

E30 Headlight Wiring Instructions

Converting Sealed Beam Systems to Ellipsoid/European Style Headlight Systems Utilizing Single Filament Bulbs

X Mon™

This document details the steps required to converting a sealed beam headlight system as found in the 90 on BMW e30 to an US Ellipsoidal/Euro Smiley/Cibie CSR based system. The US Ellipsoid system uses single element 9005 and 9006 bulbs for the high and low beams respectively, whereas the Euro Smiley and Cibie CSR systems use a single element H1 bulb for BOTH the high and low beams.

As an added caveat, due to the interdependence of the low beam and fog light circuits, a discussion of rewiring to maintain the fog light unloader circuit (fogs off with highs on) is also presented. This discussion then proceeds to the work required to create front fogs that will function with only the parking lights illuminated as well as the additional parts and work required for the installation of the rear fog light circuit.

The “Legal” Mumbo Jumbo

I’m human, I fuck up, my brain gets ahead of my fingers. If you find errors in anything written, let me know. I will correct them. Of course anything you do on YOUR car is at YOUR OWN risk. I cannot, will not, and refuse to be held responsible for any damage you may inflict, or any adverse performance you may encounter.

Written solely from my own experience on installations in an ’89 and a ’90 325iX

Converting Sealed Beam Systems to Ellipsoid/European Lighting Utilizing Single Filament Bulbs

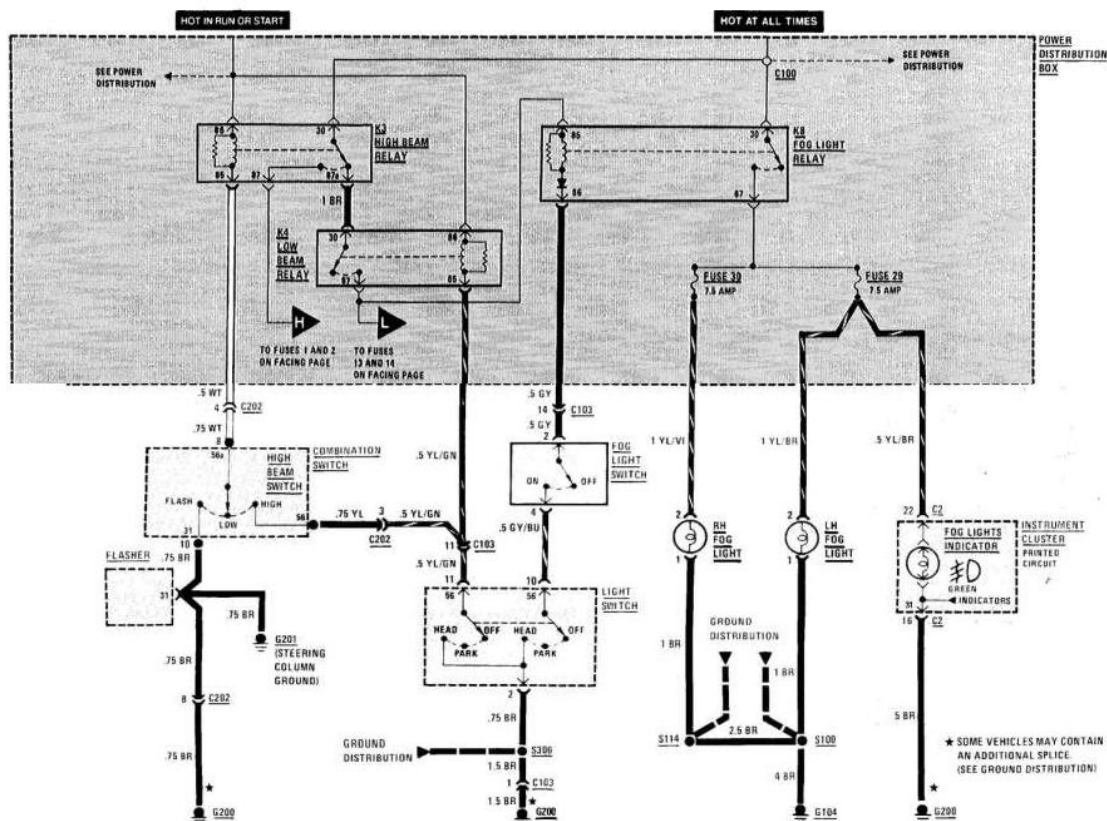
The Background

The US specification E30 head light wiring circuit utilized 3 different headlight/fog light configurations during its production run. There was an early sealed beam system that ran from 84-87, a late sealed beam that ran 90 on, and an ellipsoid system in 88 and 89. The sealed beam style lamp ran a dual filament "low" (outer) bulb that utilized a common ground. The H4 bulb used by the Hella and Cibie lights works on the same principal.

