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TURN SIGNALS AND HAZARD FLASHER

TURN SIGNAL FLASHERS VERSUS HAZARD FLASHERS

Even though the serve identical functions, and they both operate on the same principle, there is a significant difference in the two. Each has a heat element and a bimetal strip. Current through the heat element elevates the temperature of the bimetal strip, causing it to bend. On one end of the strip is a set of contacts. When the strip bends, these contacts either open (turn signal flasher) or close (hazard flasher). The current that flows through the heat element also flows through the light bulbs.

Functionally, the differences between the two types are:

1) A hazard flasher will flash at the same rate regardless of the load, as long as the load doesn't exceed the flasher capacity. One 2 watt bulb will cause the flasher to operate at the same rate as four 21 watt bulbs.

The flash rate of a turn signal flasher will vary, depending on the load. The current through one 21 watt bulb is not enough to cause the flasher to work (the lights will stay on), and four 21 watt bulbs will cause the flasher to operate at a high rate (till the flasher burns up).

There is an excellent reason for this difference, and it is not unique to Lucas -- most manufacturers do this. The reason is one of safety. If you turn on your turn signal flashers and one bulb is out, the flasher won't work, giving you notification that something needs to be fixed. On the other hand, when you need to use your hazard flasher, you need to use whatever bulbs you have. If one is out, you still want to be able to use the other three. You won't have any indication that a bulb is out, but the next time you use the turn signals, you will.

2) The flash sequence of a hazard flasher starts with an OFF, i.e., OFF--ON--OFF--ON. The flash sequence of a turn signal flasher starts with an ON, i.e., ON--OFF--ON--OFF. This difference in sequence was not a design goal, it just worked out that way.

Electrically, the differences are:

1) HAZARD FLASHER: The resistance of the heat element in a hazard flasher is very large compared to the resistance of the light bulbs, (approximately 45 ohms, as compared to approximately 2 ohms for the four flasher bulbs). To the heat element, the light bulbs look like a short to ground. As shown in **figure 1A**, when the heat element raises the temperature of the bimetal strip, the strip bends and the contacts close. The contacts are wired such that they short circuit the heat element when they close. When the heat element is shorted, all current flows

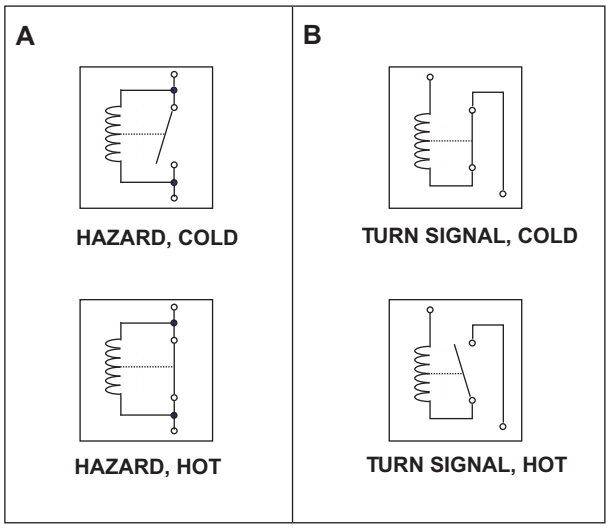


FIGURE 1

through the switch contacts and none through the heat element. As a result, the element cools off and the contacts reopen. Current again flows through the element, and the cycle starts anew. The current that flows through the heat element also flows through the bulbs, but because of the high resistance of the element, the current is much less when the contacts are open than when the contacts are closed -- not enough to light the bulbs.

This operation is depicted in **figure 2**, below. Side "A" shows the condition when the hazard switch is first turned on. A very small current flows through the heat element,

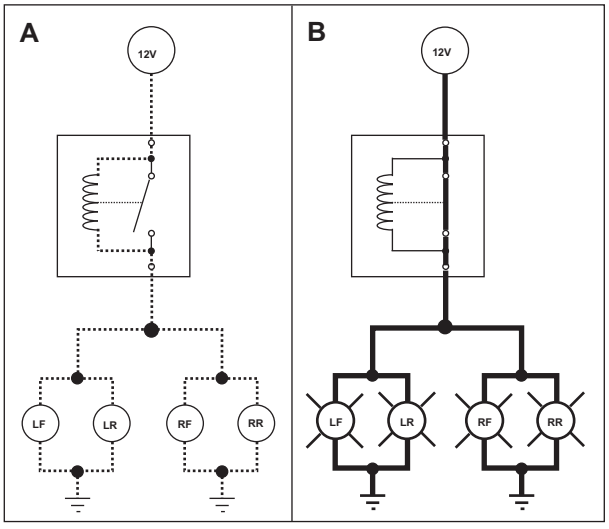


FIGURE 2

and then through the bulbs, but this small current is not enough to light the bulbs. Side "B" shows the situation after the element has had time to heat up. The contacts close, providing a direct path from the power source to the bulbs, and they are now lit at full brilliance.

2) TURN SIGNAL FLASHER: The resistance of the heat element in a turn signal flasher is sized very carefully to the specified bulb wattage for that particular car, and is very low, less than ½ ohm. See **figure 1B**. If the correct bulbs are used, the current through the element is exactly the right amount to cause the bimetal strip to bend at just the right rate for the flasher. Lower wattage causes the strip to bend too slow, and higher wattage bulbs cause the strip to bend too fast. Just as in the hazard flasher, the current through the heat element is the same current as through the bulbs. The resistance of the element is so low that it offers minimal additional resistance over that provided from the bulbs -- the bulbs light almost as bright as if the element were not there. As shown in figure 3, below, the flasher contacts are wired in series with the bulbs. When the strip bends, the contacts on the strip open, cutting off current flow to the bulbs.

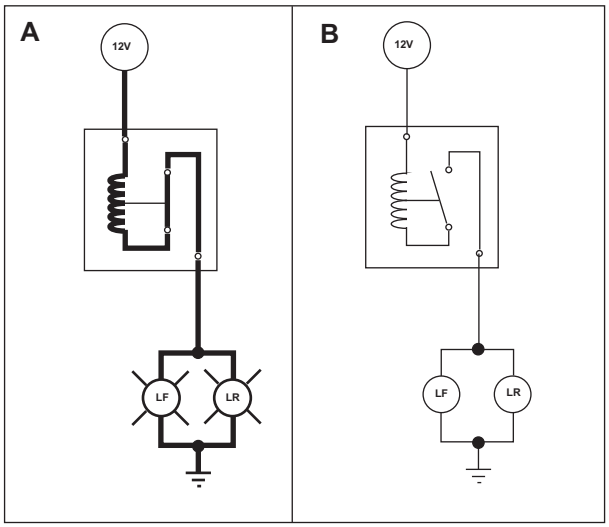


FIGURE 3

Because the operation of the flashers is dependent on the current flow through them, any change in the voltage applied will also have an effect on the flash rate. An increase in voltage will cause a corresponding increase in the current, which will cause a corresponding increase in the flash rate. A decrease in voltage will have the opposite effect.

Circuit resistance also has an effect on the flasher rate. More resistance reduces the current flow, and less resistance increases it. Barring a short circuit, the only way to reduce resistance in the circuit it to replace the normal bulbs with bulbs of a higher wattage rating. Higher wattage bulbs draw more current than lower wattage bulbs. This is one way of solving a slow turn signal flash rate problem -- replace the 21 watt bulbs installed by the factory in most British cars with 27 watt bulbs used in most American cars, bulb # 1156. Increased resistance is the most common problem, leading to a slow flash rate, or to not flashing at all. Typically, this is caused by bad connections, either in the circuit wiring, internal switch contacts -- particularly the hazard switch, or in the ground connections at the bulbs.

TROUBLE SHOOTING

FLASHER UNITS

I know of no way to test the flasher units other than by hooking them up to an appropriate load and seeing if they work For the hazard flasher, any bulb will do, but for the turn signal flasher, the load must consist of the correct number of bulbs of the correct wattage. In my shop, I keep a pair of bulbs handy for this purpose. I have soldered wire leads to them, and wired them in parallel. See **photo 1** below.

