Literature

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Title: **MGB/NG Electrics**

Author: **Brian Baggarley**

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MGB/NG ELECTRICS

by

Brian Baggarley

plus - Geoff Briscoe's wiring diagrams, drawn by Malcolm Reilly

MGB/NG ELECTRICS 1

THIS SERIES OF ARTICLES HAS BEEN WRITTEN BY A NON-SPECIALIST IN VEHICLE ELECTRICS AND IS BASED ON PERSONAL EXPERIENCE ONLY. IT SHOULD NOT BE CONSIDERED THE ONLY METHOD.

Over the next few issues of Changing Gear I hope to give some help to those who want to tackle their own wiring. I should add at this point that I had no previous experience in vehicle electrics prior to my TD build and apart from a few silly, easily rectified mistakes, it works.

My donor vehicle was a 1971 MGB GT 1800 cc and I will be concentrating on this car. You may find some minor variations in other models but the basics should be similar. My own wiring diagram on which this article is based is Diagram 11 in the MGB Workshop Manual, Section N page 0338.

Where to start?

1. Buy or borrow the Haynes or MGB Workshop Manual.

2. Identify your own wiring diagram from the many variations. You will need your original chassis number for identification purposes.

3. Write the names of all components on the diagram against the numbers. This will make life much easier when working on the car later.

4. Do the same with the colour code. Steps 3 and 4 reduce the number of diagrams/lists to one and avoids the need to continually refer to other pages in the manual.

5. At this stage photocopy the marked wiring diagram, ideally at A3 size. Take two copies.

6. Tippex out all the components and wires not to be refitted to your NG. Do this on one copy only. The other is for reference purposes when dismantling the loom. If in doubt, leave the item in. When you come to rewire you can colour in the cables/components as you fit them.

7. Now is the time to take out the loom from the MG, BUT REMEMBER to label each connection with sellotape and paper markers as you strip out. It's a long fiddly job but well worthwhile when you come to reconnect and you can also be sure of using the correct size wire when you come to rewire. If you have already stripped out your loom without labelling it, never fear, it's just harder in the long run. I borrowed a friend's MGB.

8. Clean the loom's outer covering and replace any labels as necessary.

9. Decision point. At this point you will have to decide whether you are going to refit the loom as removed without further work, remembering that the rear loom will require shortening, or strip the complete loom down to its basic components as I did. Your decision will depend on a number of factors:

   a. Confidence - (I found the necessary courage, so can you).

   b. The condition of the loom and outer covering.

   c. Time.

   d. Cost.

   e. Instrument layout and type of switches to be used.

10. I would suggest that if you have decided to rewire the NG yourself you should dismantle the loom. You will find it far easier to route individual cables to build up your own loom rather than struggle to fit the whole rigid bunch. I believe this method is safer because:

a. All redundant cables can be removed.

b. Individual cables can be visually as well as electrically checked prior to installation.

c. You are less likely to forget to make a connection.

d. Electrical component locations will be different from the donor vehicle, requiring adjustments to th length of cables.

11. Assuming that you are still willing to rewire from basic, then you will need to buy some or all of the following:

a. Soldering iron (60 watt) with flux cored solder. £10 to £15.

b. Gunson's Test Meter.

c. Fine emery cloth.

d. A selection of tie wraps. £5 to £10.

e. PVC sleeving. I bought 5 m of each of 4, 6, 8, and 10 mm diameter. £7.

f. Pre-Insulated Terminals. The quantities assume all old connections will be renewed. MERV Plastic C descriptions used (see para 14a). The most common ones I used were:

(1) Female blade Red 14/0.30 about 20 to 30.

(2) Female blade Blue 21-35/0.30 about 80.

(3) An assortment of ring connections of various diameters; a maximum of 10 of each should be considered at this stage.

(4) Piggy back connectors, Blue; up to 10.

(5) Bullet connectors about 20 to 30. I went for the soldered type but crimp on connectors work b not look as neat. You may be able to omit the soldering iron if you use crimp on connectors through

(6) Snap connectors both single and double. Initially 10 of each but this depends on the conditio the ones fitted to your loom.

g. Crimping tool. £7.

h. PVC tape, about 60 to 80 m. £5.

j. Battery/starter cable. Cost will depend on battery position.

k. Battery terminals. £5.

l. Earth strap. £1 (approximately).

m. Tying wire. I used the paper covered wire my wife bought to seal food in bags for the freezer. Th saves expensive tie wraps when you are building up the loom (it was her idea anyway).

n. Cable. I did not buy any new cable, I used redundant lengths from the old loom. If you follow my example then be careful with cable sizing; more of this in the next article. Remember to indicate on yo wiring diagram where you have used non-standard colours.

12. Decision point. How many original minor electrical components from your donor vehicle do you need to replace? I replaced all mine except the starter solenoid relay. Even this was eventually replaced as it stu shut leaving the engine merrily cranking over even after removing the ignition key. Don't forget to allow for suppression equipment if you intend installing a radio or cassette player.

13. The last point for consideration in this article is battery position. I elected to put mine in the engine compartment and did not fit a brake servo. The battery sits beside the heater on the front bulkhead. I used a Oldham Heavy Duty Type 063 (Halfords). Alternative battery positions are rear battery well or 2 x 6 volt, one each rear passenger footwell (TD/TF). Remember you may need a more powerful battery if you locate it in the re of the vehicle.

14. Useful addresses for fittings/components/advice.

a. MERV Plastics, 201 Station Road, Beeston, Notingham, NG9 2AB, Tel (0602) 222783. Terminals, tie wrap sleeving, PVC Tape, Crimping tool, cables etc mentioned in paragraph 11. The catalogue also gives some us guidance on basic techniques.

b. Speedex International, 153/154 Westbury Trading Estate, Westbury, Wiltshire, England, Tel (0373) 8263 Switches, tie wraps, P Clips etc.

c. Woolies, I & C Woolsten Holmes Ltd, off Blenheim Way, Northfields Industrial Estate, Market Deeping, Nr Peterborough, PE6 8LD, Tel (0778) 347347. Switches, electrical components etc.

d. The Complete Automobilist Ltd, Dept 1, The Old Rectory, Greatford, Stamford, Lincs, PE9 4PR, Tel (077 312. Lamps, switches etc.

e. Paul Beck Vintage Supplies, High Street, Stalham, Norwich, Norfolk, NR12 9BB, Tel (0692) 81534. Vari vintage electrical items.

f. Brian Baggarley

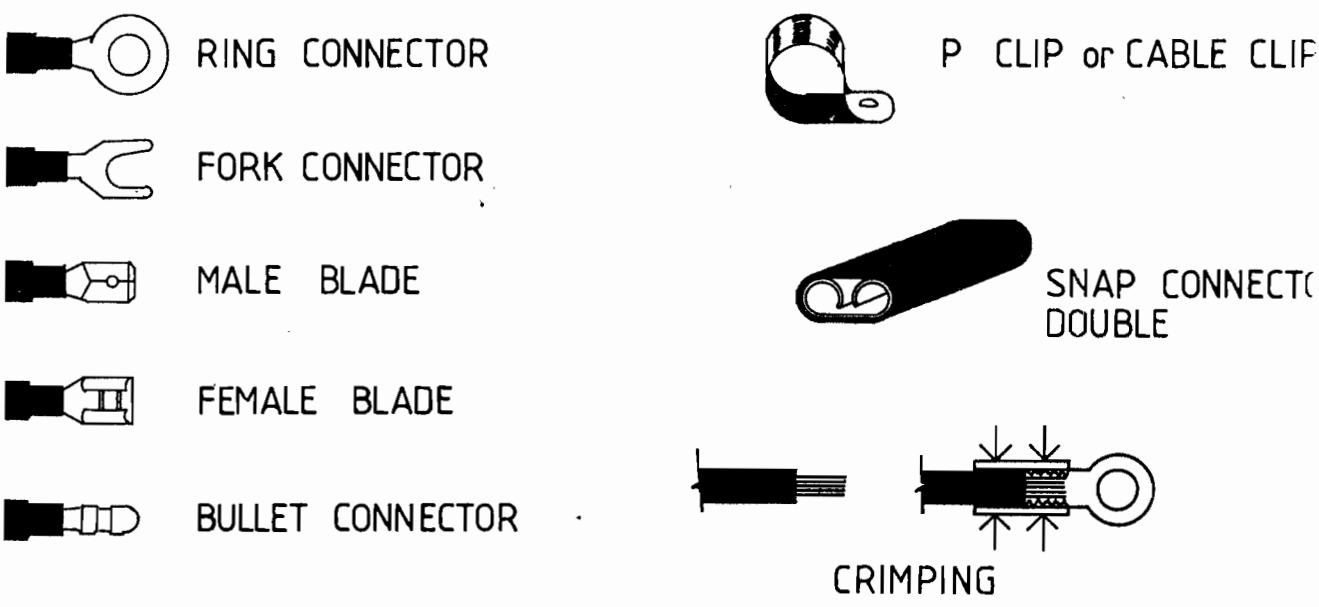
g. Mobilex, Tinkers Cottage, Bleasby Road, Thurgaton, Notts, NG14 7FW, Tel (0636) 813809. For those who the heading and opted out. Mobilex offer a wiring service, at a price.

15. In the next article I shall deal with instrument layout, switches and basic layout. Between now and the n article you will need to think about the following:

a. Your own ideas on instrument and switch layout.

b. How many lights you want up front. I used the Ciebie dipping spots bought through NG Cars and side lights fitted to each cycle wing in addition to the standard headlights and indicators.

c. The use of a central console mounted under the dash. I used an MGB console salvaged from a scrapped roadster.



