

# XJ-S Injector Harness Rebuild

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*1976 XJ-S*

## **Background**

We all know that the V-12 injector harness is in a severe environment—hot and oily. Often they become brittle after a few years, which can lead to breaking of the strands when servicing injectors and doing engine maintenance requiring moving the harness. Also, the connectors become brittle and break and corrosion can lead to poor contact and injector failure. After trying to patch mine by splicing in new connectors here and there, I finally decided to rebuild the whole thing. The only thing I did not replace was the harness connector.

I hope these notes will help others with this project. My car is a 1976 XJ-S (preHE), but much of this should apply to the HE as well. The only difference will be the injector connectors.

## **Wire**

I used 18 gauge stranded copper wire. I did not get it off the shelf at the local auto parts store because I wanted at least 125 degree C rated wire. Through the Yellow Pages, I was able to find a wire wholesale house not far away that would sell me what I wanted. I insisted that they look up the specs in their catalogs. I used a single color because they had a 100-foot minimum. I choose white because that's what they had in stock. I had some left over, so it took less than 100 feet. The cost was \$5.00. Source: Anaheim Wire Products, 714-771-2511, 766 N. Lemon St., Orange, CA 92867. (Note: Long after doing this project I discovered Del City Wire Co., [www.DelCity.net](http://www.DelCity.net) from whom I bought 7 reels of 100 feet in various colors of #18 Cross-link 125C wire, e.g., Red #3718101.)

## **Injector Connectors**

The injector connectors are available from NAPA. Ask for harness repair kits. I used the bare contacts rather than ones with pigtails so I could solder directly to the new wiring and thus avoid splicing. The NAPA part numbers for my preHE injector connectors are given in Table 1

**Table 1 Injector Connector Parts (preHE only)**

Connector body	2-17411	\$1.35
Contact only	2-17414	\$0.72
Contact with Pigtail (not used)	2-17421	

If you have a later model XJ-S you will need different connectors. Table 2 gives the part numbers for the HE engines, available from [www.delcity.net](http://www.delcity.net).

**Table 2 Injector Connectors (HE)**

Connector body	2-17416
Contact only	2-17418
Spring clips	2-17417

**Main Harness Connector**

I used the original as I could not find a suitable replacement. One day I will replace mine with the Packard-Delphi Weather Pack style connectors available from Del City.

**Harness Layout**

First, the structure of the harness needs to be studied. There are 8 wires out of the connector. I numbered them 1-8, looking at the back of the connector, i.e., the side opposite the pins:

5	
6	1
	2
7	3
8	4

**Figure 1 Harness Connector**

Thus numbered, the structure of the harness is shown in Table 2. Each of the 8 main trunk wires is spliced to 3 wires going to individual injectors.

