Renegade Tech Works

Mitsubishi 3000gt / Stealth Electronic Strut Controller

Retrofit Manual

Manual Version 3.0 / ECS M03 PCB Rev 3.1 / Firmware 3.3

Renegade TechWorks

www.renegadetechworks.com

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Introduction

The Renegade TechWorks ECS controller can be used in two separate applications either as an aftermarket OEM plug n replacement for the factory controller or it can be used in a retrofit application to add the Factory ECS struts system into a 3000gt or Stealth that never had ECS before.

This manual describes the procedure for doing the retrofit.

ECS System Retrofit

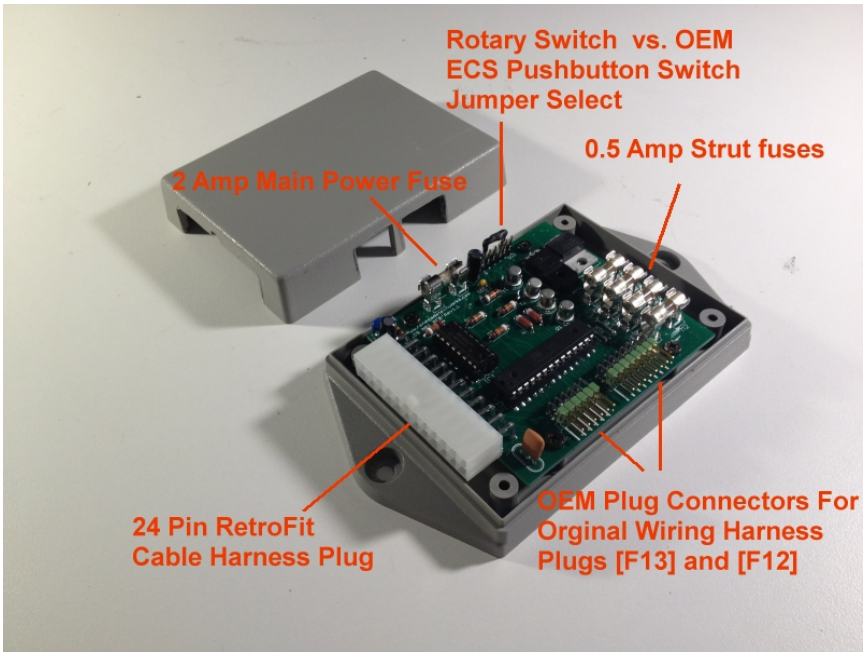
The Tech Works controller can also be used in 1996, 1997, 1998 or 1999 Mitsubishi 3000gt or Stealth cars that do not have the Mitsubishi Factory OEM ECS system. It allows you to be able to retrofit the electronically controllable struts back into these later model year 3000gt cars or earlier model year cars that did not come with the ecs option.

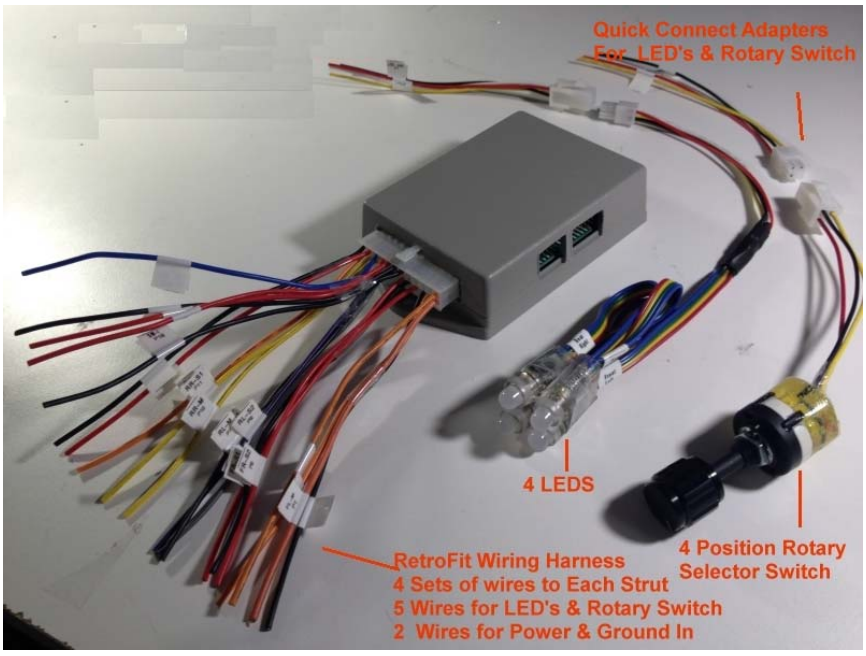
To do the ECS Retrofit into 3000gt or Stealth you:

- Remove your non-ecs struts and replace them with Mitsubishi 1995 model year standard factory OEM ECS struts & mounting hardware. You can use the OEM Springs or use after market springs such as Teins.
- Install this custom controller and connect it to your vehicle +12v & Ground
- Run a 4 wire cable from the controller to each of the 4 struts
- Run 6 wires from the controller to your console area for connecting the LED display, Tour/Sport Lights and the Pushbutton ECS Switch .