The reason for the dual filament is that the lights are designed with two different focal points. When the low beams filament is illuminated its position relative to the reflector and face of the light bulb allow it to cast a shorter, less intense pattern, so as to not blind the oncoming driver. On the other hand, the position of the high beam filament allows the same lens optics to cast a longer, more intense pattern out in front of the vehicle. Based on the design, it would be pointless to illuminate both of these filaments at the same time. Additionally, I question if it would cause early failure of the filaments due to heat related issues within the lens assembly. Therefore, the sealed beam cars were designed to have the unloader circuit (driven by the high beam relay) unload BOTH the fog lights AND the low beam filament of the outer headlight as shown in Figures 1a and b.

Fig 1a: '90 M3 Headlight Wiring (6312-0 '87 325e / '90 M3 due to error in ETM)

6312-0 HEADLIGHTS/FOGLIGHTS

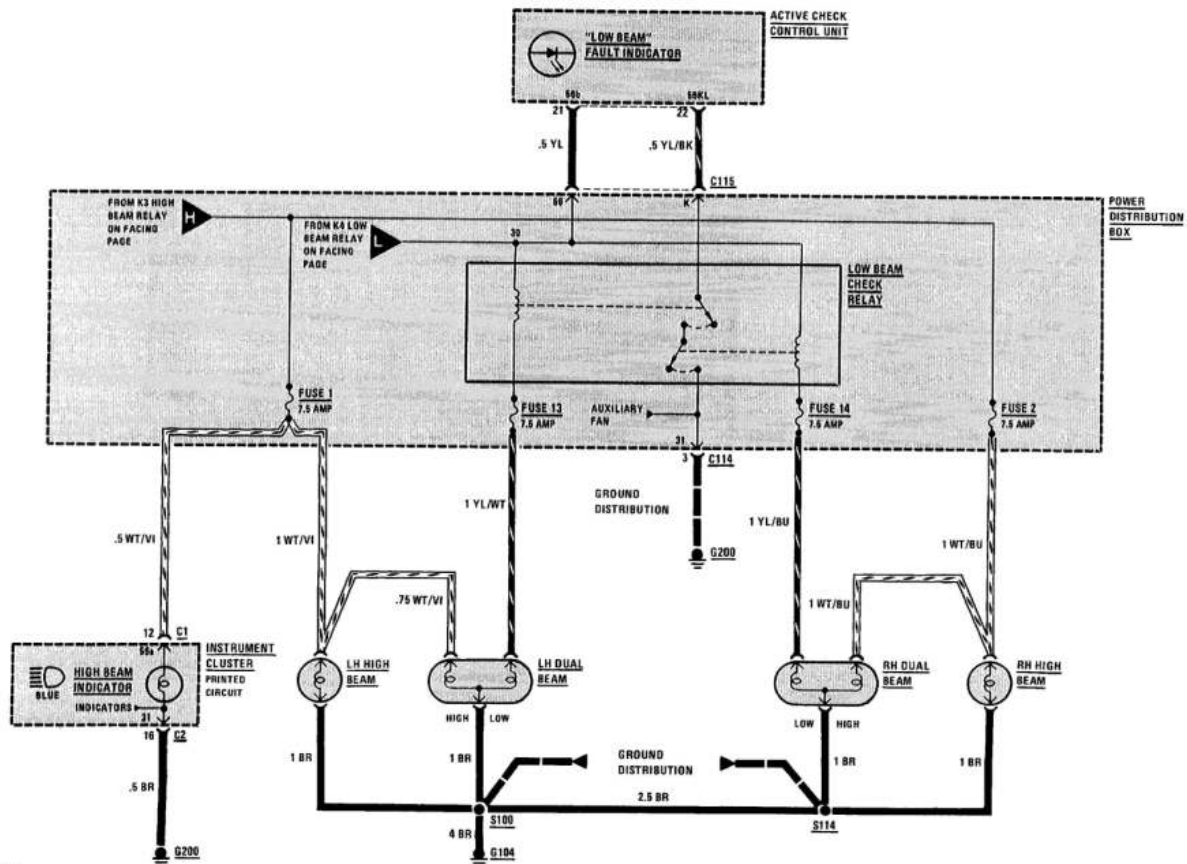


Full Scale Figures at End of Document

Converting Sealed Beam Systems to Ellipsoid/European Lighting Utilizing Single Filament Bulbs