16. I hope my first article was of interest and has helped a few "wavering hearts" to undertake a rewire. In last article I dealt with the basics of stripping, labelling and equipment and asked you to consider 3 things p to reading this article:

a. Instrument and switch layout.

b. Forward lighting.

c. A central console.

17. Each NG is unique and it would be wrong of me to dictate a particular layout. It is necessary for you to include the different electrical components/functions for your car to be road legal. These again will differ, for instance you fit aero screens the need for screen washers and wipers disappears. Some or all of the follow will be fitted to your NG. I have indicated with an * those components I fitted:

a. *Head Lights: Side, Dip and Main Beam.

b. *Spot Lights: Dip and Main Beam.

c. *Side Lights: Mounted on Cycle Wings.

d. *Front Indicators.

e. *Twin Horns.

f. *Windscreen Washer Pump.

g. Engine Compartment Light.

h. Map Light.

j. Boot Light.

k. *Cassette Player.

l. *4 Way Flasher.

m. *Rear Indicators.

n. *Stop/Tail Lights.

o. *Number Plate Lights.

p. *Wipers.

q. *Clock.

r. *Speedo/Rev Counter/Oil & Temp/Petrol gauge & Sender unit.

s. *Petrol Pump.

t. *Heater Fan.

u. Rheostat for Dash Lights.

v. Battery Isolator.

w. Electronic Ignition.

x. Alarm.

y. *Relays and Fuse Box.

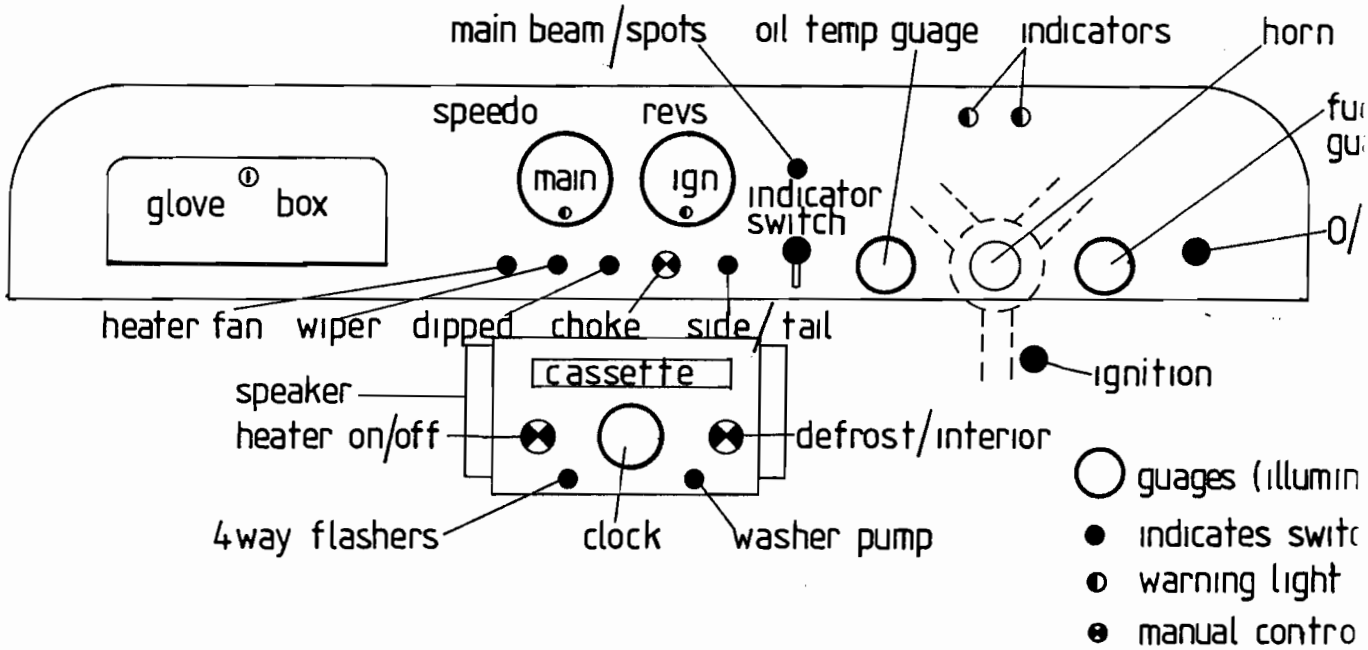
z. *Flasher Unit/Indicator Switch/Voltage Stabiliser.

aa. Cigar Lighter.

bb. Thermostatically Controlled Fan.

18. You will notice that I have not included the major electrical components such as alternator, coil, batter starter, distributor and overdrive.

19. The instrument layout I chose is shown below. I should add that I changed the overall layout many times before I started cutting out the dash.



20. You will see from the above sketch that I did not fit the MGB column stalk switches preferring to locate main beam and indicator switches along with the overdrive switch directly to hand under the steering wheel. I might add that the system works extremely well when driving and with the addition of the console the dash is uncluttered.

21. I also opted to use special push/pull switches at £2.95 each from Woolies (see MGB/NG Electrics 1) rather use the metal plate from NG. Speedex (see Electrics 1) offer a black crackle finished metal plate cut to take switches and an ignition. Switches can be supplied.

22. My system left me with a single speed wiper motor (adequate) and 3 switches to control the lights. My indicator switch is from a Bedford 4 tonne truck and has a distinct period look. Flasher repeater lamps are f Halfords and the overdrive switch is non standard. This necessitated fitting a relay to reduce the current lo on the switch.

CABLE SIZES

23. Cables must be of the correct size, that is the cross sectional area, to carry the current without overh and additionally to prevent a large voltage drip preventing the component from operating.

24. Cables are graded by indicating the number of strands and the diameter of a single strand eg. 14/0.01 (i has 14 wires each of which has a diameter of 0.01 inch. You will need to identify the difference between Incl Metric cables if you intend buying new cables. Five common sizes are listed below:

Inch Units	Metric Units (mm)	Current Rating (Amps)	Used for
14/0.012	14/0.3	8.75	General applications, parking and rear l stop lamps, flashers and radios.
28/0.012	28/0.3	17.5	Headlights, horns, cigar lighters.
44/0.012	44/0.3	27.5	Dynamo charging circuits.
65/0.012	65/0.3	35	Alternator charging circuit.
84/0.012	84/0.3	41.5	Alternator charging circuits.

If these cables are run in a loom the rating shown should be reduced to 60% to avoid overheating.

25. As you can see with the most commonly used cables the wire diameter is constant - just count the strands. find the type of cable you need for a particular component you can either:

a. Match the existing cable from the old loom visually.

b. Check the instructions to see what the manufacturer recommends. For example Oscar H4 spots need 28/(gauge. (28 strands each 0.3 mm in diameter).

c. Calculate the current. For example on a 12 volt system a 60 watt spot light bulb would draw 60 divi by 12 = 5 amps. A 14/0.3 rated at 8.75 amps would do, but in a loom this is reduced to 60% (5.25 amps) w is too close, hence the uprated cable in para 25 b.

COLOUR CODING

26. My MGB followed the Lucas colour coding system of 7 plain colours supplemented with a thin line trace of different colour. The following list shows the basic colour layout:

a. Black : earth connections.

b. Green : feeds to auxiliary components controlled by the ignition switch, eg wipers, flashers etc.

c. White : base colour for ignition circuits.

d. Red : Side lights, parking and rear lights.

e. Blue : with white trace - main beam.
with red trace - dipped beam.

f. Purple: auxiliary components not controlled via the ignition switch, eg horn, interior lights.

g. Brown : main battery feed.

27. Other colours used are light green, pink and yellow.

BASIC LAYOUT

28. Most of the major electrical components can only be fitted in one place. This is the good news, it does however leave you to position the following: (brackets show my choice of location)

a. Washer pump and bottle (Nearside front bulkhead (bottle) with pump on top of bulkhead).

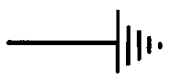
b. Battery (Nearside bulkhead top).

c.	Coil	(Beside clutch and brake master cylinders)
d.	Fuse box	(Offside front bulkhead)
e.	Radio/cassette	(Console).
f.	Horns	(In front of radiator).
g.	Relays	Various locations but ideally near the component.

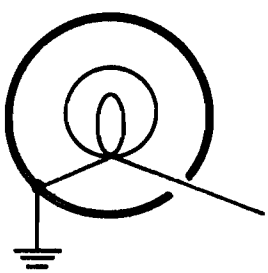
In the next article I shall deal with the actual circuitry and wiring up. May your ohms be little.

WIRING DIAGRAM (Some common symbols)

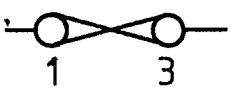
Double snap connector, 2 cable to 1 cable connection.



Earth connection. Make sure your earth loop is not interrupted by rubber mountings etc.

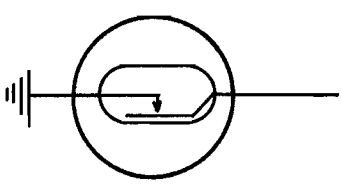


Instrument light with earth and power connections.



Fuse. Numbers indicate fuse box rather than inline auxiliary fuse

Thick cable. Battery to earth and starter solenoid.



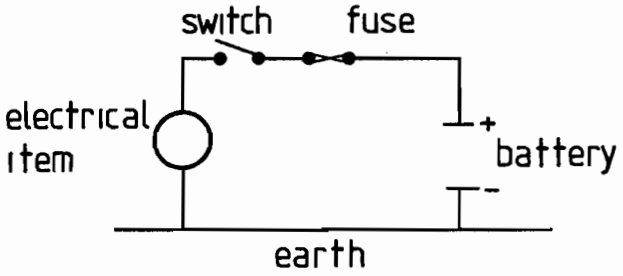
Petrol guage sender unit mounted in tank.

