Way to cut down on the AM/FM noise that HID ballasts produce. There are three factors that could produce interference in an HID system:

1 - The ballast itself. This is unlikely since it is enclosed in a metal case which is grounded to the chassis (see Faraday Cage)
2 - The wires between the CEM and the ballast. The ballast operates via a 200-500khz boost converter. If this is poorly filtered it will spit out EMI back down the supply lines. Since they were designed for halogen bulbs they are unshielded, and basically act as a 15 or 20 foot antenna to broadcast that interference. This can be fixed pretty easily, with a capacitor-inductor filter at the ballast, which will prevent high frequency transients down the line.
3 - The HV wires between the ballast and the bulb. These are shorter and thus have less radiative length. But it's possible that these are the culprit, as they do transmit HV at HF. Unfortunately there's not much you can do about these, because the ballast requires a direct connection to the bulbs to ensure proper ignition and arc stabilization. What you can do is shield the HV lines, and the easiest way to do this is with stainless steel hose sleeving, and then ground that shield to the chassis. This will greatly cut down on the amount of radiated EMI.

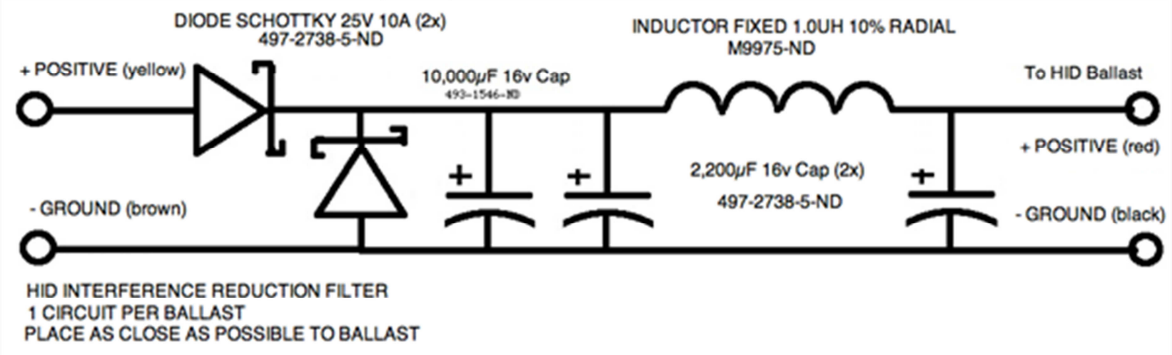
1) Ground the ballast.

Zip ties are not good enough. The ballast should be physically bolted to the car's chassis. Most kits come with brackets, and sheet metal (preferably aluminum or stainless steel) can be used to make custom brackets. If you're lazy, use self tapping screws. I drilled holes and used stainless steel hardware (hex cap bolts) that threaded into my slim ballasts.

Even though the case is grounded through the negative wire, there's a bunch of wire between the ground point and the ballast which has the potential to act as an antenna. Grounding the case of the ballast cuts that wire out of the loop. It will also help keep it cool, which is never a bad thing.

2) Filter the input.

Even if the negative lead is grounded, there is about 15 feet / 5 meters of wire in two harnesses between the positive (yellow) wire in the headlight and the battery. This can easily act as an antenna for back EMF coming off of the flyback or boost converter. To cut this noise out, we use a low-pass pi-filter:



The capacitor-inductor-capacitor "pi" form the lowpass filter. It's tuned to cut anything

above 1khz. The larger capacitor and series diode act to filter input ripple from the PWM, and the reverse-bias diode eliminates any negative transients that develop within the filter.

Components:

Info:
BOM - HID INTERFERENCE REDUCTION FILTER (2x) 2x M9975-ND INDUCTOR FIXED 1.0UH 10% RADIAL $1.13 http://search.digikey.com/scri...75-ND 4x 565-1782-ND CAP 2200UF 16V ELECT LXY RAD $1.06 http://search.digikey.com/scri...82-ND 2x 493-1546-ND CAP 10000UF 16V ELECT HE RADIAL $2.04 http://search.digikey.com/scri...46-ND 4x 497-2738-5-ND DIODE SCHOTTKY 25V 10A TO-220AC $1.50 http://search.digikey.com/scri...-5-ND TOTAL COST, COMPONENTS, 2 UNITS: $16.58

The circuit should be constructed on a solder perf board or with fly leads. Then it should be put in an enclosure and completely covered (potted) with RTV silicon. For this to effectively filter noise, it should be as close to the ballast as possible, preferably next to it. For best results, connect the negative wires to the harness, the ballast, AND to a close chassis ground (maybe the bolt securing the ballast, eh?). I'd also bolt it to the car, but that's not necessary for this guy.

3) Shield the HV lines.

A great deal of noise may come from the HV lines between the ballast and the bulb, especially if your ballast has an external ignitor (small box in line with HV wires). There's no easy way to directly filter this, nor would you want to, since it would reduce the efficiency of the ballast. The best way to combat this EMI is to get some stainless steel hose sleeves (~20 from Advance Auto/Pep Boys) and run the HV components inside of the sleeve.

Remember, to act as a shield the sleeve must be grounded. The easiest way to do this is using a hose clamp at one end to clamp a ground wire to the sleeve. Don't over-tighten, or you may damage the wires underneath. It doesn't really matter if it's a loose fit, as long as it runs continuously from the ballast to the headlight assembly.

You can use any combination of the methods described above. They will all help. I personally don't have interference issues so I can't say for sure, but I'd recommend doing them in this order: 1, 3, 2 and check each time to see if the problem is fixed.

This information is from and property of:

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