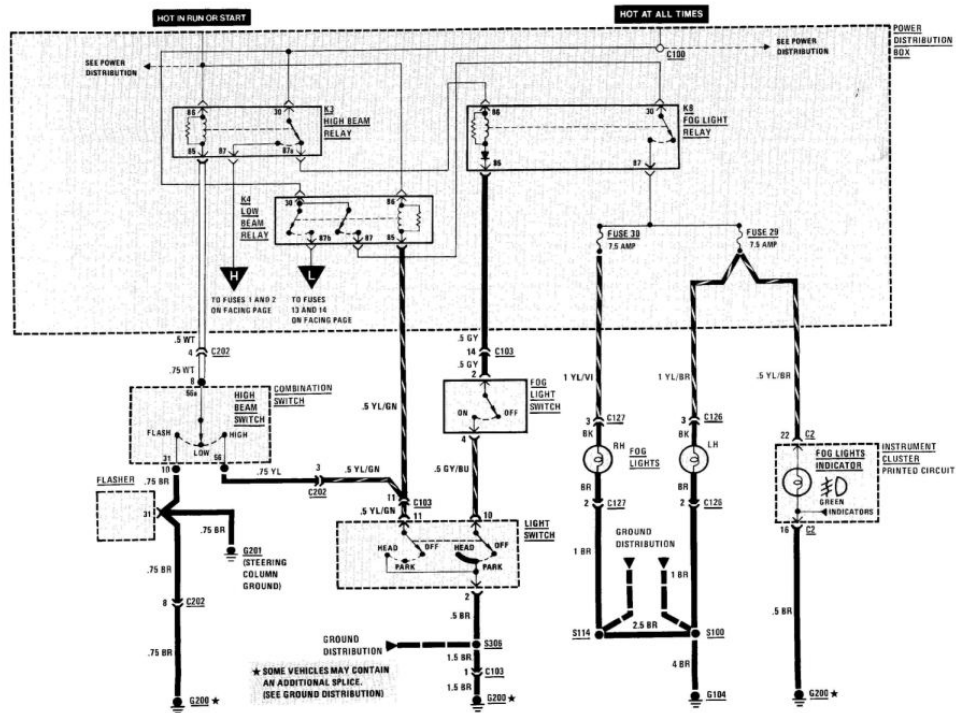
Fig 1b: '90 M3 Headlight Wiring (6312-1)