MGB/NG ELECTRICS 3

29. In my last article, I covered instrument and component layout, cable sizing and colour coding. Before I g to deal with circuitry and wiring up, I want to cover earthing.

30. All black cables in your original loom were there to provide an earth return circuit for an electrical component. Without this earth return, no current could flow. The MGB from which your loom was taken had a met body and dash and the earth return was via these metal parts to the battery for all components mounted thereon.

31. The NG is different with its GRP body. It does however have a metal chassis and I used this as my earth return. The dash being wood cannot act as an earth return so additional wires are required to complete the circuit. A word of warning, some early MGB's were fitted with a positive earth. If your car is one of these, you will need to reverse the basic circuit below:



If you apply this basic layout to your own circuits yo will not go far wrong. The circuit has a positive fee from the battery (or via another component that has it own positive feed). Most circuits have a fuse fitted protect the component. Next comes the switch and the component. Finally the earth return.

LAYOUT OF LOOM

32. The idea is to end up with a neat, protected loom supplying power to the various components. You will be installing about 200 feet of cable with upwards of 100 connections to your NG. There can be nothing more frustrating than building in faults through poor workmanship and having to trouble shoot and maybe strip out previously installed circuits. The following list gives some areas where care is required to prevent these problems:

a. Cables. Check the cable using the OHM setting on your multimeter. You should get a zero reading meaning no resistance (breaks) in the cable. Look at the PVC covering, it should be in good condition and free from cracks or cuts exposing bare wires.

b. Connections. These must be clean. Use emery cloth to buff up bullet connectors and blades. Remove traces of oil and grease. Make sure when crimping that you crimp both the wire strands to the metal and t PVC cover to the cable covering. Check by trying to pull the connector off.

c. Shrouds. Rubber covers should fit, ideally be new and not cracked or split.

d. Switches. Again using the OHM scale check that you get zero resistance when on and maximum resistar when off.

e. Electrical components. This is one area where you are on your own. I took the easy (expensive) way and replaced the lot. The Haynes/MGB workshop manuals show how to check these components.

f. Tightness. All bolted and push on connections must be tight.

g. Protection. Run your cables in protected areas. Use body/chassis parts to protect the loom from mechanical damage from flying stones etc and the worst of the weather and muck thrown up from the road. routing should be such that bits that move, turn or get hot on the engine don't touch the loom. General protection is afforded by strapping the completed loom in PVC tape or cable sleeving and by fixing the lo non moving parts with tie wraps.

h. Grommets. Use new rubber grommets to protect cables/loom passing through the body or holes in metal components. Grommets can be glued to holes through the body to prevent displacement.

j. Slack. Allow some slack in each cable as you build up the loom. This will prevent connections bei pulled off and cables from snapping when running the NG. There will be movement in your NG from vibratio flexing of the body/chassis.

k. Seal the ends of sleeving/holes into fittings with a mastic sealant. (Messy).

l. Bare wires cause fires.

BUILDING THE LOOM

33. Armed with your enlarged, amended circuit diagram (Electrics 1 para 5), a fist full of connectors, tying etc you are now ready to start.

34. I would suggest you start at the rear of the NG. It is the simplest part to rewire and should not deviat far from the original circuit diagram. It's also a great confidence builder.

35. Work from the near side wiring each lamp as you go. Aim to complete one component before moving onto the next. The earth wires from the three standard NG lights each side can be combined and using a ring connector to one of the rear chassis/body bolts. All these cables need to be sleeved with a PVC covering.

36. Run the cables into a loom and fix with tie wraps/P clips to suitable fixing points. I used P clips fitt the rear valance securing screws with tie wraps through the loop of the P clip supporting the loom.

37. Next you need to decide how to route the loom to the front of the car. I chose to come up through the bc behind the petrol filler pipe, up the off side wall in the boot and using P clips and tie wraps secured the PV taped loom to the underside of the channel formed by the GRP roll along the top edge of the body. The P clips were fitted to bolts used to fix the hood frame and arm rest padding.

38. The rear loom was terminated under the wooden dash. You have now wired in the following:

a.	Stop lights	(Green Purple feed, black earth).
b.	Tail lights	(Red feed, black earth common with 'a').
c.	Flasher lamps	(Green Red feed - nearside, Green White feed - offside, black earth).
d.	Number plate lights	(Red feed, black earth).
e.	Fuel pump	(White feed, black earth).
f.	Fuel tank sender unit	(Green Black feed, black earth).

39. Working forward under the car you can now route the overdrive and reversing switch cables up over the gea to the front offside bulkhead.

40. The overdrive cable is yellow, maybe with a red or purple trace. This will be connected to the standard switch on the dash. If like me you use a non standard switch then this wire goes to a relay. (More about rel in the next article).

41. The reversing light cables (Green Brown) are connected together routed under the body and connected to th reversing switch on the gear box. I did not fit reversing lights and left the original loom from the gear bo forward intact. I masked off the reversing lamp cables just leaving the O/D to be connected.

42. You will now hopefully have correctly wired up the rear of the car. The real fun starts from this point particularly when working under the dash (no seats fitted and use a cushion for your head) and in the engine compartment.

In the next article I shall be covering the front half of the loom, relays, ignition switch and fuse box.

MGB/NG ELECTRICS 4

43. This is the fourth and last part of this series of articles dealing with wiring up your 1800 cc NG.

44. This article covers the bulk of the practical work, namely the dash and under bonnet wiring. Before I de with this last phase, I want to cover three separate but important items. These are:

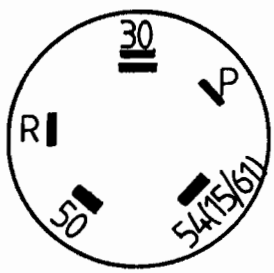
a. Ignition switch.

b. Fuse Box.

c. Relays.

IGNITION SWITCH

45. When I looked at my wiring diagram nothing appeared easier than the ignition switch. Four connections numbered 1 to 4 and on your MGB I hope the actual switch has the same numbers, mine did not. My switch was ma West Germany with BMK 2259 stamped on it. For those with the same switch read on; the remainder pass to Fuse Box. If you have already mounted the column and ignition switch never fear. For ease you can remove the actu switch by undoing two small screws on the back. The switch can only be fitted one way when you replace it as is a small lug on the body which locates into a recess on the switch. On the rear of the switch you will see following:



Rear view-ignition switch

Connections are as follows:

a. Peg 50. White/Red cable from W1 on starter solenoid relay.

b. Peg R. White/Green cable from auxiliary in line fuse (Green/Pin cable on other side of in line fuse.)

c. Double Peg 30. Four white cables from O/D switch, Ign warning l Tacho and fuel pump.

d. Peg P. Spare.

e. Peg 54 (15/61). Brown cable from the starter solenoid.

FUSE BOX

46. I refitted the standard 8 double peg fuse box with 35 amp (17 amp continuous) fuses. Yours may differ, b the basics should remain the same:

a. Peg 7. Always live.

b. Peg 8. Fed from 7. Horn relays/horn push.

c. Peg 5. Live when Ign on. Fuel pump/Ign switch peg 2 (Peg 30).

d. Peg 6. Main auxiliary supply terminal. Voltage stabiliser/Flasher unit/Stop lamp switch. (Note o stop switch, one connection peg is raised above the other, this takes the Green/Purple from the stop lamp The green from fuse 6 fits onto the lower peg).

e. Pegs 3 & 1. Interconnected, fed from light switch when on.

f. Pegs 2/4. I used this for my side light circuit.

RELAYS

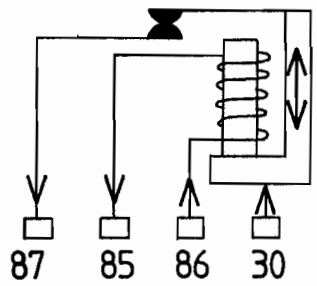
47. This is simply an electrically operated switch. It is used to reduce the current passing through the cont of the operating switch, mounted on say the dash, which may lead to switch failure. Items that should have rel fitted are:

a. Spot/Fog lamps.

b. Horns.

c. Components operated by non standard switches of unknown current rating or of low current rating.

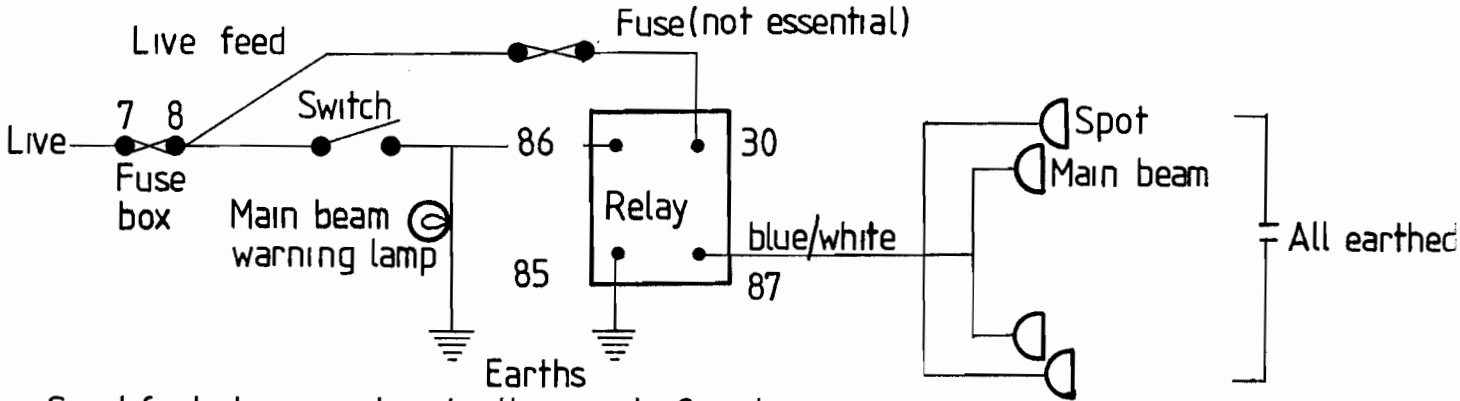
48. Relays generally have 4 pegs (mine did anyway) each peg numbered or lettered depending on the country of manufacture.



