USB to Subaru Diagnostics Interface

Introduction

This document describes how to build a cable to connect your PC to the 9 pin diagnostics connector on older Subarus. The cable designs are based around the FTDI TTL-232R cable that contains a tiny circuit inside the USB plug. The circuit converts the USB signals from the computer to the 5v TTL signals that the car requires. You must use this special FTDI cable, an ordinary USB cable is not suitable.

Simple Cable

To build the simple cable you need the following parts:

1 x Audio harness adapter for Legacy 84-97 (Autoleads: PC2-29-4)
1 x FTDI TTL-232R USB to 5v TTL cable. See http://www.ftdichip.com
1 x 2.54mm 0.1" Pin Strip (Maplin JW59P)

From the Legacy Audio Harness, remove all of the wires except for pins 2, 3 and 9. You can do this by inserting a needle into the front above each pin, lifting the plastic retainer and pulling the wire out from the back.

FTDI Cable			Legacy Audio Harness		
Pin	**Function**	**Colour**	**Pin**	**Function**	**Colour**
5	PC Receive	Yellow	2	Car Transmit	White
4	PC Transmit	Orange	3	Car Receive	Green
1	PC Ground	Black	9	Car Ground	Purple/Black

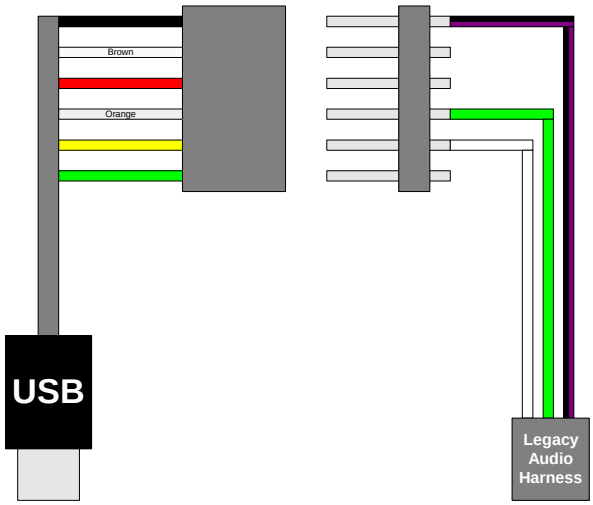
1. Cut a piece of pin strip, 6 pins in length to fit into the pin connector on the end of the FTDI cable.

2. Solder the purple/black wire (Car Ground) of the Legacy Audio Cable to the 1st pin of the pin strip.

3. Solder the Green wire (Car Receive) of the Legacy Audio cable to the 4th pin of the pin strip.

4. Solder the White wire (Car Transmit) of the Legacy Audio cable to the 5th pin of the pin strip.

5. Now plug the pin strip into the connector on the end of the FTDI cable so that pin 1 of the strip connects to the black wire of the FTDI cable. The connections should be as in the table above: Black to Purple/Black, Orange to Green, Yellow to White.



Improved Cable

The Simple cable does not work properly on all cars. Some cars like my 92 SVX produce a poor quality signal. In the thread on the SVX network, we refer to this as the “92 problem” because I initially thought (wrongly) that it only affected 1992 models.