HEADLIGHTS/FOGLIGHTS 6312-

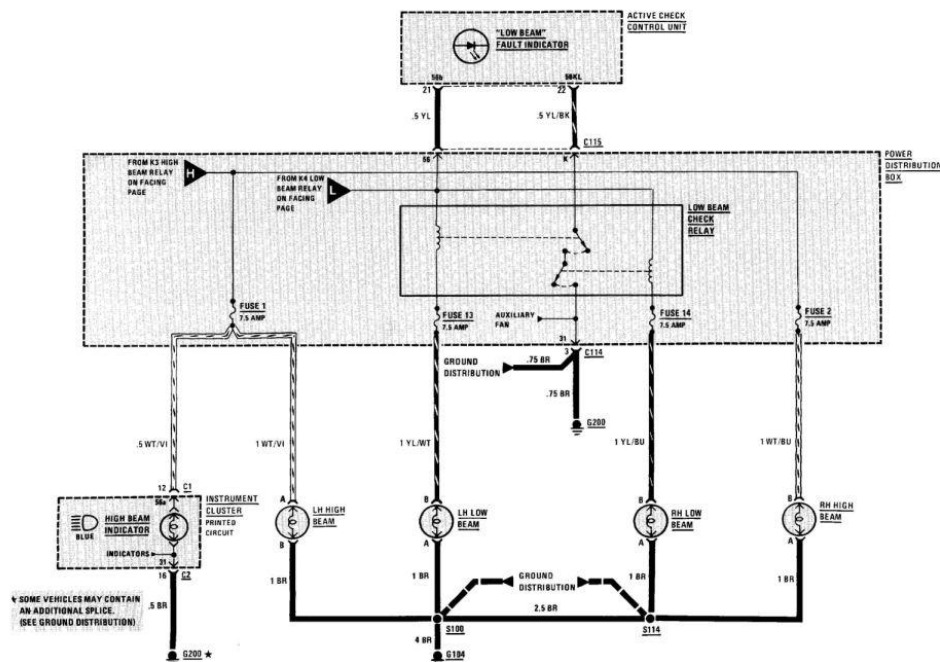


Taking a look at the High Beam Relay (K3) in Figure 1a, one finds that Pin 87a, hot with the high beams OFF, is the power source for the Low Beam Relay (K4) at Pin 30. One also notes that with K3 energized, Pin 87a is now cold, while Pin 87 is hot. Thus even with the headlight switch in the on (HEAD) position this filament will turn off when the high beams are ON. Additionally it is interesting to note that the Fog Light Relay (K8) unloads from the down relay side of K4. This means that if you modify the circuit to keep the low beam circuit active when the high beams are on, your fog lights will stay on as well. In some states this can create issues with regard to passing safety inspection. We will revisit the fog lights later. Taking a look at the Figure 1b, one sees that the high beam filament of the outer light is illuminated on a common circuit with the high beam (inner) light. Thus it is obvious that the circuit cannot be tied together on the down current side of things. However, all hope is not lost.

In the ideal world one would connect Pin 87a of K3 to Pin 86 of K8 and then connect Pin 30 of K4 to C100 inside the fuse box. This would result in fog lights with only the parking lights on while maintaining the unloader as well as keeping the head light wiring on when the high beams are turned on. This effectively suggests the creation of a circuit similar to Figure 2 overleaf. Unfortunately, the connection between Pin 87 of K4 and Pin 86 of K8 is an internal trace on the circuit board inside the fuse box.

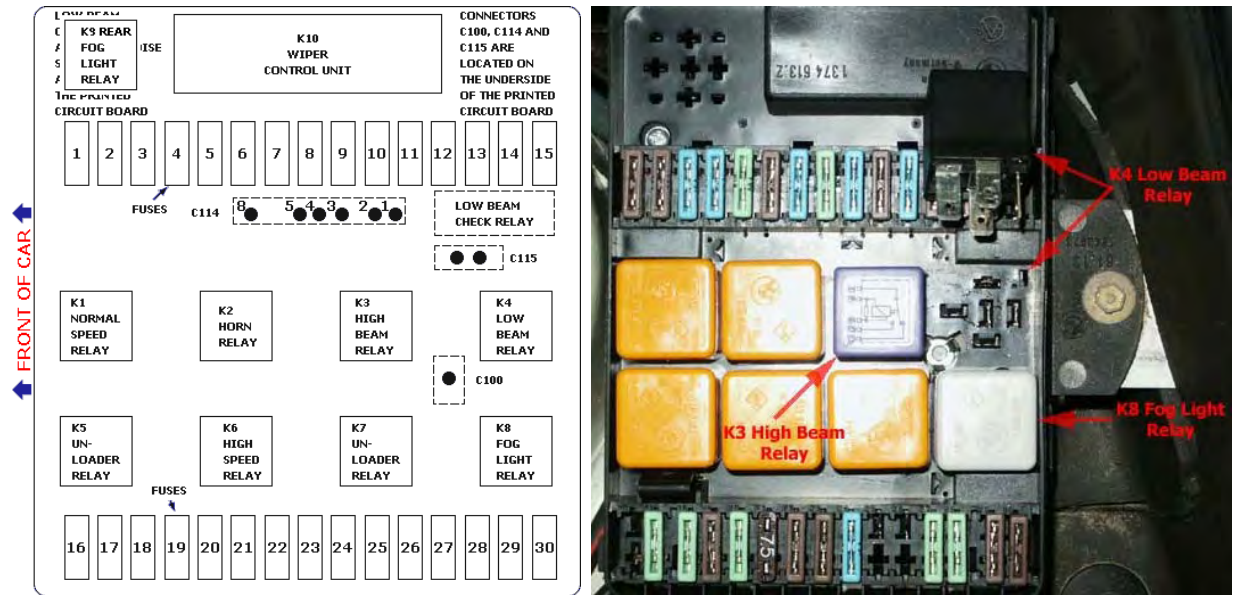
Converting Sealed Beam Systems to Ellipsoid/European Lighting Utilizing Single Filament Bulbs**Fig 2: '89 M3 Headlight Wiring (6312-0)****6312-0 HEADLIGHTS/FOG LIGHTS**

Aside from Pin 30 of K8 being connected to Pin 87 K4, it is exactly as described above. The other half of the diagram above is shown in Figure 3, which depicts the down current side of a US Ellipsoid circuit.