TechWorks ECS Control Module Components

Note: Below is a picture of the Model 01 unit – please note that only the Pushbutton Switch is now supported – the Rotary selector switch is no longer available.





Installing the TechWorks ECS Controller

RetroFit Into 3000gt & Stealths that do not have the Factory ECS system or wiring

Retrofit Overview

When doing a retrofit using the Techworks ECS controller you have the following options for doing the retrofit

- Status Display Lights and Controls:
  - Pushbutton Control Switch: you can retrofit in and use an OEM Factory ECS pushbutton switch (that you provide) or you can use an aftermarket simple Pushbutton switch that you mount in any location you choose.
    - The pushbutton switch needed is a single pole normally open / momentary closed type.
    - If you want to retrofit in the OEM pushbutton switch there are instructions in this manual on which pins to use
  - Sport /Tour Status Lights or Techworks LEDs – you can just one or both of these options
    - Sport / Tour lights: you can the existing factory Tour/Sport light mounting location in the console and wire up OEM lights or you can use a simple small single color LED & resistor in the factory location instead. You can also mount these two lights in a custom location of your choice
      - The Sport / Tour Lights are connected to the controller using 3 wires - two power wires & a common ground wire
      - For LED choices search on Amazon for "LED with Resistor"
    - Techworks 4 LED Multi-color Display - This a Techworks option and these LEDS are special multi-color programmable/controllable LEDs. For these you would custom mount in a location of your choosing. There is a small version & a large version of these leds.
      - The Techworks 4 LEDs are connected to the controller using 3 wires - a Data signal wire , +5v wire , Ground wire.


- Connecting Everything: Wiring runs and wiring harness
  - Since your doing a retrofit – it means that your car doesn't have the OEM wiring runs and wiring harness plugs to plug into the controller.
  - You will have to install & connect the wiring runs for the switches, lights, LEDs and struts as needed.
  - The Techworks controller has to different sets of wiring ports that are supported. You can use either of these to accomplish the retrofit
    - 24 PIN Techworks Molex Retrofit Connector Adapter Harness

      - The Techworks Controller has a 24 pin Molex port that has everything you need to support all the combinations possible.
      - You can order the adapter harness from Techworks or you can use an 24 PIN ATX Motherboard Power supply cable to plug into this port. If you order this from Techworks is will come with all the leads labeled.
      - If want to use the Techworks LEDs OR if you want to hack the controller software and use the I2C communications buss then you must use this connector

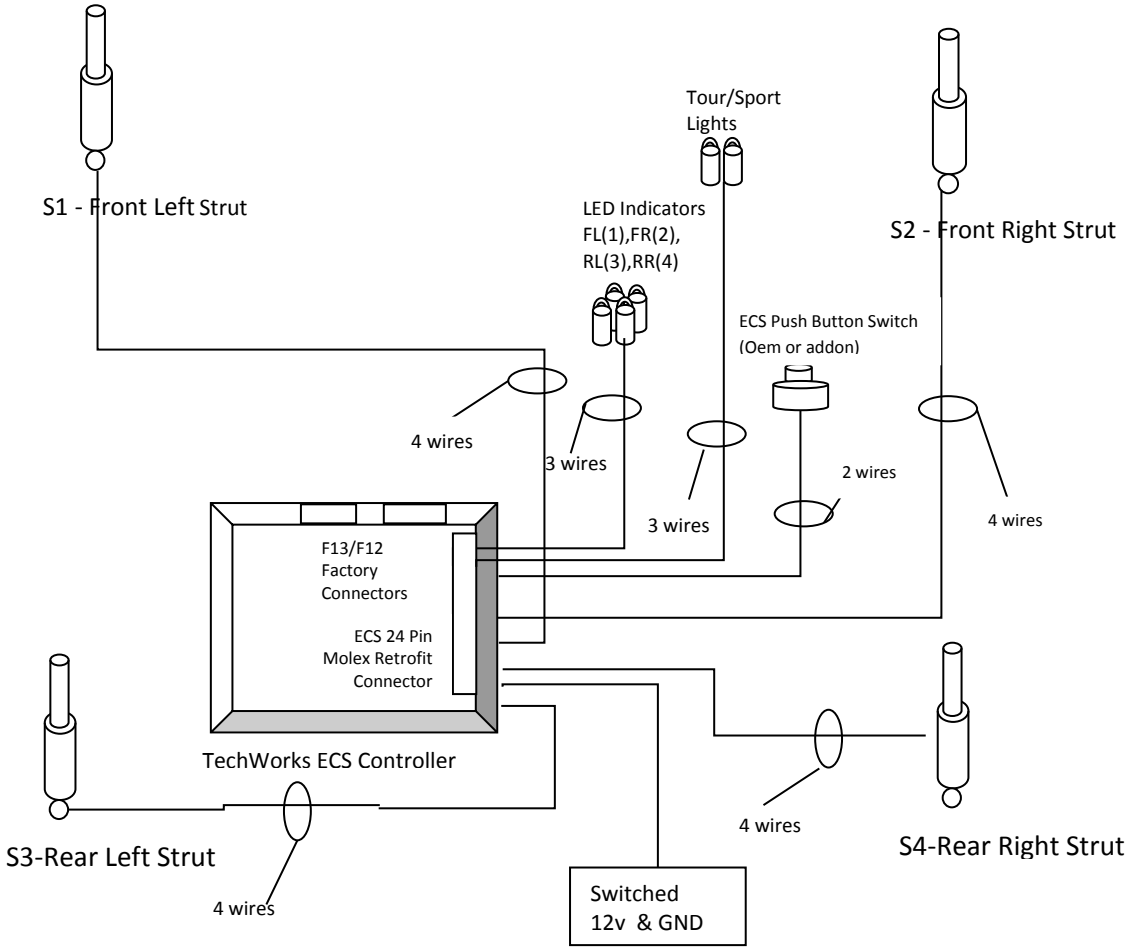
    - OEM F12 / F13 Connector Ports
      - If want to do a "pure" oem retrofit then you can cut the F12/F13 connector ends off the factory wiring harness for a car that originally came with ECS. The F12/F13 Connectors plug into the Factory ECS controller and the Techworks unit directly supports these connectors for the plug n play OEM replacement option
      - A limitation of using just the F12/F13 connectors is that you will only be able to retrofit using the sport /tour lights. You will not be able to wire up the LEDs nor will you have access to I2C buss if you want to hack the controller.