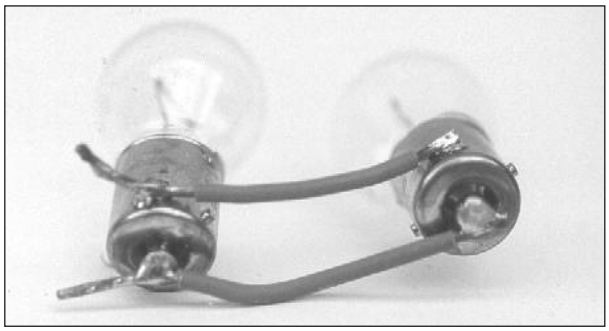


PHOTO 1

HAZARD SWITCH

Next to bad grounds or bad connections, the single most common problem with the turn signals in a Triumph, particularly the TR 250 and the earlier TR6 models, is the hazard switch. In order for the turn signals to work, the hazard switch must be installed, and in the OFF position. When the hazard switch is off, power from the "green" fuse feeds through the turn signal flasher, through the hazard switch, through the turn signal switch, and then to the turn signal lamps. When the hazard switch is on, power is cut to the turn signals and power from the "purple" fuse is fed to the hazard flasher circuit.

Like most switches, the hazard switch has contacts that have a wiping acting as the switch is operated. When the contacts close, they wipe across each other in a self cleaning action. The hazard flashers, being primarily an emergency operation, are seldom used, so the self cleaning action of the switch is seldom exercised. As a result, the contacts become dirty or corroded with time, so that when you do operate the switch and then turn it back off, the contacts for the turn signals don't make as cleanly as they should. The added resistance of the switch slows the turn signal flash rate, often to zero, as described earlier.

If your turn signals are going to quit, it is often just after you have used the hazard flasher. If so, all that is often needed is to repeatedly operate the hazard switch till the self cleaning action can clean the contacts a little. Sometimes this is enough to restore the turn signals back to working order.

Sometimes, though, this is not enough, and the switch will have to be taken apart and cleaned. Repair procedures for the rocker type switch, as used up through the '72 TR6, are covered in chapter 9, Switches, Relays, and Solenoids. The switch used in the later models is quite different, being a pull type switch. It is, though, almost as easy to disassemble and clean. Each of the contact/terminals can be removed for cleaning, which will then allow access to the other parts of the switch. To remove the contacts, insert a small screwdriver into the area marked "A" in **photo 2** below. Each terminal has a small tab, marked "B", which retains the contact in the switch. Pressing down on this tab releases the contact, which can then be pulled out for cleaning. To clean, use a pencil eraser and rub until the metal is shiny. After cleaning, insert the contact into the switch body till the tab engages, preventing the tab from backing out. While you have the contacts out, you can also clean the moving contact, using an eraser as well.

Although not obvious in the photo below, there are two sizes of contacts - two short ones and four long ones. When the switch is off, pushed in, the inner contact connects the two short contacts together, allowing power from the green fuse to flow to the turn signal circuit. When the switch is on, pulled out, the inner contact shorts the four longer contacts together, as well as the high side contact of the indicator lamp. In this position, power from the purple fuse is applied to the hazard flasher, both sides of the turn signals are connected together, and power is applied to the hazard indicating lamp. The function of this switching arrangement will be discussed later in this chapter.

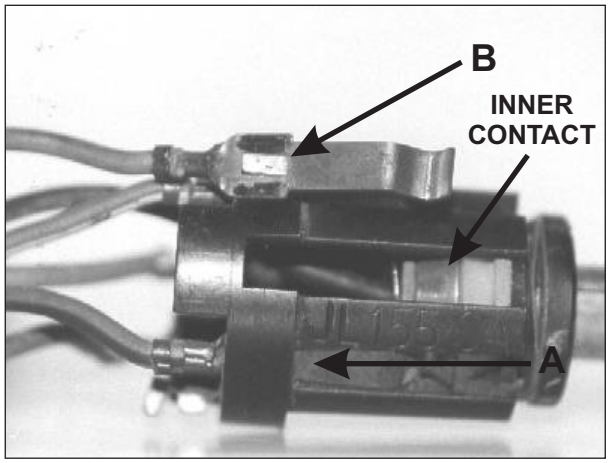


PHOTO 2

Given all the problems the hazard switch causes, the question immediately comes to mind "why on earth did Triumph run the turn signal circuit through the hazards switch?" A good question, and there is a good answer for it. Here's the situation: you are driving home late at night, in the winter time, and it is raining. You have the radio on at high volume to help keep you awake, and the heater going to keep you warm. You hear a funny noise from the rear of your car, so you pull over to investigate. Being the considerate driver you are, you signal your intentions by using the turn signals. When you get off to the side of the road, you turn off the key. Knowing that all of the electrical loads you have on will go off with the key, you don't bother to turn them off as you are distracted by your concern over the strange noise. As a safety measure, you then turn on the hazard flasher. Without the turn signals being routed through the hazard switch, you would now have real problems! You would have just overloaded your electrical circuits, and probably blown a fuse, as the radio, heater fan, and windshield wipers all turn on and off with the flasher.

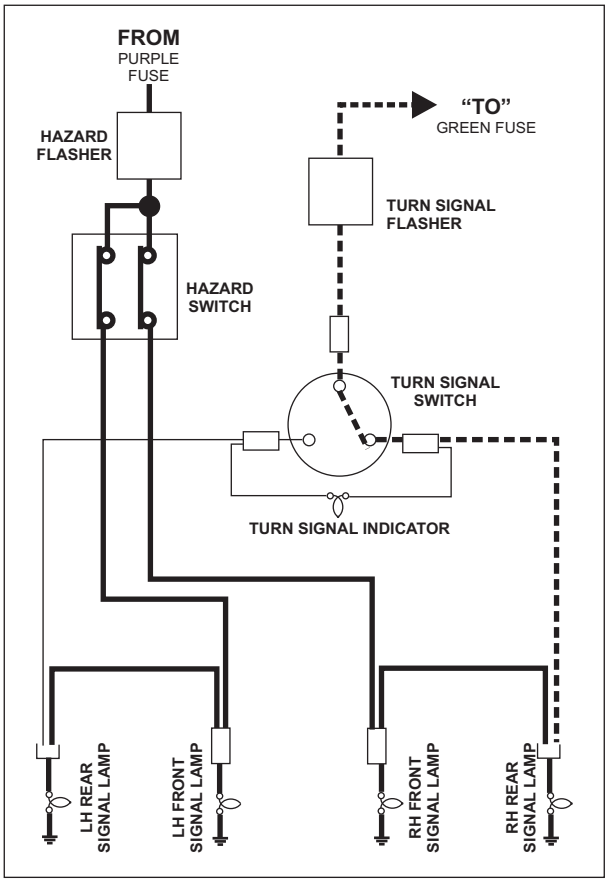


FIGURE 4

In **figure 4** above, I have drawn a very simplified diagram of what the turn signal and hazard circuits would look like if they were wired separately. For safety reasons, the hazard flashers must be operable at all times, ignition key on or not, so they are powered from the "purple" fuse, which is hot all the time. The turn signals, on the other hand, are only needed when the car is in operation, so they are powered from the "green" fuse, which is hot only when the key is on.

When the hazard switch is turned on, it performs two

functions: it connects the turn signal bulbs on both side of the car together, and it applies power to them. The heavy lines in figure 4 depict the flow of current through the circuit when the hazard flasher is on. Notice what happens if the turn signal switch should also be on. Power from the hazard switch not only flows through the bulbs, it also flows "backwards" through the turn signal switch to the "green" fuse, as shown by the heavy dotted line. Applying power to the green fuse this way has the same effect as turning on the ignition key! The resistance of the turn signal flasher is around 0.5 ohms, so current will flow almost un-impeded through it to the fuse.

This then is the reason for routing the turn signal power through the hazard switch, - to prevent the hazard flasher from back feeding through the turn signal switch, if it should happen to be left on, and powering every thing that is powered when the key switch is on.