Fig 3: '89 M3 Headlight Wiring (6312-1)**HEADLIGHTS/FOG LIGHTS 6312-1**

Converting Sealed Beam Systems to Ellipsoid/European Lighting Utilizing Single Filament Bulbs**The Conversion**

In European E30s with the REAR fog light setup installed, there is an additional Rear Fog Light Relay (K9), shown in Figure 4, which is utilized to provide the unloader circuit for the REAR fog. We can emulate this setup somewhat and at the same time provide a means to run the rear fog light should you decide you want to install it at a later date.

Fig 4: 'E30 Fuse Box Diagram – European Wiring with Rear Fog Light Relay**Supplies Required for Wiring Conversion (Fuse Box):**

6x HL87272 6.3mm Female Blade Connector w/ Barb for Relay blocks



1x 61 36 8 373 700 SPST BMW Relay (Orange Relay for Fogs, Unloader, Fan, etc)

1x 14 Gauge Open Spade Terminal



2x 18 Gauge Splice Taps

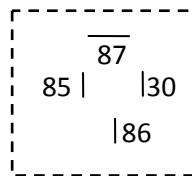


14 & 18 Gauge Wire

Converting Sealed Beam Systems to Ellipsoid/European Lighting Utilizing Single Filament Bulbs**Steps Required for Wiring Conversion (Fuse Box):**

1. Disconnect the battery
2. CAREFULLY remove the fuse box cover
3. Remove the headlight, fog light and high beam relays
4. Remove whatever else you have to in the fuse box to find 2 silver Phillips head screws
5. Remove these screws and the one Phillips head screw on the outside of the fuse box
6. CAREFULLY lift the top of the fuse box up
7. Take a paper clip, a pin or a stiff piece of wire, and gently pry back the locking tabs on the following pins of the following relay sockets:
 - a. 86 of the Fog Light Relay (.5mm Gray Wire) [Relay K8]
 - b. 87a of the High Beam Relay (1mm Brown Wire)[Relay K3]
 - c. 30 of the Low Beam Relay (1mm Brown Wire) [Relay K4]

To pry back the lock tab, stick the wire in parallel to the pin, and pull away from the pin. Pushing up from the bottom side sometimes helps. The pin orientation looking down into the fuse box should be:



With the wiring OUT, do the following:

1. Connect the .5mm Gray Wire you removed from the fog light relay socket to PIN 86 of K9.
(You'll need to carefully pry the lock tab back out to get it to stay in place.)
2. Make a new connection and connect Pin 30 of K9 to pin 87 of K8
3. Make a new connection and connect pin 85 of K9 to pin 87a of K3
4. Connect pin 87 of K9 to Pin 3 of C114 (.75mm brown)
5. Connect pin 30 of K4 to C100 using 14 GAUGE wire and spade terminal
(Gently loosen the Allen bolt going through the fuse box under K3/4)
8. Put the top of the fuse box back into place CAREFULLY making sure you are not pinching any wires.
9. Replace the Phillips head screws, the relays and anything else you took out.
10. Put the fuse box cover back on the fuse box.

Converting Sealed Beam Systems to Ellipsoid/European Lighting Utilizing Single Filament Bulbs**Supplies Required for Wiring Conversion (Headlights):**

Proper wiring pigtails pertaining to the style of light you are installing. For factory lights you should be able to have the seller provide you with pigtails, or get them from a junk yard. 9005/9006 pigtails should be able to be had at a local parts store. For lights such as the Cibie CSR, you can hard splice into the chassis side of the "harness" that connects the chassis wiring to the bulb.

