .

5.27b . . . and lens

Front sidelight

All models except Clubman and 1275 GT

19 Undo and remove the headlight outer rim securing screw and ease the bottom of the outer rim forwards, lift it up and off the retaining lugs at the top of the light unit.

20 Undo and remove the three small headlight inner rim securing screws and withdraw the inner rim. Lift out the light unit.

21 Where a sealed beam headlight unit is fitted, disconnect the headlight bulb wiring connector and remove the sidelight bulb from the wiring connector block; it will be either a push-fit or bayonet type fitting.

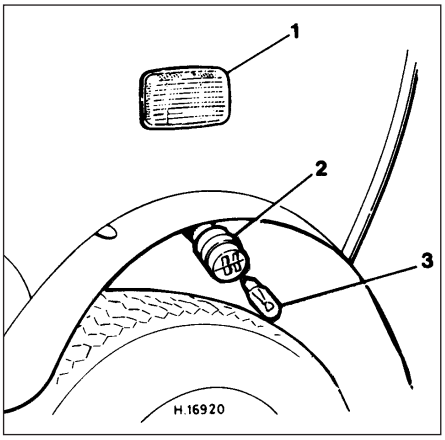
22 Where a renewable bulb type light unit is fitted, withdraw the sidelight bulbholder from the rear of the reflector. Remove the bayonet fitting type bulb from the holder.

23 Refit the bulb and headlight unit using the reverse sequence to removal.

Clubman and 1275 GT models

24 Undo and remove the two screws that secure the lens to the light body. Carefully lift away the lenses **(see illustration)**.

25 Push in the bayonet fitting bulb slightly and turn it anti-clockwise to remove.



5.31 Direction indicator side repeater details

1 Light unit
2 Bulb holder
3 Bulb

26 Refitting is the reverse sequence to removal. Take care not to over tighten the two lens retaining screws as the lenses can be easily cracked.

Front direction indicator

All models except Clubman and 1275 GT

27 To renew a bulb, very carefully fold back the rubber flange with the aid of a screwdriver and remove the plated rim and lens **(see illustrations)**. On later models the lens is secured by two screws.

28 Push the bulb in slightly and turn it anti-clockwise to remove it **(see illustration)**.

29 Refitting is the reverse of the removal procedure, but ensure that the plated rim is secured all round by the rubber flange, if applicable.

Clubman and 1275 GT models

30 The procedure is the same as described previously for the front sidelight bulb.

Front direction indicator side repeater

31 Access to the rear of the light and the bulbholder is gained through the front wheel arch **(see illustration)**.

32 Push the bulbholder in and rotate it, this will release it from the rear of the light unit and allow the holder and electrical lead to be drawn down out of the wheel arch.

33 The push-fit bulb can now be removed from the holder.

34 Refitting is the reverse of removal.

5.35a Rear light cluster lens removed for bulb renewal - Saloon models

5.28 Push and turn the bulb anti-clockwise to remove

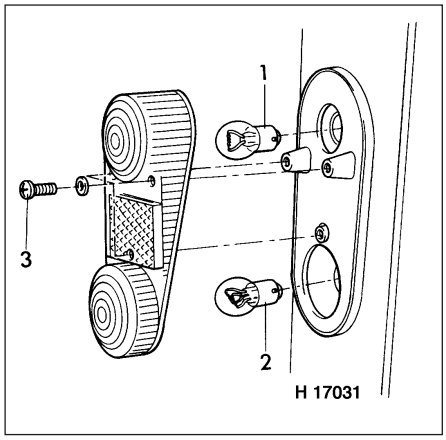
Stop/tail and rear direction indicator

35 Undo the three screws to release the light lenses **(see illustrations)**.

36 The direction indicator bulb is fitted in the top compartment and the stop/tail bulb in the lower compartment (or centre compartment on later models).

37 Both bulbs have bayonet fixings; to remove push in slightly, and rotate anti-clockwise.

38 Refitting is the reverse sequence to removal. Take care not to overtighten the lens securing screws as the lenses can easily be cracked.



5.35b Rear light bulb renewal - Estate, Van and Pick-up models

1 Direction indicator bulb
2 Stop/tail bulb
3 Securing screws

5.44 Removal of the number plate lens and bulb holder on Saloon models

5.47 On Estate, Van and Pick-up models lift off the cover and lens . . .

5.48 . . . and remove the bulbs by turning them anti-clockwise

Reversing light

39 On later models the rear light clusters are increased in size to accommodate a reversing light bulb.
40 The reversing light bulb is fitted to the lower of the three compartments in the rear light clusters and its renewal is the same as for the stop/tail and direction indicator bulbs described previously.

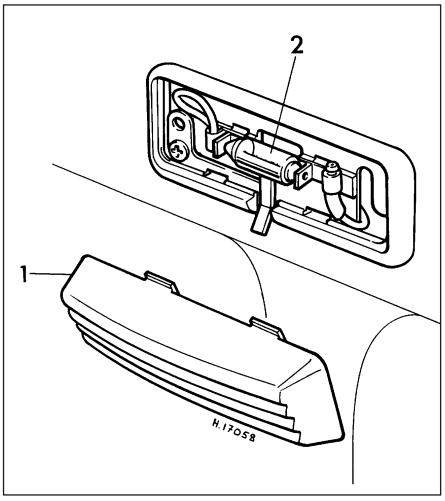
Rear foglight

41 Access to the bulb is gained by removing the two lens cover screws and pulling off the lens.
42 The bayonet-fit bulb can now be removed from the holder by pushing in slightly, and rotating anti-clockwise.
43 Refitting is the reverse sequence to removal.

Number plate light

Saloon models

44 Undo and remove the lens securing screws and carefully ease the lens and bulb holder out of the light unit. In some cases it will be found that the lens and bulb holder cannot be withdrawn due to the wires fouling the light unit. If this happens, open the boot lid, remove the three retaining screws and lift off the light unit. The lens and bulb holder can now be removed **(see illustration)**.
45 The festoon type bulb is removed by simply withdrawing it from the bulb holder contacts.
46 Refitting is the reverse sequence to removal.



6.1 Interior light bulb renewal

1 Lens *2 Bulb*

Estate, Van and Pick-up models

47 Undo and remove the retaining screw and lift off the cover and lens **(see illustration)**.
48 Remove the bulbs by turning anti-clockwise and lifting out **(see illustration)**.
49 Refitting is the reverse sequence to removal.

6 Bulbs (interior lights) - renewal

Note: *With all light bulbs, remember that if they have just been in use, they may be very hot. Switch off the power before renewing a bulb.*

Interior courtesy light - early type

1 Carefully squeeze the two sides of the courtesy light plastic lens together until the retaining lugs of the lens are clear of the sockets in the light base **(see illustration)**.
2 Draw the lens from the light base.
3 The festoon bulb may now be detached from the contact blades.
4 Refitting the bulb and lens is the reverse sequence to removal.

Interior courtesy light and glovebox light - later type

5 Release the light unit by carefully prising out the end furthest from the switch.
6 The bayonet-fit bulb can now be removed from the bulb holder by pushing in slightly, and rotating anti-clockwise.
7 Refitting is the reverse sequence to removal.

Footwell light

8 Release the light unit from its mounting below the facia.
9 The festoon bulb may now be detached from the contact blades.
10 Refitting is the reverse sequence to removal.

Switch illumination

11 To renew a bulb in the illuminated switches fitted to later models, insert a small screwdriver under the notch on both sides of the switch rocker. Depress the notch slightly and lever off the rocker. The bulb may be unscrewed for renewal using the outer plastic casing of a wiring connector which is a snug fit over the bulb lens.
12 Refit the bulb and push the switch rocker back into place.

Instrument panel illumination and warning lights

Models with central instrument panel

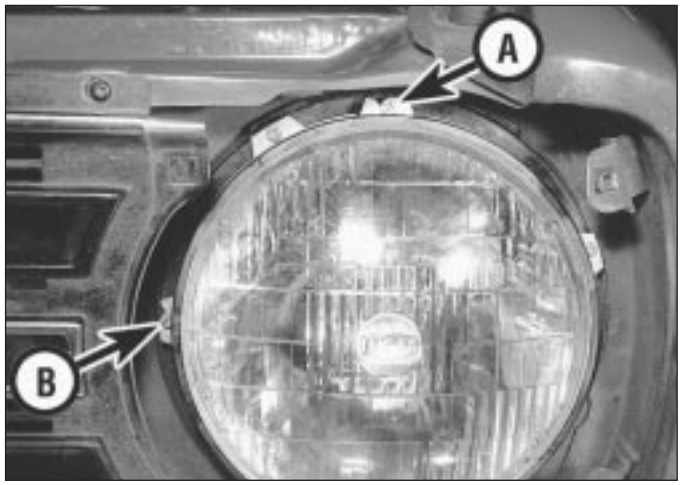
13 Access to the instrument panel warning lights and panel illumination lights is gained from the engine compartment by withdrawing the push type bulb holders from the rear of the speedometer and instruments.
14 On later models it may be helpful to remove the air cleaner assembly as described in the relevant Part of Chapter 4 to provide greater access.

Models with offset instrument panel

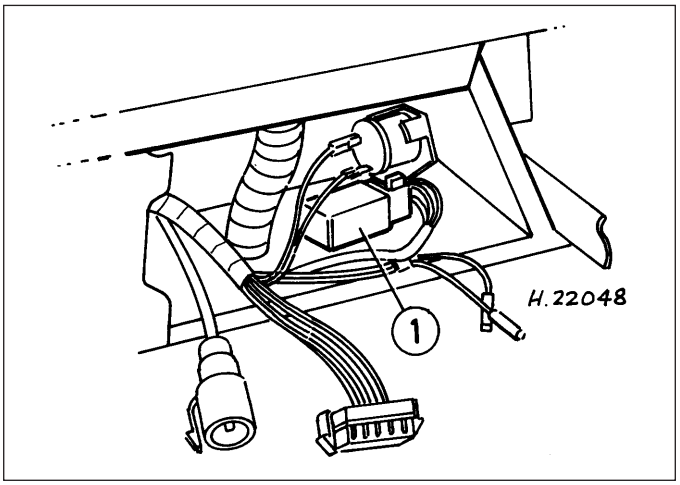
15 On models having an instrument panel in front of the driver, access to the bulbs is through an access panel beneath the parcel shelf and from the side of the panel after the facia trim has been eased back. Alternatively, for greater access, the instrument panel may be removed as described in Section 15.
16 The bulb holders are a push fit in the rear of the instrument panel and the capless bulbs are also a push fit in the holders.

7 Headlight beam alignment - checking and adjusting

1 The headlights may be adjusted for both vertical and horizontal beam positions by means of the two adjusting screws. On the standard fitting sealed beam and bulb type headlight units, the upper spring-loaded screw adjusts the vertical position and the side spring-loaded screw adjusts the



7.1 Headlight vertical position A and horizontal position B adjusting screws



8.2 Location of dim-dip lighting unit (1) behind the instrument panel

horizontal position **(see illustration)**. On the alternative type headlight units, the two diametrically opposite screws are used for adjustment. The upper screw adjusts the horizontal setting and the lower screw adjusts the vertical setting.

2 The lights should be set so that on full or high beam, the beams are set slightly below parallel with a level road surface. Do not forget that the beam position is affected by how the car is normally loaded for night driving, and set the beams with the car loaded to this position.

3 Although this adjustment can be approximately set at home, it is recommended that beam alignment is be carried out by a Rover dealer or other specialist heaving the necessary optical alignment equipment.

8 Dim-dip lighting system components - removal and refitting

Dim-dip unit

Removal

1 Remove the instrument panel as described in Section 15.

2 Disconnect the dim-dip unit from the wiring loom connector **(see illustration)**.

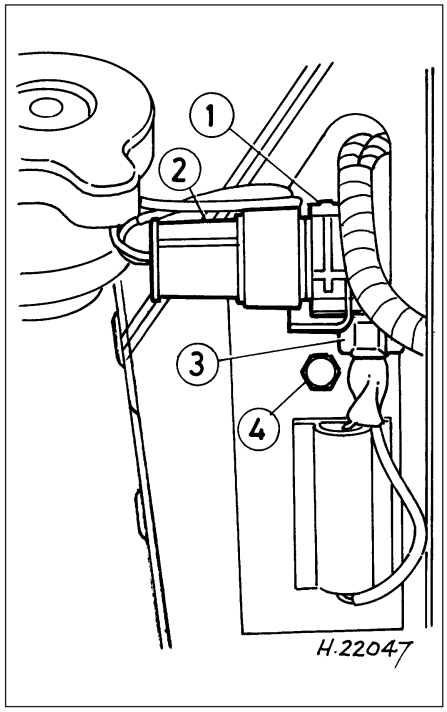
Refitting

3 Refitting is the reverse sequence to removal.

Dim-dip resistor

Removal

4 Disconnect the battery negative lead.



8.5 Location of dim-dip resistor

1 Wiring loom connector
2 Resistor plug
3 Wiring loom clip
4 Mounting plate bolt

9.1 Horn location showing electrical leads and mounting nuts

5 Open the bonnet, and unclip the wiring loom connector on the right-hand side of the engine compartment **(see illustration)**.

6 Pull the resistor plug from the connector, and release the wiring loom.

7 Unscrew the mounting bolt, and withdraw the resistor and mounting plate.

Refitting

8 Refitting is the reverse sequence to removal.

9 Horn - removal, refitting and adjustment

Removal and refitting

1 The horn is located in the engine compartment and is attached to a bracket, which is in turn secured to the front body panel by two small nuts and bolts **(see illustration)**.

2 To remove the unit, disconnect the horn wiring then undo the retaining bracket nuts and bolts. Remove the horn, complete with bracket, then remove the bracket. The horn is not repairable and should not be dismantled.

3 Refitting is the reverse sequence to removal.

Adjustment

4 On early type horns an adjustment is provided to compensate for wear of the moving parts.

5 Adjustment is by means of a screw on the broad rim of the horn nearly opposite the two terminals. Do not confuse this with the large screw in the centre.

6 Turn the adjustment screw anti-clockwise until the horn just fails to sound. Then turn the screw a quarter of a turn clockwise, which is the optimum setting.

10 Windscreen wiper arms - removal and refitting

Removal

1 Before removing a wiper arm, turn the windscreen wiper switch on and off, to ensure that the arms are in their normal parked position with the blades parallel to the bottom of the windscreen.
2 To remove the arm, pivot the arm back and pull the wiper arm head off the splined drive, at the same time easing back the clip with a screwdriver **(see illustration)**.

Refitting

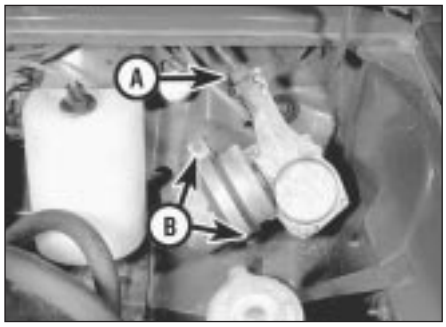
3 When refitting an arm, place it so it is in the correct relative parked position and then press the arm head onto the splined drive until the retaining clip clicks into place.

10.2 The wiper arm is a push fit on the wiper spindle splines

11 Windscreen wiper motor - removal and refitting

Removal

1 Remove the wiper arms from the spindles as described in Section 10.
2 Disconnect the battery negative lead.
3 Withdraw the electrical cable terminal connector from the motor, and if a separate earth wire is fitted, detach this from the wing valance.
4 Undo the nut securing the cable rack guide tube to the wiper motor gearbox **(see illustration)**.
5 Undo and remove the two motor strap retaining screws and lift off the strap.
6 Carefully withdraw the motor assembly pulling the cable rack from the guide tubes.



11.4 Cable rack guide tube retaining nut A and motor strap retaining screws B

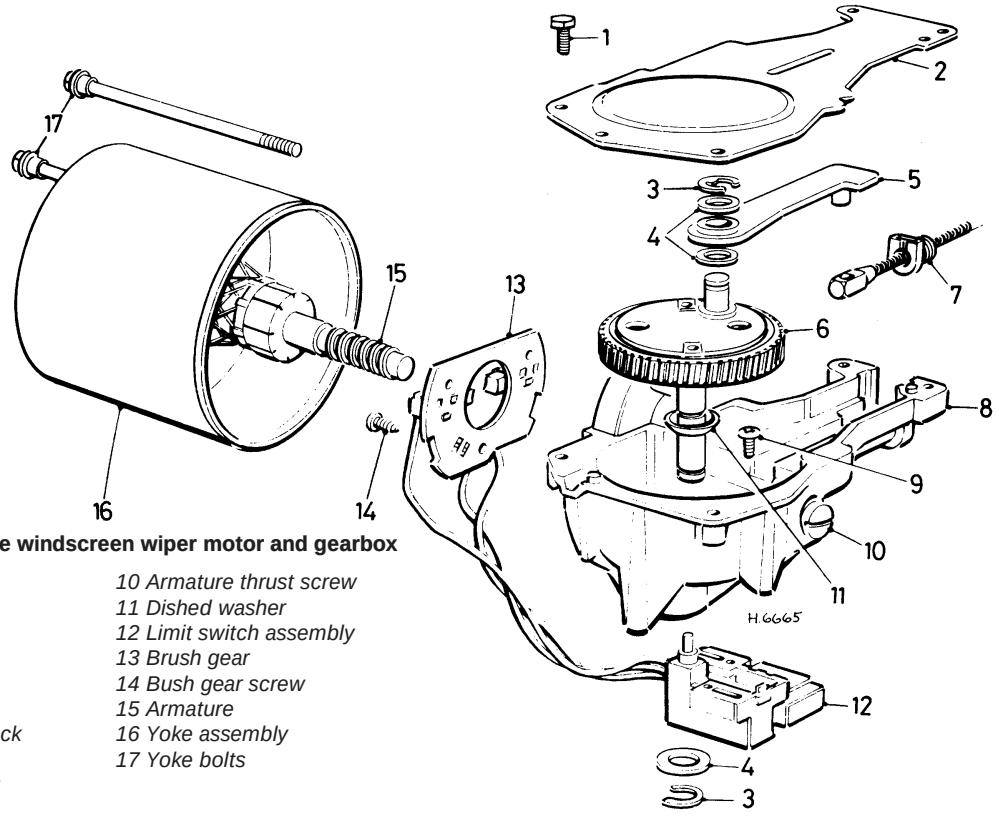
Refitting

7 To refit the motor, lightly lubricate the cable rack with a general purpose grease.
8 Enter the cable rack into the guide tubes and carefully push it through, ensuring that it engages the wheelbox gear teeth.
9 Refit the motor retaining strap and the guide tube retaining nut.
10 Reconnect the electrical leads and the battery terminal.
11 Switch on the wipers, check the function of the motor and then turn it off. With the motor now in the "park" position, refit the wiper arms.

12 Windscreen wiper motor - dismantling and reassembly

Dismantling

1 Due to the limited availability of spare parts, the only repair which can be effectively undertaken on the motor is the renewal of the brushes and the limit switch. Anything more serious than this will mean exchanging the



12.2 Exploded view of the windscreen wiper motor and gearbox

1 Cover screw
2 Gearbox cover
3 Circlip
4 Plain washers
5 Connecting rod
6 Shaft and gear
7 Cross-head and rack
8 Gearbox
9 Limit switch screw
10 Armature thrust screw
11 Dished washer
12 Limit switch assembly
13 Brush gear
14 Bush gear screw
15 Armature
16 Yoke assembly
17 Yoke bolts

complete motor or having a repair undertaken by an automobile electrician.

2 With the motor removed from the car as described in Section 11, undo and remove the four gearbox cover retaining screws and lift away the cover **(see illustration)**. Release the circlip and flat washer securing the connecting rod to the crankpin on the shaft and gear. Lift away the connecting rod followed by the second flat washer.