GERMAN	BRITISH	ITALIAN
87	C1	A
30	C2	B
85	W1	P
86	W2	BLANK

When the switch is put to o power is fed to 86 energis the coil causing the centr spike to move down and close the contacts allowin power to flow through 87 to the component.

49. The connections and operation of a relay are best illustrated with a wiring diagram, in this case for spot/main beam.



Simplified diagram. I actually used 2 relays one each for spot and main beam. This used a common feed to 86 & 30 on both relays. Switch operates both sets of lights. As p

50. My relays came from Halfords with a double peg 87. Only use the outer peg as nothing happens when you co a cable to the inner one.

CIRCUITS

51. The majority of the circuits to be installed will be identical to your wiring diagram. As you make a connection, colour in the cable/component on the diagram. Circuits possibly requiring changes are shown below diagrammatic form. Circuits dealts with are:

a. Lights. (When using on/off switches rather than standard MGB fittings).

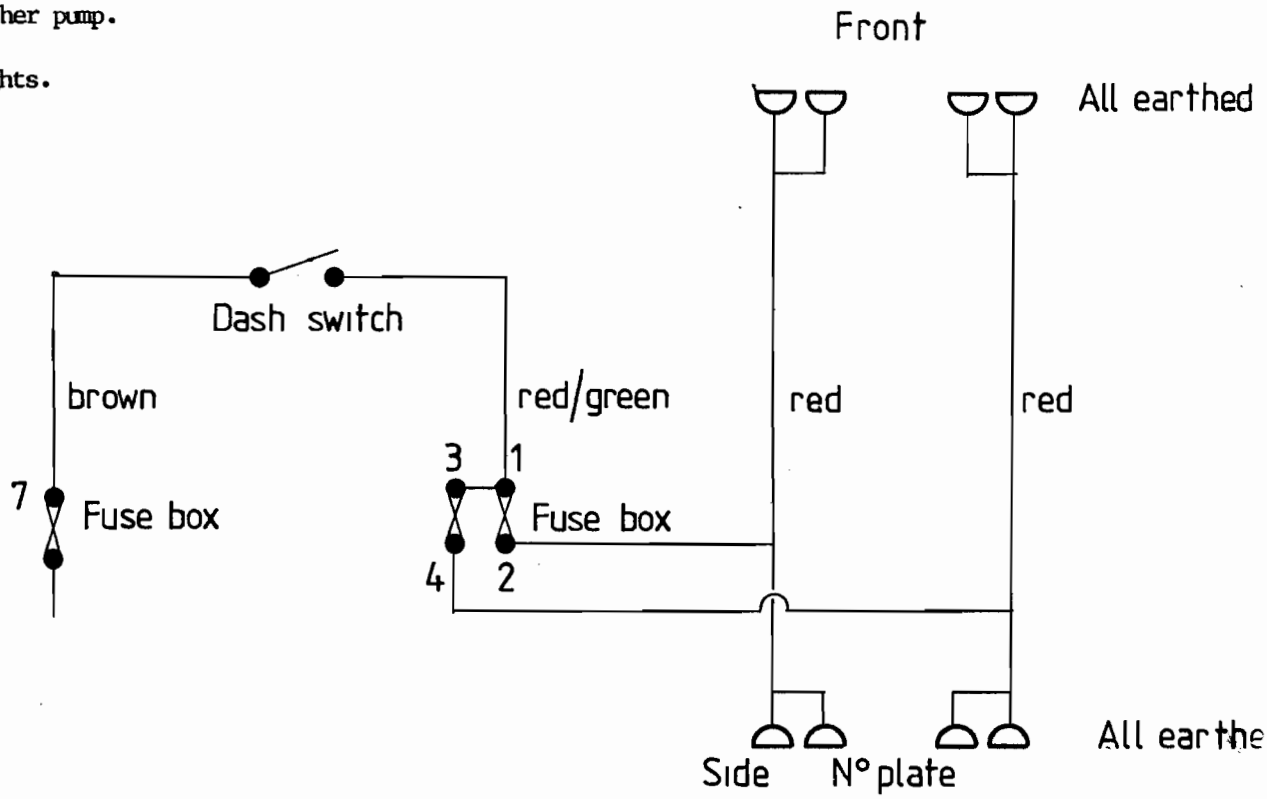
b. Wiper. (When using on/off switches rather than standard MGB fittings).

c. Horn. For new twin horns supplied with a relay.

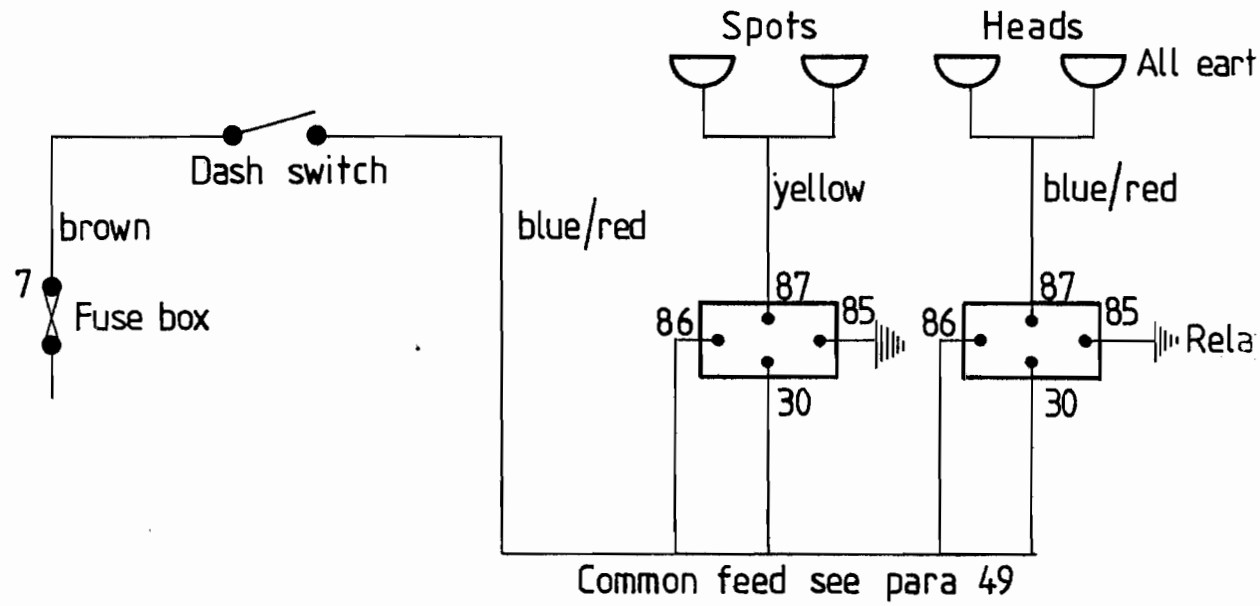
d. Four-way flashers.

c. Washer pump.

52. Side Lights.



53. Dipped head light and spot lights (if using Ciebie H4's).



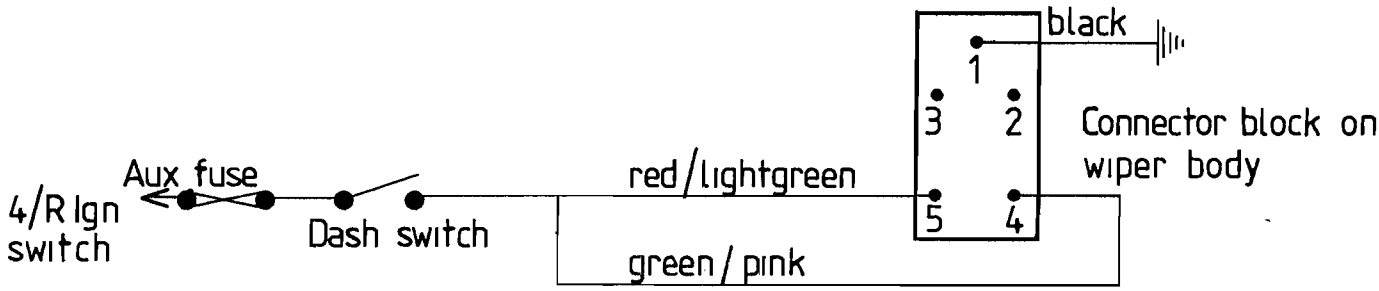
54. Wiper. A short explanation is necessary here. I did not use the MGB switch rather a single position on/off with a special long shank especially for wooden dash mounting. This means my wiper motor has only a si speed wipe with no self parking of the blades. If you follow this route read on, I might add that the single : speed wipe is adequate and I soon mastered the art of switching off the wiper motor at the right time.

55. The Lucas 14W wiper motor, which seems to be fitted to the majority of early MGB's, has 5 electrical connections. Wiring diagrams from 1975 on seem to differ. For those with older cheaper MGB's read on. I sha not deal with the MGB wiper switch, only the connection to the motor. There are 5 wires fitted to the plastic connector. When connecting to a single on/off switch only the following cables are of any use:

a. Peg 1. Black cable - earth.

