

Remaking a Wiring Harness

As a few club members know, I have been slowly restoring a 1972 ID21F (stationwagon) for the last several years. The vehicle was purchased from Forest Gist of Newburg, Oregon, who in turn had purchased it from Thomas Nordby of Ashland, Oregon in 1991. The car has not been on the road since at least 1987 but was in generally very good shape with what I thought was minimal rust. As it turns out, the car did have very little rust in the rear window and hatch area (a notorious rust zone on the later wagons), but did have a bit more serious case in the front floor pan area. All rust in this area was cut out and removed by Chris Middleton of the club (who did an extraordinary job).

This article focuses around the effort associated with repairing the main wiring harness. The original wiring harness in the car was actually in pretty good shape, the insulation of many of the wires was not completely brittle as it is on so many of our cars. Over the years though, there had been a number of "modifications" to the wiring in the battery and coil area that left a lot to be desired, and I decided rather than risking future problems, to redo the majority of the harness, in particular the area within the engine compartment.

The original wiring harnesses consist of a variety of wire gauge sizes. Although the metric wiring size system may be slightly different than U.S. customary units, I found that by having an ample supply of 18, 16, 14 and 10-gauge wire that I could closely match the original wire configurations. Most of the wire within the harness has black insulation, but there is some green, yellow, blue and even one red and one white insulated wire mixed in just to make things interesting. Based on discussions with other members of the club who have repaired DS wiring harnesses (namely Chris Dubuque), I tried to match the existing wire sizes as closely as possible. While there is a significant temptation to slightly increase wire size for "safety" sake, this can lead to real problems in trying to thread the wire bundle through the firewall, and behind the dash of the car because of the increased bundle size. My recommendation is to match the existing wire sizes, with the possible exception of the main feed from the battery where a 10-gauge wire is probably wise. I tried to find wire with relatively high strand count for a particular gauge, and insulation which was both impervious to petroleum products, and could withstand wide temperature variations. The local hardware store stocked a brand made by Noble Wire Company that really fit the bill, but I also found that Anchor brand wire from the local marine supply store was also useful (because of the wide selection of gauges and colors available).

Following is a list of some of the other materials necessary for reconstructing the wiring harness, most of which I got through Western Hemispheres:

Description	Part Number
Rubber electrical connector sleeve, 4mm	5420488
Rubber electrical connector sleeve, 5mm	
Plastic color codes (for elect. Connectors)	DX511151a
Clip to hold fuse in fuse box	75449663
Female electrical connector, 4mm	
Male electrical connectors, 4mm	
Female electrical connector, 5mm	
Male electrical connector, 5mm	
Cloth electrical tape (black)	CP-885938000 (also can get from Eastwood)
Vinyl electrical tape	Local hardware store

Preparation

Before commencing work on the wiring harness, procure a sheet of 3/8" or thicker plywood that is large enough to layout the entire harness. I found that I needed a piece about 3' x 5' for my harness. Also get enough white or cream colored poster board to cover the entire piece of plywood. Securely staple this poster board to the plywood. The purpose of doing this is you'll want to label different strands of the wiring harness to keep track of later, note where the remnants of the existing electrical cloth begin and end, and generally keep notes upon as the work progresses. Other items you will need are a soldering iron that can get very hot (I used a small, hand-held butane powered unit that not only could solder, but with different tip configurations, also provide heat for heat shrink), heat shrink in various sizes, a dremel tool to cut some of the electrical crimp splices you'll find later, liquid electric tape (comes in a small can with a brush), and lots of small plastic wire ties. Probably most important of all is a copious quantity of patience for the project ahead.

Before unwrapping a single piece of the cloth electrical tape from the existing wiring harness, secure the wiring harness to the plywood board. I did this by using lots of 1-inch wood screws as shown on the following photo. Be sure to spread out the wiring harness as much as you can, you'll need all the room you can get as things progress later.

Now note on the poster board where the cloth tape ends on the wiring harness, and label all of the major branches (such as front left fender, battery feed, coil, etc.). Doing so now will come in very hand later if by chance you get a bit confused, and have to turn back to one of the original wiring diagrams.