Solder and Heat Shrink

Steps Required for Wiring Conversion (Head Lights):

Splice the connectors following the scheme presented below. For instructions on how to properly solder western union style splice joints check out the information provided [here](#). Remember to slip the heat shrink onto one of the sides of wires back out of the way BEFORE you splice them together. Connections are Chassis Side/Light Side

US Ellipsoids or Euro Ellipsoids (w/ or w/out city lights)

- | | | |
|--------------------------|------------------------------|----------------|
| 1. Left Hand Low Beam: | Yellow/White to Yellow/White | Brown to Brown |
| 2. Right Hand Low Beam: | Yellow/Blue to Yellow/Blue | Brown to Brown |
| 3. Left Hand High Beam: | White/Purple to White/Purple | Brown to Brown |
| 4. Right Hand High Beam: | White/Blue to White/Blue | Brown to Brown |

Cibie or other single filament setup

- | | | |
|--------------------------|-------------------------------|------------------------|
| 1. Left Hand Low Beam: | Yellow/White to Low Beam (+) | Brown to Low Beam (-) |
| 2. Right Hand Low Beam: | Yellow/Blue to Low Beam (+) | Brown to Low Beam (-) |
| 3. Left Hand High Beam: | White/Purple to High Beam (+) | Brown to High Beam (-) |
| 4. Right Hand High Beam: | White/Blue to High Beam (+) | Brown to High Beam (-) |

Converting Sealed Beam Systems to Ellipsoid/European Lighting Utilizing Single Filament Bulbs**Supplies Required for Wiring Conversion (City Lights):**

1x 61 31 1 380 352 Fog Light Switch (Case 1 or 3)

1x 18 Gauge Ring Terminal (Case 1)



1x ATC Style Fuse Holder and 7.5Amp Fuse (Case 3)



1x 18 Gauge Splice Tap (Case 3)



18 Gauge Wire

Steps Required for Wiring Conversion (City Lights):

There are three different cases of possible wiring for the city light circuits.

CASE 1

If you want the lights switched while the parking lights are on, wire the hot side to the parking lights and the other side to a switched chassis ground. The heavier gauge wire on each respective side is for the front marker light, while the lighter gauge is for the side marker. Run the ground wire into the passenger compartment. Connect the wire to one side of a fog light switch, which can be placed in one of the blanks above the radio. Wire the other side of the switch to chassis ground.

CASE 2

If you don't want them to have an independent switch, but rather just come on with the parking lights you can use the wiring in Case 1, but simply use a chassis ground such as the one near the left hand headlight assembly.

Connections are Chassis Side/Light Side

1. Left Hand City Light: Gray/Yellow to Gray/Yellow, Brown to Common Brown
2. Right Hand City Light: Gray/White. to Gray/White, Brown to Common Brown
3. Common Brown to: Case 1 – Switch, Switch to Chassis Ground
Case 2 - Chassis Ground by LH Lights

CASE 3

If you want the city lights switched independent of the parking light circuit, run a common source that is powered in key position 1 or 2 through the fog light switch of Case 1 and utilize the common chassis ground used in Case 2. Make sure to use a 7.5 amp fuse inline between source and switch.

Connections are Chassis Side/Light Side

1. Left Hand City Light: Gray/Yellow to Common Source, Brown to Common Brown
2. Right Hand City Light: Gray/White to Common Source, Brown to Common Brown
3. Common Brown to Chassis Ground by left hand headlights
4. Common Source to Switch, Switch to 7.5 Amp Fuse, Fuse to source hot in Key Position 1 or 2