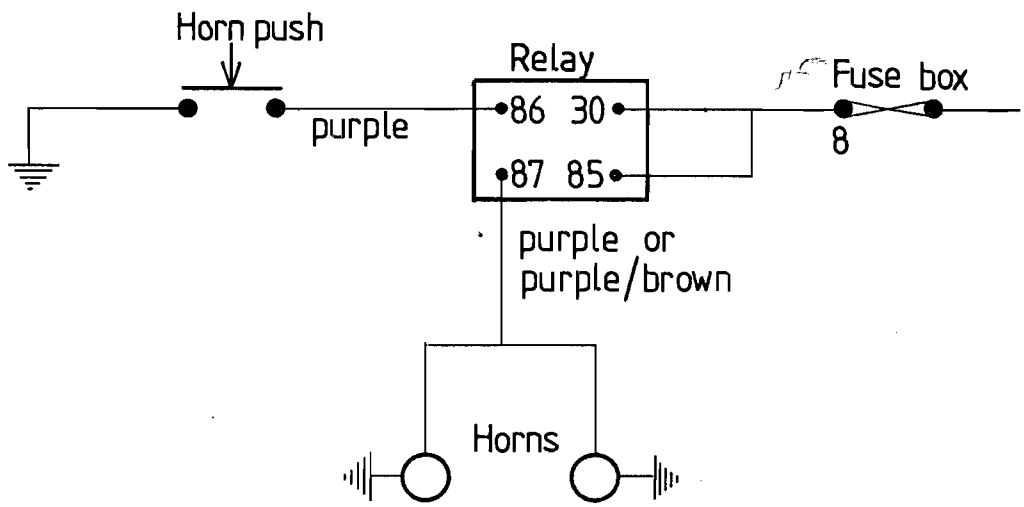
b. Peg 4. Green/Pink - power feed from auxiliary fuse.

c. Peg 5. Red/Light Green - slow speed wipe.

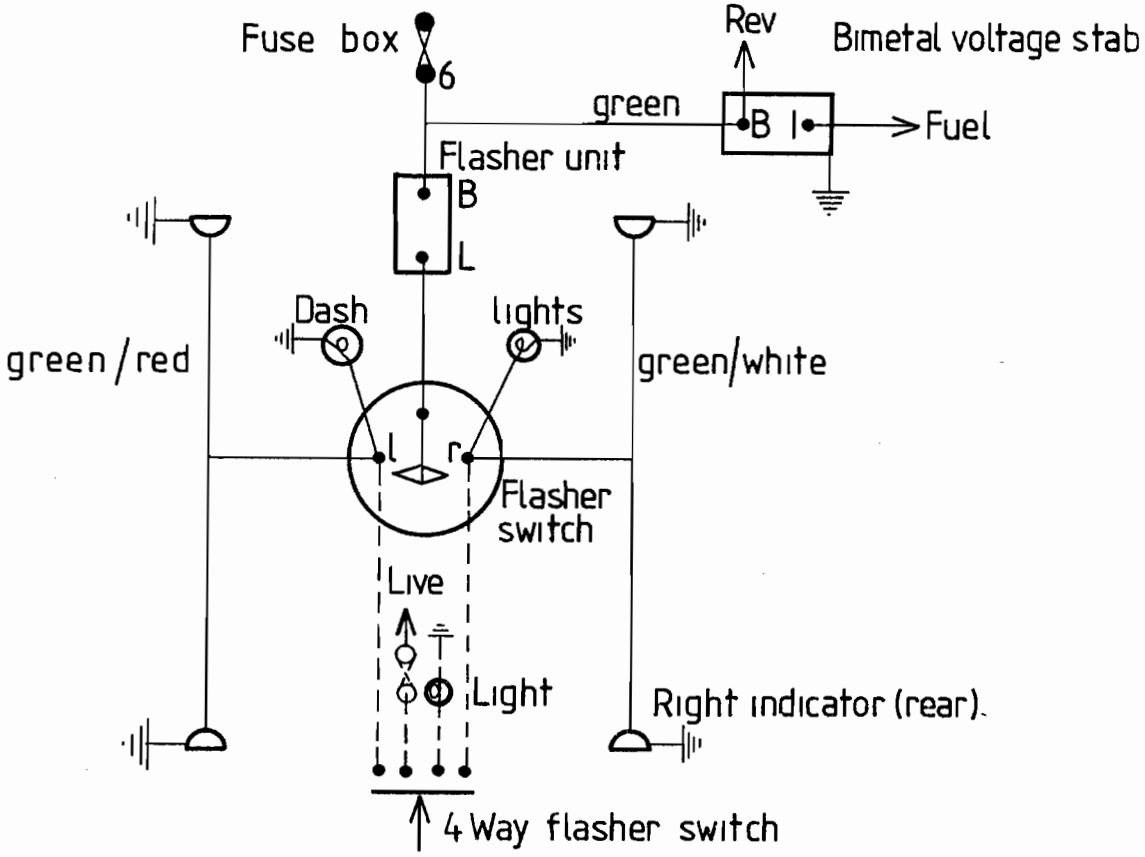


Alternatively ignore peg 5 and connect to peg 3 for a high speed wipe. (Peg 2, when connected, parks the blade automatically when the switch is off).

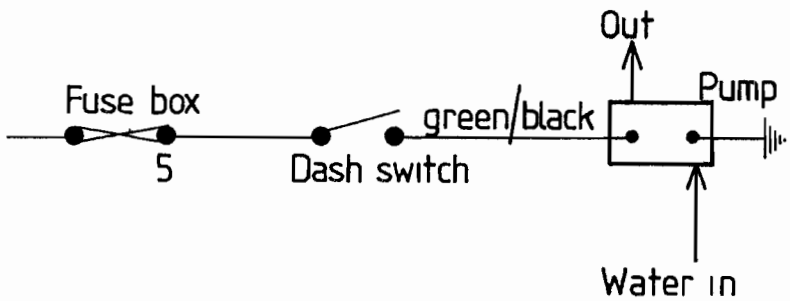
54. Horn.



57. Four Way Flashers. Many types exist. I used the push/pull type with the warning flasher repeater house the switch knob and a separate flasher unit attached. I cannot say who makes it 'cos it was given to me. (Nu said).



58. Washer Pump.



59. I daresay there will be questions to be answered and areas that I have not covered in enough detail. I m no apologies for the level at which I have written this series of articles. I have assumed that the majority people reading this have never before undertaken any major wiring in a vehicle.

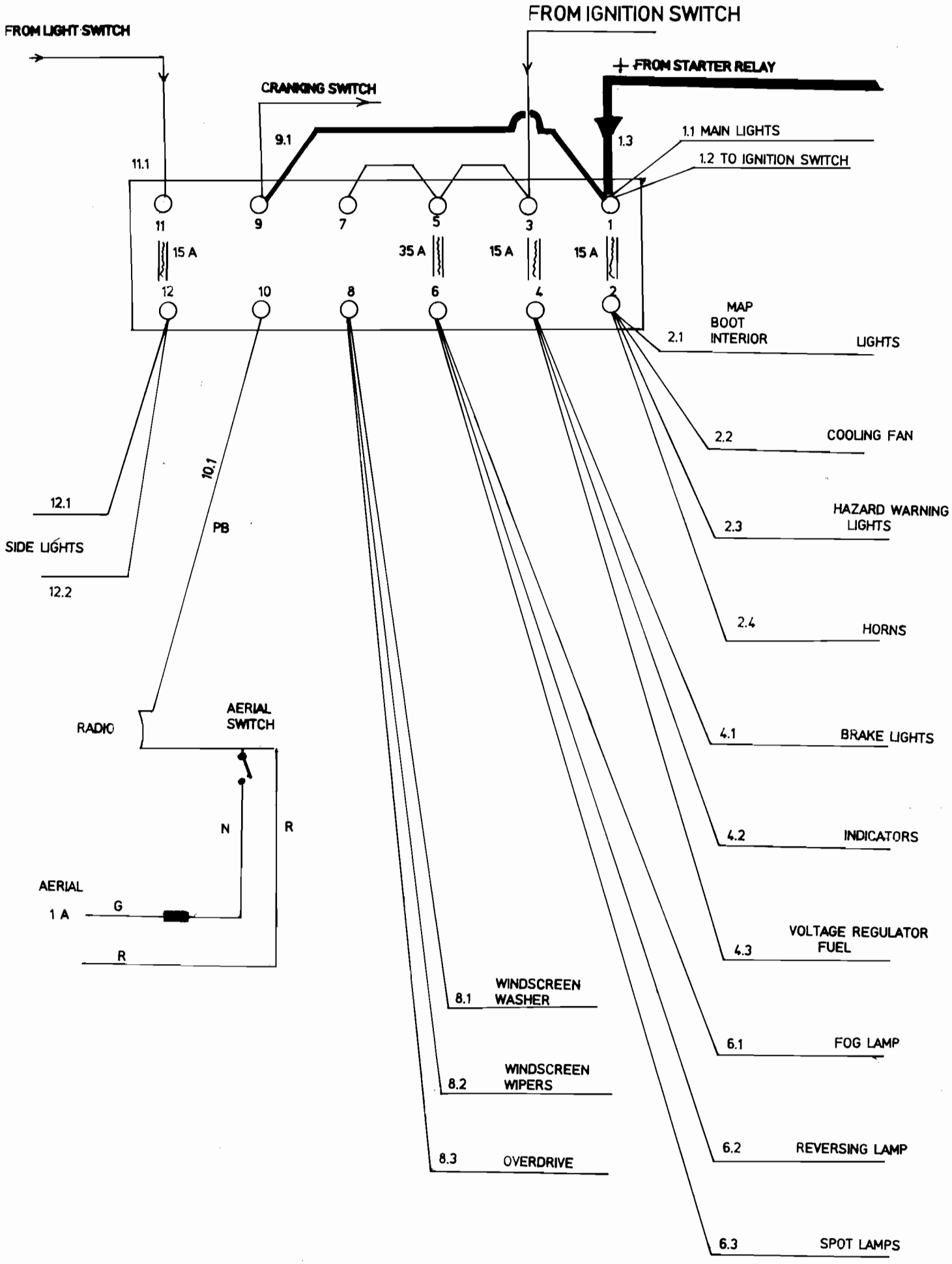
60. I would welcome comments and helpful suggestions.