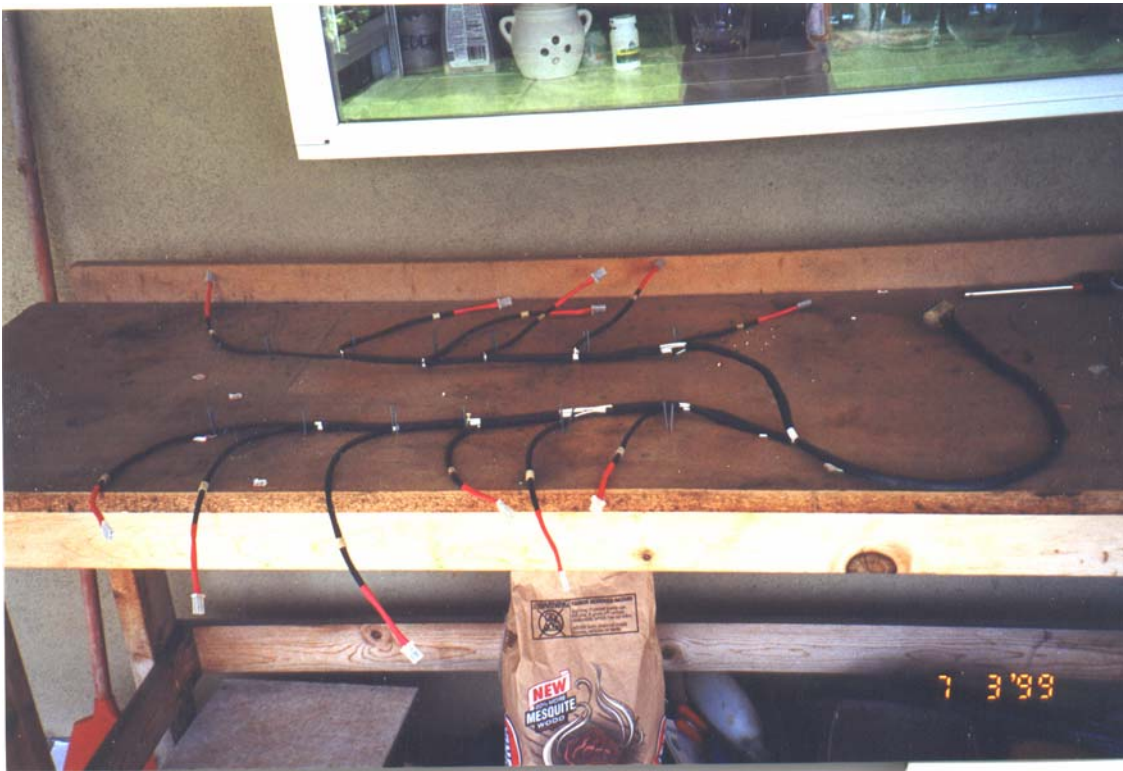
**Table 3 Harness Connection Description**

Trunk Wire	Injector number
1	1A, 3A, 5A (blue stripe on original wire)
2	2B, 4B, 6B (Green)
3	2A, 4A, 6A (Black)
4	1B, 3B, 5B (Tan)
5	1B, 3B, 5B (Yellow)
6	2A, 4A, 6A (White)
7	2B, 4B, 6B (Purple)
8	1A, 3A, 5A (Brown)

**Making a Loom**

First, I did some measurements of the layout of the injectors on the engine. Using these measurements, I fashioned a “loom” on my gardening table. I marked the position of each injector with a pencil, and then drove two nails at each point, about ¼” apart. This

allowed me to lay the main trunk of the harness down the middle and run each pair of injector wires between the nails, giving some form to the harness. Figure 1 is a photograph of this, showing the finished new harness.



**Figure 2. Harness in loom.**

### ***Measuring and Cutting***

I measured wire lengths by laying the new wire along the original harness, being careful to stretch it out to get the true length, then cutting. In order to stay reasonably clean while using the old harness in this way, I soaked it in a bucket with dishwashing soap over night, and then gave it a good scrub. After drying, I could work with it without getting too much grease on me and the new harness.

I began with wire 1, pulling it tight so as to stretch out to its full length; then cut the new wire to match the old down to the injector wire splice point. Mark the trunk wire 1. Then measure and cut to length the 1A, 3A, and 5A wires in the same manner, marking each. Then splice the 3 injector wires to the trunk wire following suggestions below. Lay the assembly aside and repeat the process for the other 7 trunk wires.

### ***Splicing***

Following advice from the list, I twisted the wires to be spliced together and soldered the joints. For the actual soldering I used a soldering fixture, which is a pair of alligator clips on ball joints attached to a heavy base. Holding the wires a short distance on both sides of the joint with these clips gives necessary stability while you apply the soldering iron. Otherwise, you will have a “cold” joint.

I applied a little flux to the joint and dipped the iron in the flux and tinned it a bit before applying it to the wire. After the wire is hot, touch with the solder. Not too much—just be sure it flows well into the strands and covers the entire joint.

Be sure to clean the joint with flux solvent when finished. Otherwise, corrosion can result.