3 Raise the circlip and flat washer securing the shaft and gear to the gearbox body.

4 De-burr the gearshaft and lift away the gear, making a careful note of the location of the dished washer.

5 Scribe a mark on the yoke assembly and gearbox to ensure correct reassembly, and unscrew the two yoke bolts from the motor yoke assembly. Part the yoke assembly, including armature, from the gearbox body. As the yoke assembly has residual magnetism ensure that the yoke is kept well away from metallic dust.

6 Unscrew the two screws securing the brushgear and the terminal and switch assembly and remove both the assemblies.

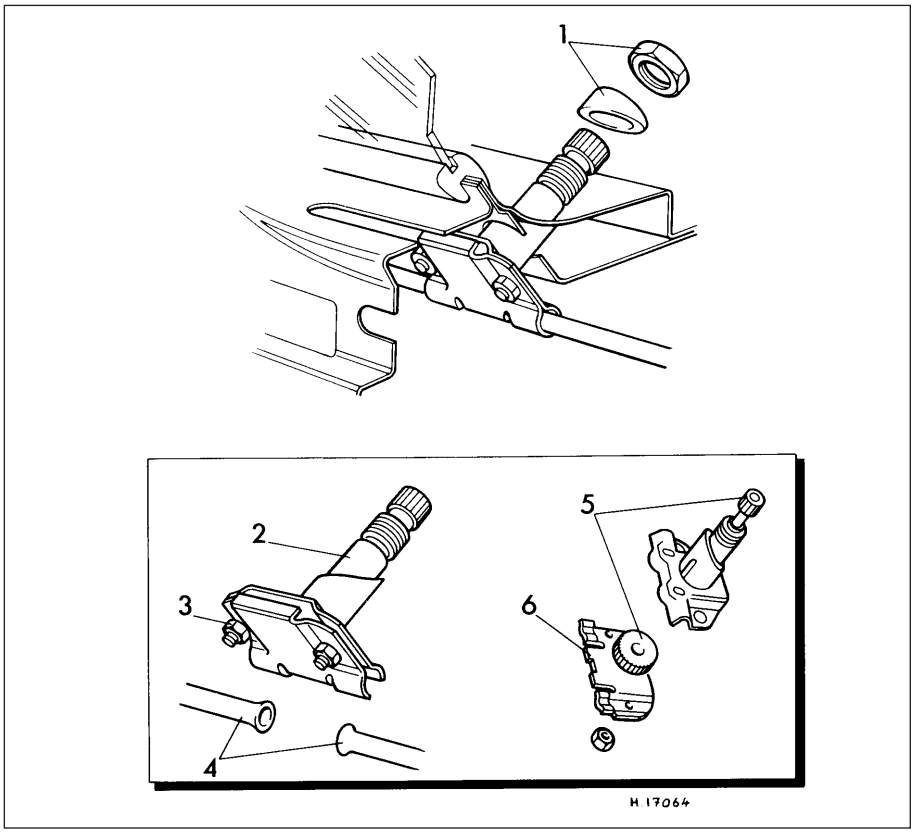
7 Inspect the brushes for excessive wear. If the main brushes are worn to less than the minimum specified length, or the narrow section of the third brush is worn to the full width of the brush, fit a new brushgear assembly. Ensure that the three brushes move freely in their boxes.

8 If either the brushes or the limit switch are to be renewed on early motor assemblies, it will be necessary to unsolder the wires at the switch and then re-solder the new wires. On later types the wires are retained by Lucar connectors which are simply detached. In all cases make a note of the wire positions before disconnecting.

Reassembly

9 Reassembly of the windscreen wiper motor is the reverse sequence to dismantling.

13 Windscreen wiper wheelbox - removal and refitting



13.3 Windscreen wiper wheelbox assembly

1 Retaining nut and spacer
2 Wheelbox body
3 Wheelbox plate retaining screw
4 Wiper rack guide tubes
5 Spindle and gear
6 Lower plate

Removal

1 Remove the windscreen wiper motor as described in Section 11.

2 Carefully lift back the engine compartment bulkhead insulation to provide access to the wheelboxes.

3 Undo and remove the retaining nut and spacer from each wheelbox **(see illustration)**.

4 Slacken the nuts that clamp the guide tubes between the wheelbox plates and then lift out the guide tubes.

5 The wheelboxes can now be lifted out.

6 With the wheelboxes removed, withdraw the wheelbox plates and lift out the spindle and gear. Examine the gear teeth for wear and renew as necessary.

Refitting

7 Refitting is the reverse sequence to removal; bearing in mind the following points.

a) Lightly lubricate the spindles and gear teeth with a general purpose grease
b) Do not tighten the nuts that clamp the guide tubes between the wheelbox plates until the motor and cable rack have been refitted
c) Ensure that the bend radius on the guide tube nearest to the motor is not less than 230.0 mm

14 Windscreen washer pump - removal and refitting

Manual pump - early models

Removal

1 Disconnect the battery negative lead.

2 Undo and remove the retaining nut at the rear of the heater and the two screws securing the front of the heater to the parcel shelf. Lower the heater to the floor.

3 Unscrew the locking ring securing the washer pump to the centre of the switch panel and pull the pump out from the rear of the panel.

4 Detach the two water hoses from the rear of the pump and lift it away.

Refitting

5 Refitting is the reverse sequence to removal.

Electric pump - early models

Removal

6 Disconnect the battery negative lead.

7 Refer to Chapter 4A or 4B as applicable and remove the air cleaner.

8 Disconnect the two electrical wires and the two water hoses from the pump.

9 Undo and remove the two securing screws and lift off the pump.

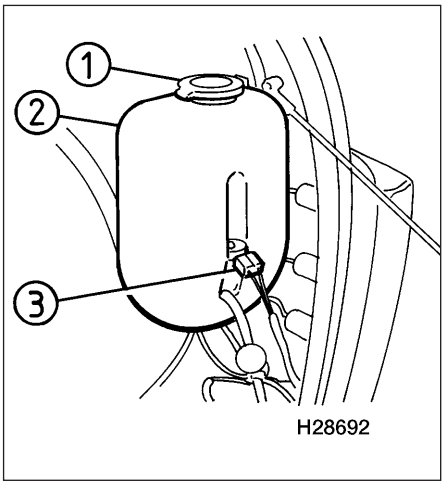
Refitting

10 Refitting is the reverse sequence to removal. Make sure that the water hoses are connected to the correct outlets. Arrows on the pump body indicate the direction of water flow.

Electric pump and reservoir - later models

Removal

11 On later models the washer pump and reservoir are located in the luggage compartment. The pump is clipped into the side of the reservoir **(see illustration)**.



14.11 Washer pump and reservoir location in the luggage compartment on later models

1 Filler cap
2 Reservoir
3 Pump and wiring multiplug

12 To renew either item, first disconnect the battery negative lead.
13 Carefully prise the wiring connector from the pump.
14 Pull the reservoir upwards from its retaining bracket. Drain the fluid into a container.
15 Release the washer tube from the pump. The reservoir can now be removed completely.
16 Detach the pump from the reservoir.

Refitting

17 Refitting is the reverse sequence to removal, noting the following:

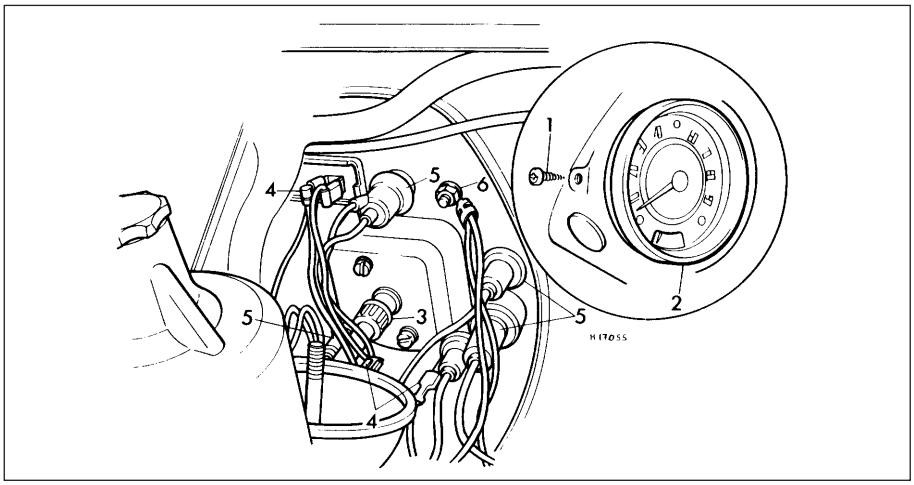
a) Use a new pump seal. Fit the seal in the reservoir and lubricate it before refitting the pump.
b) If the washer tube is difficult to replace onto the pump, soften it by immersing it in hot water for a few minutes.
c) Top-up the reservoir with reference to "Weekly Checks" and test the operation of the washers.

15 Instrument panel - removal and refitting

Models with central instrument panel (except Mini 850)

Removal

1 Disconnect the battery negative lead.
2 Carefully ease out the trim panels at the rear of the facia on either side of the instrument panel.
3 Fold back the parcel shelf cover around the front of the instrument panel.
4 Slacken the nut securing the heater unit to the rear mounting bracket. Undo and remove the two screws securing the front of the heater to the parcel shelf and lower the unit to the floor.



15.18 Instrument panel removal - 850 models

1 Retaining screw
2 Instrument panel
3 Speedometer cable
4 Wiring connectors
5 Bulb holders
6 Earth lead

5 Undo and remove the screws securing the instrument panel to the facia.
6 Working in the engine compartment, remove the air cleaner as described in the relevant Part of Chapter 4.
7 Unscrew the knurled nut securing the speedometer cable to the rear of the speedometer and withdraw the cable.
8 Remove the clip that secures the oil pressure gauge pipe to the engine compartment bulkhead.
9 From inside the car draw the instrument panel away from the facia and disconnect the wires and bulb holders from the rear of the instruments. Label each wire as it is removed to prevent confusion when refitting.
10 Unscrew the union nut and release the oil pipe from the rear of the oil pressure gauge.
11 Unscrew the knurled retaining nuts and lift out the instruments.
12 Undo and remove the two securing screws and lift out the speedometer and sealing ring.
13 If required, the fuel gauge and voltage stabiliser may be removed from the rear of the speedometer after removing the retaining screws and nuts.

Refitting

14 Reassembly and refitting of the instruments and panel is the reverse sequence to dismantling and removal.

Mini 850 models

Removal

15 Disconnect the battery negative lead.
16 Working in the engine compartment, remove the air cleaner as described in the relevant Part of Chapter 4.
17 Withdraw the sound insulation from speedometer aperture.
18 Unscrew the knurled retaining nut and detach the speedometer cable from the rear of the speedometer **(see illustration)**.
19 Disconnect the wires from the fuel gauge and voltage stabiliser. Label each wire as it is removed to prevent confusion when refitting.
20 Note the locations of the bulb holders and remove them from the rear of the speedometer.
21 Disconnect the earth wire.
22 From inside the car undo and remove the two screws securing the speedometer to the cowling and then lift out the speedometer.

Refitting

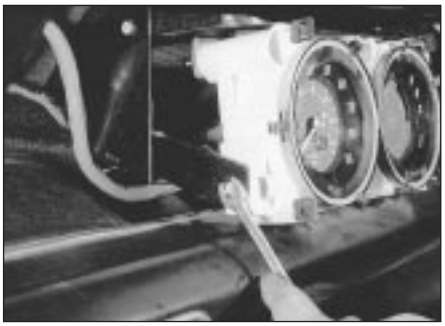
23 Refitting is the reverse sequence to removal.

Models with offset instrument panel

Removal

24 Disconnect the battery negative lead.
25 Hold both sides of the instrument nacelle and carefully pull it off the instrument cluster **(see illustration)**. On some models the nacelle is secured by screws.
26 Remove the upper plastic trim strip to gain access to the panel upper retaining screws.
27 Undo and remove the side and upper retaining screws securing the instrument panel to the mounting brackets **(see illustrations)**.

15.25 Remove the instrument cluster nacelle



15.27a Undo the side . . .

15.27b . . . and upper retaining screws

15.28a Detach the speedometer cable . . .

28 Draw the panel outward and detach the speedometer cable, the wiring multiplug connector and (where fitted) the two electrical leads at the rear of the tachometer **(see illustrations)**.

29 Carefully lift away the instrument panel, taking care not to damage the printed circuit.

Refitting

30 Refitting is the reverse sequence to removal.

Models with wooden facia

31 Refer to the removal and refitting procedures for the wooden facia as described in Chapter 11, which include details of instrument panel removal.

16 Instrument panel - dismantling and reassembly

Note: *On models fitted with a centrally mounted panel the instruments and components are withdrawn as part of the instrument panel removal sequence (see Section 15). The following procedure is therefore applicable to models having an offset instrument panel mounted in front of the driver.*

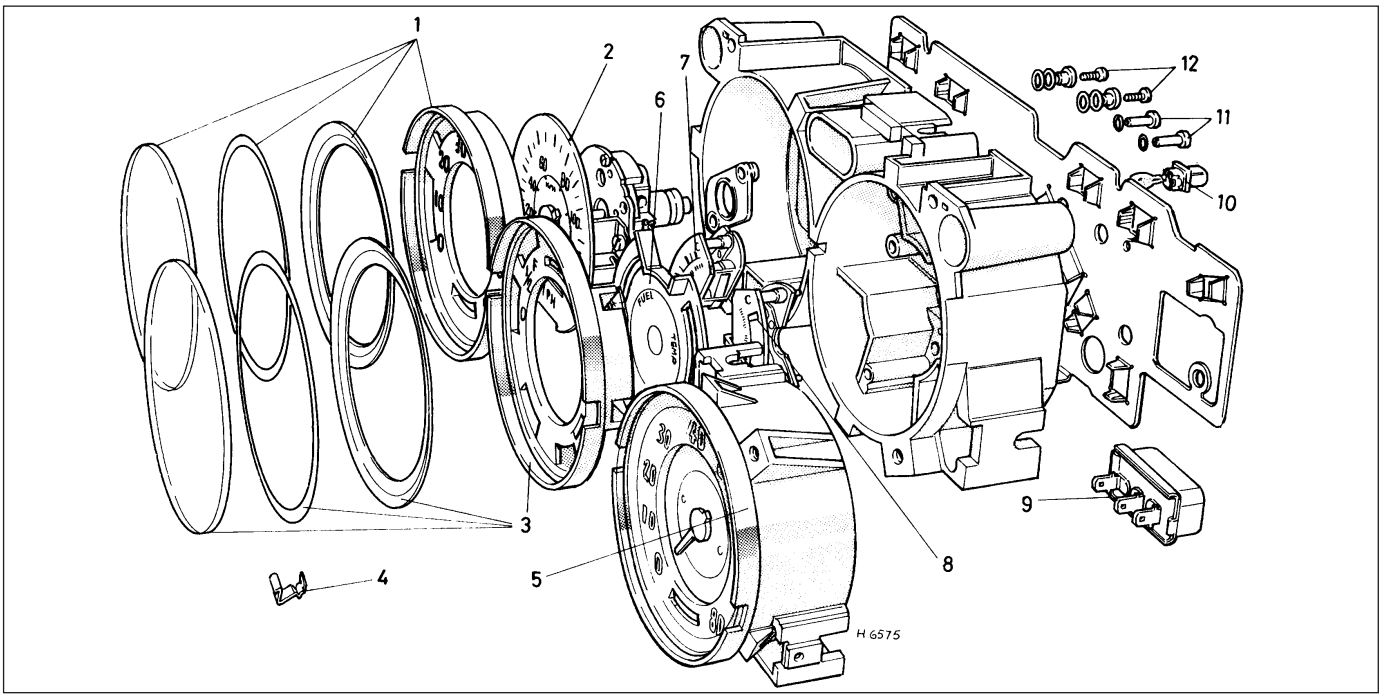
Dismantling

1 Remove the instrument panel as described in Section 15.

Fuel and temperature gauge

2 Ease off the spring clips securing the instrument lens glass and carefully remove the glass, sealing rings and printed face plate **(see illustration)**.

15.28b . . . and the multiplug connector, then lift away the instrument panel



16.2 Exploded view of the offset instrument cluster

1 Speedometer lens and faceplate assembly
2 Speedometer unit
3 Fuel/temperature gauge lens and faceplate assembly
4 Lens securing clips
5 Tachometer assembly (where fitted)
6 Fuel/temperature gauge facing
7 Fuel gauge
8 Temperature gauge
9 Voltage stabiliser
10 Panel lamp bulb and holder
11 Fuel/temperature gauge securing screws
12 Speedometer securing screws

3 Undo and remove the three small screws and lift out the instrument facing.
4 At the rear of the instrument panel, undo and remove the two screws securing the gauge to the panel body and remove the gauge.

Speedometer

5 Ease off the spring clips securing the speedometer lens glass and carefully remove the glass, sealing rings and printed face plate.
6 At the rear of the instrument panel undo and remove the two screws securing the speedometer to the panel body and remove the speedometer.

Tachometer

7 Detach the voltage stabiliser lead and bulb holder from the rear of the tachometer.
8 Carefully prise up the pegs securing the printed circuit to the tachometer body and lift the unit away.

Printed circuit and voltage stabiliser

9 Pull the voltage stabiliser carefully out of its location in the printed circuit at the rear of the instrument panel **(see illustration)**.
10 Withdraw the panel and warning light bulb holders.
11 Where fitted, undo and remove the three screws and the voltage stabiliser tag connections for the tachometer.
12 Undo and remove the four screws securing the fuel and temperature gauges.
13 Carefully prise out the plastic pegs securing the printed circuit to the instrument panel and lift off the printed circuit.

Reassembly

14 In all cases reassembly is the reverse of the dismantling sequence.

17 Speedometer cable - removal and refitting

Removal

Models with central instrument panel

1 Disconnect the battery negative lead.
2 Working in the engine compartment, detach the speedometer cable from the rear of the speedometer by unscrewing the knurled retaining nut and pulling the cable into the engine compartment.
3 Release the cable from the cable clip on the bulkhead

Models with offset instrument panel

4 Disconnect the battery negative lead.
5 Hold both sides of the instrument nacelle and carefully pull it off the instrument panel. On some models the nacelle is secured by screws.
6 Remove the upper trim strip to gain access to the upper instrument panel retaining screws.
7 Undo and remove the side and upper retaining screws securing the instrument panel to the mounting brackets.
8 Draw the panel outward slightly, depress the lug on the side of the speedometer cable connector and withdraw the cable off the end of the speedometer.
9 Pull the cable through the bulkhead grommet and into the engine compartment.

All models

10 Working under the car disconnect the cable from the transmission. To gain access, work through the aperture above the left-hand driveshaft.
11 Should the cable securing nut be tight to turn by hand, remove the bolt that secures the speedometer drive and withdraw the cable complete with the drive assembly. The cable may then be detached from the drive assembly.

Refitting

12 Refitting the speedometer cable is the reverse sequence to removal but the following additional points should be noted:

a) If the speedometer drive was removed, always fit a new joint washer.
b) To lubricate the inner cable, withdraw the inner cable and lightly grease it except for 200 mm at the speedometer end. Refit the inner cable and wipe away any surplus grease.

18 Radio - removal and refitting

Note: *If the radio incorporates an anti-theft system, once the battery has been disconnected, the radio unit cannot be re-activated until the appropriate security code has been entered. Do not remove the unit unless the appropriate code is known.*

Removal

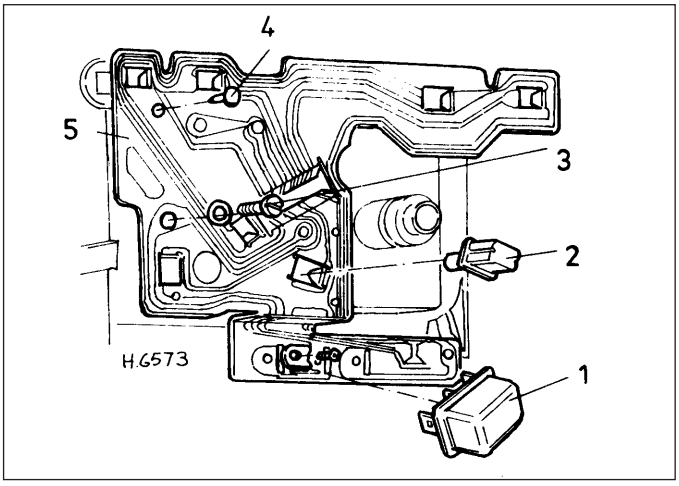
1 De-activate the radio security code (where applicable).
2 Disconnect the battery negative lead.