- Installation Overview - Refer to diagram below:
  - Wire Gauge selection:
    - It is recommended to use a minimum of 20 gauge conductor wire for all wire runs - struts, power feeds ,LED lights and Rotary Switch.
    - If the controller is located within 3 feet of the display LED lights & Rotary Switch - 22 gauge conductor wire can be used for this part of the install.

  - From each strut you will need to
    - run a 4 conductor cable from each of the struts to the where you will locate the controller
    - splice the cable run at the strut end to the factory strut cap connector
    - splice the wires at the controller end to 24 pin retrofit harness adapter
  - You will need to run a 6 conductor cable from the controller to where you will locate the LED status lights and/or the Sport Tour Lights & the ECS pushbutton Switch
    - connect 2 wires from the 6 wire cable run to ECS Pushbutton Switch
    - connect 3 wires from the 6 wire cable run to Sport & Tour Lights
    - connect 3 wires from the 6 wire cable run to the LED Status lights.
    - splice the 5 wires from the cable run at the controller end to 24 pin retrofit harness adapter

    NOTE: Installation of the both the LEDS & Sport Tour lights is optional – you can install both or either and wire appropriately.

  - Run an Ignition Switched +12v power feed & Ground wire to the controller and splice them to the 24 pin retrofit harness



Installation Steps

At the end of this section is a detailed installation system diagram that shows what needs to get connected. It is how your system should be connected when done. This diagram has areas on it for you to write down what color wires you are using to complete the installation. Print it out and use it to document your installation.

- Step (1) Remove your non-ecs struts and replace them with Mitsubishi 1995 model year standard factory OEM ECS struts & mounting hardware. You can use the OEM ECS Springs or use after market springs such as Teins.

- Step (1b) As part of the retrofit install you should have ordered 4 strut cap connector harnesses that plug into the top of each strut. Cut the ends farthest away from the strut cap connector off - you will need to splice the wires coming from these strut cap connectors to the 4 conductor cables that you run to the controller.

- Step (2) Pick a suitable mounting location for the controller.
    - Candidate locations are - inside the center console or in the right rear quarter panel where the factory controller would normally be installed.
    - Whatever location is picked , will require the running of four - 4 conductor cables to each of the struts from the controller - so keep this in mind.

- Step (3) Providing Power to the Controller: Locate and run a Switched +12v & Ground set of wires to where you will be installing the controller.

- Step (3a) splice the vehicle switched power wire to the wire labeled "+12v P 23" of the controller wiring harness

- Step (3b) splice the vehicle ground wire to the wire labeled "GND P24" of the controller wiring harness

- Step (4) Connecting the LED Display , the Pushbutton Selector Switch and the Sport Tour light: Run 6 wires from the controller to your console area for connecting the LED display, Switch Selector and/or the Sport /Tour lights.
- Step (4a) On the controller side ,Splice the 6 wires to the following 6 controller harness wires labeled:
    - SW-I P18 (This is the Pushbutton Switch Signal Connection)
    - SW-GND LED-GND P19 (This is the common ground wire for the LEDs, Lights & Switch)
    - LED-D P21 (This is the LED Data Wire)
    - SW-5 LED-5 P22 (This is the +5v power for the LEDS)
    - Sport Light P14 (This is the power feed to the Sport light)
    - Tour Light P15 (This is the power feed to the Tour light)

- Step (4B) ECS Pushbutton Switch connections for aftermarket Single Pole , Momentary Normally Open switch

    - Connect a Wire coming from the Pushbutton Switch Pole 1 to the wire feed corresponding to "LED-GND SW-GND P19 from the Controller side.