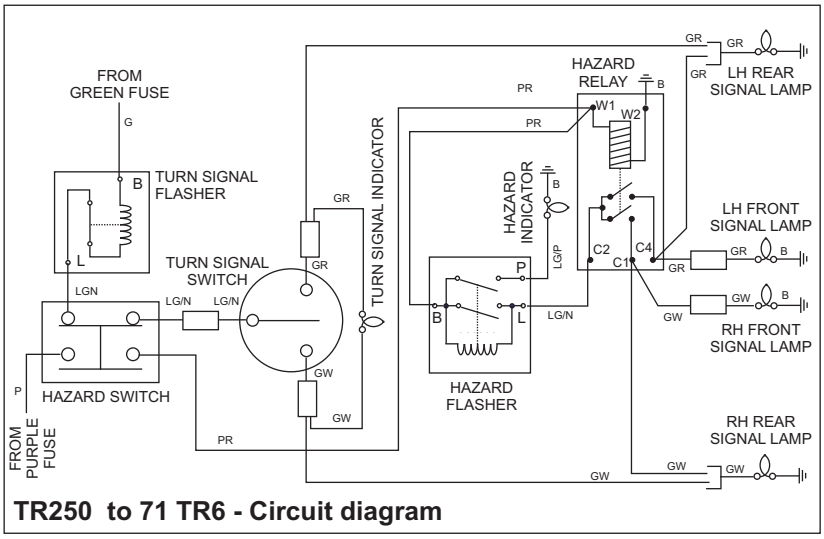
Note: *Beginning with* ***figure 5****, this page, and* ***continuing through figure 13****, page 124, I have drawn three schematics for each of the three wiring configurations used in this series of Triumph TRs. One diagram in each series shows the schematic alone, , one shows the wiring configuration and current flow when the turn signals are operated, and the other shows the configuration and current flow when the hazard switch is operated. As you read the following material, refer to the appropriate diagram.*

To determine if the hazard switch is the problem, it will be necessary to bypass it.

TR250 - '71 TR6:

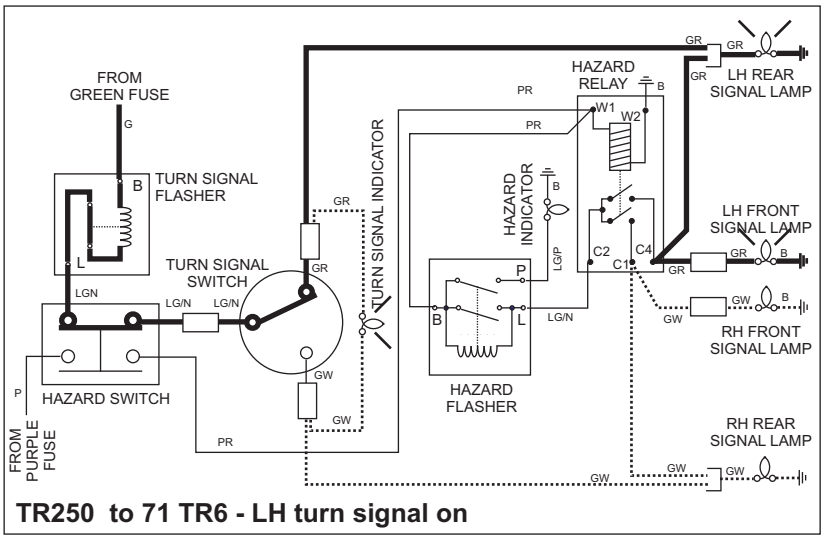
Step 1). Make up a test lead long enough to reach from the turn signal switch wiring under the dash to the turn signal flasher (located on the inner fender wall, inside the car, and just above the passenger side footwell), with an alligator clip on each end. Remove the LG/N wire from the flasher, and connect one end of the test lead to the terminal where the LG/W was attached.

Locate the LG/N wire from the turn signal switch, as it exits the steering column under the dash. Connect the other end of the test lead to this wire. You may be able to make the connection without pulling the wire and its bullet connector from the sleeve, and you may not, depending on your particular



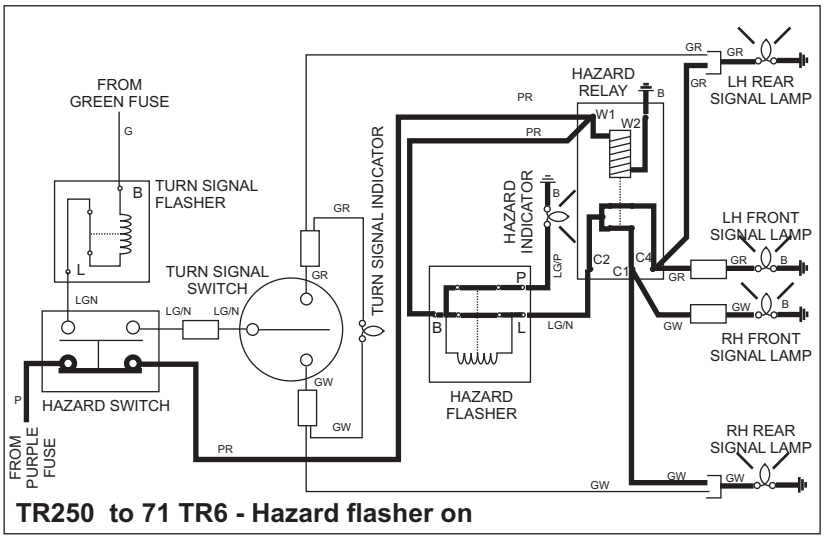
TR250 to 71 TR6 - Circuit diagram

FIGURE 5



TR250 to 71 TR6 - LH turn signal on

FIGURE 6



TR250 to 71 TR6 - Hazard flasher on

FIGURE 7

circumstance. If you have to pull the wire, make sure you connect your test lead to the LG/N wire going to the turn signal switch, and not the LG/N wire going to the hazard switch.

Turn on the ignition key and try the turn signals. If they now work, the hazard switch is the problem. If not, you have high resistance in the circuit. Go to step 2 under "all models."

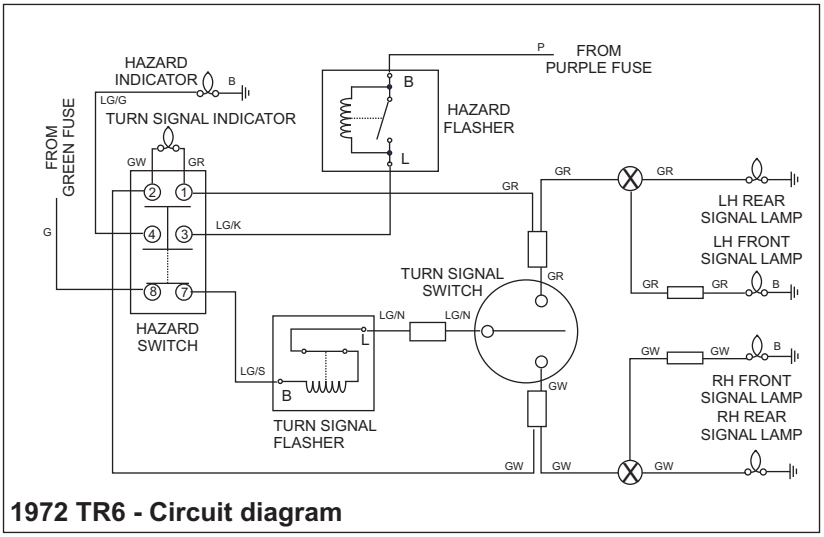
To gain access to the hazard switch, it will be necessary to remove either the speedometer or the tachometer. To remove either of these items, first unscrew the drive cable connection at the rear and pull the cable out of the way. Next, remove the illumination and the various indicating lamps. There are two clamps holding the meter in place, and these are held onto two studs at the back of the case by knurled nuts. Remove these two nuts, and any ground wires, and slip the clamps off. The meter can then be pulled out the front of the dash.

'72 - 76 TR6:

Step 1). Make up a test lead long enough to reach from the battery to the turn signal flasher (located on the inner fender wall, inside the car, and just above the passenger side footwell), with an alligator clip on each end. Remove the LG/S wire from the flasher, and connect one end of the test lead to the flasher terminal where the LG/S wire was connected. Connect the other end of the test lead to the positive post of the battery, and try the turn signals again (no need to turn on the key, as the flasher is now connected directly to the battery). If they now work, the hazard switch was the problem. If not, you have high resistance in the circuit. Go to step 2, under "all Models."