Centre console mounted radio

3 Removal and refitting of the radio is included in the centre console removal and refitting procedures described in Chapter 11.

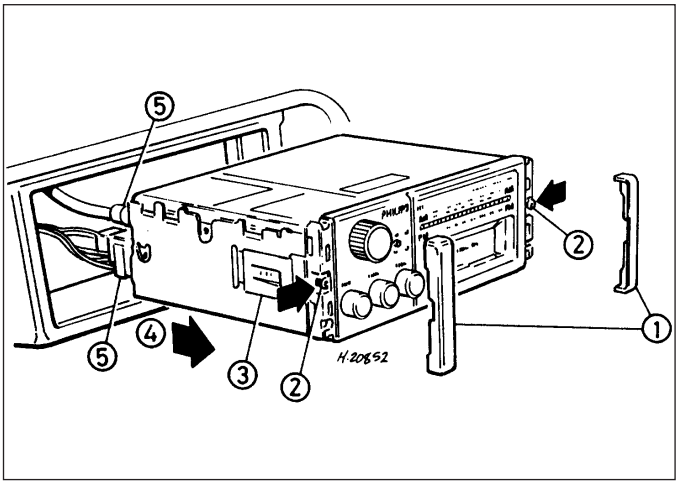
1989 onwards models with radio beneath the facia

4 Prise the side covers from the radio, then loosen the two small screws **(see illustration)**.



16.9 Offset instrument panel printed circuit connections

1 Voltage stabiliser
2 Panel light
3 Fuel and temperature gauge securing screws
4 Printed circuit securing stud
5 Printed circuit



18.4 Radio fixings on 1989-on models

1 Side covers
2 Retaining screws
3 Holding clips
4 Direction of removal
5 Multi-plug and aerial lead

5 Press the two screws in to release the radio securing clips.
6 Push the radio out from behind the facia, and disconnect the wiring connectors and aerial lead.
7 Refitting is a reversal of removal, but make sure that the radio is fully engaged with the clips.

1989 onwards models with radio in the facia

8 Two special DIN standard removal tools, available from in-car entertainment specialists, are required for removal.
9 Where fitted, prise the side covers from the radio.
10 Insert the removal tools into the holes on each side of the radio front plate, and push them in until they snap into place.
11 Push the tools apart to depress the internal retaining clips, then pull the tools outwards to withdraw the radio.
12 Disconnect the wiring connectors and the aerial lead from the rear of the radio. Release the removal tools.
13 To refit, reconnect the wiring and aerial lead, push the radio into its aperture until the retaining clips engage and, where applicable, refit the side covers.

Refitting

14 Refitting is the reverse sequence to removal. Where applicable, re-activate the security code on completion.

19 Anti-theft alarm system components - removal and refitting

Removal

Electronic control unit (ECU)

1 On models fitted with a wooden facia, remove the facia as described in Chapter 11.
2 On models without a wooden facia, remove the left-hand fresh air vent assembly as described in Chapter 3, then release the left-hand door seal weatherstrip to gain access to the bulkhead trim. Remove the two edge clips, and peel back the bulkhead trim for access to the ECU.
3 On all models, undo the two ECU retaining screws and disconnect the wiring multiplugs.
4 Cut the cable-ties to release the receiver lead, and remove the ECU.

Bonnet switch

5 Open the bonnet, and undo the screw securing the switch to the front panel.
6 Lift off the switch and disconnect the wiring.

Boot switch

7 Open the boot, and disconnect the wiring from the switch.
8 Undo the switch retaining screw, and remove the switch from its bracket.

Refitting

9 Refitting is the reverse sequence to removal. Secure the receiver lead with new cable-ties when refitting the ECU.

Key to wiring diagrams 1 to 9 inclusive

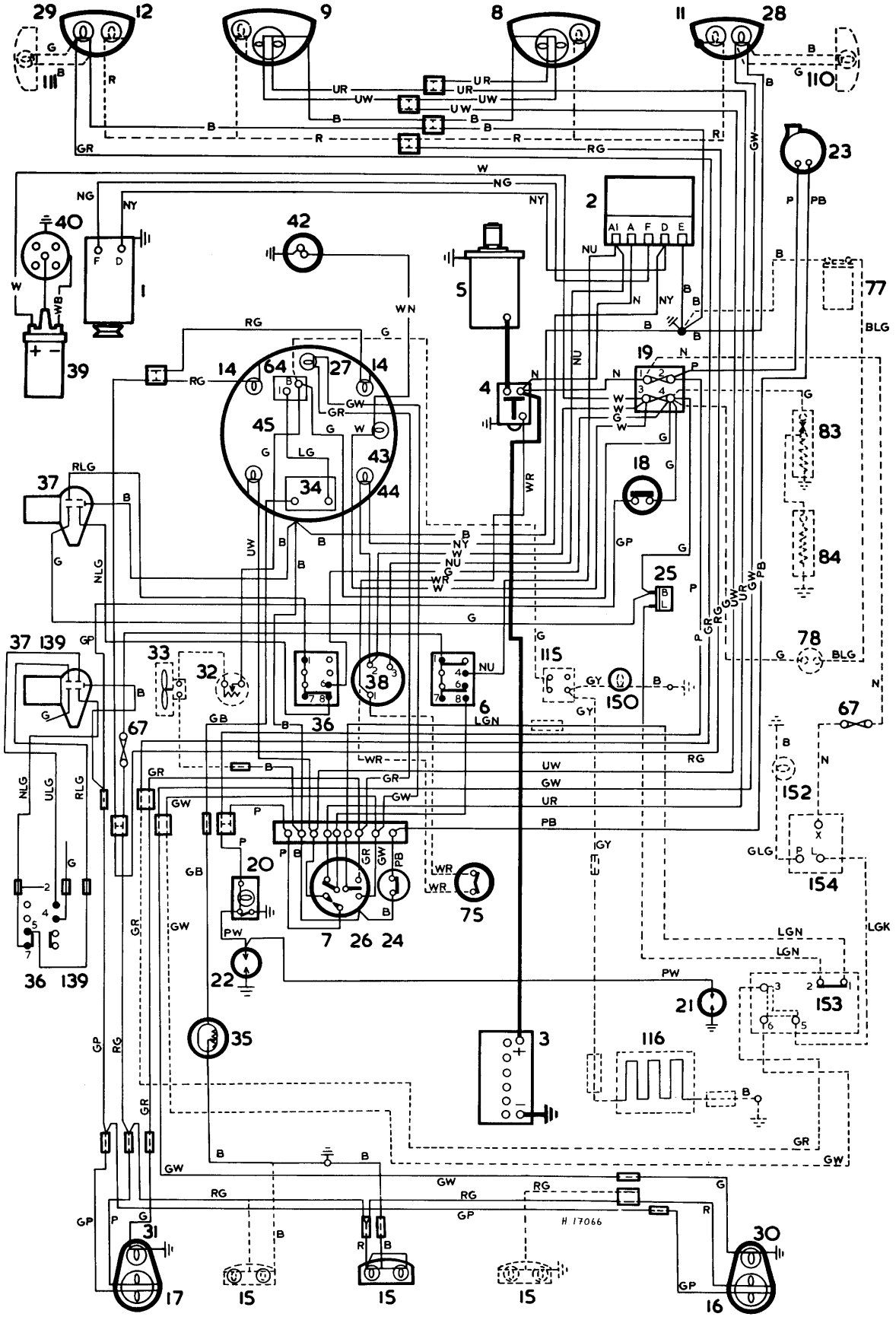
Some of the components listed in this key may not be fitted to individual models

1	*Dynamo or alternator*
2	*Control box*
3	*Battery (12 volt)*
4	*Starter solenoid*
5	*Starter motor*
6	*Lighting switch*
7	*Headlight dip switch*
8	*RH headlight*
9	*LH headlight*
10	*Main beam warning light*
11	*RH sidelight/parking light*
12	*LH sidelight/parking light*
14	*Panel lights*
15	*Number plate light(s)*
16	*RH stop and tail light*
17	*LH stop and tail light*
18	*Stop light switch*
19	*Fuse block*
20	*Interior light*
21	*RH door switch(es)*
22	*LH door switch(es)*
23	*Horn(s)*
24	*Horn push*
25	*Flasher unit*
26	*Direction indicator headlight flasher and dip switch*
27	*Direction indicator warning light(s)*
28	*RH front flasher light*
29	*LH front flasher light*
30	*RH rear flasher light*
31	*LH rear flasher light*
32	*Heater or fresh-air blower switch*
33	*Heater or fresh-air blower*
34	*Fuel gauge*
35	*Fuel gauge tank unit*
36	*Windscreen wiper switch*
37	*Windscreen wiper motor*
38	*Ignition/starter stitch*
39	*Ignition coil*
40	*Distributor*
41	*Fuel pump*
42	*Oil pressure switch*
43	*Oil pressure gauge or warning light*
44	*Ignition warning light*
45	*Speedometer (headlight flasher switch on Canadian Mini 1000)*
46	*Water temperature gauge*
47	*Water temperature transmitter*
49	*Reversing light switch*
50	*Reversing light*
64	*Bi-metallic instrument voltage stabiliser*
67	*Line fuse (35 amp)*
75	*Automatic transmission inhibitor switch (when fitted)*
77	*Windscreen washer motor*
78	*Windscreen washer switch*
83	*Induction heater and thermostat*
84	*Suction chamber heater*
95	*Tachometer*
110	*RH repeater flasher*
111	*LH repeater flasher*
115	*Rear window demister switch*
116	*Rear window demister unit*
139	*Alternative connections for two-speed wiper motor and switch*
150	*Rear window demist warning light*
152	*Hazard warning light*
153	*Hazard warning switch*
154	*Hazard warning flasher unit*
158	*Printed circuit instrument panel*
159	*Brake pressure warning light and light test switch*
160	*Brake pressure failure switch*
164	*Ballast resistor*
168	*Ignition key audible warning buzzer*
170	*RH front side marker light*
171	*LH front side marker light*
172	*RH rear side marker light*
173	*LH rear side marker light*
198	*Driver's seat belt switch*
199	*Passenger's seat belt switch*
200	*Passenger's seat switch*
201	*Seat belt warning gearbox switch*
202	*Seat belt warning light*
203	*Seat belt warning code*

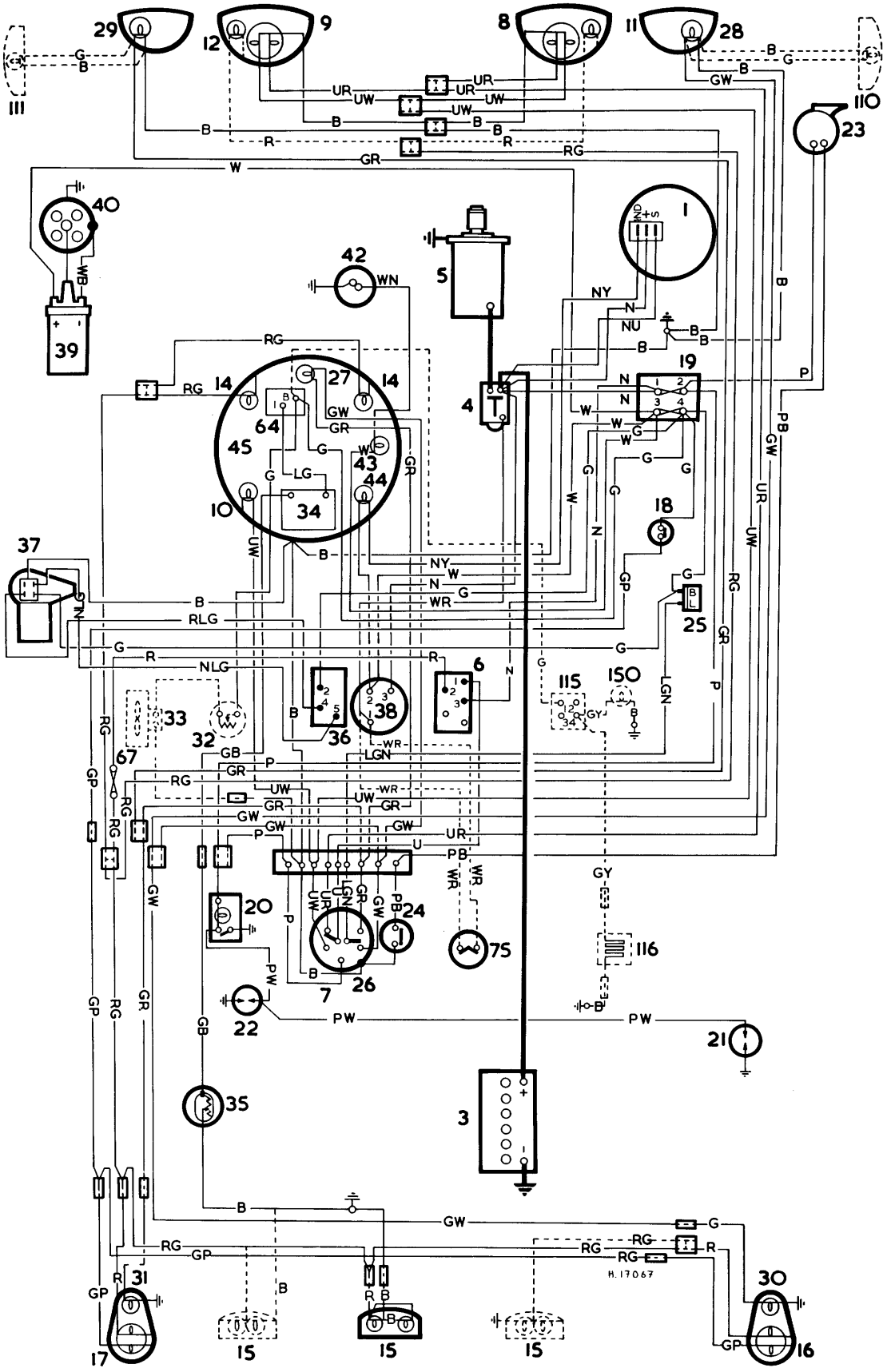
Cable colour code

B	Black	N	Brown	U	Blue
G	Green	O	Orange	W	White
K	Pink	P	Purple	Y	Yellow
LG	Light Green	R	Red		

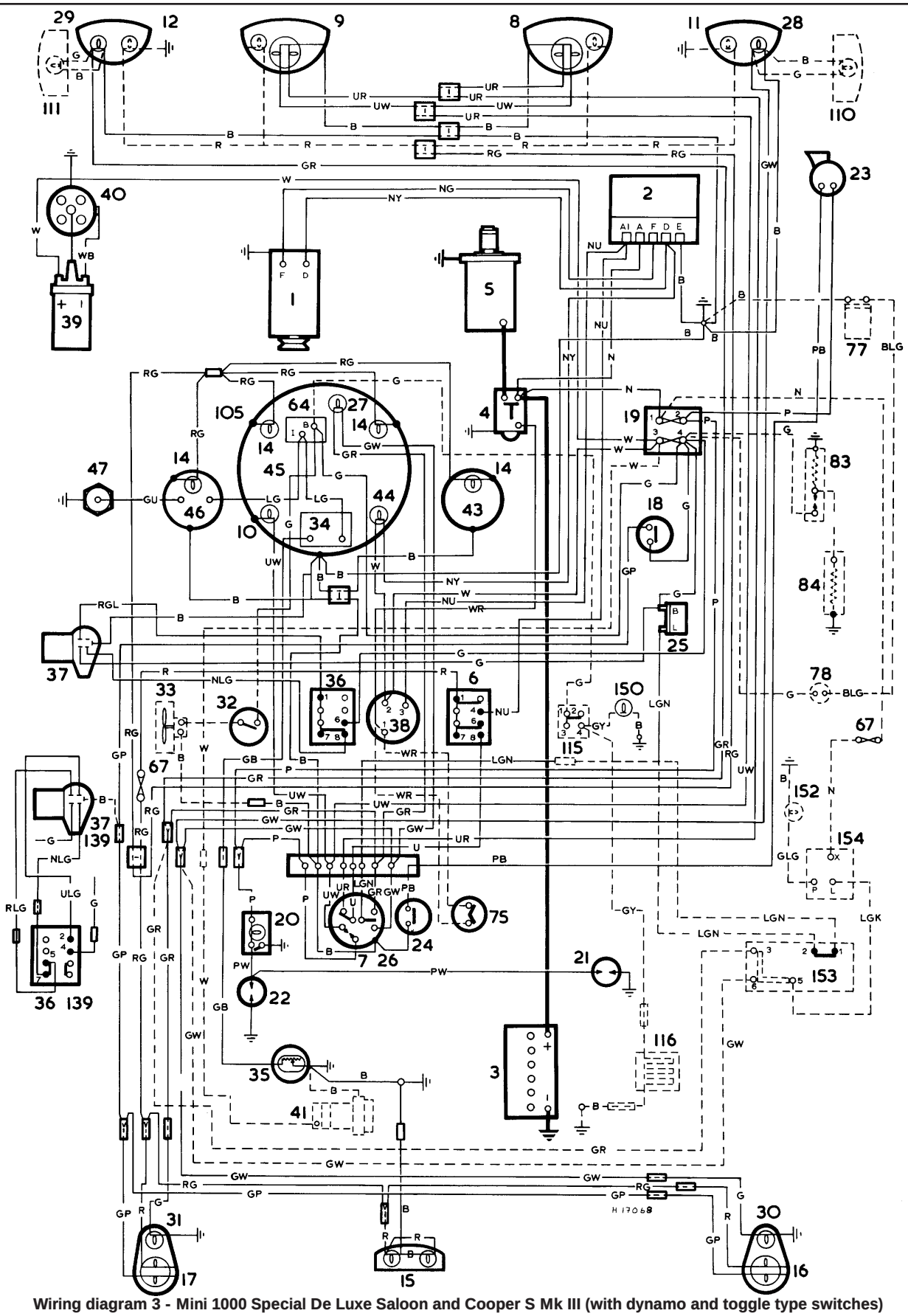
When a cable has two colour code letters the first denotes the main colour and the second denotes the tracer colour