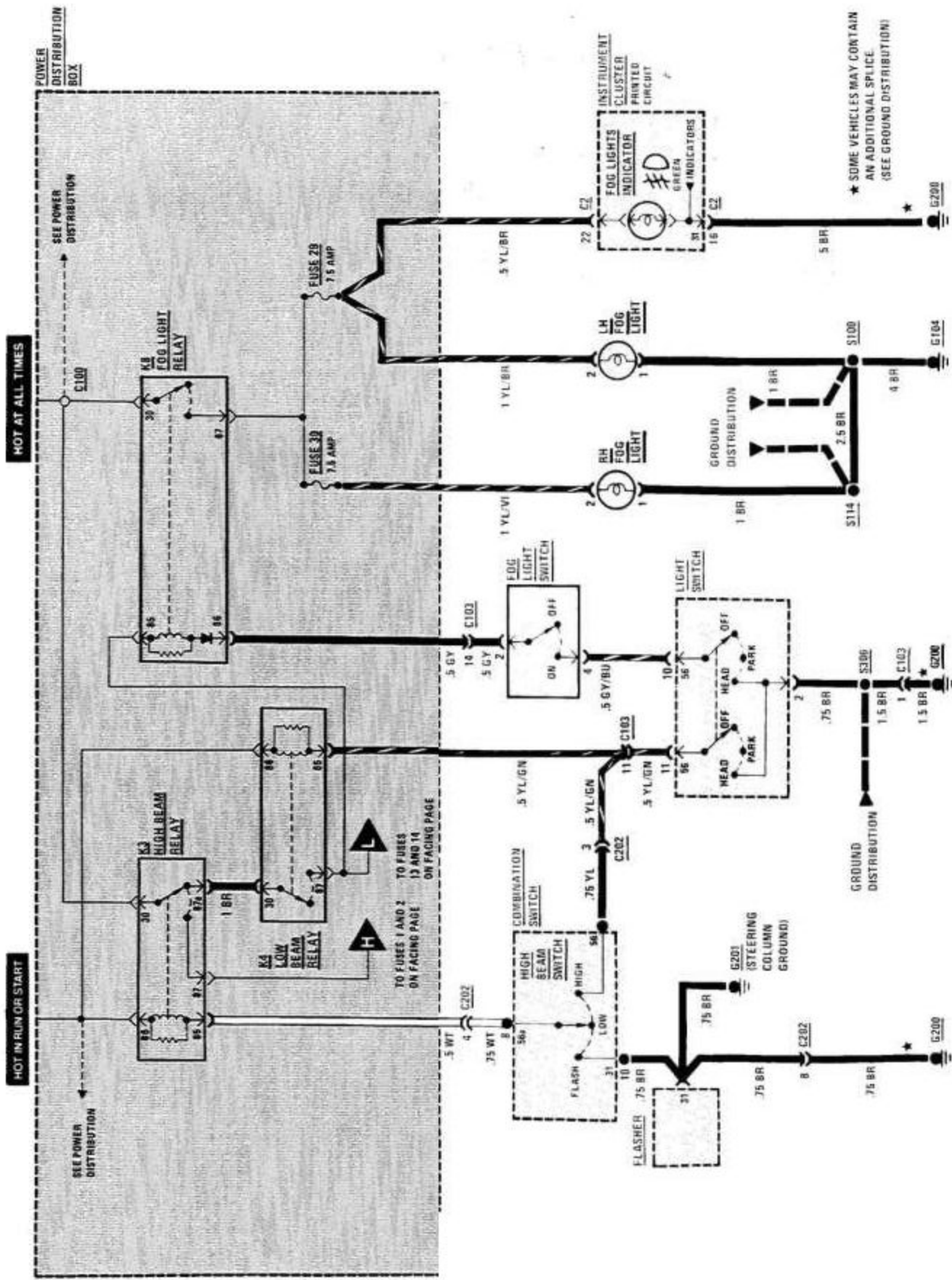
Converting Sealed Beam Systems to Ellipsoid/European Lighting Utilizing Single Filament Bulbs**A note about further wiring modifications:**

The headlight wiring in the E30 is sufficient to handle up to twice its stock current, 15 amp fuse versus the stock 7.5 amp, WITHOUT any risk of damaging the wire. This would allow you to run up to at least a 110Watt bulb without having issues with the lighting, and the voltage drop at the light should be minimal. If anything, this is a relaxation of the wiring requirements on the high beam circuit, as now only one 55W (assuming stock wattage) H1 bulb is powered by the circuit whereas the original circuit powered both the 55W sealed beam high and the 60W high beam filament of the "low" beam (outter) bulb.