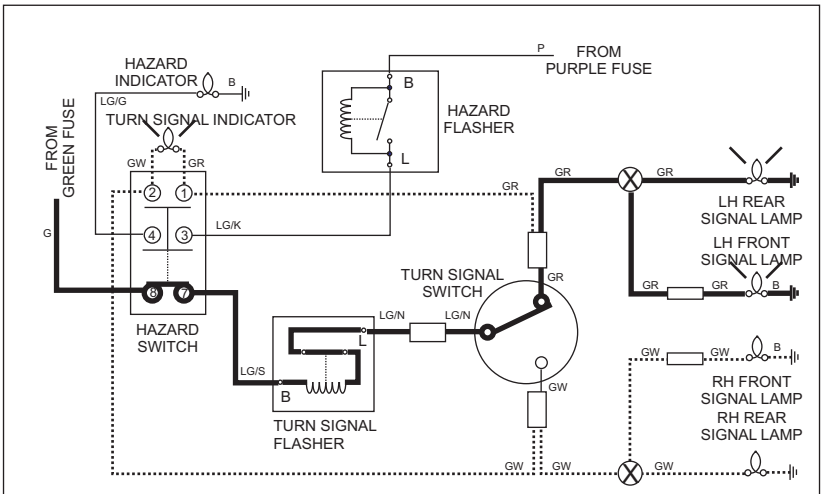
ALL MODELS:

Step 2). If it turns out that the problem is in your wiring, you are going to have to do some detective work to find it. The first place to look is at the ground connections at the turn signal bulbs themselves. Most of the time, that is where the problems are. Whether it's a problem with grounds, or bad connections, the treatment is the same - clean, clean, clean! Go through the wiring, item by item, with steel wool or fine sandpaper, and polish all metal to metal contact points. If your budget



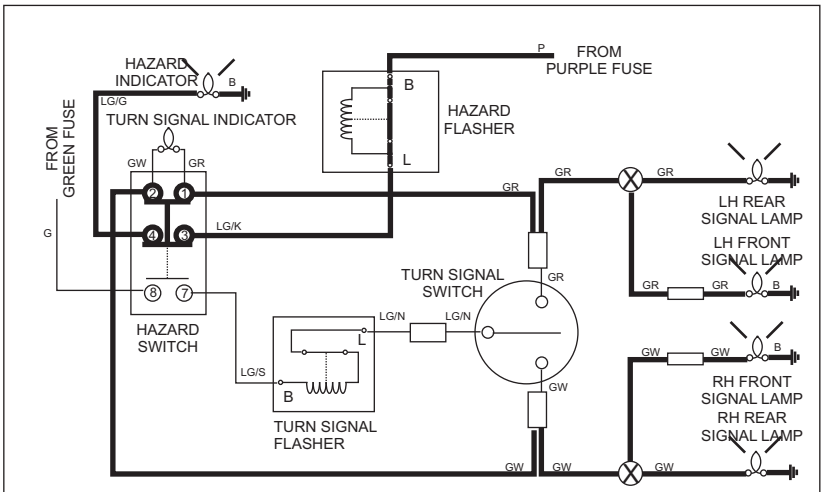
1972 TR6 - Circuit diagram

FIGURE 8



1972 TR6 - LH turn signal on

FIGURE 9



1972 TR6 - Hazards flasher on

FIGURE 10

allows, I strongly recommend replacing all of the sleeve connectors in the circuit. For some reason, the metal sleeves inside these things have a habit of becoming brittle with age, and often break into pieces. When this happens, compression is lost, and they no longer make good contact with the bullets.

In an emergency, you can often get recalcitrant turn signals working by substituting a heavy duty flasher module. These are not really turn signal flasher, but hazard flashers. This means that they will flash even if the total resistance of the circuit is high, or even if one bulb is out. For this reason, you don't want to use them on a regular basis, because you lose the warning feature mentioned earlier. Ask for a model 552 at your local parts store, or even at your local K-mart.

TURN SIGNAL INDICATOR LIGHT:

An interesting item of note in the diagram in **figure 4**, page 121, is the location and wiring of the turn signal indicator lamp. It appears to be an unworkable connection scheme. With one side of the lamp wired to the left hand turn signal lamps, and the other side wired to the right hand turn signal lamps, it appears as if the lamp would never light up, as there is no ground connection for it. Actually, there is, although it's not immediately apparent. Refer to **figure 14** below.

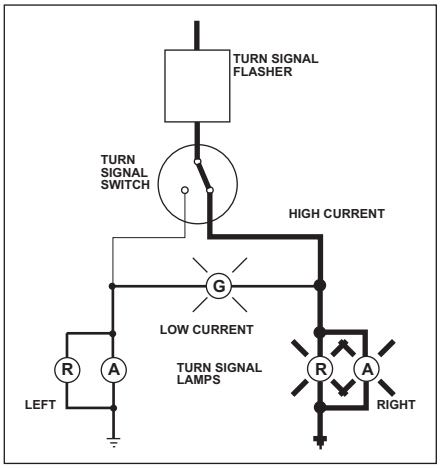
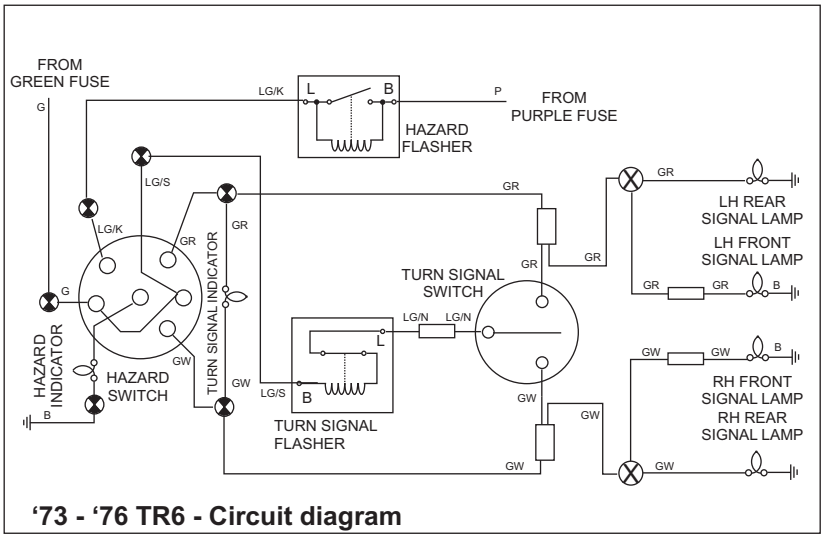


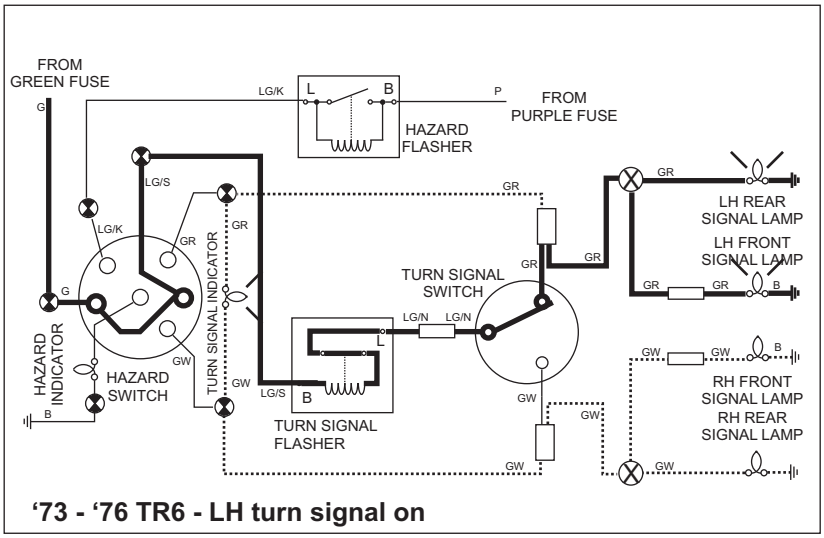
FIGURE 14

The indicator lamp is a very low wattage bulb, about 2.2 watts. The turn signal bulbs are 21 watts. A 2.2 watt bulb has a resistance of about 65 ohms, compared to about 6.8 ohms for the turn signal bulbs.