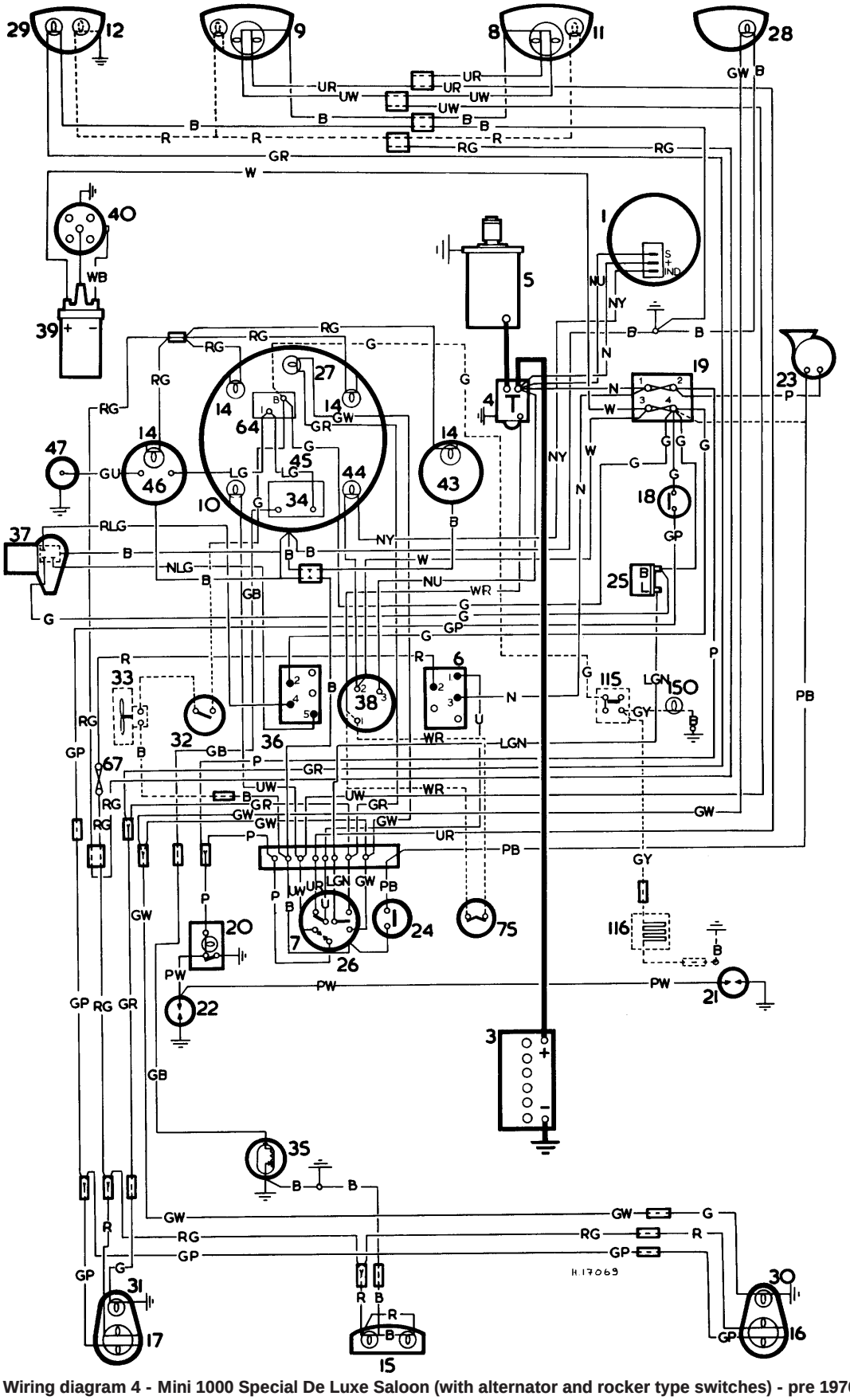
Wiring diagram 1 - Mini 850 De Luxe Saloon, Van and Pick-up (with dynamo and toggle type switches)



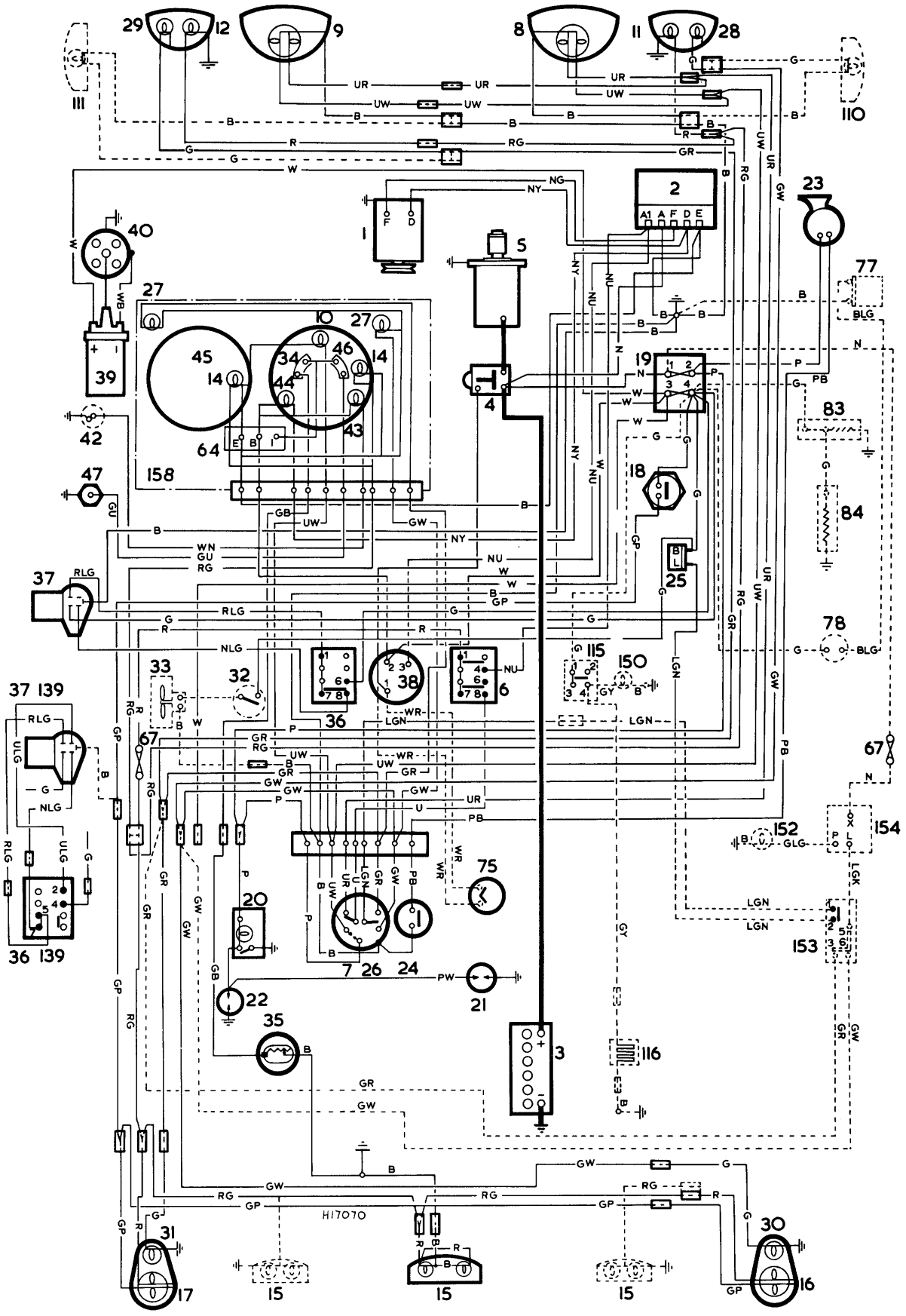
Wiring diagram 2 - Mini 850 De Luxe Saloon, Van and Pick-up (with alternator and rocker type switches) - pre 1976



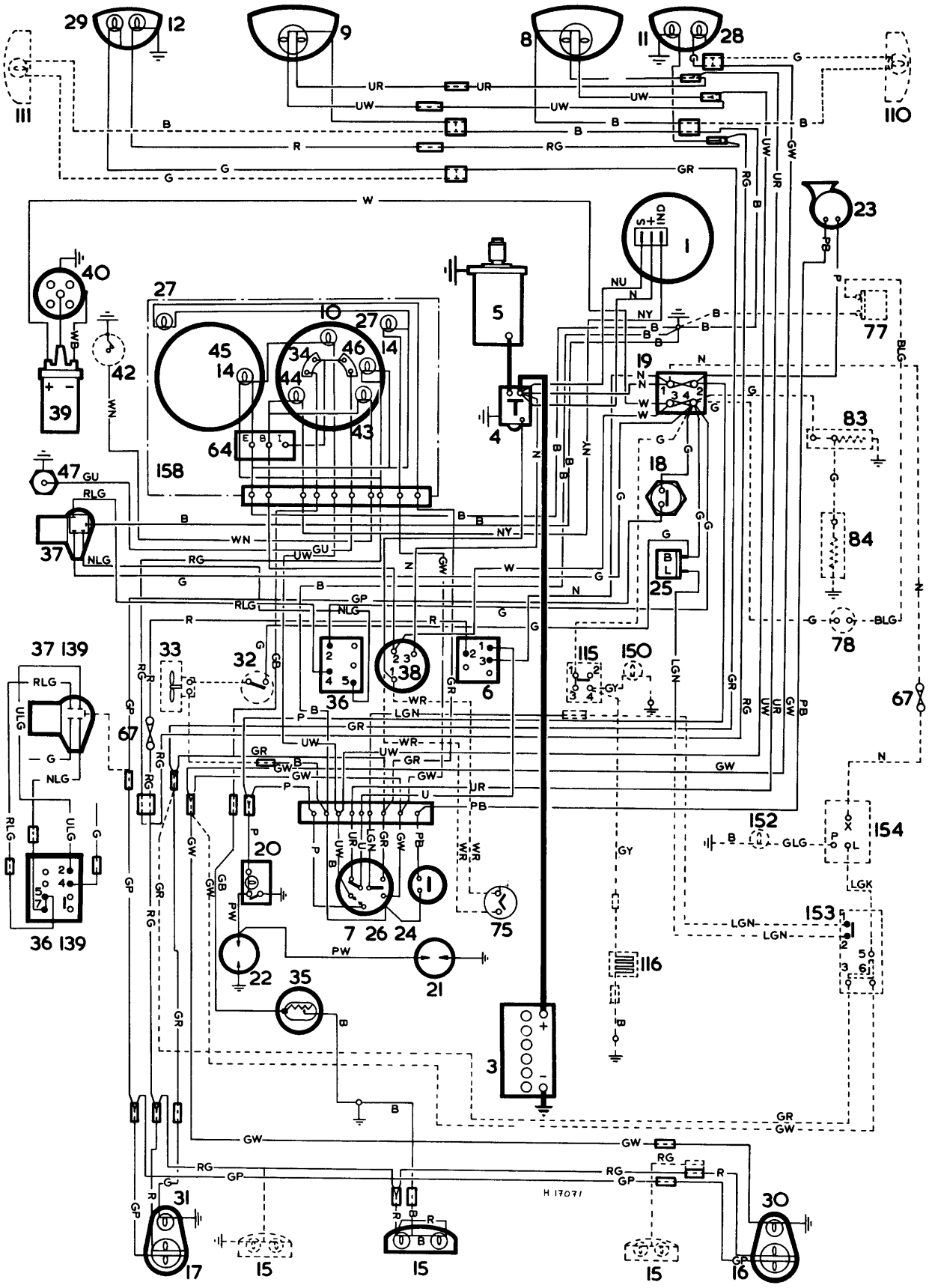
Wiring diagram 3 - Mini 1000 Special De Luxe Saloon and Cooper S Mk III (with dynamo and toggle type switches)



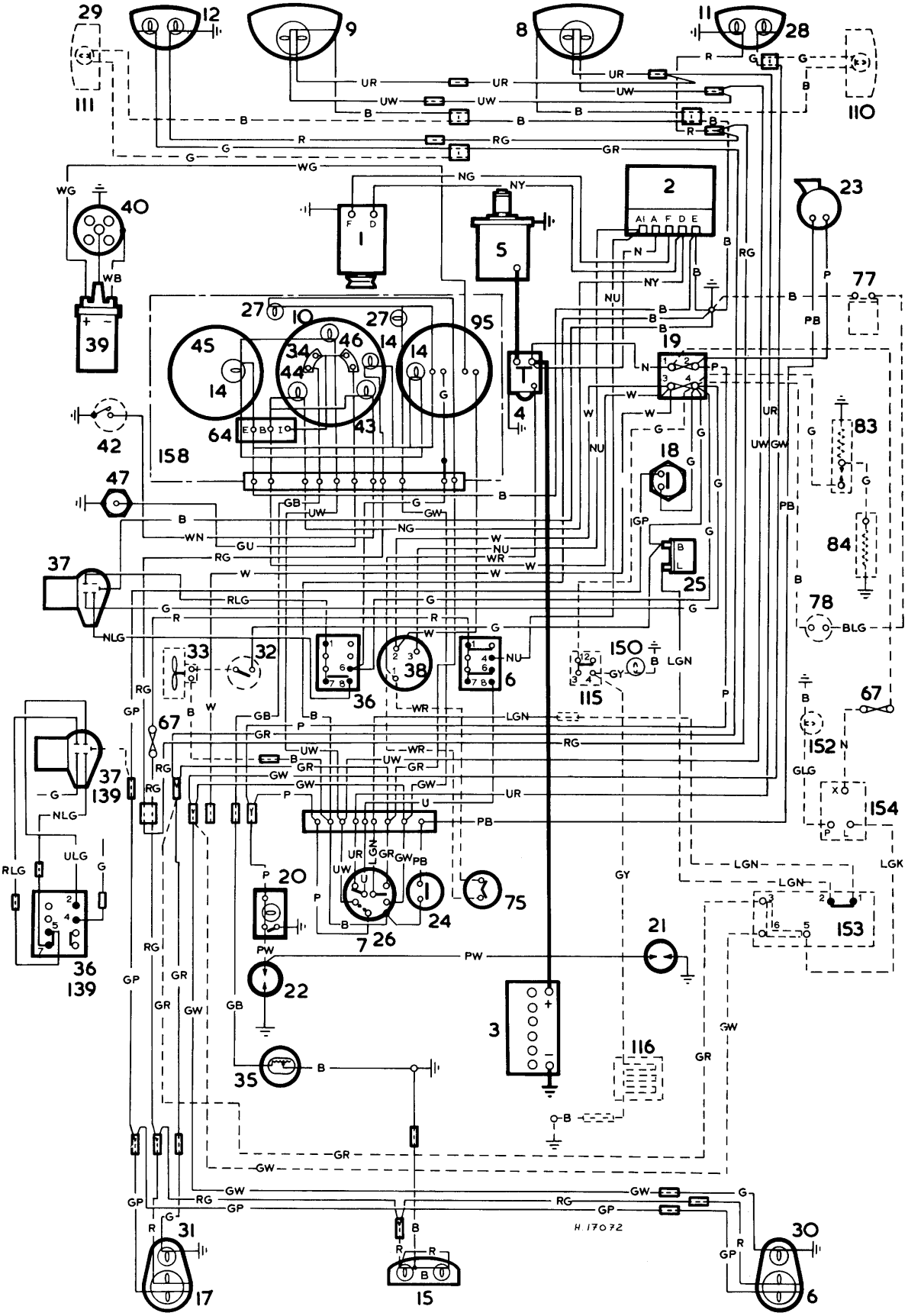
Wiring diagram 4 - Mini 1000 Special De Luxe Saloon (with alternator and rocker type switches) - pre 1976



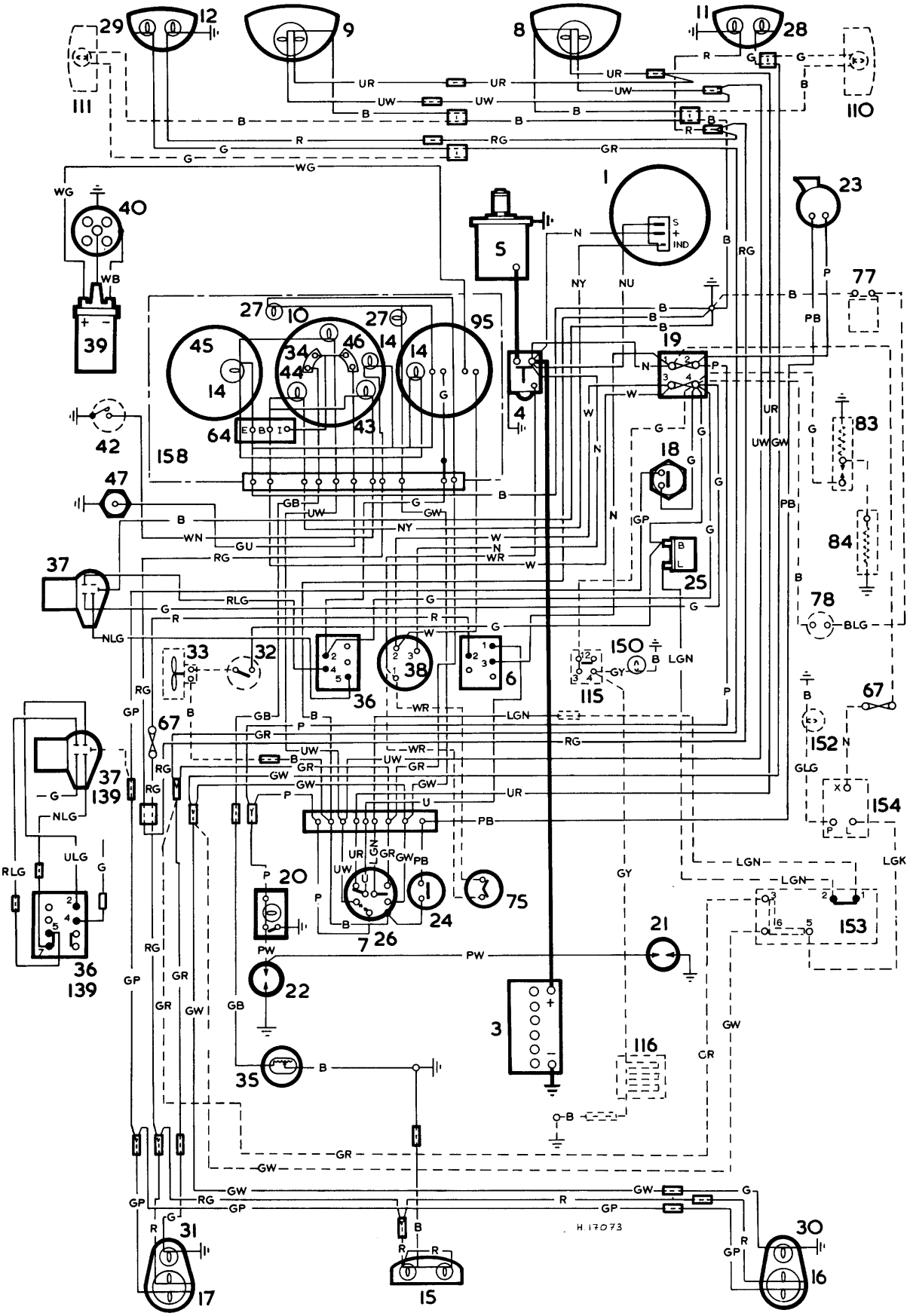
Wiring diagram 5 - Mini Clubman Saloon and Estate (with dynamo and toggle type switches)