61. I also hope my efforts will prompt more people to contribute to the club magazine. Remember if you have to solve a problem that makes you the expert. Others might benefit from your wisdom.

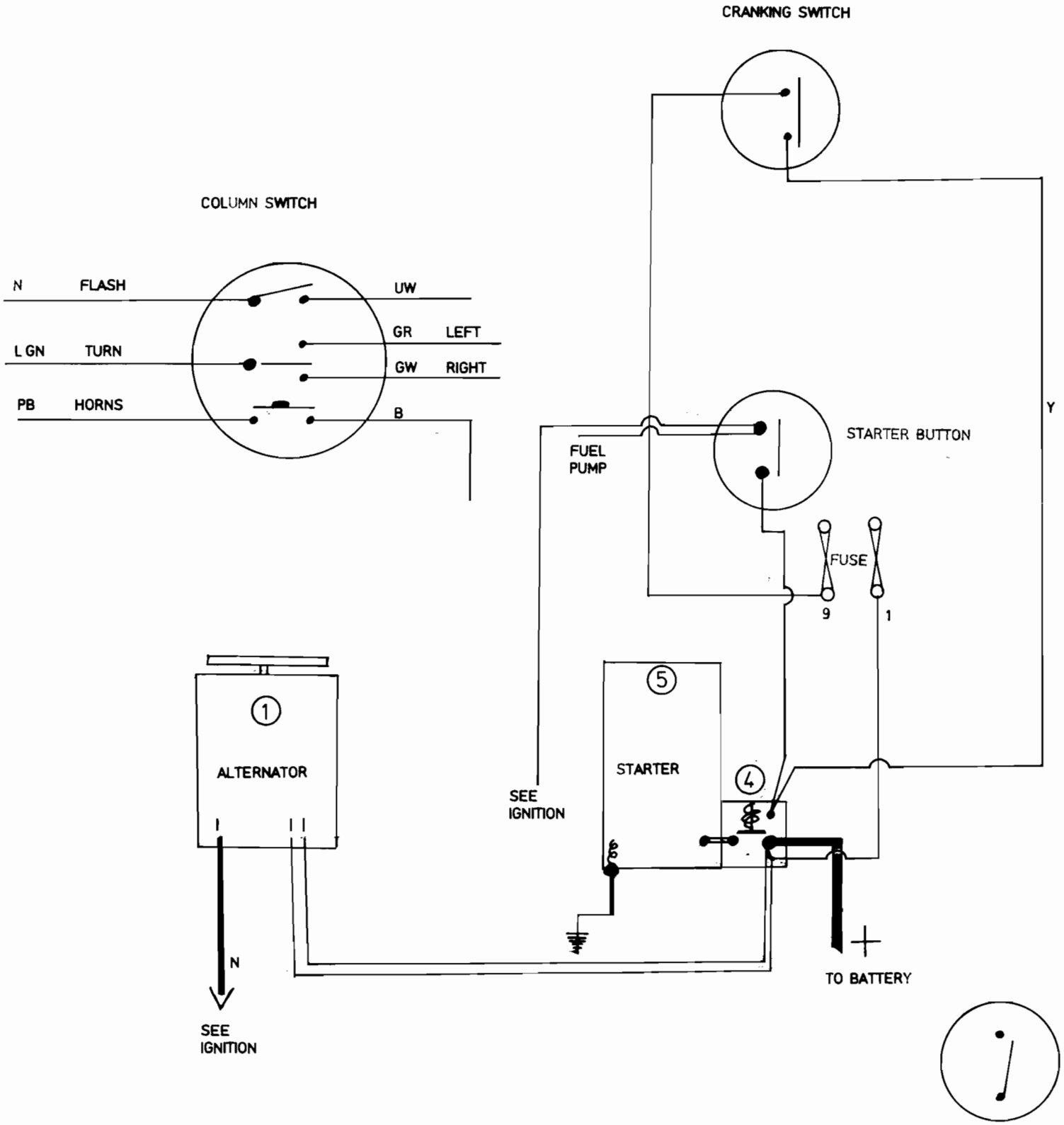
62. Lastly enjoy the build up of your NG and happy motoring.

GEOFF BRISCOE'S WIRING DIAGRAMS

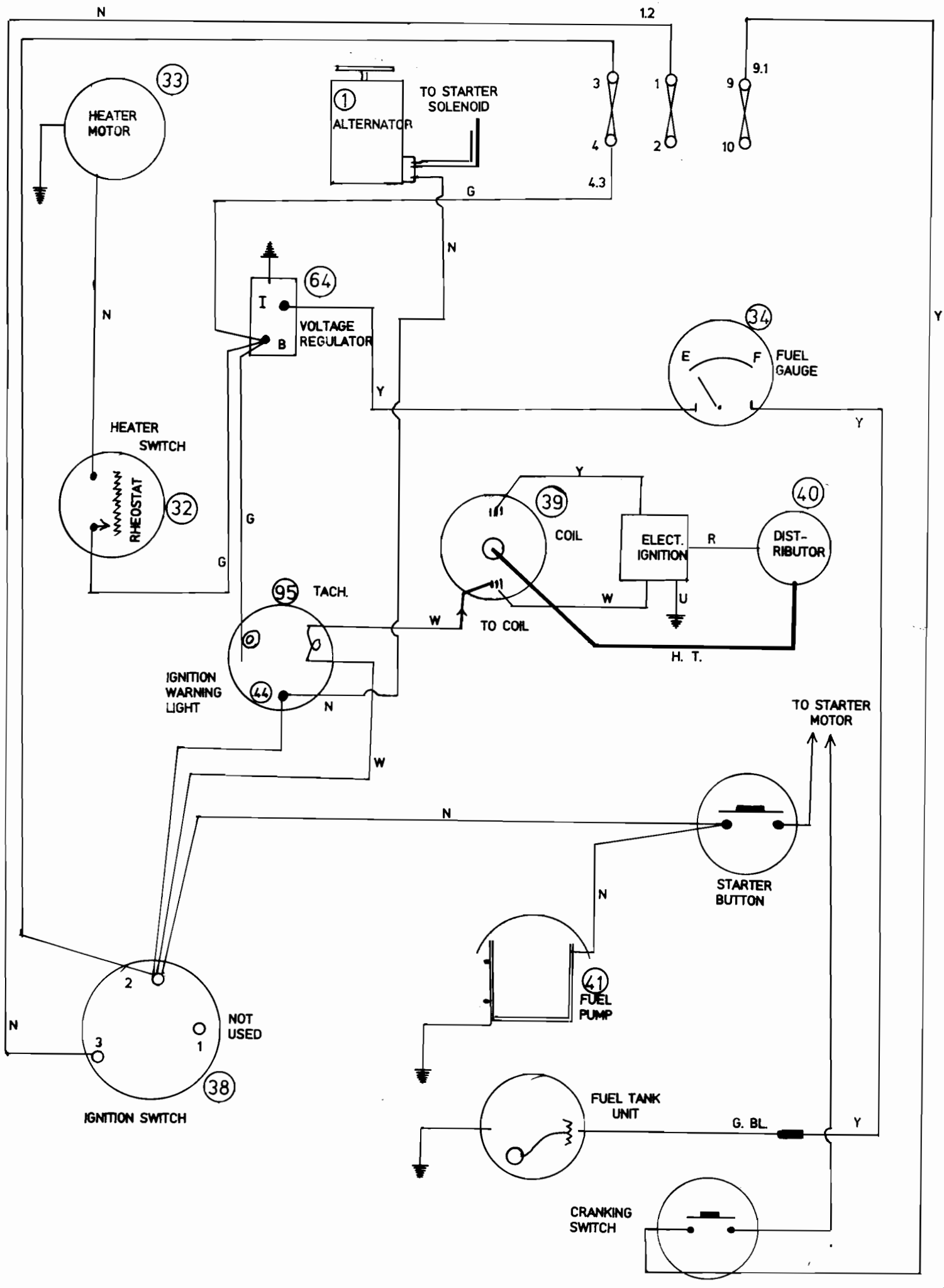
FUSE BOARD TERMINALS.