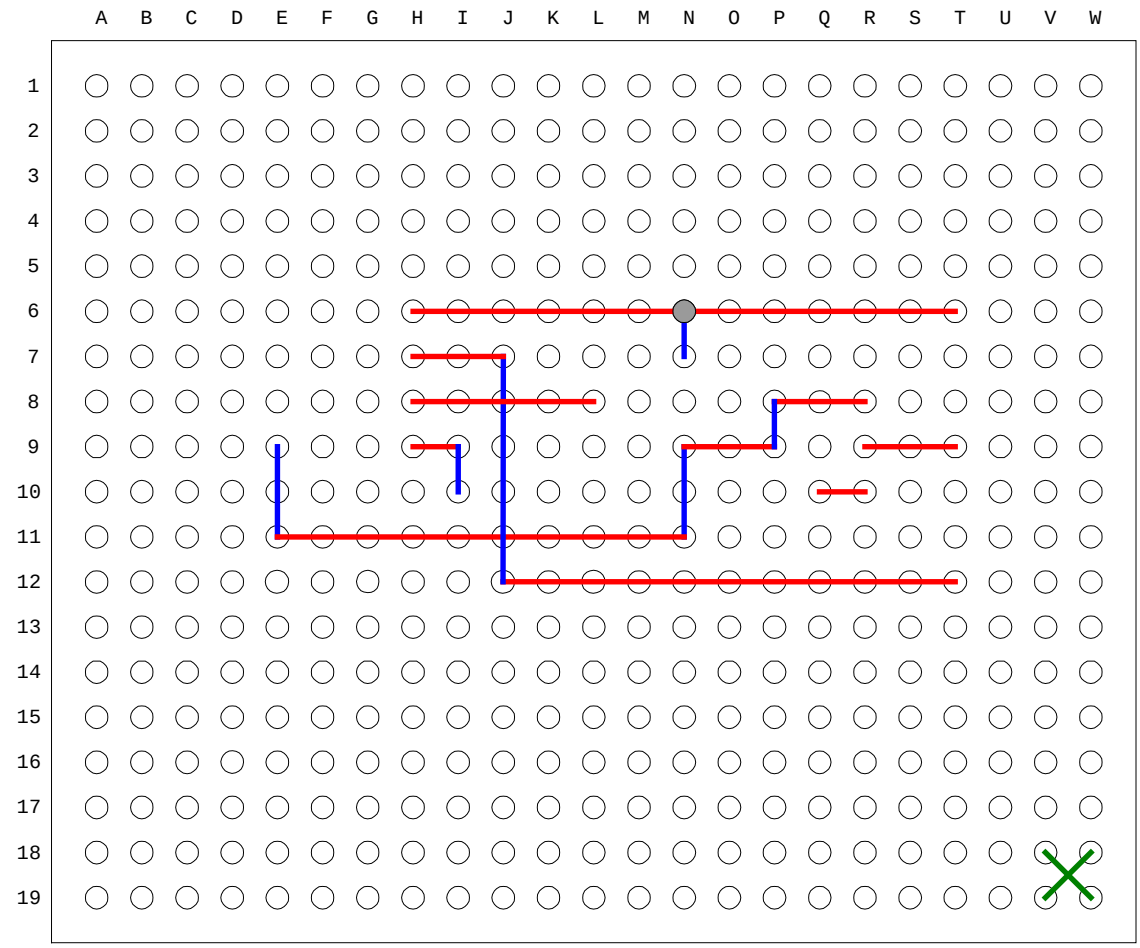
The improved cable incorporates a comparator circuit to improve the quality of the signal. This provides 100% reliable communications even on problem cars.

To build the simple cable you need the following parts:

1 x Audio harness adapter for Legacy 84-97 (Autoleads: PC2-29-4)
1 x FTDI TTL-232R USB to 5v TTL cable. See http://www.ftdichip.com
1 x 2.54mm 0.1” Pin Strip (Maplin JW59P)