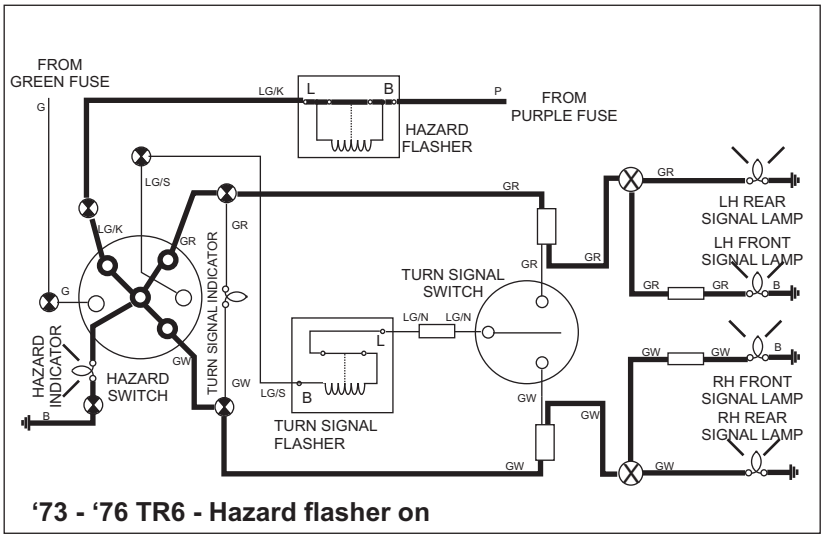
'73 - '76 TR6 - Circuit diagram

FIGURE 11



'73 - '76 TR6 - LH turn signal on

FIGURE 12



'73 - '76 TR6 - Hazard flasher on

FIGURE 13

The turn signal bulbs are in parallel, which gives a combined resistance of 3.4 ohms. Adding the 65 ohm resistance of the indicator lamp to the 3.4 ohms of the combined turn signal bulbs gives a total of 68.4 ohms. This is only five percent more than the indicator bulb by itself, so it will light almost as brightly as if it were in the circuit by itself. On the other hand, this is ten times the resistance of the individual turn signal bulb, so the current through them is no where near enough to light them. Current flows from one side of the turn signal circuit , through the indicator lamp, and through the turn signal bulbs on the other side, as shown by the medium weight line, and, concurrently, through the operating turn signal bulbs, as shown by the heavy line.

TURN SIGNALS:

ALL MODELS:

The turn signals receive power from the "green" fuse, as do the windshield wipers, windshield washer, gauges, brake lights, back up lights, and the heater fan. If ***ANY*** of these devices work, you have power to this fuse. If ***NONE*** of them work, you have a problem in the wiring to the "green" fuse, or the fuse is blown. Repair this problem before proceeding with the following steps.

Do the turn signals come on and burn steady (don't blink on and off as they should), or do they not turn on at all? If they don't operate at all, follow the appropriate steps below. If they burn steady, you know that the wiring is intact, or the lights wouldn't come on at all. Only two things will cause the lights to come on but not blink - a faulty flasher unit or high resistance in the circuit. As explained earlier, the operation of the turn signal flasher requires a certain amount of current in the circuit. If the overall resistance of the circuit is too high, the flasher will pass enough current to turn on the bulbs, but not enough to cause it to flash.

Remove the flasher unit and test as described on page 120. Or, if you have a replacement flasher, you might try replacement as the first step. If the flasher is bad, replace it. If not, there is a problem with your wiring. To resolve this problem, you will have to go through ***ALL*** of the turn signal wiring, connection by connection, ground by ground, until you find the source of the high resistance. Unfortunately, there is no sure-fire method for finding the bad connection or ground, so you will need to clean each and every connection and ground, using fine sandpaper or steel wool, starting at the switch and working your way through the wiring to the ground connections at each bulb. Tedious work, but necessary work.

TR250 - '71 TR6:

Step 1). Make up a short test lead, with male ¼" spade connectors on each end. Remove the green and the light green/brown wires from the turn signal flasher, and connect the two wires together with your test lead. Turn on the ignition key and try the turn signals. If the turn signal bulbs burn steady, your flasher is defective, and must be replaced. If not, go to step 2.

Step 2). With the ignition key on, use your voltmeter or test lamp to check for power at the green wire to the flasher. If you have power here, go to step 3. If not, there is a break or a bad connection in the green wire between here and the fuse, which will need to be repaired.

Step 3). Replace the green wire on the flasher if you removed it for test 2, and check for power on the flasher terminal with the light green/brown wire. If you have voltage here, proceed to step 4. If not, the flasher is bad, and must be replaced.

Step 4). Locate the light green/brown wire from the turn signal switch, which exits the steering column just under the dash. This wire from the switch connects to the light green/brown wire from the hazard switch with a bullet/sleeve connector. Check for the presence of voltage on the LG/N wire at this connection. If you have voltage here, proceed to step 5. If not, there is a break or bad connection in the wiring from the turn signal flasher to the hazard switch, from the hazard switch to the turn signal switch, or the hazard switch is bad. Refer to the hazard switch section of this chapter, page 120, For replacement/repair instructions for the hazard switch. If the switch proves to be good, you will have to repair the wiring to/from the switch.

Step 5). In the same bundle of wire coming out of the steering column that had the LG/N wire you just tested in step 4, there will also be a green/white and a green/red wire. The G/W wire powers the right side signals, and the G/R wire powers the left side signals. With the ignition key on, operate your turn signal switch and check for voltage at each of these wires. If you have voltage here, proceed to step 6. If not, the turn signal switch is bad, and must be repaired or replaced. This switch is repairable, but it's a bit harder to do than for the rocker type switches. Repair procedures are covered on page 121.

Step 6). Does the hazard flasher circuit work? The turn signals and the hazard flasher both use the same bulbs, and the two circuits connect together at the wiring to the bulbs. In the TR250 - '71 TR6, this connection takes place at the hazard relay (terminals C1 and C4). If the hazard circuit works, you know the turn signal circuit is also operable from this point onward to the lights, so no need to check further than the hazard relay. If you've gotten this far without finding the trouble, and the hazard circuit works, it's pretty certain, then, that the problem lies in the wiring from the turn signal switch to these connections, and repairs to this portion of the wiring will be needed. If the hazard flasher circuit doesn't work, proceed to step 7.

Step 7). With the key on, operate the turn signal switch while monitoring for voltage on the GW wire (for a RH turn) and the GR wire (for a LH turn) at the terminals C1 and C4 of the hazard relay. If you have voltage, there is a break or a bad connection in the wiring from this point to the lights, or, quite likely, the ground connection to each bulb is bad. Clean or repair as needed. If not, there is a break or bad connection in the wiring between the turn signal switch and the connector, which will need to be repaired.

‘72 - ‘76 TR6:

Step 1). Make up a short test lead, with male ¼” spade connectors on each end. Remove the light green/slate and the light green/brown wires from the turn signal flasher, and connect the two wires together with your test lead. Turn on the ignition key and try the turn signals. If the turn signal bulbs burn steady, your flasher is defective, and must be replaced. If not, go to step 2.

Step 2). Using your voltmeter or test lamp, check for the presence of power at the LG/S wire at the turn signal flasher. If you have power here, proceed to step 5. If not, remove the test lead, reconnect the flasher wires, and proceed to step 3.

Step 3). Check for the presence of power on the hazard switch terminal with the LG/S wire. To gain access to the hazard switch, it will be necessary to remove either the speedometer or the tachometer. To remove either of these items, first unscrew the drive cable connection at the rear and pull the cable out of the way. Next, remove the illumination and the various indicating lamps, There are two clamps holding the meter in place, and these are held on by two studs at the back of the case by knurled nuts. Remove these two nuts, and slip the clamps off. Remove ground wires, if any. The meter can then be pulled out the front of the dash. If you have power here, there is a break or a bad connection on the LG/S wire between the hazard switch and the turn signal flasher. If not, proceed to step 4.

Step 4). Do you have power on the green wire to the hazard switch? If so, the hazard switch is bad, and will need to be repaired or replaced. If not, there is a break or bad connection between the hazard switch and the “green” fuse, which must be repaired.

Step 5). With the test lead still in place from step 1 (to ensure that a defective flasher won’t mask the results of the test - you may have more than one problem), locate the light green/brown wire from the turn signal switch, which exits the steering column just under the dash. This wire from the switch connects to the light green/brown wire from the hazard flasher with a bullet/sleeve connector. Check for the presence of voltage on the LG/N wire at this connection. If you have voltage here, proceed to step 6. If not, there is a break or bad connection in the wiring from the turn signal flasher to the hazard switch, from the hazard switch to the turn signal switch, or the hazard switch is bad. Refer to the hazard switch section of this chapter, page 120, for replacement/repair instructions for the hazard switch. If the switch proves to be good, you will have to repair the wiring to/from the switch.

Step 6). In the same bundle of wire coming out of the steering column that had the LG/N wire you just tested in step 5, there will also be a green/white and a green/red wire. The G/W wire powers the right side signals, and the G/R wire powers the left side signals. With the ignition key on, operate your turn signal switch and check for voltage at each of these wires. If you have voltage here, proceed to step 7. If not, the turn signal switch is bad, and must be repaired or replaced. This switch is repairable, but it’s a bit harder to do than for the rocker type switches. Repair procedures are covered on page 121.