### ***Marking Wires***

In order to maintain sanity while building the harness I marked the new wires when they were cut. For this marking, I first used Avery adhesive labels, but later switched to the little, numbered heat shrink sleeves available at electronics stores. Since the latter normally go only up 0-9, I used a 2-digit system, i.e., 11 => 1A, 21=2A, etc. Note that this numbering is only temporary, since you can probably salvage the marking sleeves from the original harness when you are finished.

### ***Wrapping the Harness***

The splice joints should be covered with heat shrink tube (at least 125C rated). I used 1/8" first, but since it is too small to fit over the insulation of the bundle of 3 injector wires, I later covered the entire joint with 1/4" shrink tube.

I then temporarily bundled and tied the 8 main trunk wires and stretched out the entire harness on the board, feeding the 2 wires marked 1A through the nails at 1A, etc. This temporary tying was done with small cable ties. For the first time, it all began to look like a harness, rather than a jumble!

After the harness was soldered together I proceeded to wrap it entirely with black shrink tube. I used mostly 1/2" tube on the main trunk, dropping down to 3/8" since the bundle diminishes as it branches off to the injectors. I used 1/4" tubing for injector wire pairs, stopping about 4-5" from the end. This leaves some free wire to work with while soldering the connectors.

A little thought is required to see how to begin the wrapping task. Having the old harness nearby to look at will help. I started at the harness connector end of the trunk, feeding the wires through the tube precut to the proper length. This was the easy part. It was a little more work on the other parts, since you have to work from the other end of the harness, feeding the appropriate injector wire pairs through the tube. You always have to cut the tube to the length needed to cover a portion, then feed all the injector wires through this tube and work it up to where it belongs. This is kind of hard to describe, but once you have laid out the harness on the board, what needs to be done will be clear. As you can see in Figure 1, I was not able to cover the branch points very well. I thought about wrapping these joints with tape, but decided against it.

### ***Attaching Injector Connectors***

After the harness is wrapped, it's time to attach an injector connector to each pair of injector wires. But first, cut some 6-8" lengths of 1/4" red shrink tube. These should be slipped over the injector wire pair before soldering the contacts on. Slid them back out of the way while soldering. Later, you can slip them up snug with the plastic connector bodies and then shrink them in place.

To prepare to attach the contacts, first strip the wire ends about 1/8", twist apply a little flux, and tin with a bit of solder. The contacts have a cylindrical "crimping tube" into which you slip this prepared end. Crimp with crimping pliers. Then apply solder. Then crimp the small tabs on the contacts over the wire insulation.

After this attaching the contacts, insert them simultaneously into the plastic connector body. You don't have to worry about which one goes into which hold; there is no concern about polarity here. Be sure they go far enough in so that the locking tab clicks into its notch inside the connector body. Otherwise, they will push back when you insert the connector into the injector and the injector will not work.

You can see the final effect of all this in Figure 1.

### ***Notes and Afterthoughts***

1. After devising my own numbering, Table 1, I discovered that the ROM shows a different numbering. Not that it matters, but I should have used the official scheme.
2. While I was at it, I should have replaced the connectors for the various temperature sensors around the engine compartment. They are identical to the injector connectors. In fact, I had to replace the air temperature and coolant temperature sensor connectors shortly after the harness rebuild.
3. I am still uncomfortable with having used the old harness connector. If I happen to find a good substitute, someday I'll replace it. I left some extra length in the main trunk wires so I can cut out the old one and still have something to work with.
4. I'm not happy with the injector connectors being exposed. I understand the original rubber boots are available but quite expensive. For one thing, water and cleaning solutions can get in there when cleaning the engine, leading to corrosion. I'm thinking about simply shrinking some heat-shrink tube over the entire connector and injector receptacle. This will keep the connections clean, and may look a little better. They can be cut off and discarded when you need to work on the injectors.
5. I wish I had looked around for some high temperature tape and taped the joints that I could not cover with shrink tube.