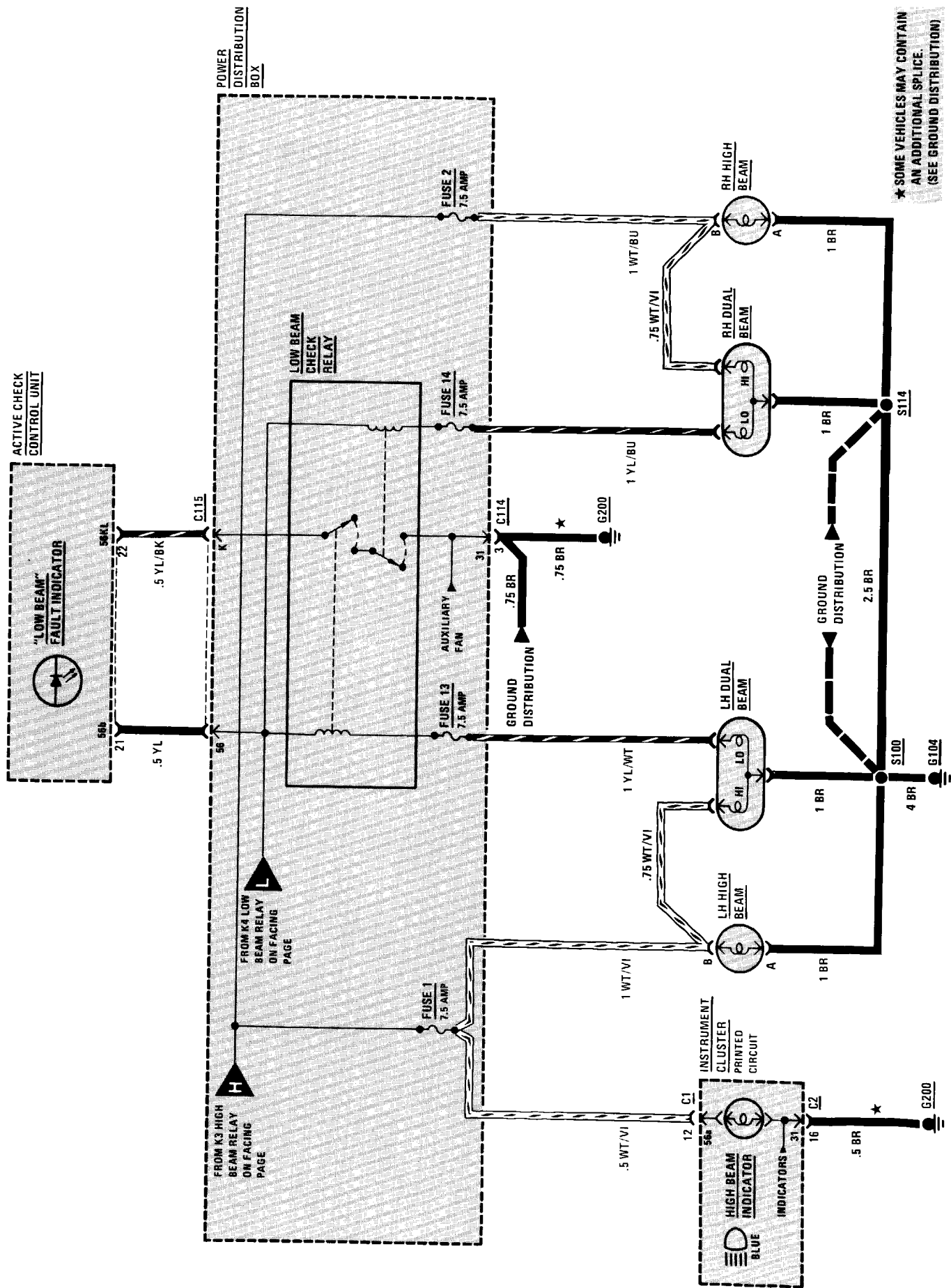
If you start rewiring the lights be isolating them on their own relay circuit, you're going to need to poke wires through the firewall (never a fun time) and do a bunch of other mindless stuff that's really unnecessary. Additionally, making changes as suggested by Daniel Stern of [Daniel Stern Lighting](#) will cause the low beam fault indicator to illuminate. The author typically uses [Susquehanna Motor Sports](#) for lighting and wiring products. You can have a look at their headlight wiring page here. The long and short is that you can stick with the stock wiring gauge when initially doing a headlight conversion.

However, if you insist on changing the feeds to a higher gauge, this can be accomplished by swapping out the wiring coming off the fuse block inside the fuse box. It's a little more complex than afore mentioned, but will keep things in check, and should not cause issues with the fault indicator (less resistance in the larger gauge wire, but this should be MINIMAL). Additionally, converting using such practices will allow you to run the stock relays in their stock locations, with the modifications afore mentioned here. This requires the sourcing of 4 pins for the fuse box connectors, which you should be able to source from Susquehanna. Tell them you are looking for pins to fit a HELLA fuse box.

6312-0 HEADLIGHTS/FOGLIGHTS



HEADLIGHTS/FOG LIGHTS 6312-1



6312-0 HEADLIGHTS/FOG LIGHTS