    - Connect a Wire coming from the Pushbutton Switch Pole 2 to the wire run feed corresponding to "SW-I P18 from the Controller side.

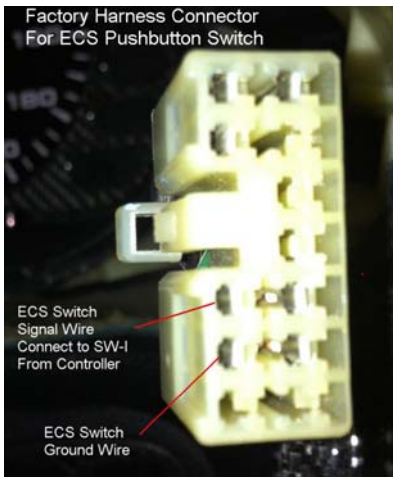
- Step (4C) OEM ECS Pushbutton Switch - ALTERNATE INSTALLATION - DO This Step only if you are retrofitting in an original ECS PUSHBUTTON Selector Switch

  The picture below shows which two pins of the factory ECS switch assembly to connect to the Techworks ECS controller

    - Connect the Wire coming from the ECS Pushbutton Switch Ground Pin to the wire feed corresponding to "LED-GND SW-GND P19 from the Controller side.

    - Connect the Wire coming from the ECS Pushbutton Being used for SW-I to the wire run feed corresponding to "SW-I P18 from the Controller side.

    - NOTE: If your car seems to have an intact Wiring Harness Connector that would plug into the ECS switch Assembly then you can splice into the ECS Switch Wiring harness connector as shown below:

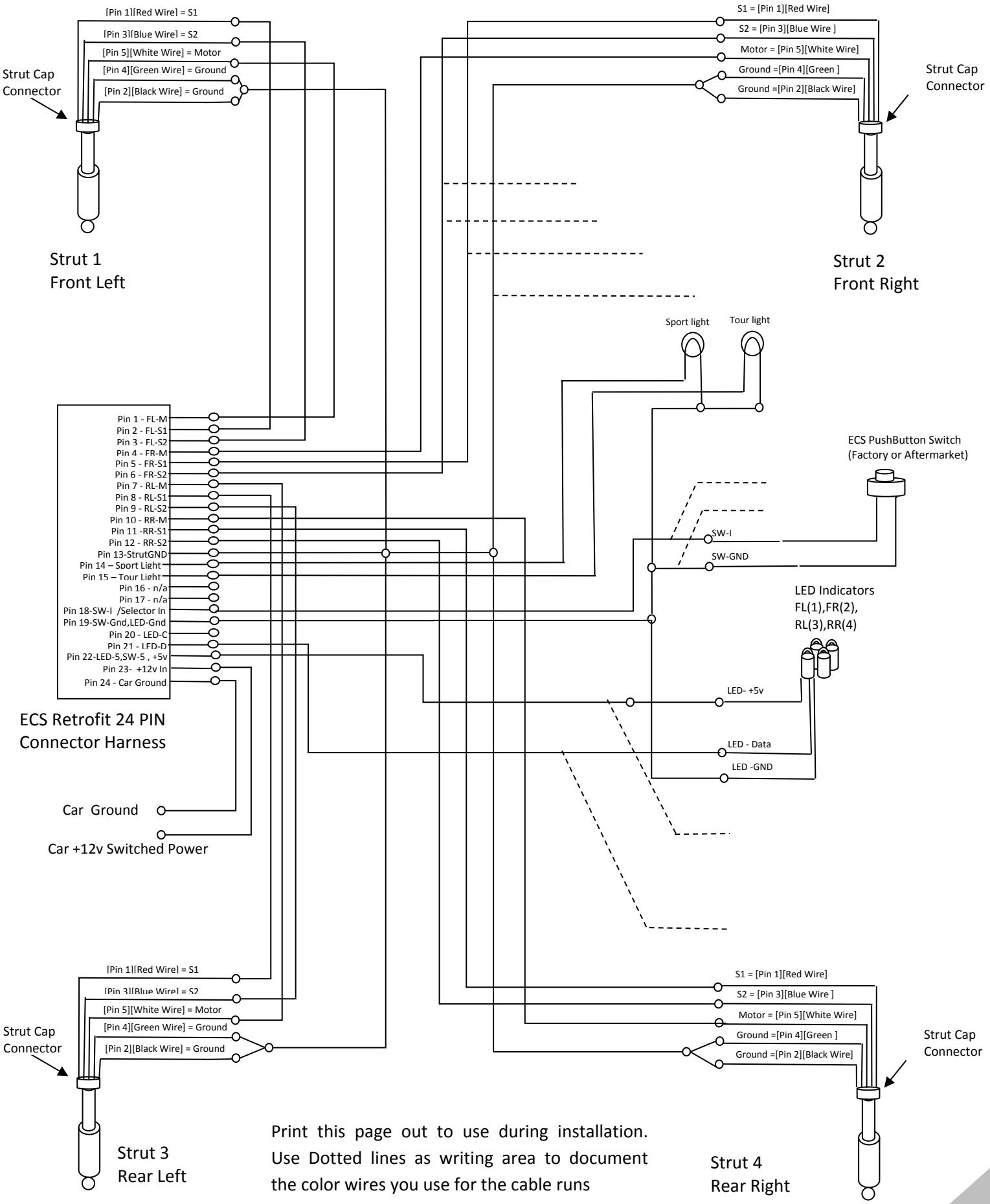


- Step (4D) Connecting the Techworks LEDs
    - Connect the LED Pigtail wire labeled " LED-GND P1" & the Wire coming from the ECS Pushbutton Switch Ground Pin to the wire feed corresponding to "LED-GND SW-GND P19 from the Controller side.
    - Connect LED Pigtail wire labeled " LED-5 P2" to the wire feed corresponding to "LED-5 SW-5 P19 from the Controller side
    - Connect the LED Pigtail wire labeled " LED-D P3" to the wire feed corresponding to "LED-D P21 from the Controller side.
- Step (5) Run a 4 wire conductor cable to each of the four struts from the controller location.
- Step (5a) at each of the struts using the strut cap connector harness prepared in Step (1b) above splice the 5 wires from the connector harness to the 4 wire cable as follows:
    - From the strut cap connector harness connect the GREEN & BLACK ground wires to one of the 4 wires. Make a Note which of the 4 wires you are using as ground.
    - From the strut cap connector harness connect the White Motor Wire to one of the 4 wires. Make a Note which of the 4 wires you are using as the Motor Wire.
    - From the strut cap connector harness connect the RED S1 Signal Wire to one of the 4 wires. Make a Note which of the 4 wires you are using as the S1 Wire.
    - From the strut cap connector harness connect the BLUE S2 Signal Wire to one of the 4 wires. Make a Note which of the 4 wires you are using as the S2 Wire.
    - Repeat these connections for the other 3 struts.
- Step (6) Connect each of the 4 strut cable feeds from Step (5) to the ECS controller side wiring harness. Using the Front LEFT strut as an example:
    - Connect the wire coming from the Front Left Strut Cap Harness White Motor wire to the controller side connector harness wire labeled "FL-M P1".
    - Connect the wire coming from the Front Left Strut Cap Harness RED S1 Signal wire to the controller side connector harness wire labeled "FL-S1 P2".
    - Connect the wire coming from the Front Left Strut Cap Harness BLUE S2 Signal wire to the controller side connector harness wire labeled "FL-S2 P3".
    - Connect the wire coming from the Front Left Strut Cap Harness Ground wires (Green & Black) to the controller side connector harness wire labeled "S-GND P13".

- **NOTE: the controller side P13 Ground wire is a common ground wire used by all four strut grounds. So you will want to splice the 4 common ground wires from all four struts - all at once**