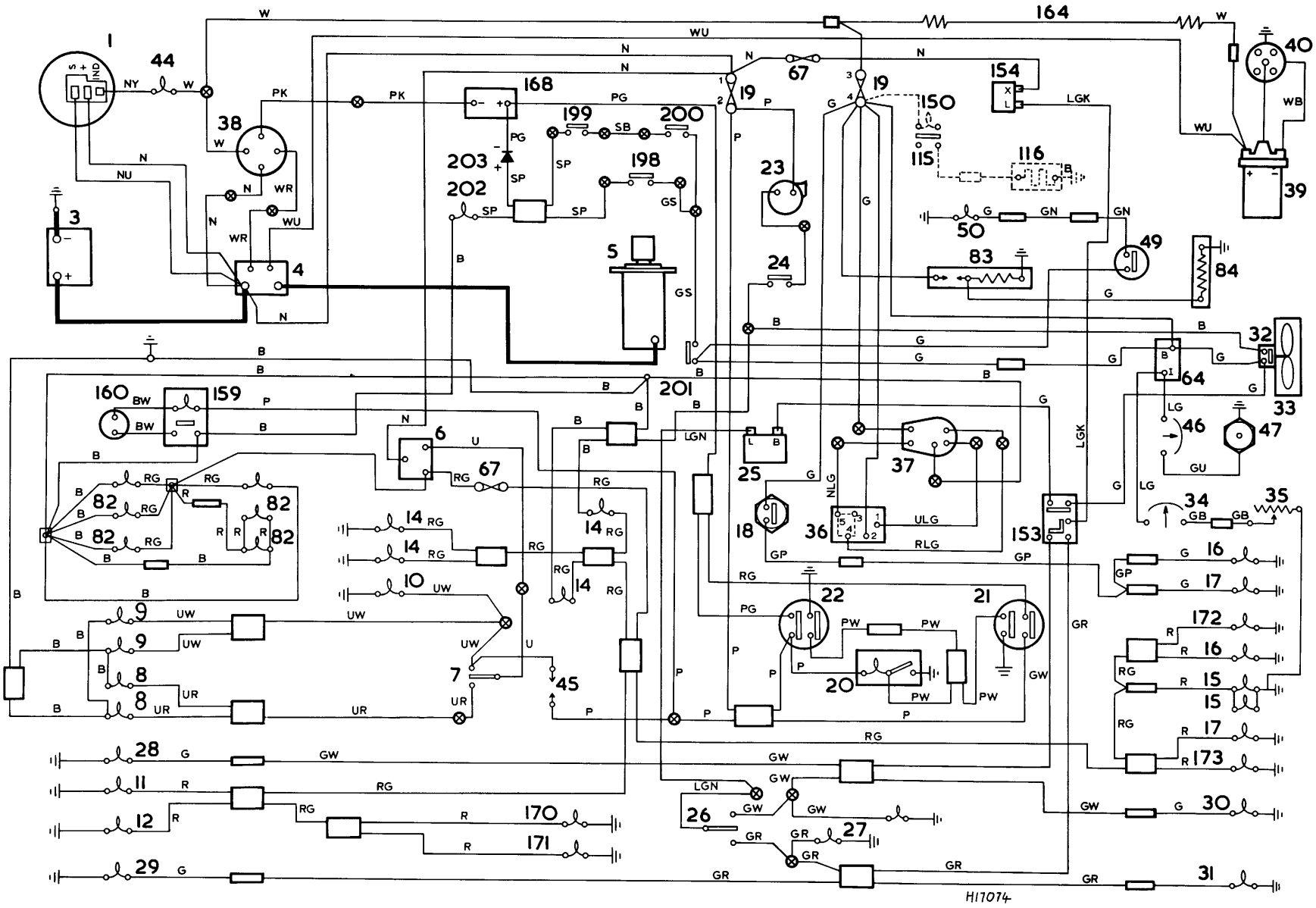
Wiring diagram 6 - Mini Clubman Saloon and Estate (with alternator and rocker type switches) - pre 1976



Wiring diagram 7 - Mini 1275 GT (with dynamo and toggle type switches)



Wiring diagram 8 - Mini 1275 GT (with alternator and rocker type switches) - pre 1976



Wiring diagram 9 - Mini 1000 Saloon (Canada) - pre 1977

Key to wiring diagrams 10 to 15 inclusive

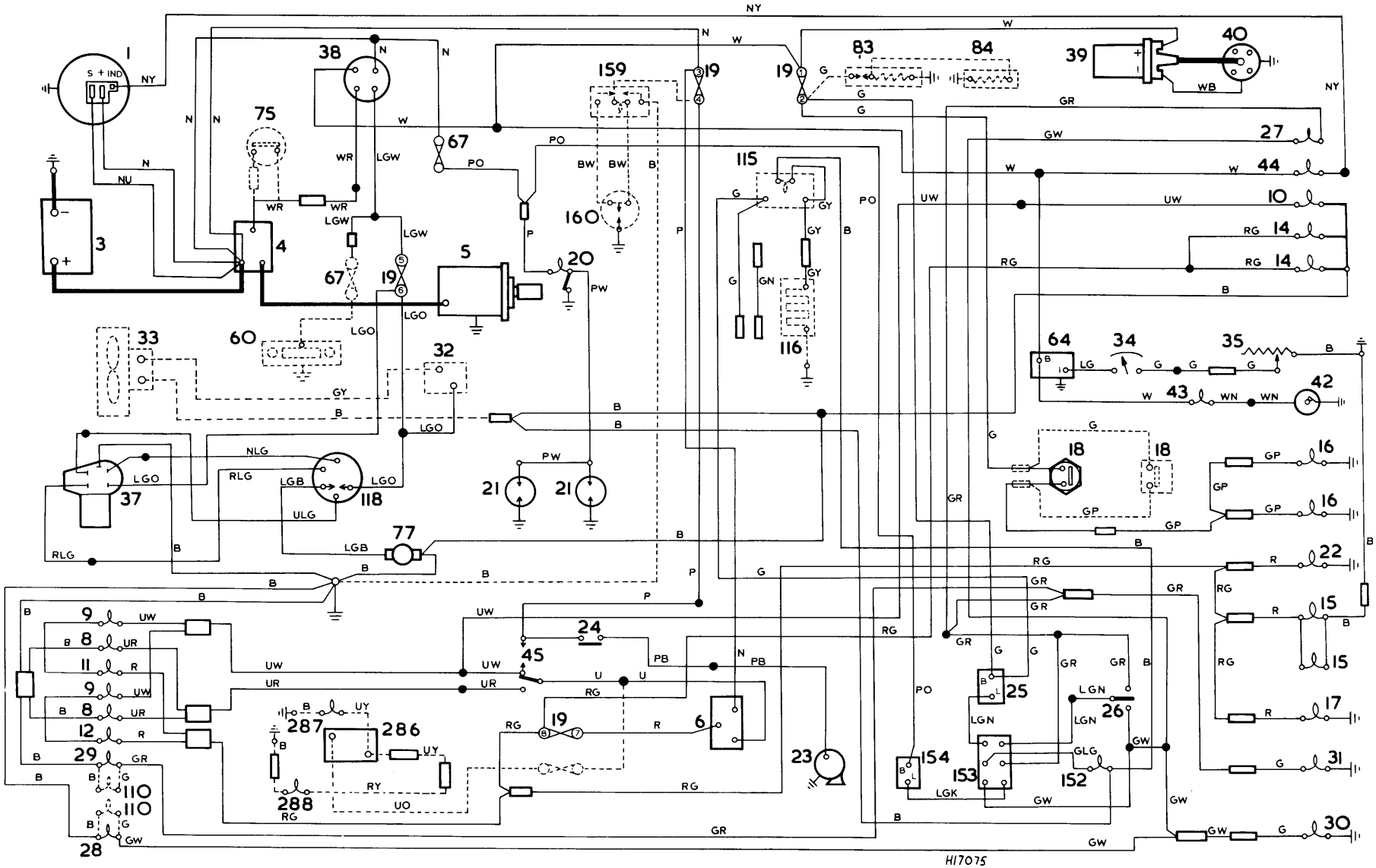
Some of the components listed in this key may not be fitted to individual models

1 Alternator
3 Battery
4 Starter solenoid
5 Starter motor
6 Lighting switch
7 Headlight dip switch
8 Headlight dip beam
9 Headlight main beam
10 Main beam warning light
11 Sidelight - RH
12 Sidelight - LH
14 Panel illumination lights
15 Number plate illumination lights
16 Stop lights
17 Tail light - RH
18 Stop light switch (hydraulic)
18 Stop light switch (mechanical)
19 Fuse box
20 Interior light
21 Interior light switch (door)
22 Tail light - LH
23 Horn
24 Horn-push
25 Indicator flasher unit
26 Indicator switch
27 Indicator warning light
28 Front indicator light - RH
29 Front indicator light - LH
30 Rear indicator light - RH
31 Rear indicator light - LH
32 Heater switch
33 Heater motor
34 Fuel level indicator
35 Fuel level indicator tank unit
37 Windscreen wiper motor
38 Ignition switch
39 Ignition coil
40 Distributor
42 Oil pressure switch
43 Oil pressure warning light
44 No charge warning light
45 Headlight flasher switch
46 Water temperature indicator
47 Water temperature transmitter
49 Reversing light switch
50 Reversing light
56 Clock (if fitted)
57 Cigar lighter (if fitted)
60 Radio
64 Voltage stabiliser
67 Line fuse
75 Automatic transmission inhibitor switch
77 Windscreen washer motor
82 Switch illumination light
83 Induction heater and thermostat
84 Suction chamber heater
95 Tachometer
110 Indicator repeater lights
115 Heated rear screen switch
116 Heated rear screen
118 Combined windscreen washer and wiper switch
132 Brake warning light
150 Heated rear screen warning light
152 Hazard warning light
153 Hazard warning switch
154 Hazard warning flasher unit
158 Printed circuit instrument panel
159 Brake failure test switch and warning light
160 Brake pressure differential switch
164 Resistive cable
165 Handbrake switch
166 Handbrake warning light
168 Ignition key warning buzzer
169 Buzzer door switch
170 RH front side marker light
171 LH front side marker light
172 RH rear side marker light
173 LH rear side marker light
198 Driver's seat belt switch
199 Passenger's seat belt switch
200 Passenger seat switch
201 Seat belt warning gearbox switch
202 Seat belt warning light
203 Blocking diode - seat belt warning
208 Cigar lighter illumination
210 Panel illumination rheostat
211 Heater control illumination
286 Rear fog guard switch
287 Rear fog guard warning light
288 Rear fog guard light
291 Brake warning relay
314 Clock illumination

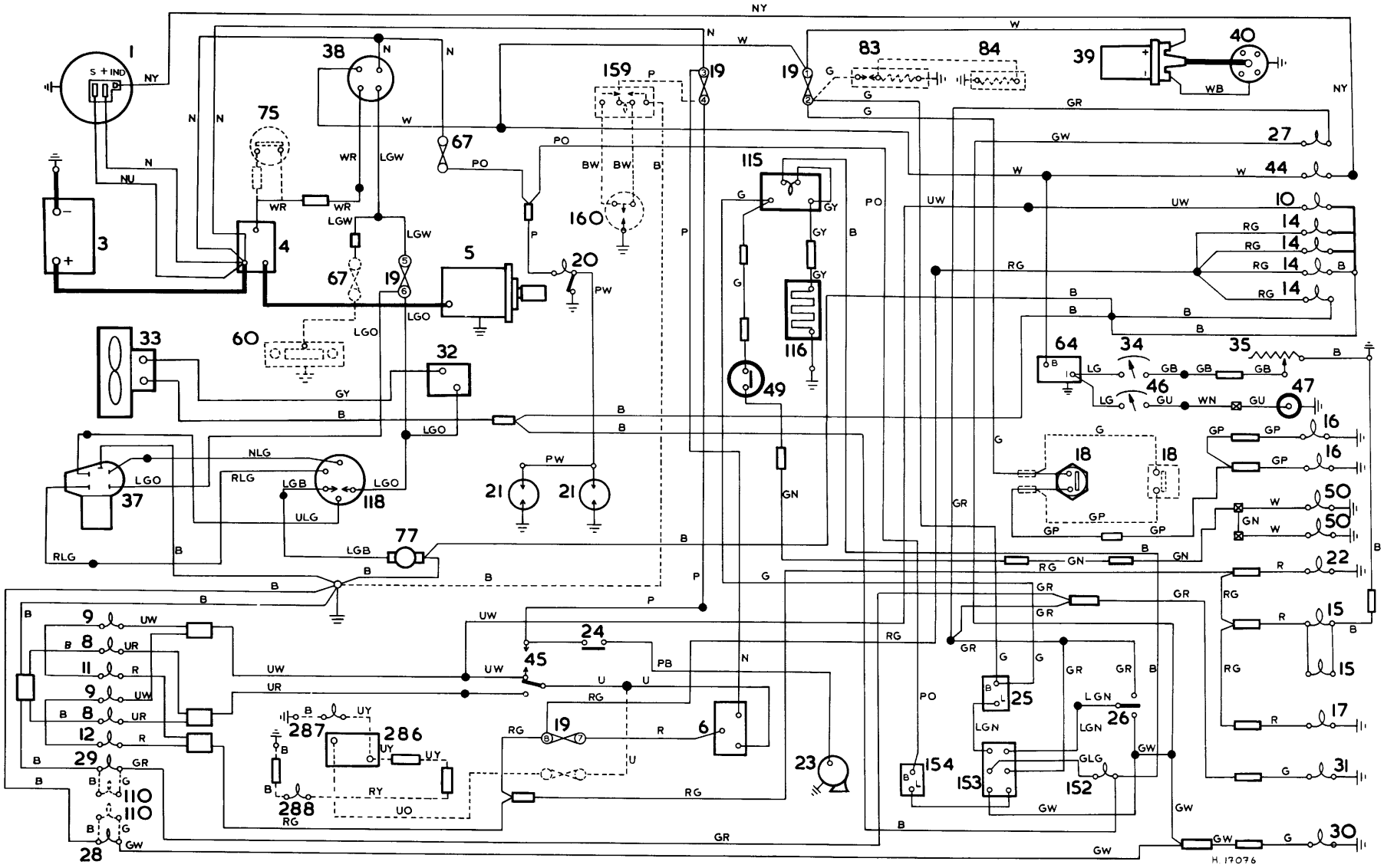
Cable colour code

B	Black	N	Brown	U	Blue
G	Green	O	Orange	W	White
K	Pink	P	Purple	Y	Yellow
LG	Light Green	R	Red		

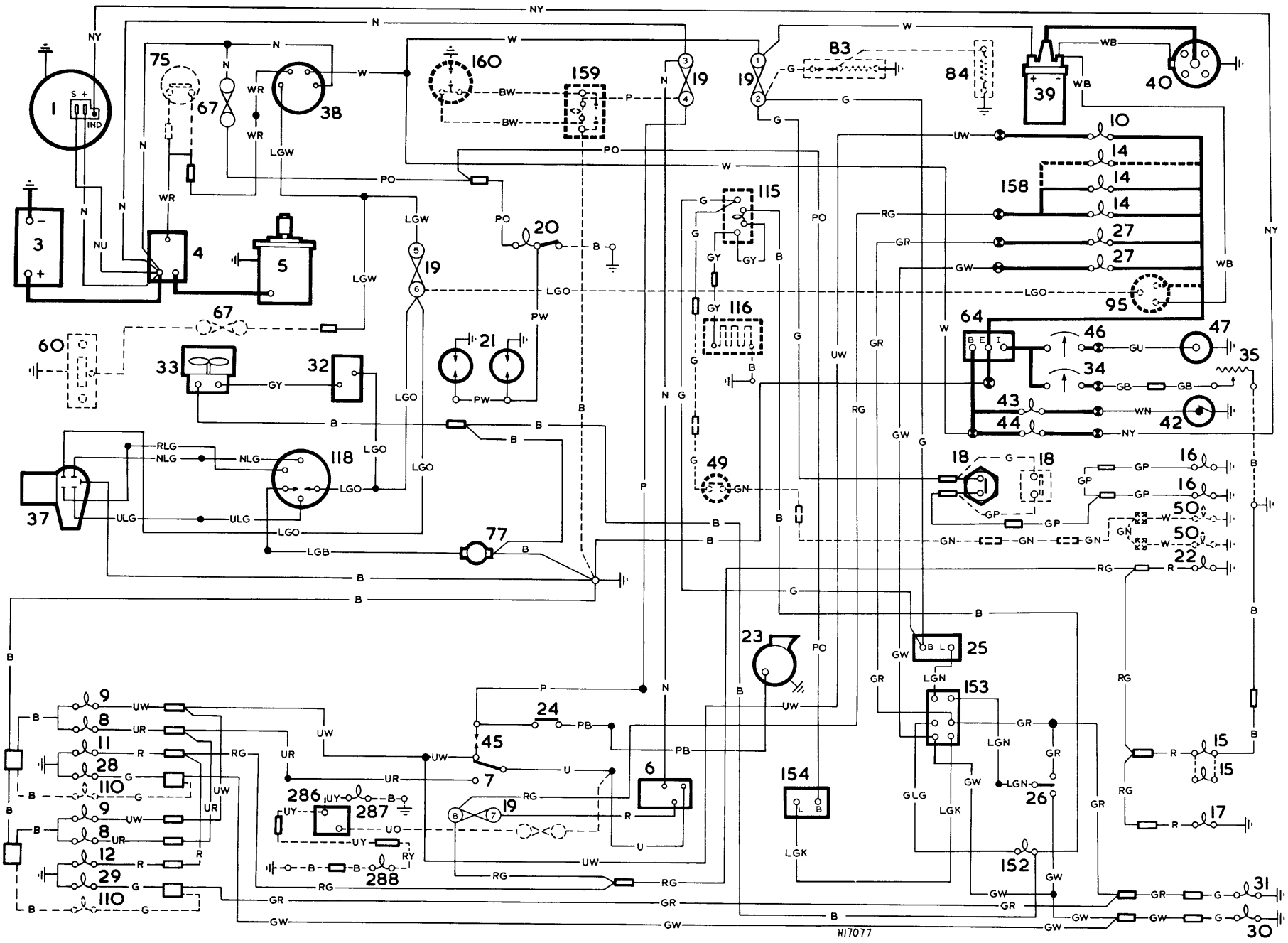
When a cable has two colour code letters the first denotes the main colour and the second denotes the tracer colour.



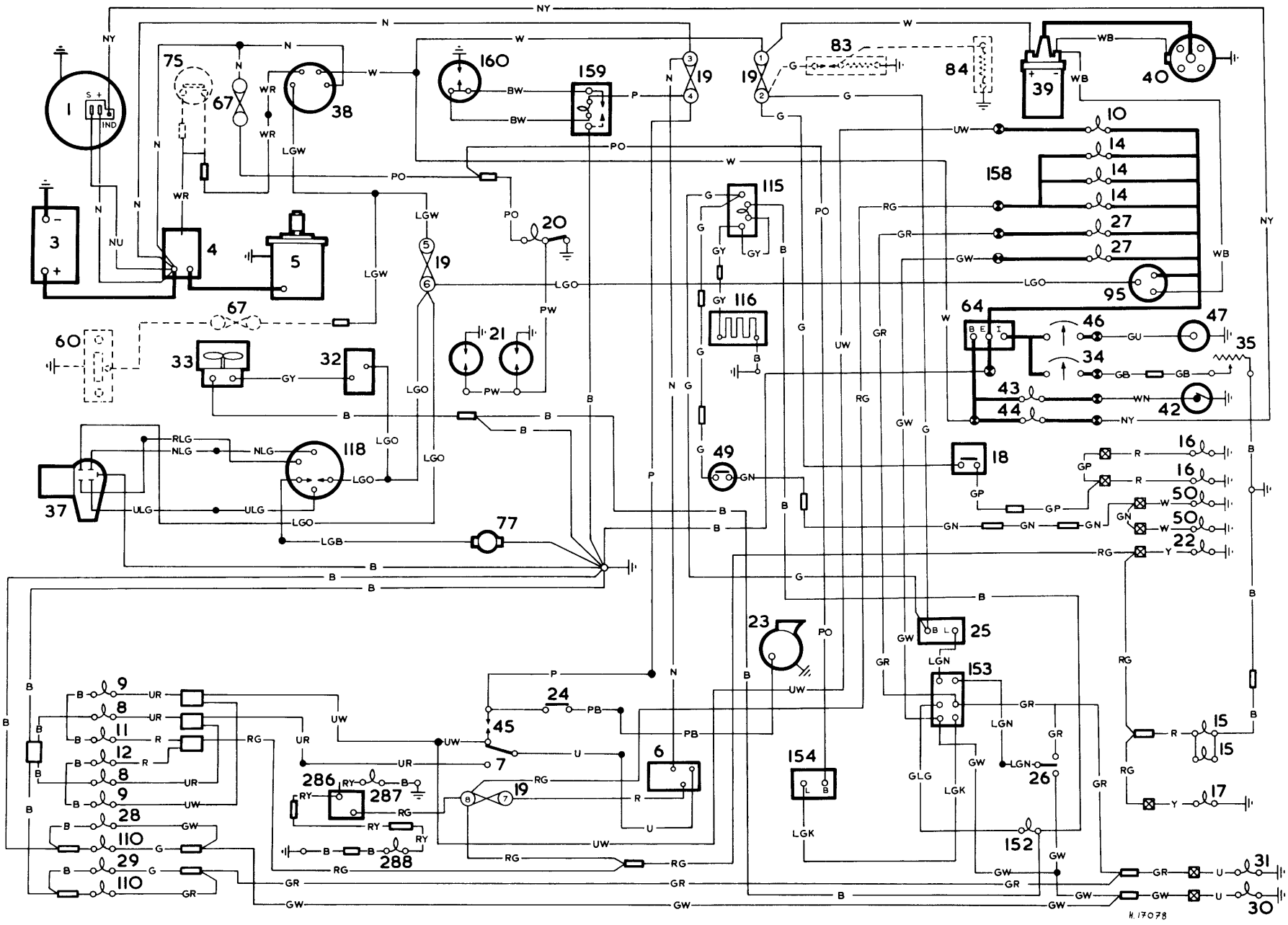
Wiring diagram 10 - Mini 850 Saloon, Van and Pick-up - 1976 onwards