Step 7). Does the hazard flasher circuit work? The turn signals and the hazard flasher both use the same bulbs, and the two circuits connect together at the wiring to the bulbs. In the ‘72 - ‘76TR6, this connection takes place at the hazard switch. If the hazard circuit works, you know the turn signal circuit is also operable from this point onward to the lights, so no need to check further than the hazard switch connections. If you’ve gotten this far without finding the trouble, and the hazard circuit works, it’s pretty certain, then, that the problem lies in the wiring from the turn signal switch to this connection, and repairs to this portion of the wiring will be needed. If the hazard flasher circuit doesn’t work, proceed to step 8.

Step 8). With the key on, operate the turn signal switch while monitoring for voltage on the GW wire (for a RH turn) and the GR wire (for a LH turn) at the rear harness connector. If you have voltage, there is a break or a bad connection in the wiring from this point to the lights, or, quite likely, the ground connection to each bulb is bad. Clean or repair as needed. If not, there is a break or bad connection in the wiring between the turn signal switch and the connector, which will need to be repaired.

HAZARD FLASHER CIRCUIT:

ALL MODELS:

The hazard flasher circuit receives power from the “purple” fuse, as do the horns, high beam flash-to-pass, and the courtesy lights. If ***ANY*** of these devices work, you have power to this fuse. If ***NONE*** of them work, you have a problem in the wiring to the “purple” fuse, or the fuse is blown. Repair this problem before proceeding with the following steps.

TR250 - ‘71 TR6:

Step 1). With your hand on the hazard relay, located under the hood next to the fuse box, operate the hazard switch. Does the relay click? If not, go to step 10. If it does, go to step 2.

Step 2). Using a short test lead with alligator clips on each end, jumper from the “purple” fuse to the hazard relay terminal with the Light green/brown wire (should be the C2 terminal, but may be C1 or C4), and operate the hazard switch. Do the lights come on and burn steady? If so, go to step 4. If not, go to step 3.

Step 3). With the jumper from step 2 still in place, and the hazard switch still on, check for voltage on the GW and GR wires at the hazard relay. If you have voltage on these wires, go to step 8. If not, the relay is bad, and must be replaced. Remove the jumper.

Step 4). Remove the jumper from step 2, and, with the hazard switch on, check for voltage on the purple/red wire at the hazard flasher, (located just ahead of the fuse box). If you don’t have voltage here, there is a break or a bad connection in the P/R wire between the flasher and the

hazard relay, which will need to be repaired. If you do find voltage here, proceed to step 5.

Step 5). Make a short test lead with ¼" male spade terminals on each end. Remove the wires from the hazard flasher, and insert one end of your test lead into the wire terminal with the P/R wire, and the other end into the wire terminal with the LG/N wire. Operate the hazard switch. Do the lights come on and burn steady? If so, the flasher is bad and must be replaced. If not, leave the jumper in place and proceed to step 6.

Step 6). With the hazard switch still on, and the test lead jumper from step 5 still in place, check for voltage on the LG/N wire at the hazard relay. If you don't have voltage here, there is a break or bad connection in the LG/N wire from the flasher to the relay. If you do have voltage, go to step 7.

Step 7). With the hazard switch still on, and the test lead jumper from step 5 still in place, check for voltage on the GW and GR wires at the hazard relay. If you don't have voltage here, the relay is bad, and must be replaced. If you do have voltage, go to step 8.

Step 8). Do the turn signals work? The turn signals and the hazard flasher both use the same bulbs, and the two circuits connect together at the wiring to the bulbs. In the TR250 - '71 TR6, this connection takes place at the bullet/sleeve connectors where the GW and GR wires from the turn signal switch exits the steering column under the dash. If the turn signals work, you know the hazard circuit is also operable from this point onward to the lights, so no need to check further than the plug/socket connection. If you've gotten this far without finding the trouble, it's pretty certain, then, that the problem lies in the wiring from the hazard switch to this connection, and repairs to this portion of the wiring will be needed. If the turn signals don't work, proceed to step 9

Step 9). With the hazard switch still on and the jumper still in place, check for voltage on the GW wire (for a RH turn) and the GR wire (for a LH turn) at the rear harness connector. If you have voltage, there is a break or a bad connection in the wiring from this point to the lights, or, quite likely, the ground connection to each bulb is bad. Clean or repair as needed. If not, there is a break or bad connection in the wiring between the hazard relay and the connector, which needs repair. Remove the jumper

Step 10). With the hazard switch on, use your voltmeter or test lamp to check for the presence of power at the purple/red wire at the hazard relay. If you have power here, go to step 11. If not, go to step 12.

Step 11). Using a short piece of wire with an alligator clip on each end, connect the relay terminal with the black wire (should be W2, but may be W1), to ground. Turn the hazard switch on, and check to see if the relay clicks. If it does, the black wire to ground is open, or there is a bad connection. Repair as needed. If the relay doesn't click, it is defective, and must be replaced.

Step 12). If you had no power on the P/R wire at the relay, you will need to check for power on the P/R wire at the hazard switch, with the switch on.

To gain access to the hazard switch, it will be necessary to remove either the speedometer or the tachometer. To remove either of these items, first unscrew the drive cable connection at the rear and pull the cable out of the way. Next, remove the illumination and the various indicating lamps. There are two clamps holding the meter in place, and these are held onto two studs at the back of the case by knurled nuts. Remove these two nuts, and any ground wires, and slip the clamps off. The meter can then be pulled out the front of the dash.

If you have power on the P/R wire, go to step 13. If not, there is a break or bad connection in the P/R wire between the relay and the switch, which will need to be repaired.

Step 13). If you had power on the P/R wire, check for the presence of power on the purple wire at the hazard switch. If you have power here, the switch is bad, and must be repaired or replaced. If not, there is a break or a bad connection in the purple wire from the fuse to the switch.

'72 - '76 TR6:

Step 1). Remove the wiring from the hazard flasher (located just in front of the fuse box), and check for the presence of power on the terminal with the purple wire, using your voltmeter or test lamp. If you have power here, go to step 2. If not, there is a break or bad connection in the purple wire from the fuse box to the flasher, which will need to be repaired.

Step 2). Using a short test lead with ¼" male spade terminals on each end, connect the purple and the light green/pink wires together. Do the lights come on and burn steady? If so, the flasher is bad and will need replacement. If not, go to step 3).

Step 3). With the jumper still in place, check for voltage on the LG/K wire at the hazard switch.

To gain access to the hazard switch, it will be necessary to remove either the speedometer or the tachometer. To remove either of these items, first unscrew the drive cable connection at the rear and pull the cable out of the way. Next, remove the illumination and the various indicating lamps. There are two clamps holding the meter in place, and these are held onto two studs at the back of the case by knurled nuts. Remove these two nuts, and any ground wires, and slip the clamps off. The meter can then be pulled out the front of the dash.

If you have power here, go to step 4. If not, there is a break or bad connection in the LG/K wire between the flasher and the switch.

Step 4). With the jumper still in place, check for voltage at the hazard switch on the GW wire (RH bulbs), the GR wire (LH bulbs), and the LG/G wire (hazard warning indicator). If you have voltage on these wires, go to step 5. If not, the hazard switch is bad, and will need to be repaired or replaced.

Step 5). Do the turn signals work? The turn signals and the

hazard flasher both use the same bulbs, and the two circuits connect together at the wiring to the bulbs. In the '72 - '76TR6, this connection takes place at the bullet/sleeve connectors where the GW and GR wires form the turns signal switch exits the steering column under the dash. If the turn signals work, you know the hazard circuit is also operable from this point onward to the lights, so no need to check further than these connectors. If you've gotten this far without finding the trouble, it's pretty certain, then, that the problem lies in the wiring from the hazard switch to this connection, and repairs to this portion of the wiring will be needed. If the turn signals don't work, proceed to step 6

Step 6). With the hazard switch still on and the jumper still in place, check for voltage on the GW wire (for a RH turn) and the GR wire (for a LH turn) at the rear harness connector. If you have voltage, there is a break or a bad connection in the wiring from this point to the lights, or, quite likely, the ground connection to each bulb is bad. Clean or repair as needed. If not, there is a break or bad connection in the wiring between the hazard switch and the connector, which will need to be repaired.