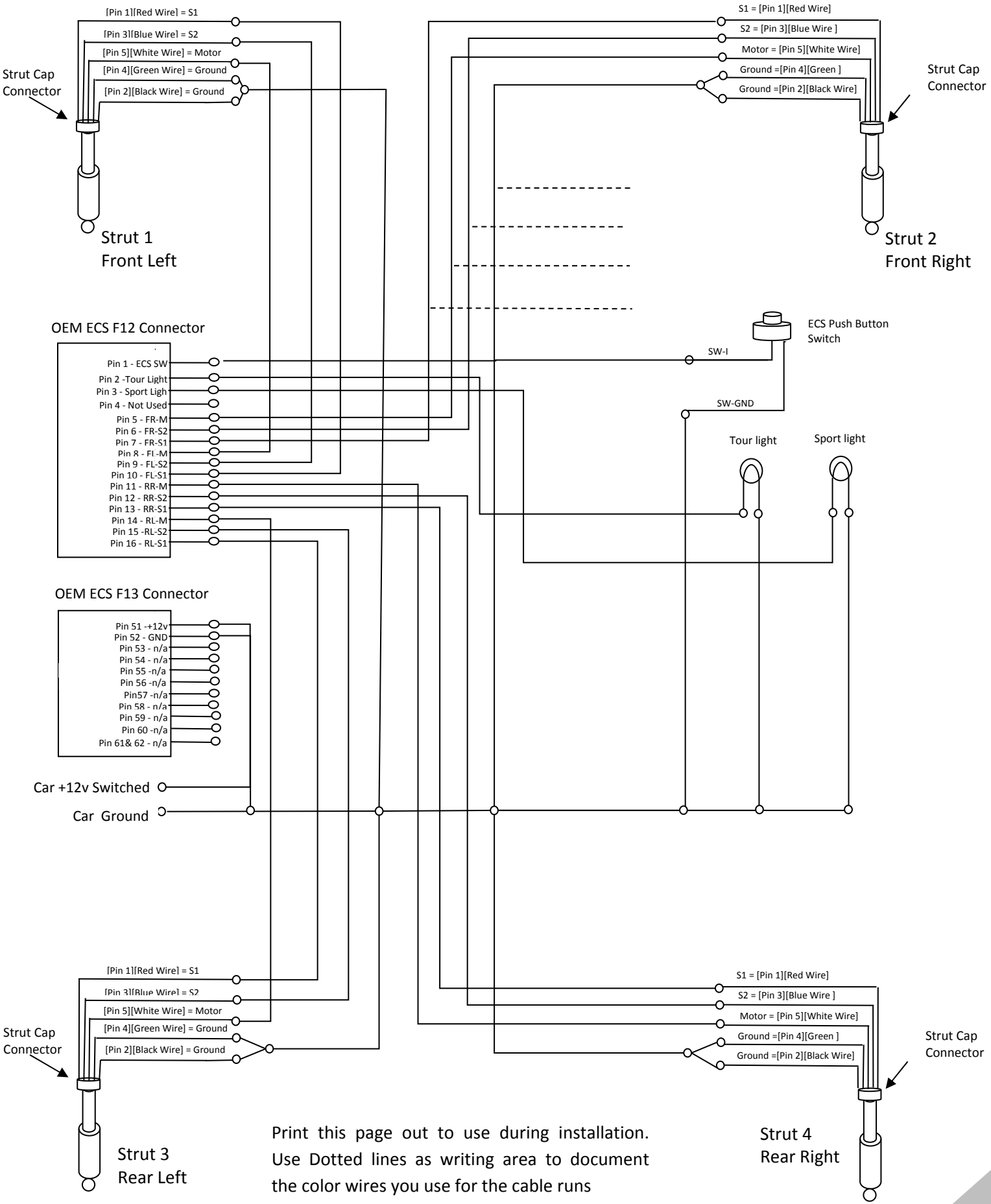
- Step (6a) Repeat Step 6 for the other 3 struts.
    - Front Right Strut connects to controller harness Pins 4,5,6 & 13.
    - Rear Left Strut connects to controller harness Pins 7,8,9 & 13.
    - Rear Right Strut connects to controller harness Pins 10,11,12 & 13.

Renegade TechWorks ECS Controller Detailed Retrofit Installation System Diagram



Print this page out to use during installation. Use Dotted lines as writing area to document the color wires you use for the cable runs

Renegade TechWorks ECS Controller Detailed Retrofit Installation System Diagram Using OEM F12/F13 Connectors + OEM ECS Switch +OEM Incandescent Lights



Print this page out to use during installation. Use Dotted lines as writing area to document the color wires you use for the cable runs