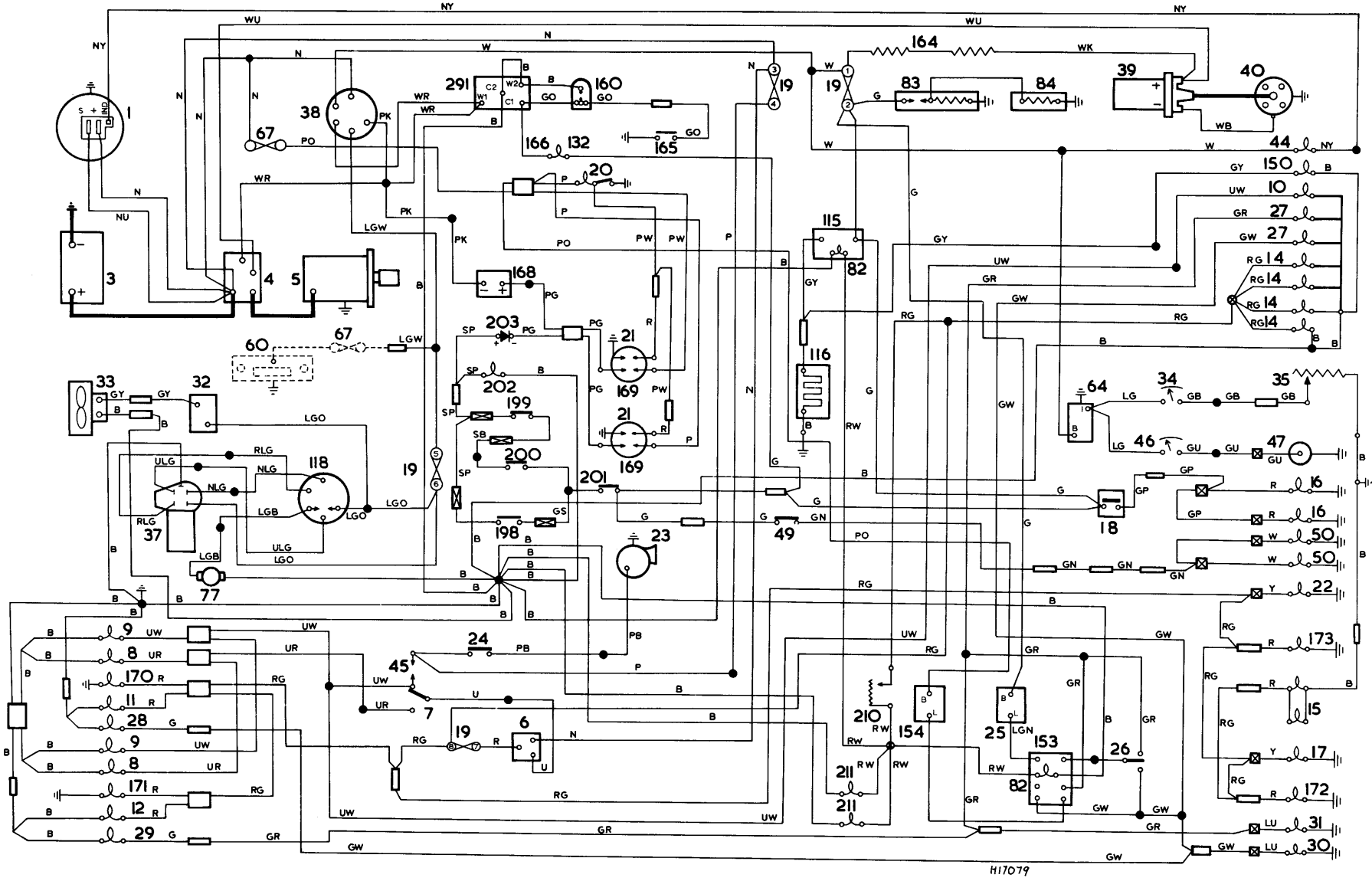
Wiring diagram 11 - Mini 1000 Saloon (triple instrument facia) - 1976 onwards (UK, Europe, Sweden); and Mini Special (triple instrument facia) - 1976 to 77



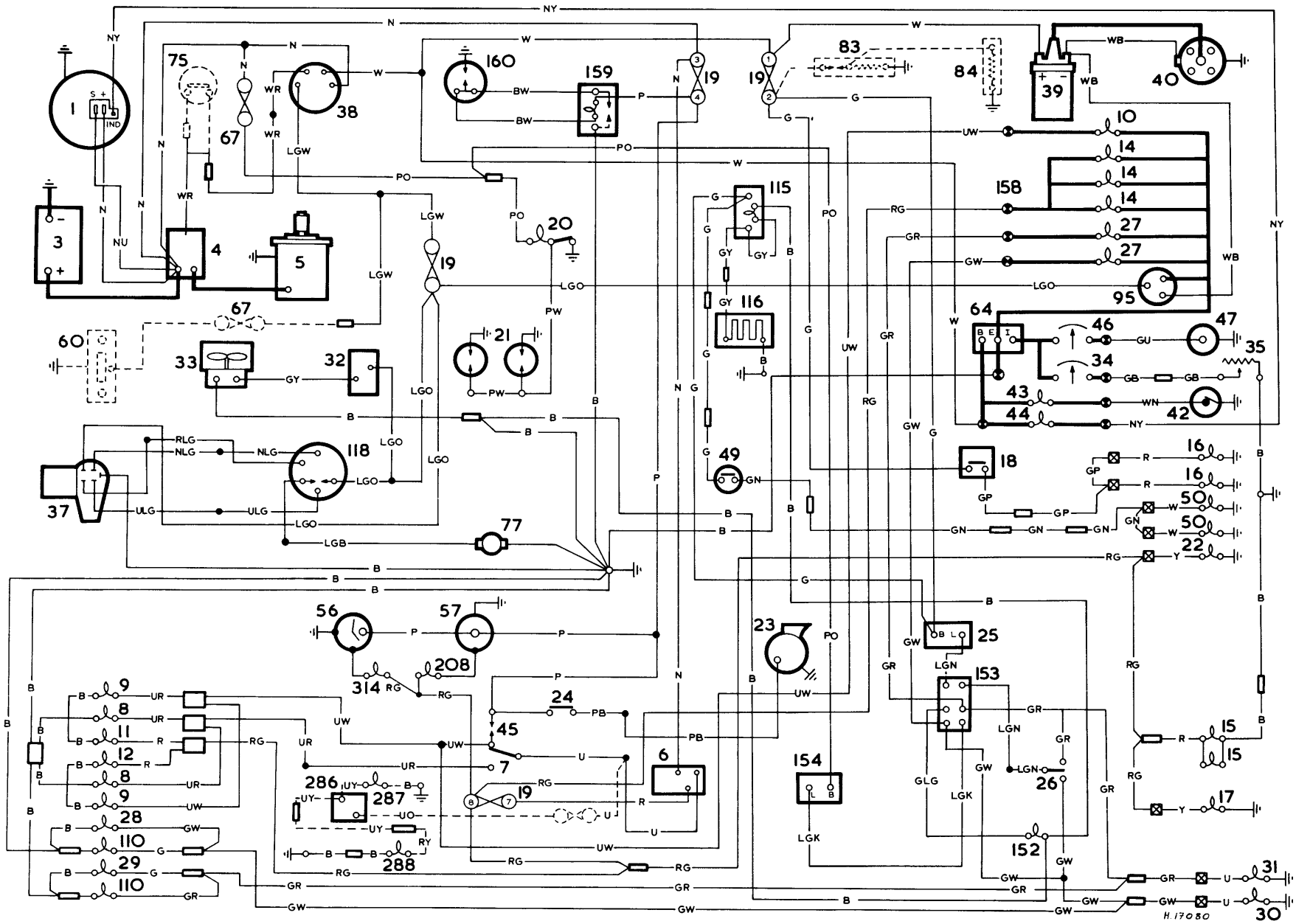
Wiring diagram 12 - Mini Clubman, Estate and 1275 GT - 1976 onwards



Wiring diagram 13 - Mini Special - 1977 to 78



Wiring diagram 14 - Mini 1000 (Canada) - 1977 onwards



Wiring diagram 15 - Mini Special - 1979 onwards

Master key to wiring diagrams 16 and 17

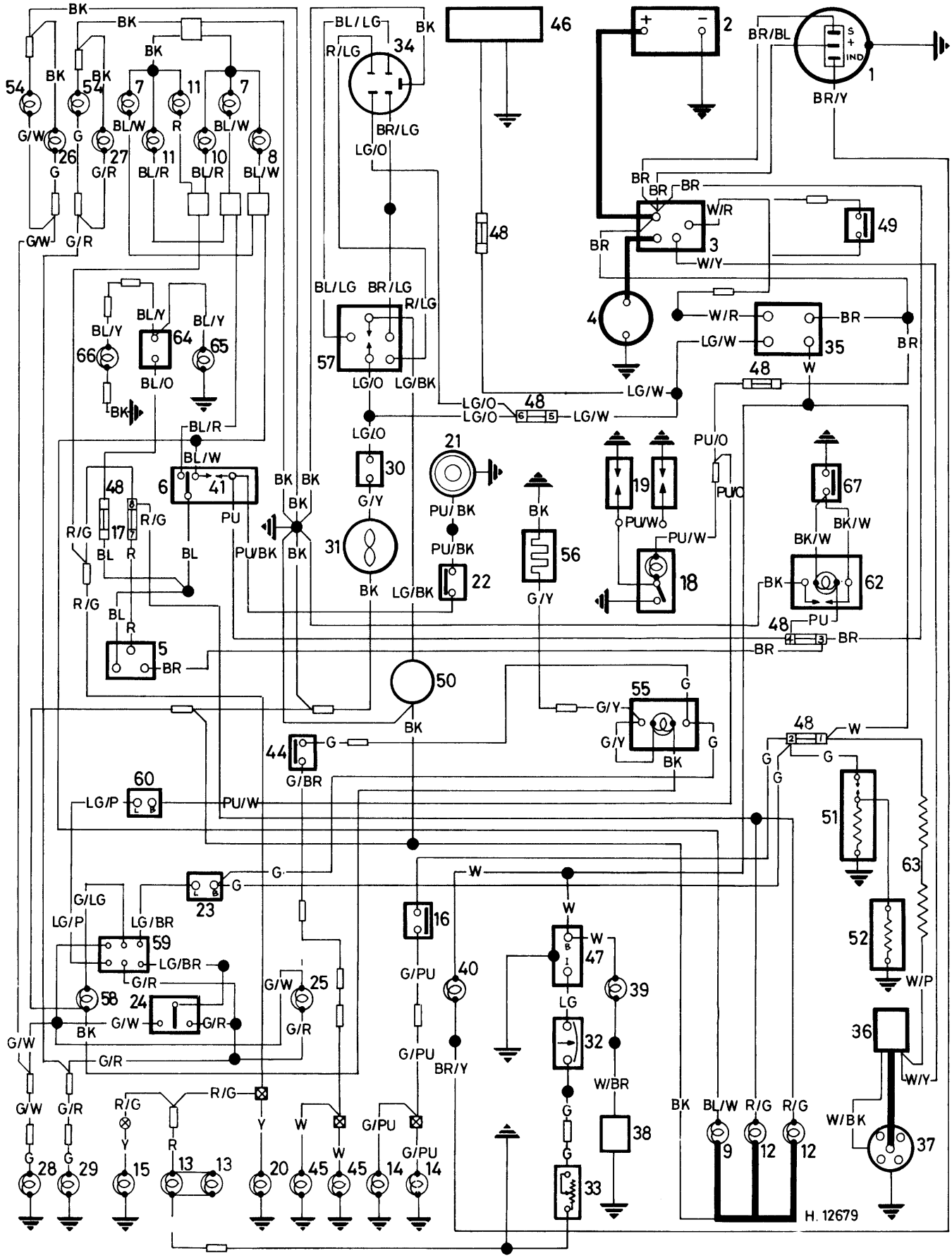
No	Description
1	*Alternator*
2	*Battery*
3	*Starter motor solenoid*
4	*Starter motor*
5	*Lighting switch*
6	*Headlight dip switch*
7	*Headlight dip beam*
8	*Headlight main beam*
9	*Main beam warning light*
10	*Sidelight RH*
11	*Sidelight LH*
12	*Panel illumination lights*
13	*Number plate illumination lights*
14	*Stop-lights*
15	*Tail-lights RH*
16	*Stop-light switch (mechanical)*
17	*Fusebox*
18	*Interior light*
19	*Interior light switch (door)*
20	*Tail light LH*
21	*Horn*
22	*Horn push*
23	*Direction indicator flasher unit*
24	*Direction indicator switch*
25	*Direction indicator warning light*
26	*Front direction indicator light - RH*
27	*Front direction indicator light LH*
28	*Rear direction indicator light - RH*
29	*Rear direction indicator light LH*
30	*Heater switch*
31	*Heater motor*
32	*Fuel level indicator*
33	*Fuel level indicator tank unit*
34	*Windscreen wiper motor*

No	Description
35	*Ignition/start switch*
36	*Ignition coil*
37	*Distributor*
38	*Oil pressure switch*
39	*Oil pressure warning light*
40	*No charge warning light*
41	*Headlight flash switch*
42	*Water temperature indicator (when fitted)*
43	*Water temperature transmitter (when fitted)*
44	*Reverse light switch*
45	*Reverse light*
46	*Radio (when fitted)*
47	*Voltage stabiliser*
48	*Line fuse*
49	*Automatic transmission starter inhibitor switch (when fitted)*
50	*Windscreen washer motor*
51	*Induction heater and thermostat (when fitted)*
52	*Carburettor dashpot heater (when fitted)*
53	*Tachometer (when fitted)*
54	*Direction indicator repeater lights (when fitted)*
55	*Heated rear screen switch*
56	*Heated rear screen*
57	*Combined windscreen washer and wiper switch*
58	*Hazard warning light*
59	*Hazard warning switch*
60	*Hazard warning flasher unit*
61	*Printed circuit instrument panel*
62	*Brake low fluid level warning light and test switch*
63	*Ballast resistor (cable)*
64	*Rear fog-guard switch*
65	*Rear fog-guard warning light*
66	*Rear fog-guard light*
67	*Brake fluid level sensor switch*
68	*Speakers (when fitted)*

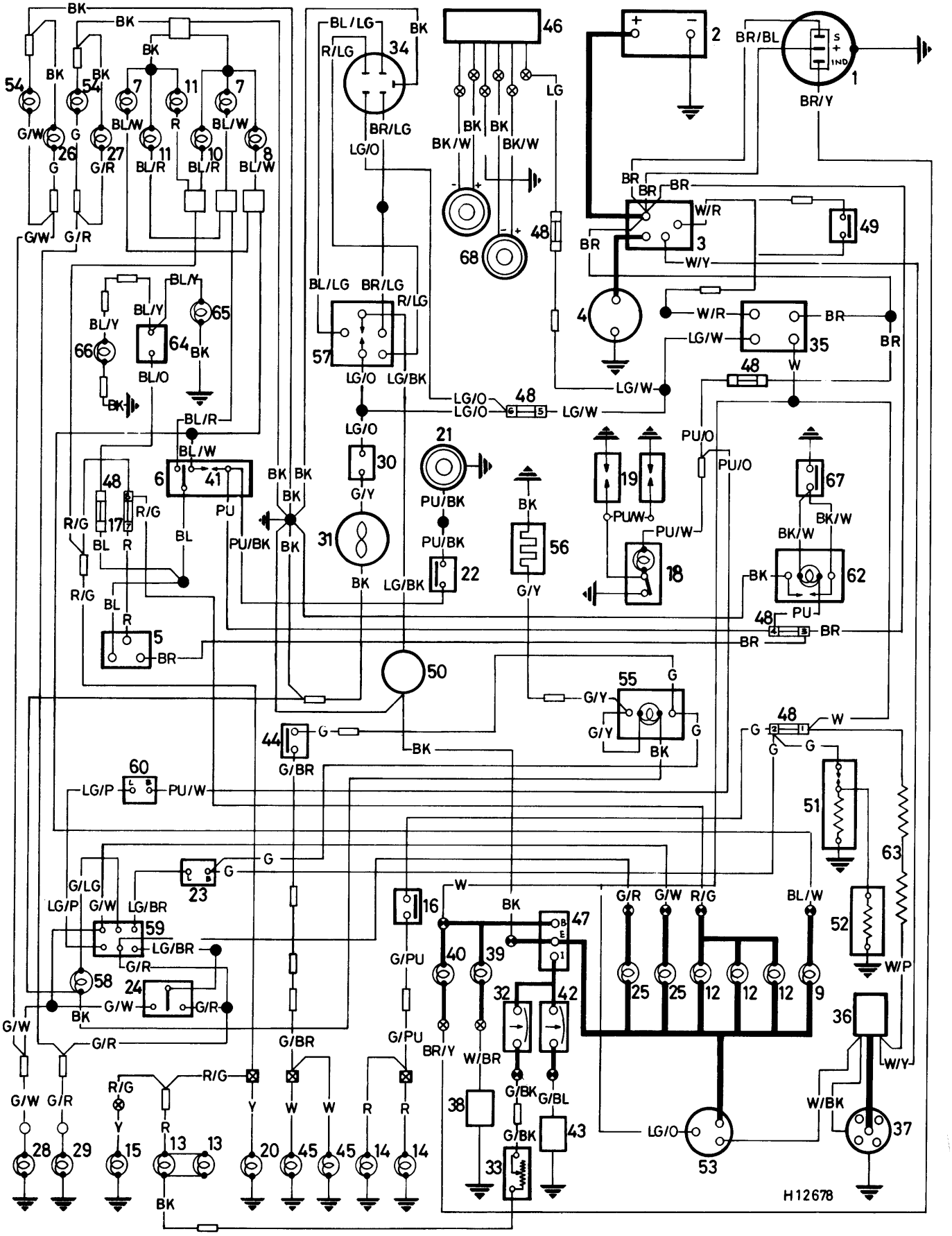
Cable colour code

BL	Blue	GR	Slate	PU	Purple
BK	Black	LG	Light green	R	Red
BR	Brown	O	Orange	W	White
G	Green	P	Pink	Y	Yellow

When a cable has two colour code letters, the first denotes the main colour and the second denotes the tracer colour



Wiring diagram 16 - all 1984-on carburettor models with single instrument pack



Wiring diagram 17 - all 1984-on carburettor models with multiple instrument pack

Key to wiring diagram 18

No	Description
1	Direction indicator unit
2	Direction indicator switch
3	Hazard warning switch
4	Hazard warning unit
5	Hazard warning light
6	RH front direction indicator
7	RH side repeater light
8	RH rear direction indicator
9	LH front direction indicator
10	LH side repeater light
11	LH rear direction indicator
12	Automatic transmission starter inhibitor switch
13	Distributor
14	Ignition coil
15	Starter relay
16	Ignition switch
17	Starter motor solenoid
18	Ballast resistor
19	In-line fuse
20	Fuse block
21	Stop-light switch
22	Dim/dip resistor
23	Heated rear window switch
24	Heater motor
25	Reversing light switch
26	Interior light
27	RH front door switch
28	Fuel tank sender unit
29	Radio - single speaker
30	Radio/cassette player
31	RH stop light
32	RH sidelight
33	LH sidelight
34	Headlight main beam
35	Headlight dip beam
36	Brake failure light test switch
37	Ignition warning light
38	LH indicator warning light
39	RH indicator warning light
40	Main beam warning light
41	Coolant temperature gauge
42	Fuel gauge
43	Rear foglight warning light
44	Panel lights
45	Heater switch
46	Horn switch
47	Voltage stabiliser
48	Battery
49	Lighting switch
50	Headlight dipswitch
51	Number plate illumination lights
52	RH tail light
53	LH tail light
54	Horn
55	Windscreen wiper motor
56	Headlight flasher switch
57	Rear foglight switch
58	Windscreen washer motor
59	Heated rear window element
60	LH front door switch
61	Wash/wipe switch
62	Alternator
63	Coolant thermistor
64	Oil pressure switch
65	Brake fluid level switch
66	Oil pressure warning light
67	Tachometer
68	RH/single door speaker
69	LH front door speaker
70	LH stop light
71	Rear foglight
72	Dim/dip relay
73	LH reversing light
74	RH reversing light
75	Emission control valve switch
76	Heated rear window warning light
77	Vacuum solenoid valve