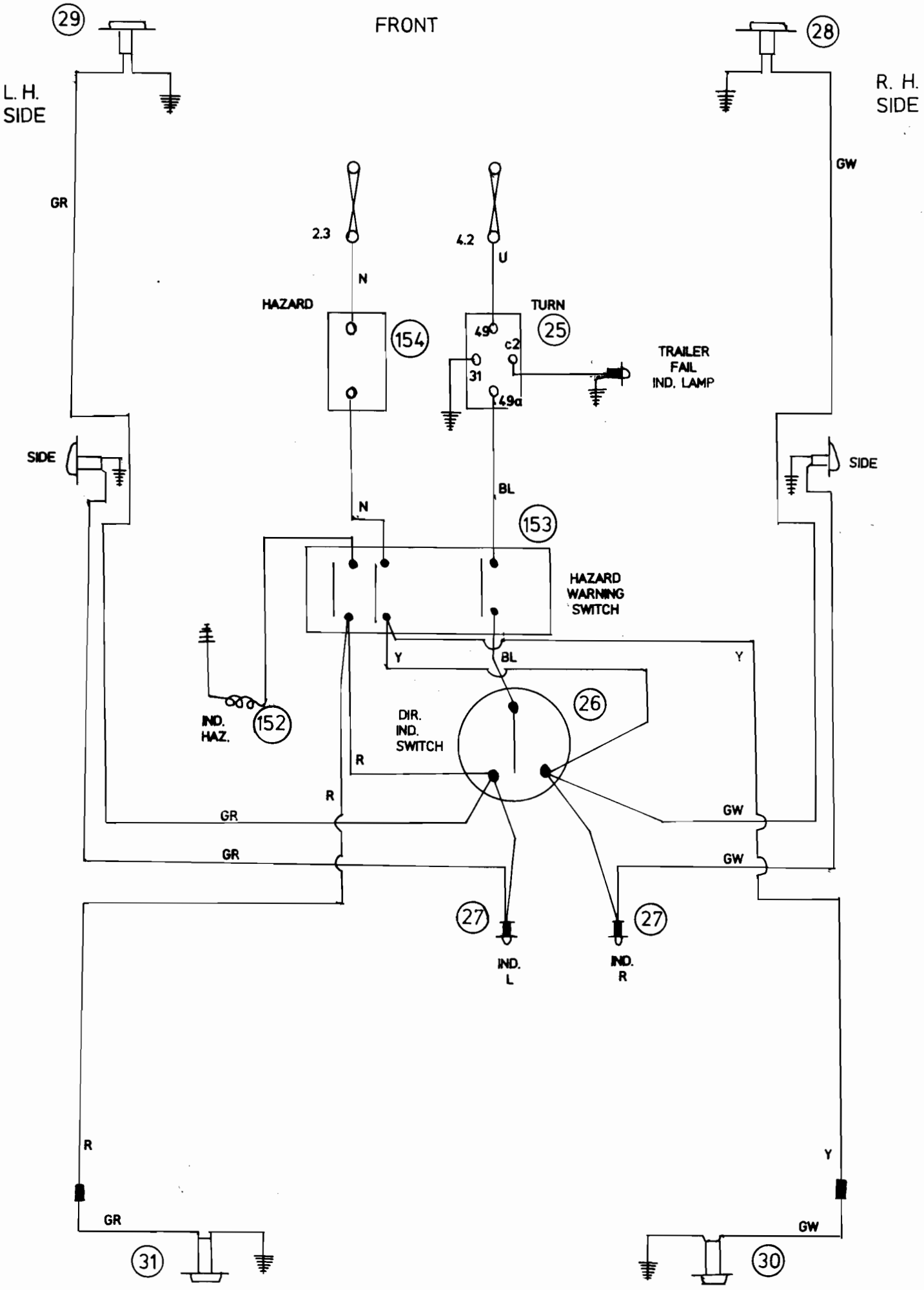
STARTER, ALTERNATOR.



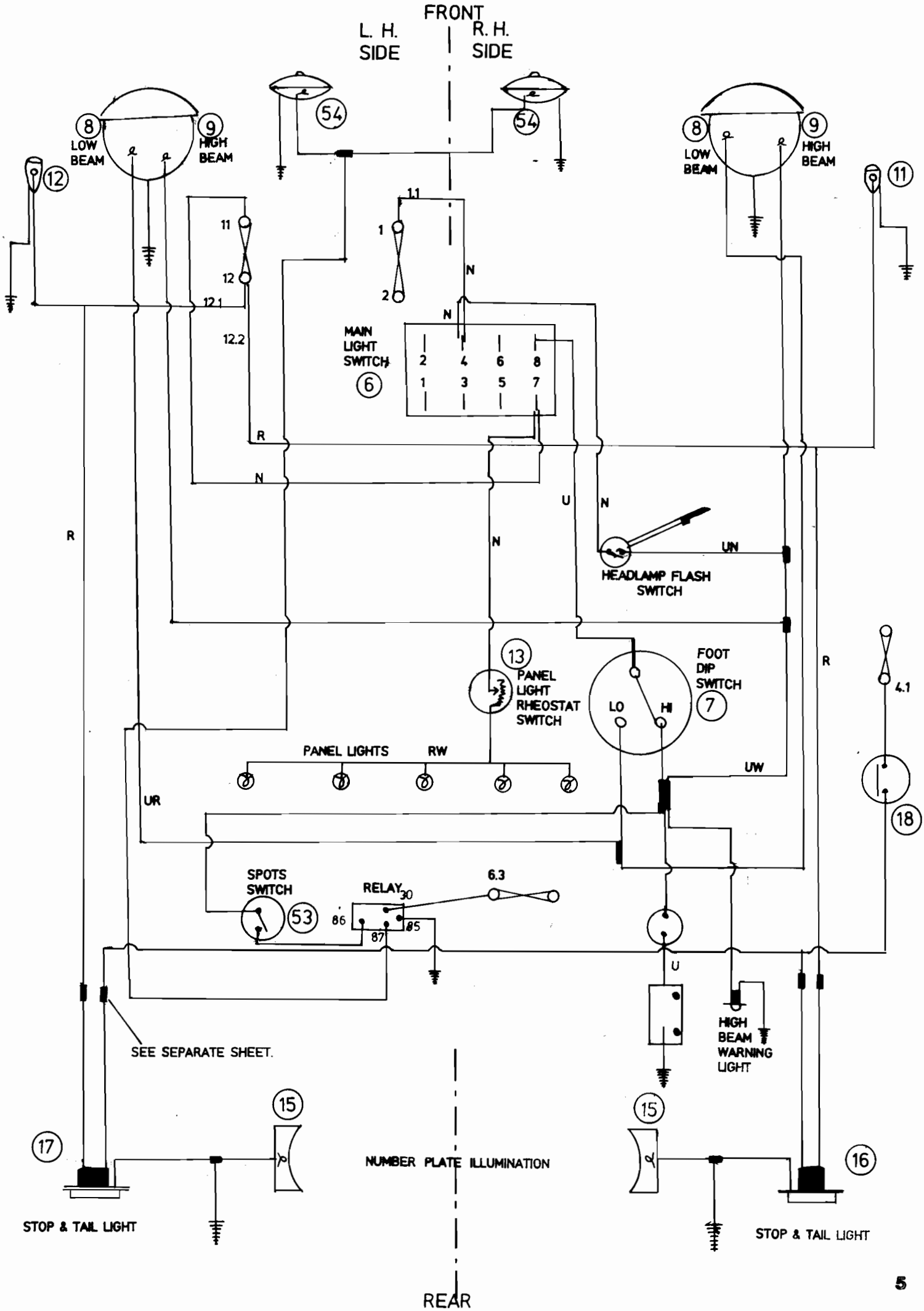
IGNITION FUEL HEATER.



INDICATORS & HAZARD.