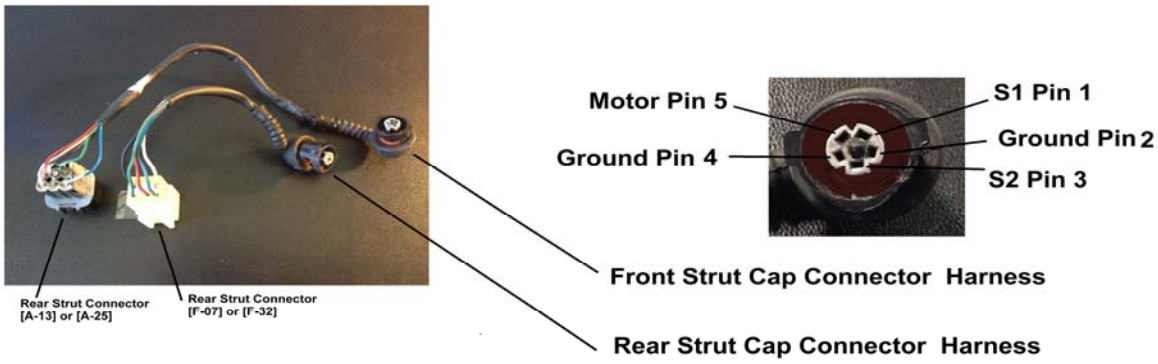
APPENDIX A

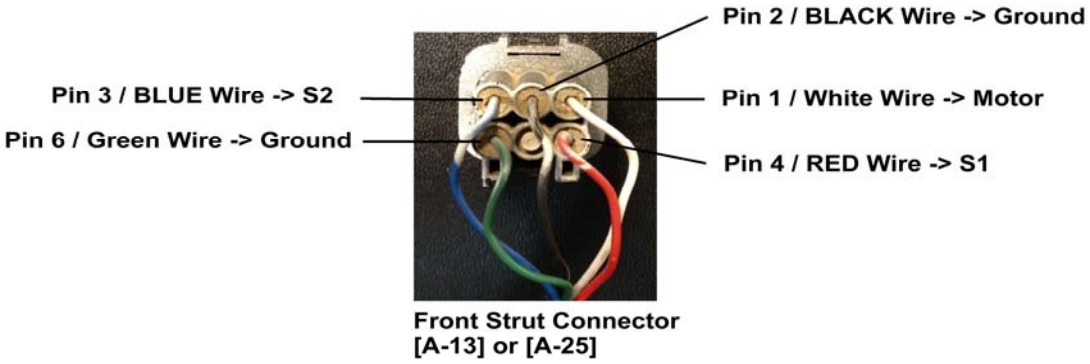
Reference Information

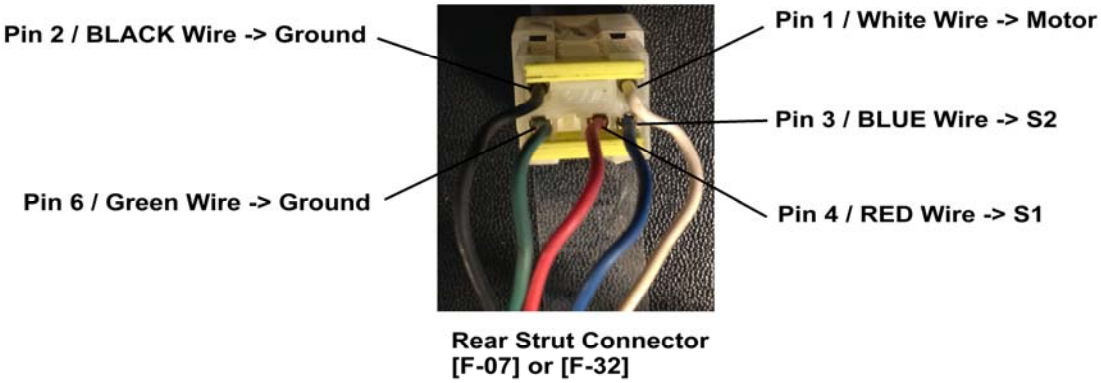
Strut Cap Connector Harness Pin & Wire Color assignments

For a Retrofit of ECS struts into a Non -ECS car you will cut the ends off a set of OEM strut cap harness connectors as part of making your own wire harness. You will need to confirm that the wire colors shown below match the color and Pin assignments of your strut cap harnesses that you will be using.

The electrical pin connectivity of the strut cap connectors at the top of the strut is the same for both the rear and front struts. The body harness connectors are however different. This does not matter for an ECS Retrofit since you will be cutting off the body harness side of the connectors - this means you could use four front ECS strut cap connectors or four rear connectors. Use whichever is cheaper to acquire.







ECS 24 PIN Molex Connector Pin assignments

24 PIN ECS HARNESS CONNECTOR	WHAT IT NEEDS TO CONNECT TO
PIN 1	(FL-M) Front LEFT Strut - MOTOR (Cap Harness WHITE Wire)
PIN 2	(FL-S1) Front LEFT Strut - S1 (Cap Harness RED Wire)
PIN 3	(FL-S2) Front LEFT Strut - S2 (Cap Harness BLUE Wire)
PIN 4	(FR-M) Front RIGHT Strut - MOTOR (Cap Harness WHITE Wire)
PIN 5	(FR-S1) Front RIGHT Strut - S1 (Cap Harness RED Wire)
PIN 6	(FR-S2) Front RIGHT Strut - S2 (Cap Harness BLUE Wire)
PIN 7	(RL-M) Rear LEFT Strut - MOTOR (Cap Harness WHITE Wire)
PIN 8	(RL-S1) Rear LEFT Strut - S1 (Cap Harness RED Wire)
PIN 9	(RL-S2) Rear LEFT Strut - S2 (Cap Harness BLUE Wire)
PIN 10	(RR-M) Rear RIGHT Strut - MOTOR (Cap Harness WHITE Wire)
PIN 11	(RR-S1) Rear RIGHT Strut - S1 (Cap Harness RED Wire)
PIN 12	(RR- S2)Rear RIGHT Strut - S2 (Cap Harness BLUE Wire)
PIN 13	(S-GND) Strut Common Ground Wire To All FOUR Struts - Connect to the GREEN & BLACK Ground wire from each strut cap Harness
PIN 14	Sport Light
PIN 15	Tour Light
PIN 16	I2C Data Line - Interface Buss for Expansion via Open Source Hacking
PIN 17	I2C Clock Line -Interface Buss for Expansion via Open Source Hacking
PIN 18	(SW-I) Connect to ECS Pushbutton Switch or Aftermarket Switch
PIN 19	(SW-GND), (LED-GND) Common Ground Wire to LED Lights & Selector Switch
PIN 20	-not used-
PIN 21	(LED-D) LED Lights DATA signal
PIN 22	(SW-5), (LED-5) +5v Out to LED Lights
PIN 23	(+12V in) from Car Power Source. Must be Switched power from Ignition Switch
PIN 24	(GND) Ground In from Car Ground

ECS 24 PIN Molex Connector Pin orientation

Note: Pins 1, 2 & 3 are marked on the connector by three sets of raised plastic ridges on the side of the connector housing. Pin 1 has 1 ridge, Pin 2 has two ridges , Pin 3 has three. In the picture the ridges have been highlighted by a black marker.