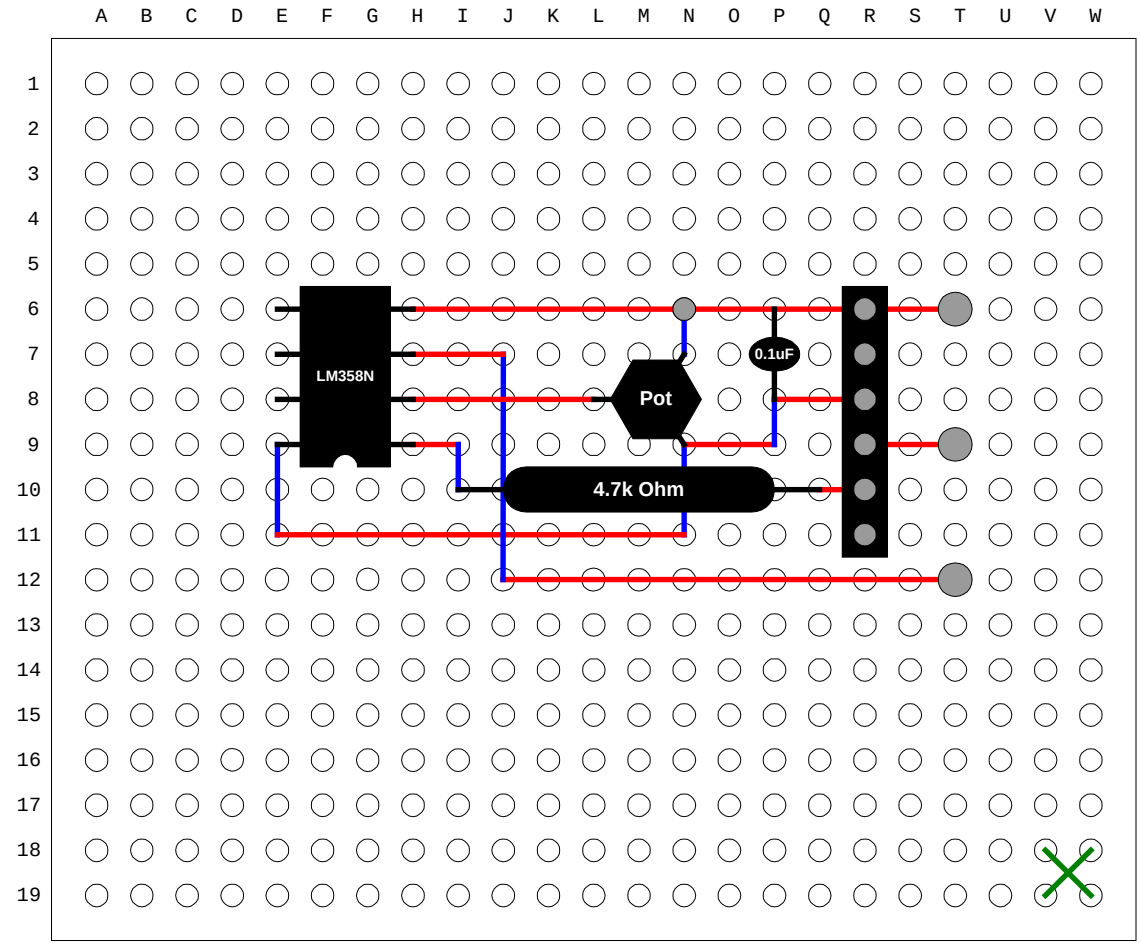
1 x plain matrix board with 1mm holes on a 2.5mm matrix (Maplin: JP54)
1 x LM358N Op Amp (Maplin UJ34M)
1 x 10k Ohm minature potentiometer (Maplin WR42V)
1 x 4.7k Ohm resistor. (Maplin D4K7).
1 x 0.1uF Capacitor 35V (Maplin WW544)
1 x BL17 8-way DIL socket (Maplin BL17T)
Some copper wire, approx 0.5mm diameter (AWG24).

1. First thread the wire through the matrix board as shown below, keep it taut and leave about half an inch of excess at each end. In the diagram, wires in red are under the board and wires in blue are above the board.



Wire 1: Down T6. Up H6
Wire 2: Down T9 Up R9
Wire 3:Down T12, Up J12, Down J7, Up H7
Wire 4: Down R8, Up P8, Down P9, Up N9, Down N11,Up E11, Down E9
Wire 5: Down L8, Up H8
Wire 6: Down H9, Up I9, Down I10
Wire 7: Down Q10, Up R10
Wire 8: Up N7, Down N6, Solder to wire 1 under N6.

2. Now arrange the other components on the top side of the board as shown in the diagram below. As you fit each one, solder the connections on the underside of the board and cut off any excess wire.



a) DIL Socket: Pin 1 in H9, Pin 5 in E6.
b) Potentiometer. Top and Bottom pins in N7 and N9, Wiper pin in L8.
c) Capacitor. Negative leg in P6, Positive leg in P8
d) Resistor. One leg in I10, the other in Q10. Don't let it short against the 2 blue wires that pass underneath it.
e) Pin strip. Cut a piece 6 pins long. One end goes in R6, the other in R11.

3. Now connect the Legacy Audio Connector to the top side of the board.
a) Solder the Purple/Black wire to T6.
b) Solder the Green wire to T9.
c) Solder the White wire to T12.

4. Plug the FTDI cable into the pin strip. The black wire goes to R6.
5. Turn the potentiometer to approximately the middle of it's scale.
6. Put the board inside a plastic box to protect it.