Wire Replacement

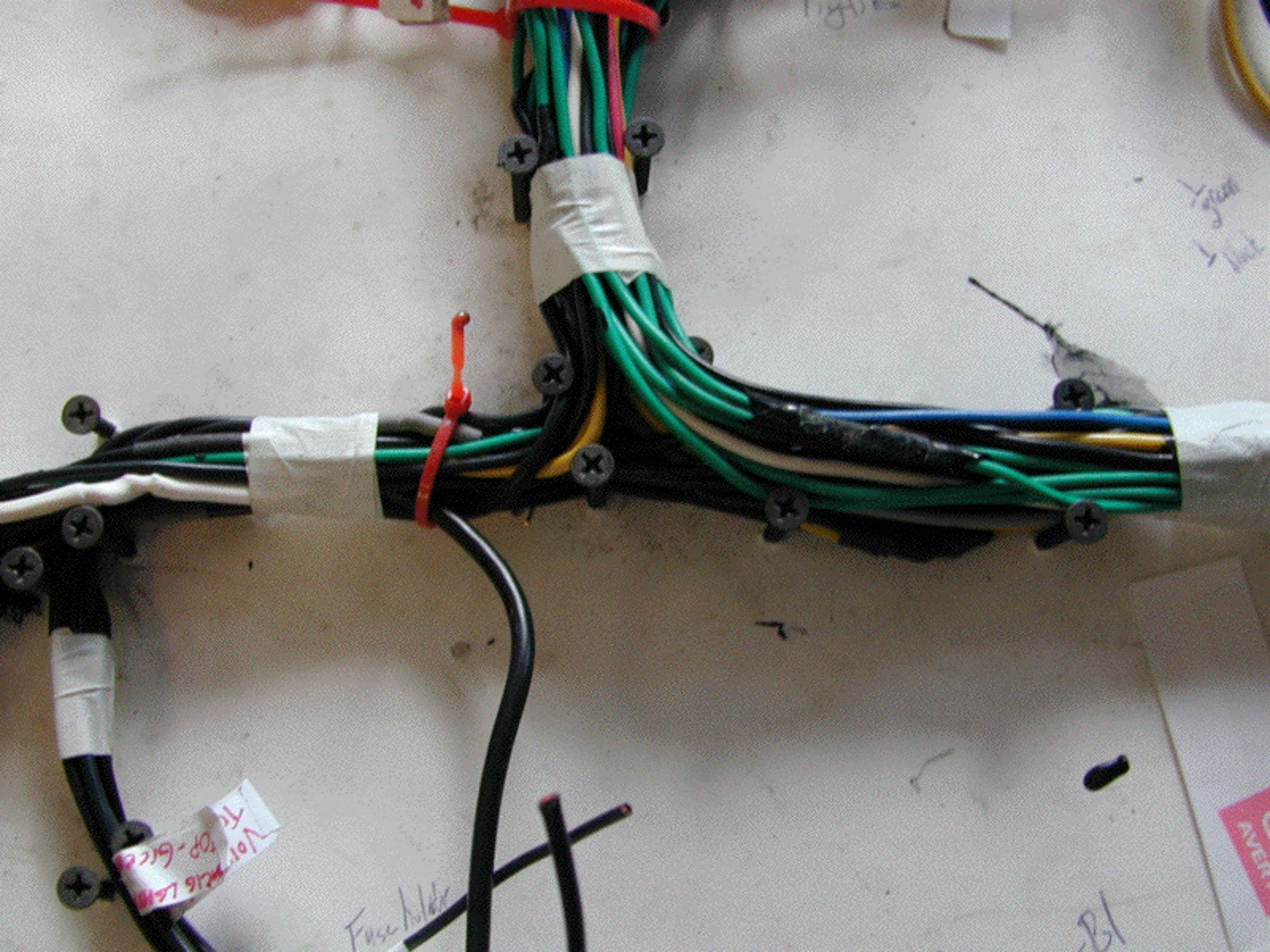
Once you have everything secured and labeled, carefully unwrap what after all these years are probably shredded cloth electrical tape from the wiring harness. Be very careful to keep the wire groups within each cloth wrapped area together though. This is where you'll start to dip into the patience reserve I mentioned earlier. I found it very helpful to use plastic wire ties to hold the wire groups together after the old cloth tape was removed. It is best if you only lightly loop the wire tie around, you'll need enough slack in them to both remove existing wires, and thread new ones through.

You'll typically find that not all wires in the harness need replacement. Those that are behind the dash are frequently in pretty good shape. I ended up replacing just about everything in my harness, again just to be safe, but probably only needed to replace all of the wires that fed through the firewall. You have a choice of just cutting the bad wire section out, and solder splicing new segments in, or replacing whole lengths of wire. I generally encourage you to do the latter, there are enough potential problems in a wiring harness without potentially adding new ones by splicing pieces together more than absolutely necessary.

As you go to remove each wire, try to note the color code on the terminal end, and if possible, what it was to (i.e., coil, high beam, etc). Although not necessary, again this helps if things ever get confused. Remove and replace only one wire at a time, trying to do more than one at once is guaranteed to create a problem. I suggest that you start with the outermost end of a wire, and begin to remove from that end, being careful to note where it snakes through the bundle. You will find that many pieces can be removed in one piece from beginning to end. Occasionally though you will find that some wires are spliced into others, and that is where the dremel tool comes in handy. Each of the splice points are held together with a brass crimp, I cut these crimps apart with the dremel tool, placed shrink tube above the wire zone, soldered the new wire into what had formerly been the crimp area, and then used the shrink tube to insulate the zone. The original insulation for the crimp area was vinyl electrical tape, I felt that the shrink tube was a better solution wherever I could use it. You will find that in a few cases you won't be able to thread shrink tube into the area, and then you will have to resort to the vinyl electrical tape.

Once you have finished replacing all of the wires, it is time to rewrap the harness. I wrapped the bundle with masking tape in a few critical locations before I started to use the cloth electrical tape. This helped to keep the bundle tight, and seemed to be the same method the factory originally used. Start with the cloth electrical tape about 2-3 inches in from the place you had marked earlier as the start point of the wrapping, and wrap outward. When you reach the marked point, start working your way back inward. Doing this helps keep the material from unwrapping after a few years of use. As you get into the area where the major branches occur, you will find the wrapping can be a bit challenging. Just take your time, and be careful as you wrap to keep the bundle tight. I only removed the plastic wire ties as I got close to them, they can be tightened before working with the cloth wrap to keep things together better.

Hope this helps those of you who may have been contemplating this task. It really isn't that hard to do, but does take time and you have to be careful to proceed in a diligent manner. It took me about 10-15 hours from start to finish, but I spread the work over several weeks. Good luck!



Vol 12V-60A
100-60A

FUSE HOLDER

B1

AVER

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