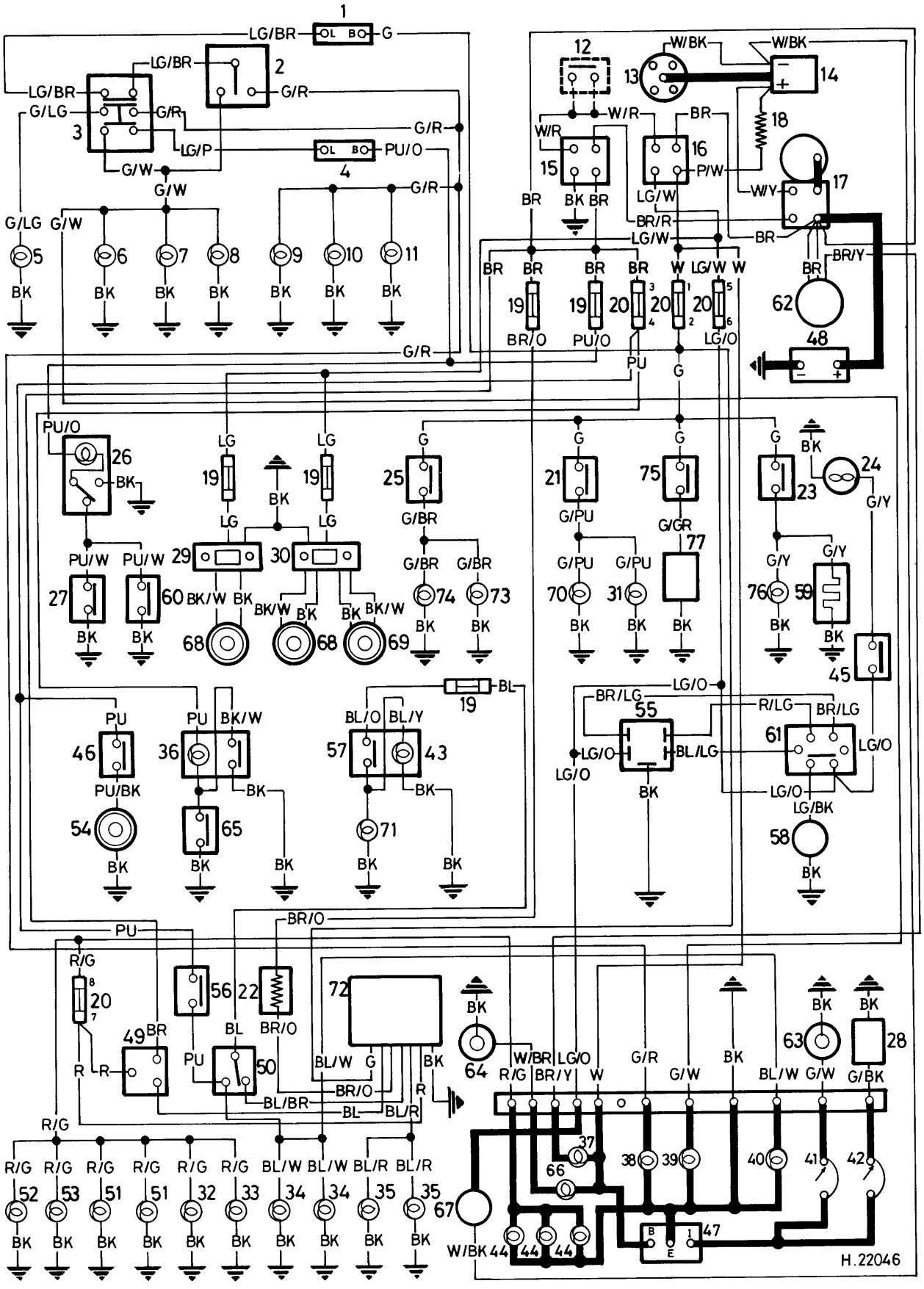
Cable colour code

BK	Black	O	Orange
BL	Blue	P	Pink
BR	Brown	PU	Purple
G	Green	R	Red
GR	Slate	W	White
LG	Light green	Y	Yellow

When a cable has two colour code letters, the first denotes the main colour and the second the tracer

Symbols used

1	Fuse	 1
2	Sealed joint	 2
3	Earth connection	 3



Wiring diagram 18 - 1988-on carburettor models

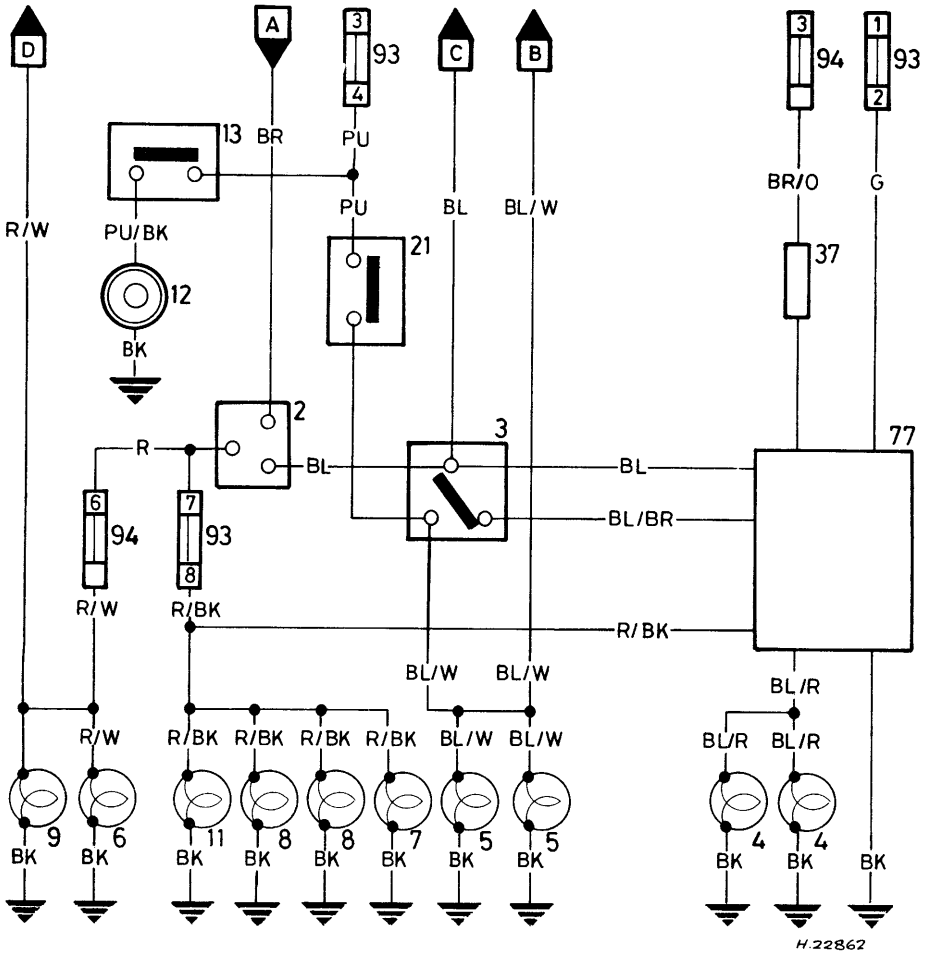
Key to wiring diagrams 19 to 32 inclusive

No	Description
1	Battery
2	Lighting
3	Dip switch
4	Dipped beam headlight
5	Main beam headlight
6	RH sidelight
7	LH sidelight
8	Number plate illumination light
9	RH tail light
10	Brake light switch
11	LH tail light
12	Horn
13	Horn switch
14	Direction indicator switch
15	RH front direction indicator light
16	LH front direction indicator light
17	Heater switch
18	Heater motor
19	Windscreen wiper motor
2û	Ignition switch
21	Headlight flasher switch
22	Rear foglight switch
23	Direction indicator/hazard warning light unit
24	Automatic transmission selector indicator light
25	Windscreen washer pump
26	Heated rear window switch
27	Heated rear window element
28	Hazard warning light
29	Hazard warning light switch
3û	Auxiliary cooling fan
31	Purge valve
32	Fusible links
33	LH side repeater light
34	RH side repeater light
35	Driver's door interior light switch
36	Passenger door interior light switch
37	Dim-dip resistor
38	Auxiliary cooling fan switch
39	Alternator
40	Starter relay
41	Ignition coil
42	Crankshaft sensor
43	Throttle potentiometer
44	Coolant temperature sensor
45	Fuel pump relay
46	Main relay
47	Manifold PTC heater relay
48	Inertia switch
49	Fuel sender unit
50	Fuel pump
51	Relay module
52	Automatic transmission starter inhibitor switch
53	Accelerator pedal switch
54	Diagnostic connector
55	Stepper motor
56	Manifold PTC heater
57	Oil pressure switch
58	Brake fluid level switch
59	Ignition/charging warning light
60	Oil pressure warning light
61	Brake system warning light
62	Tachometer
63	Coolant temperature gauge
64	Fuel gauge
65	Main beam warning light
66	LH indicator warning light
67	RH indicator warning light
68	Instrument pack
69	Intake air temperature sensor
70	Interior light
71	Radio/cassette player
72	RH speaker
73	LH speaker
74	Auxiliary cooling fan relay
75	LH brake light
76	RH brake light
77	Dim-dip relay
78	Instrument panel illumination
79	Distributor
80	RH rear direction indicator light
81	LH rear direction indicator light
82	Voltage stabiliser
83	Engine management ECU
84	Lambda sensor
85	Reversing light switch
86	Rear foglight
87	Fuel injector
88	Wiper column switch
89	Starter
90	Lambda sensor relay
91	Reversing lights
92	Direction indicator relay
93	Fuse
94	Line fuse
95	Radio fuse

Cable colour code

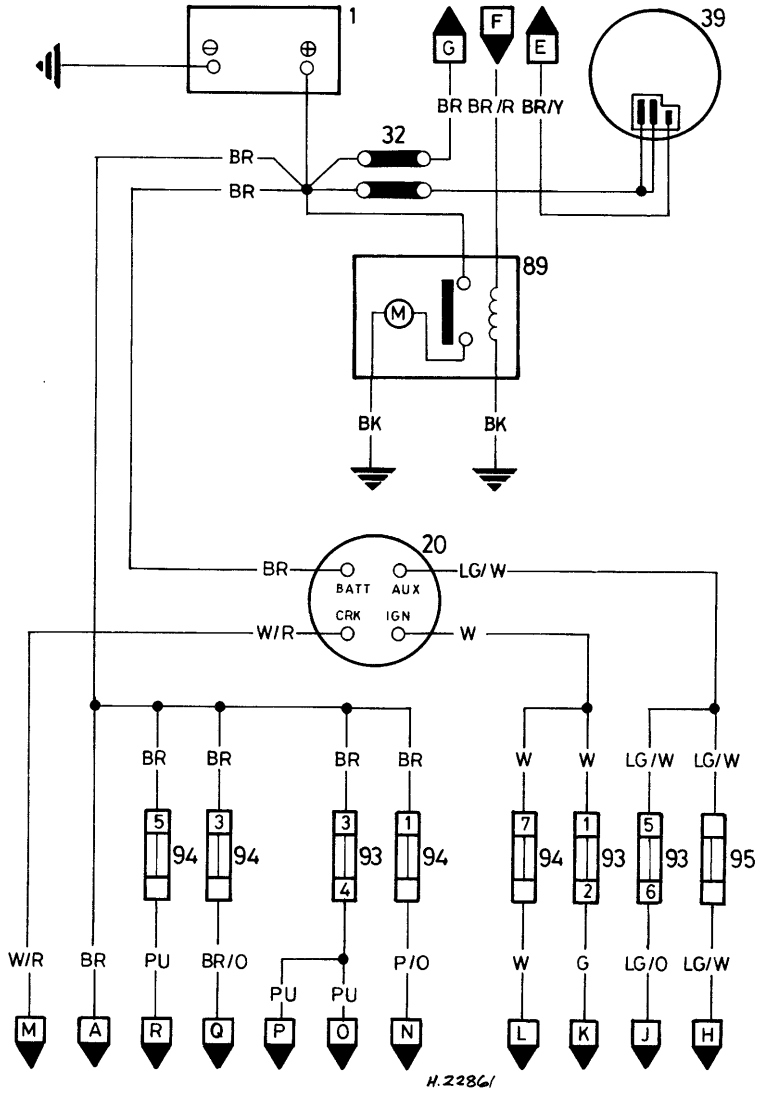
BL	Blue	O	Orange
BK	Black	P	Pink
BR	Brown	PU	Purple
G	Green	R	Red
GR	Slate	W	White
LG	Light green	Y	Yellow

When a cable has two colour code letters, the first denotes the main colour and the second denotes the tracer colour



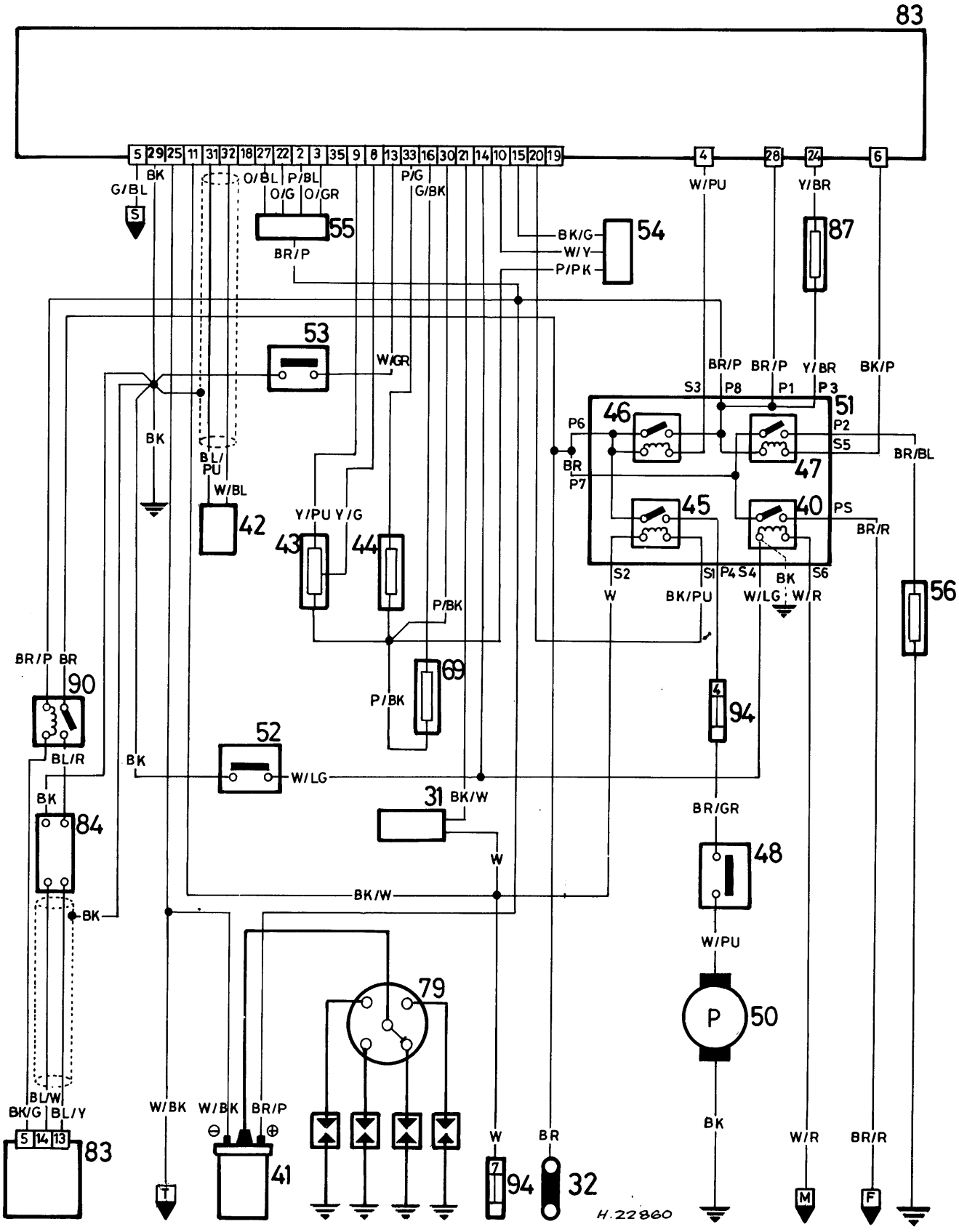
Wiring diagram 19 - Dim-dip lighting and horn circuit (fuel-injected models)

A To power distribution circuit
B To instrument circuit
C To foglight circuit
D To instrument circuit



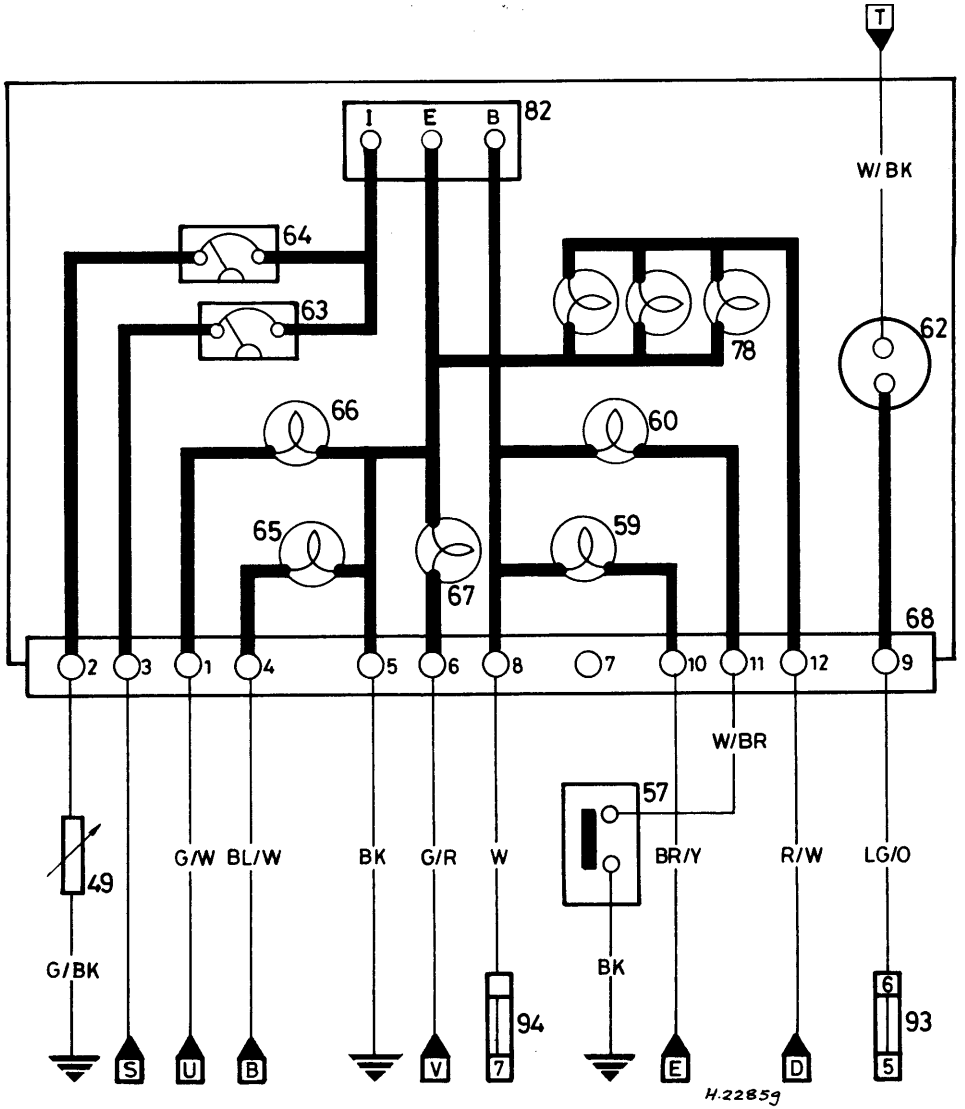
Wiring diagram 20 - Power distribution circuit (fuel-injected models)