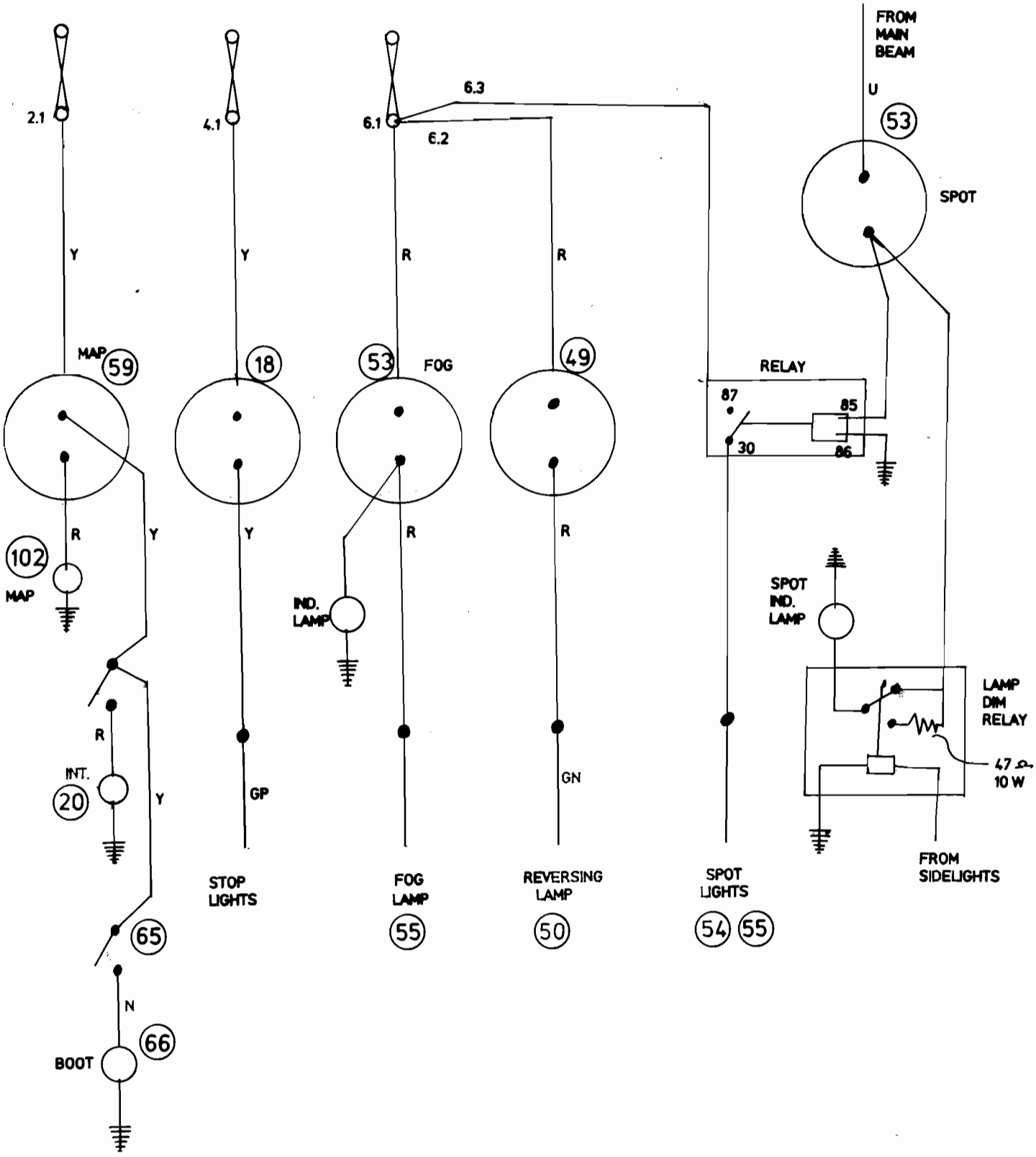


LIGHTS MAIN SIDE

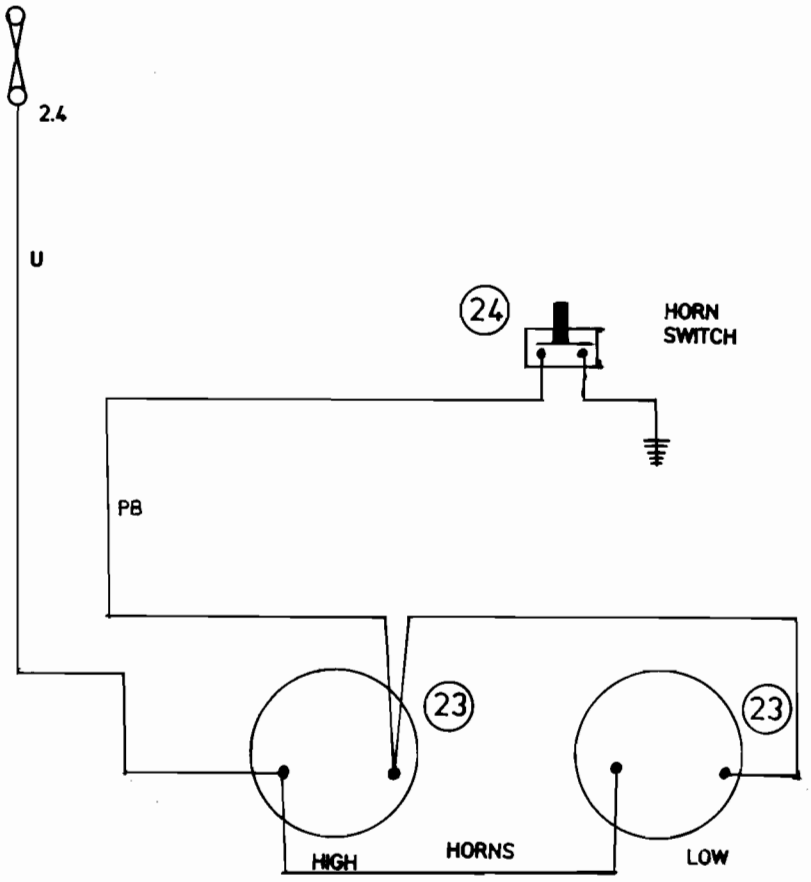


LIGHTS

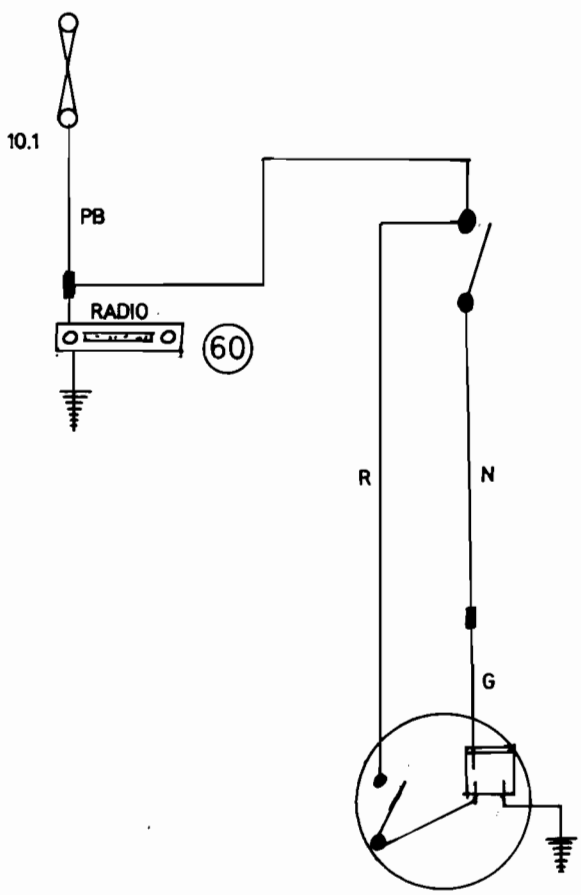
BRAKE SPOT FOG
REVERSE MAP INTERIOR
BOOT



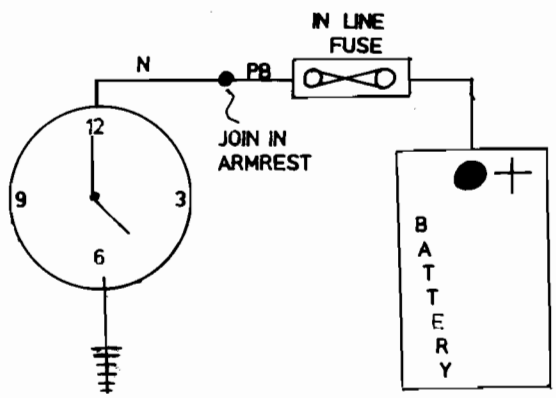
HORNS



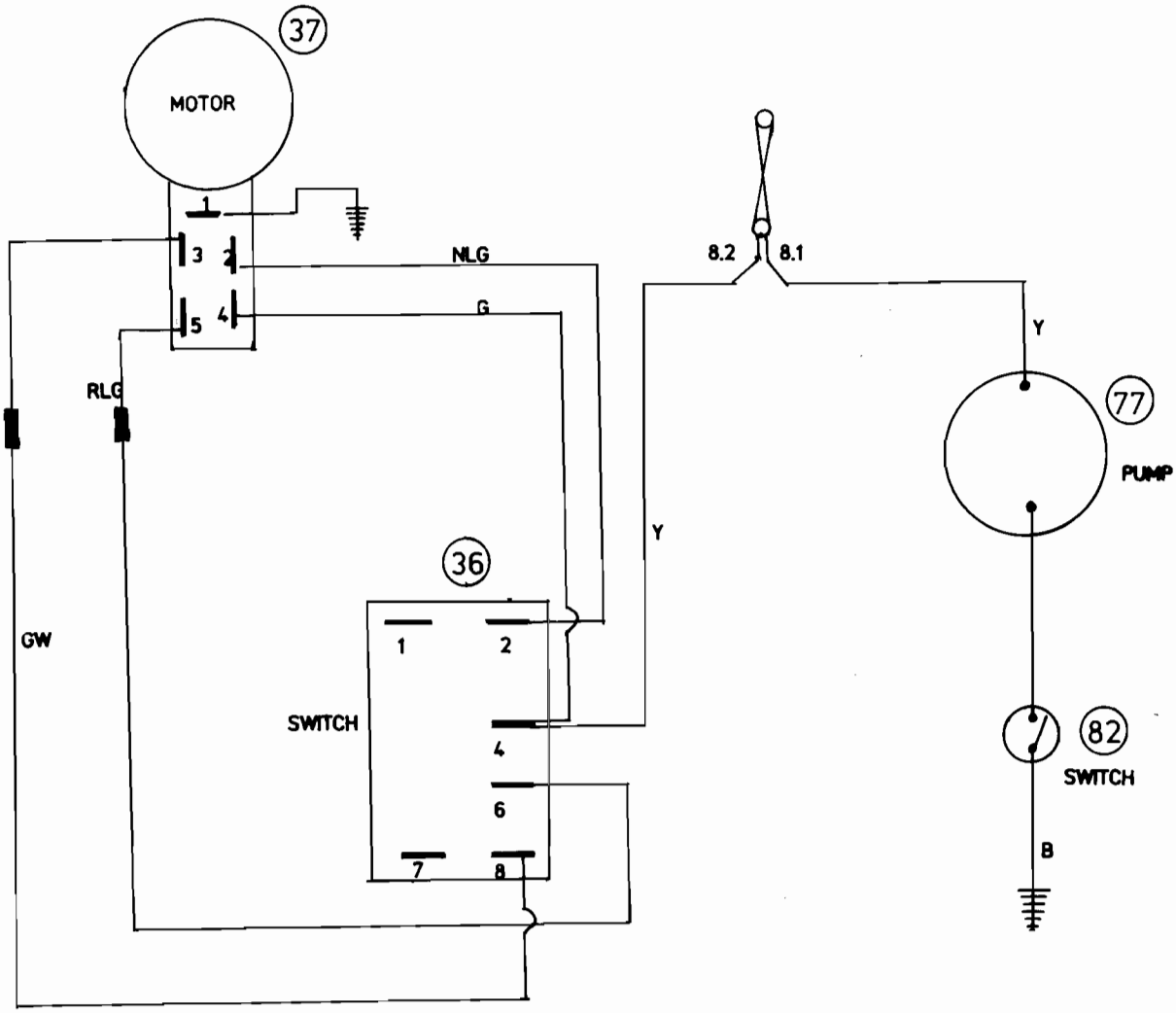
RADIO & AERIAL



CLOCK



WINDSCREEN WIPERS & WASH.



OVERDRIVE SWITCH GEAR.