EMERGENCY OR TEMPORARY TURN SIGNAL REPAIRS:

If your turn signals are sluggish, or if they come on but don't flash, you can often get them to work again by replacing the turn signal flasher with hazard flasher. Purchase a model 552 flasher from any auto parts store, or most department stores, such as Wal-Mart or K-Mart, and install it in place of the existing Lucas unit. The 552 is a round unit, so it won't fit the stock flasher holder, so you will have to tie it in place with cable ties, or similar. Remember, though, with a hazard flasher, you won't get a warning if one of the bulbs should burn out, so it isn't a good idea to consider this a permanent fix. If you don't know your turn signals aren't working, you won't be as careful as you would be if you did know, so you may put yourself at an increased risk of a tail-ender!

If your turn signals typically fail to blink after you've used your hazard flasher because of dirty contacts in the hazard switch, and you have a TR250 -'71 TR6, you can replace the hazard switch with a DPDT switch from Radio Shack or other electronic supply house. These switches have the advantage of being sealed from the elements, so they won't be as prone to mis-operation as the stock Lucas switch.

Purchase a switch rated for 6 amp or better. If you buy one from an automotive store, make sure it does NOT have a center off position, as do most switches sold there. If you should use a switch with a center off position, in the center position neither the turn signals nor the hazard flasher will work. This is more of a nuisance than a real problem.

Find a suitable location for the switch. I recommend hiding it under the dash where it can be easily reached but out of sight. Of course, this is a personal choice, and if many people drive your car, you might want it in plain view, and maybe even labeled.

Remove the wires from the existing hazard switch, and leave the switch in place for appearance sake. Other wise, you will be faced with the task of filling the hole. The easiest way to access the switch is by removing the tachometer, as described previously in the troubleshooting section. Be sure to disconnect the ground lead from the battery before doing any work under the dash.

Attach extension wires to the existing wires, long enough to reach your new switch. I recommend cutting the terminals from the existing wires, solder the extension wires and insulate the connections with heat shrink tubing. However, if you wish to maintain the option of returning your car to stock sometime in the future, you might choose to use male spade connectors instead. Just be sure to insulate them well, and tie them to a good support so they don't work loose.

Attach the extension wires to the new switch as shown in **figure 15** below. It doesn't matter which way the switch is orientated, nor which LG/N wire goes to which terminal. As long as the back of the switch looks like that shown, it will be right. With the switch in one position, the turn signals will be operable, and in the other position, the hazard flasher will be on. You choose whether you want up or down to be the position for the hazard flasher, and mount the switch accordingly.

Insulate the unused switch terminals. Under certain conditions, these terminals can have 12v on them.

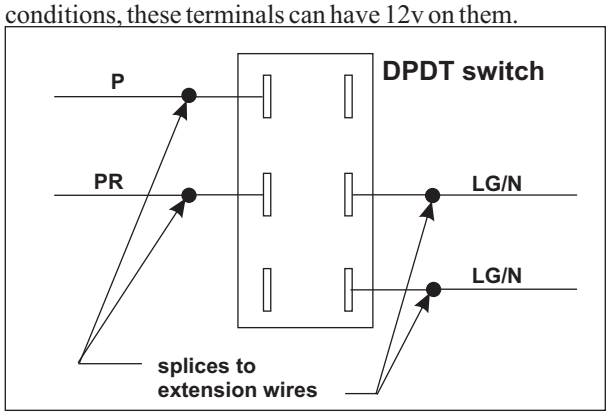


FIGURE 15

Unfortunately, the later models of the TR6 have a wiring arrangement that doesn't lend itself to this fix. Without a major revision to the wiring, you're pretty much stuck with what you've got.

TURN SIGNAL SWITCH REPAIR:

A bit difficult to do, but the turn signal switch can be repaired. Repairing it is not difficult, but a little ingenuity is required to reassemble it after the repairs have been done. As shown in **photo 3**, next page, the moving portion of the switch is held to the fixed portion by a long rivet. This rivet will have to be drilled out to get the switch

apart. Once you have it apart, clean the contacts with a pencil eraser or similar abrasive, and reassemble. Use a good electrical grease if you can find it, or assemble dry if not. You should be able to get a good electrical grease from an electrical supply house.

Replacing the rivet will be the tricky part. A long, skinny screw might do, but you will have to peen the threads after putting the nut on to keep it from working loose, or a bit of epoxy or Loctite may work.

Photo 4 below shows the other side of the switch. You will notice the two cams on the switch (A), and the spring clips next to the cams (B). The cams are operated by a clip on the steering column to return the switch to its normal position after a turn. The clip is shown in **photo 5**.

Photo 6 shows the turn signal switch in a right turn position. Pressing on the cam in direction A (as the wheel turns to the right) does nothing, but pressing the cam in direction B (as the wheel returns from the right) trips the spring clip, moving it from the notch in the switch (C), and the switch returns to neutral.

Photo 7 shows a disassembled switch. The wiper arm is a two-pronged affair, and is narrow enough that the two prongs rest entirely on the common segment of the brass plate when in the neutral position. Turning the lever for a right turn causes one of the prongs to contact the right turn segment, while the other prong maintains contact with the comment segment. The wiper and the brass plate often become very corroded, and a good cleaning will do wonders to restore the switch to operation. Rubbing the contact points with a pencil eraser will often be all that is required (after cleaning out the old grime and grease).

Repairing these items might be a bit of a challenge, but at least you can see how they work and maybe you can get the switch to return to neutral by adjusting the steering column clip. If not, its good to know just how the darn thing works.