E to Wiring diagram 22
F to Wiring diagram 21
G to Wiring diagram 21
H To Wiring diagram 26
J to Wiring diagrams 22, 24, 25, 31
K to Wiring diagrams 19, 23, 32
L to Wiring diagrams 21, 22
M to Wiring diagram 21
N to Wiring diagrams 23, 28
O to Wiring diagrams 19, 26
P to Wiring diagram 27
Q to Wiring diagram 27
R to Wiring diagram 25
A to Wiring diagram 19



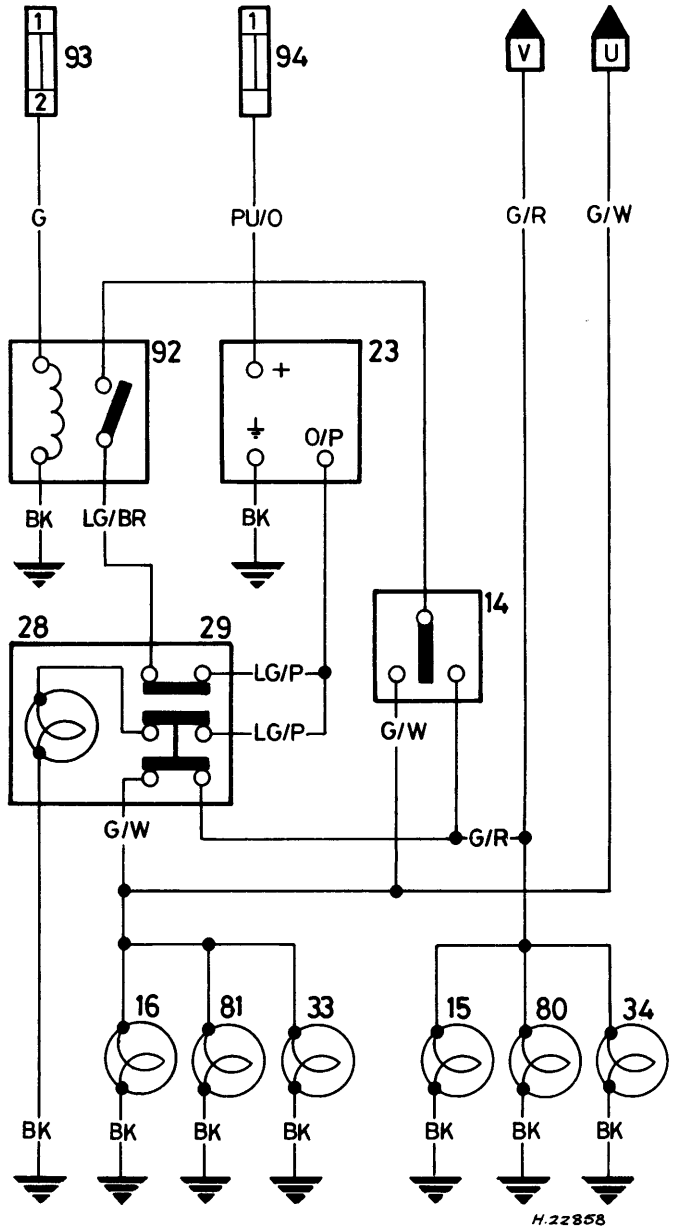
Wiring diagram 21 - Engine management circuit (fuel-injected models)

F to Wiring diagram 20
M to Wiring diagram 20
S to Wiring diagram 22
T to Wiring diagram 22



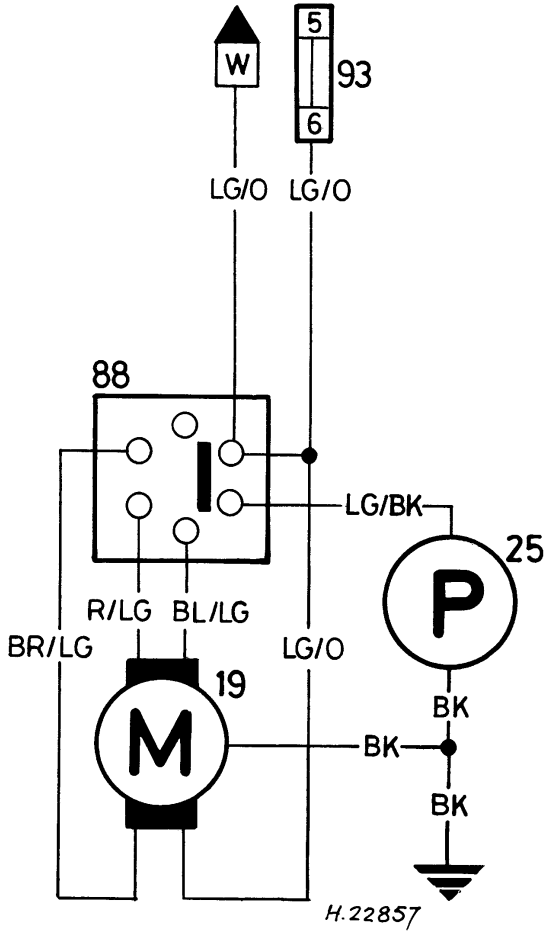
Wiring diagram 22 - Instrument circuit (fuel-injected models)

E to Wiring diagram 20
B to Wiring diagram 19
D to Wiring diagram 19
S to Wiring diagram 21
T to Wiring diagram 21
U to Wiring diagram 23
V to Wiring diagram 23



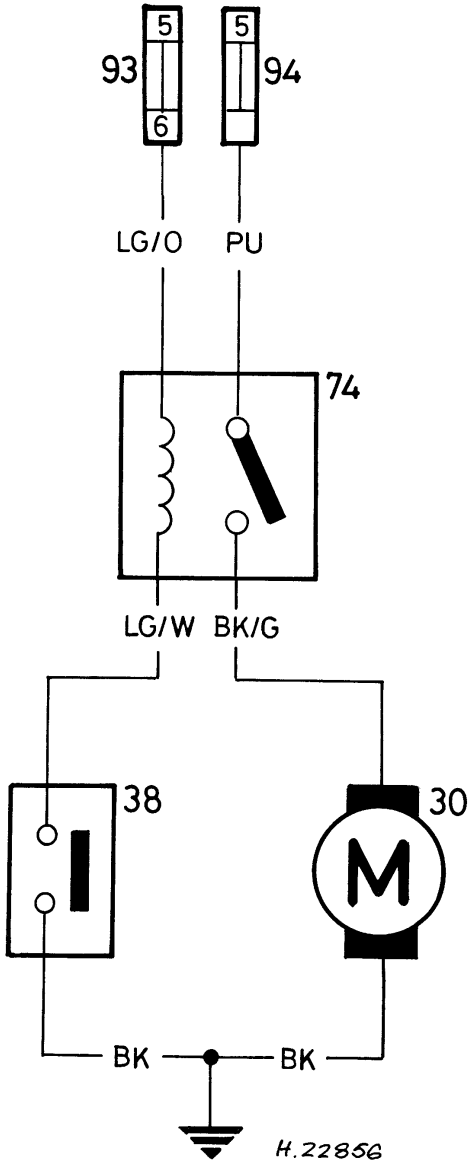
Wiring diagram 23 - Direction indicator and hazard warning light circuit (fuel-injected models)

U to Wiring diagram 22
V to Wiring diagram 22

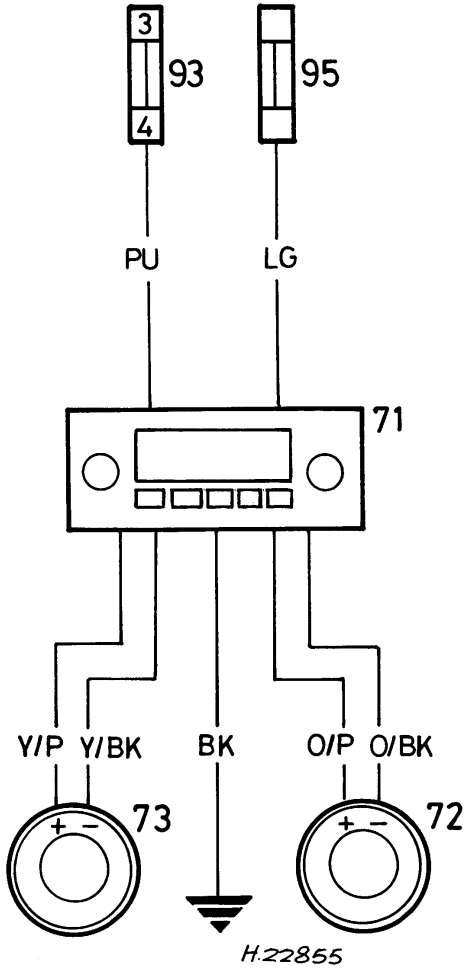


Wiring diagram 24 - Wash/wipe circuit (fuel-injected models)

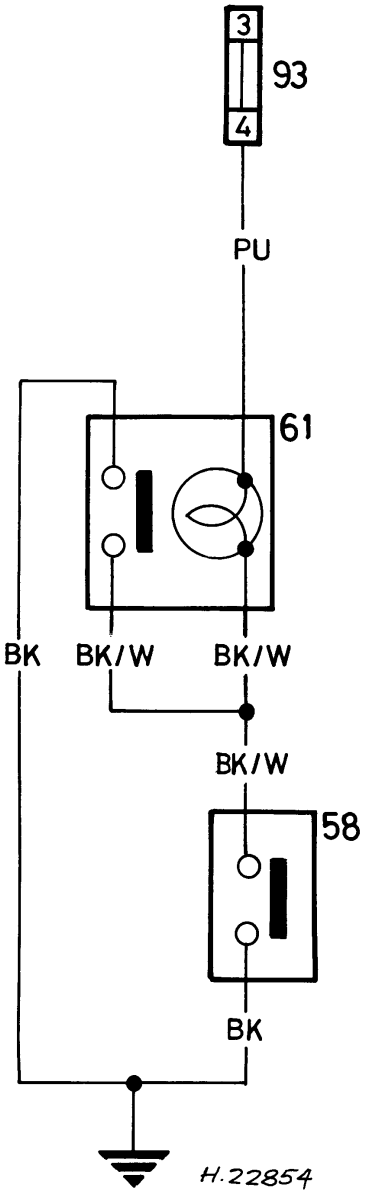
W to Wiring diagram 30



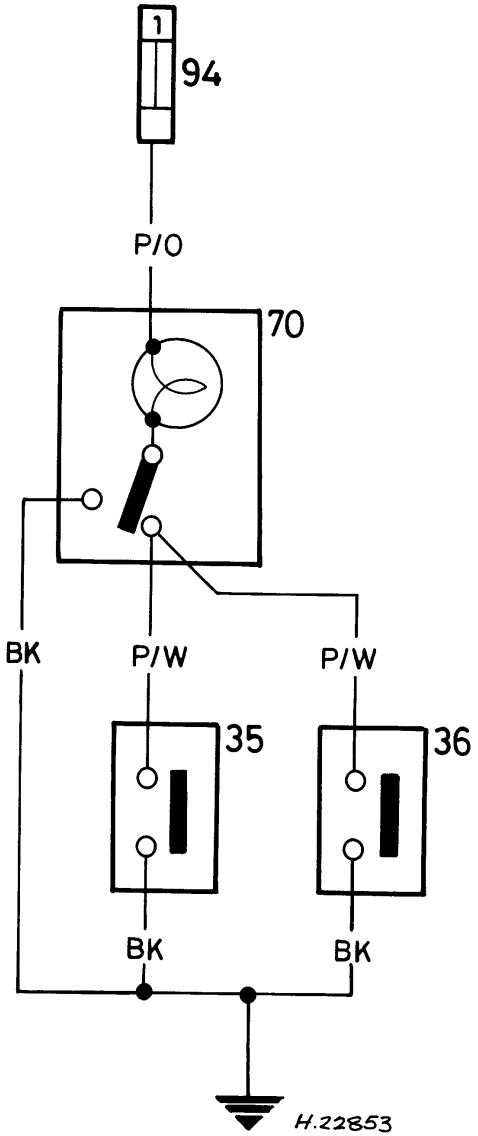
Wiring diagram 25 - Auxiliary cooling fan circuit (fuel-injected models)



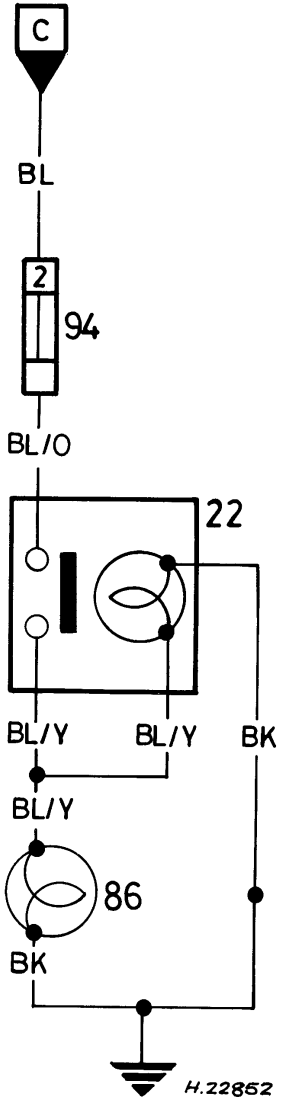
Wiring diagram 26 - Radio/cassette player circuit (fuel-injected models)



Wiring diagram 27 - Brake test circuit (fuel-injected models)

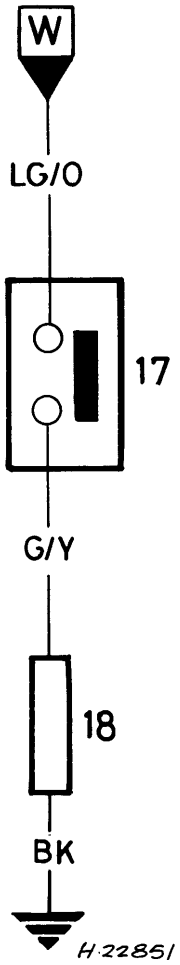


Wiring diagram 28 - Interior light circuit (fuel-injected models)



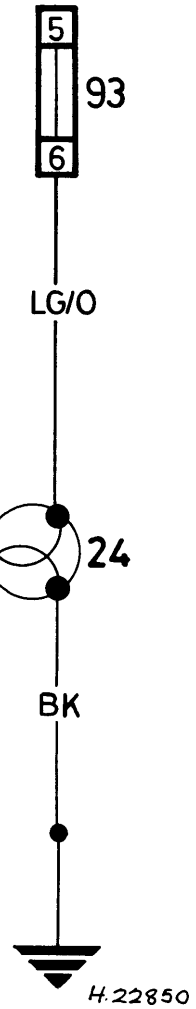
Wiring diagram 29 - Foglight circuit (fuel-injected models)

C to Wiring diagram 19

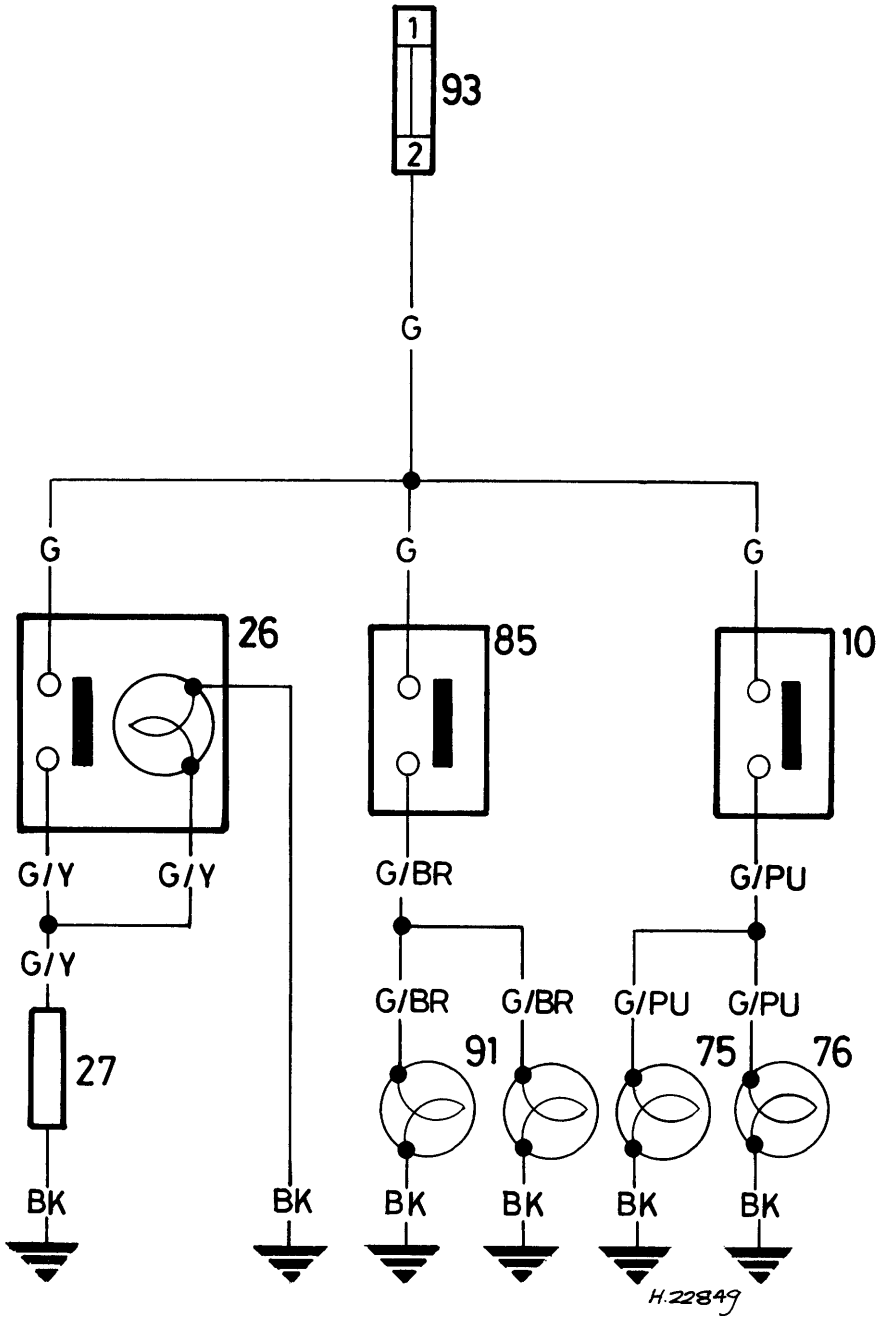


Wiring diagram 30 - Heater circuit (fuel-injected models)

W to Wiring diagram 24



Wiring diagram 31 - Automatic transmission selector illumination circuit (fuel-injected models)



Wiring diagram 32 - Reversing light, stop-light and heated rear window circuit (fuel-injected models)