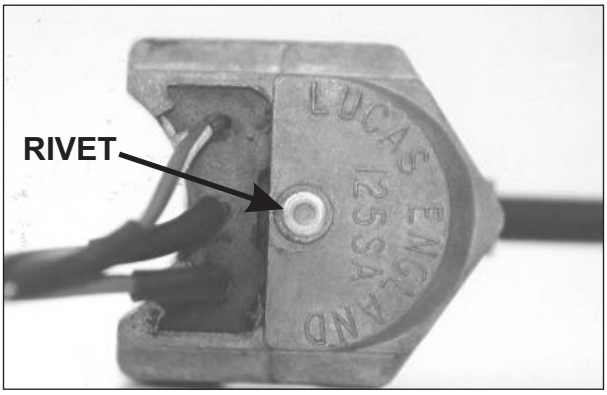


PHOTO 3

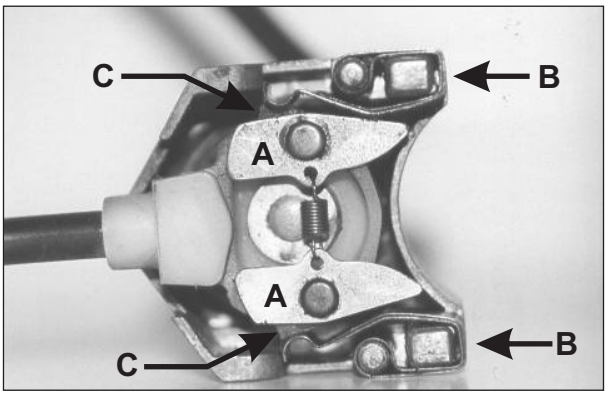


PHOTO 4

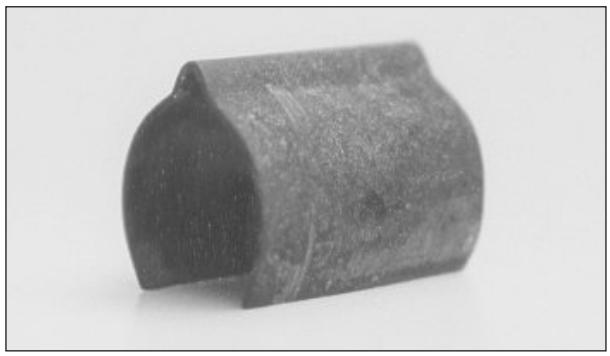


PHOTO 5

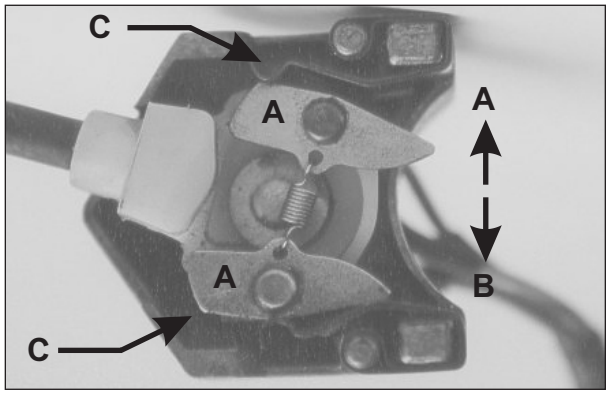


PHOTO 6

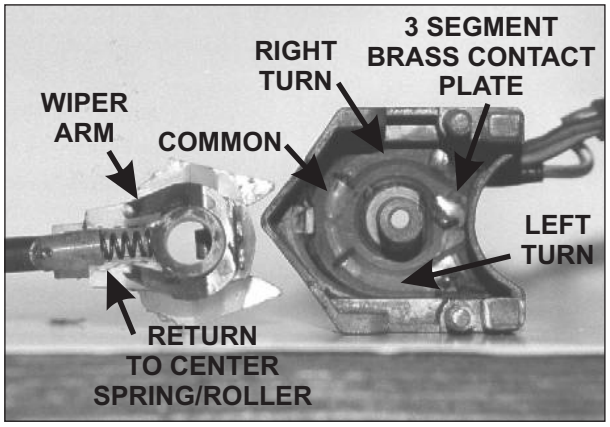
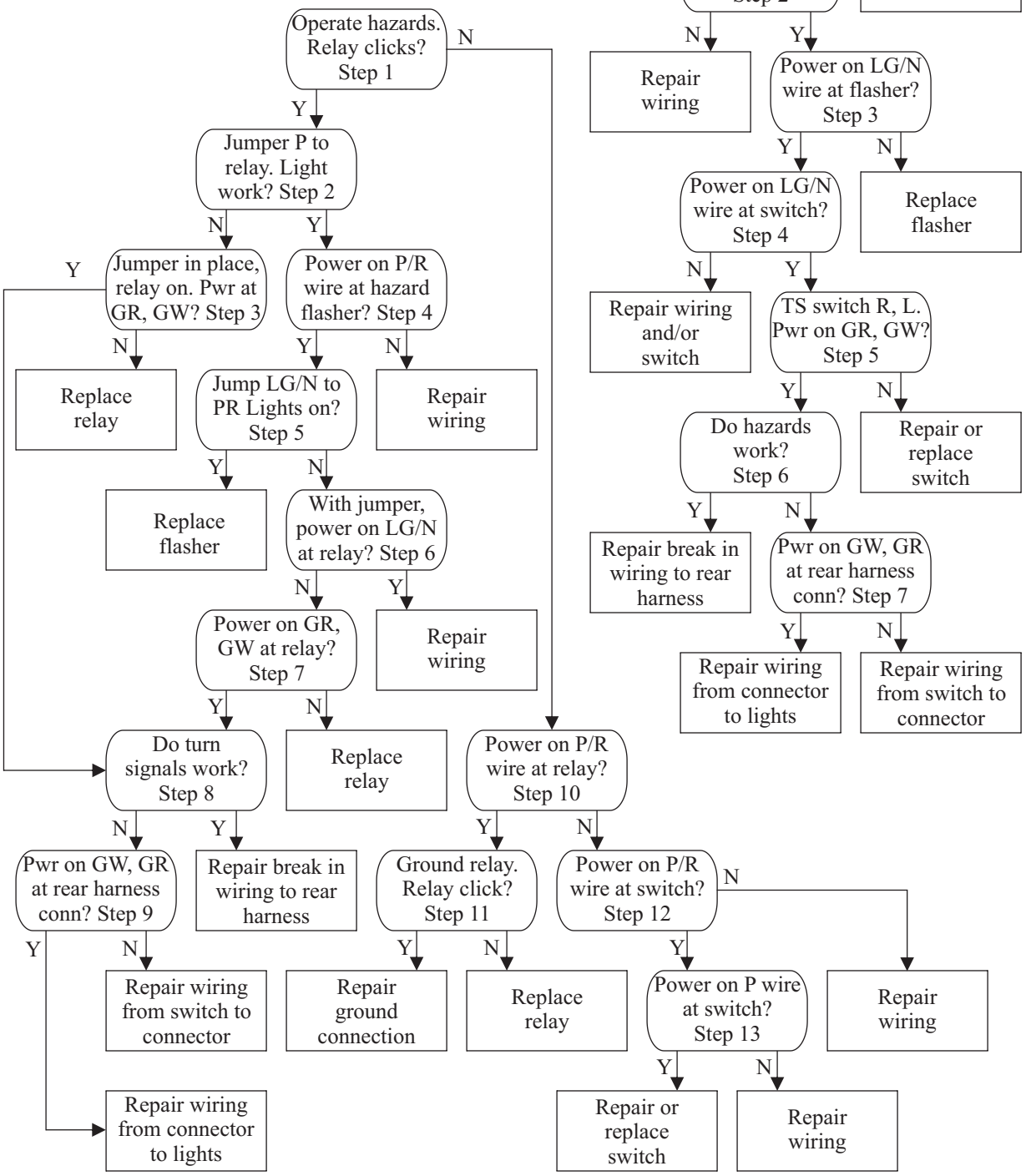


PHOTO 7

TROUBLESHOOTING FLOW DIAGRAMS

TR250 - ‘71 TR6

TR250 - ‘71 TR6 HAZARD FLASHERS

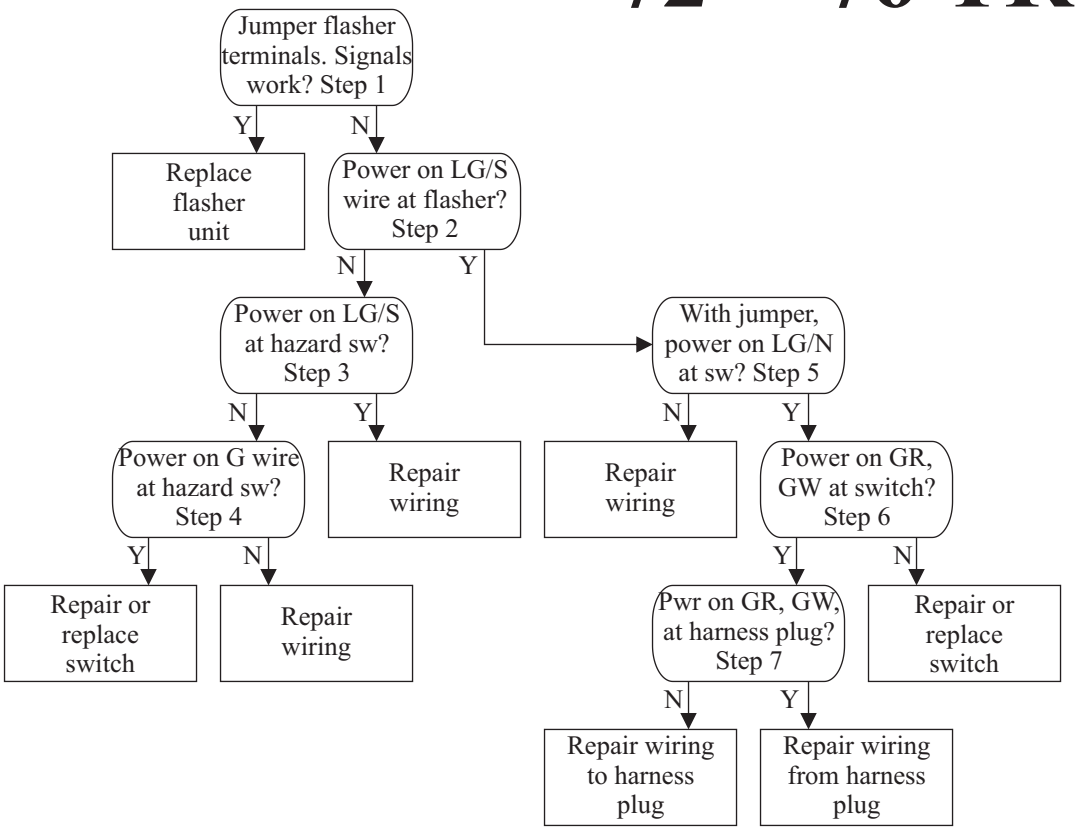


TR250 - ‘71 TR6 TURN SIGNALS

TROUBLESHOOTING
FLOW DIAGRAMS

‘72 - ‘76 TR6

‘72 - ‘76 TR6 TURN SIGNALS



‘72 - ‘76 TR6 HAZARD CIRCUIT