Your 24 PIN ECS Retrofit Connector Harness may have been shipped to you with all the Strut connection wires/pins (Pins 1->12) removed & the 12v Power & Ground wires/pins (Pins 23 & 24) removed. This is done in case you are "upgrading" an OEM setup with the LED Lights & Rotary Switch but you will still be using the existing OEM wiring harness for the strut wires and to supply power to the ECS unit.

If you need to use the retrofit strut wires connectors in the 24pin harness - simplly re-insert the labeled spare wires back into the 24 pin connector in the correct location. Each wire is labeled with a P# that indicates which pin position it is.

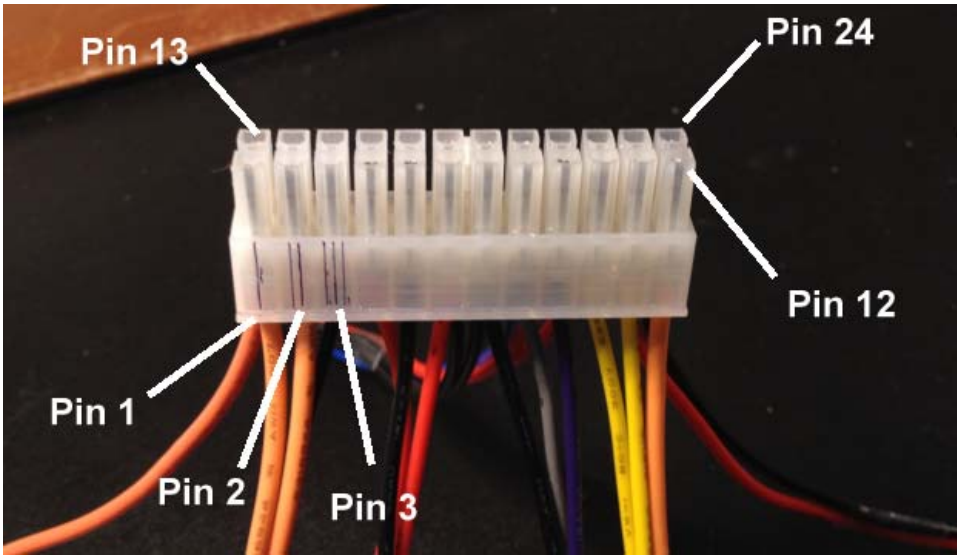
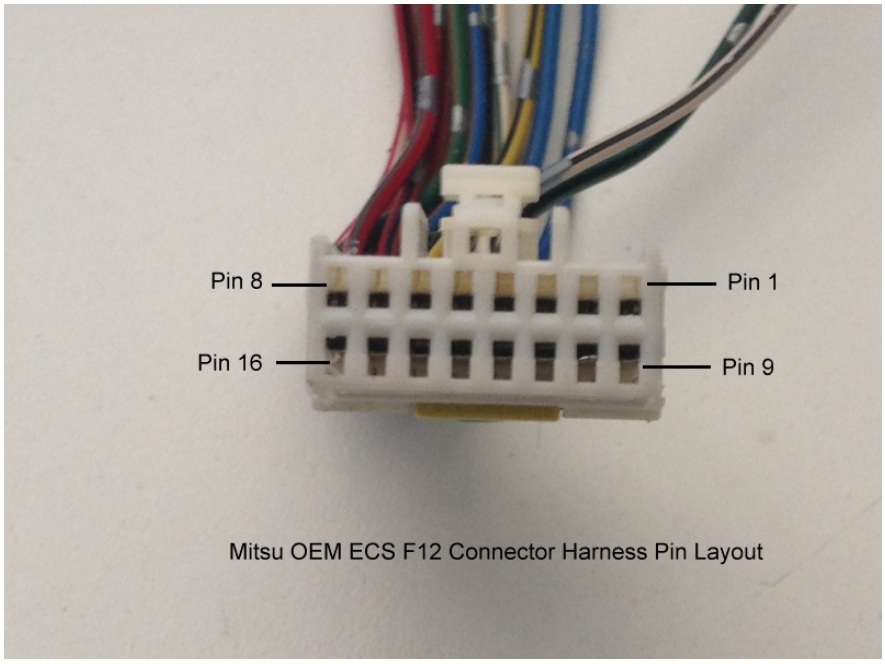


Figure 1. 24 PIN ECS Connector Harness

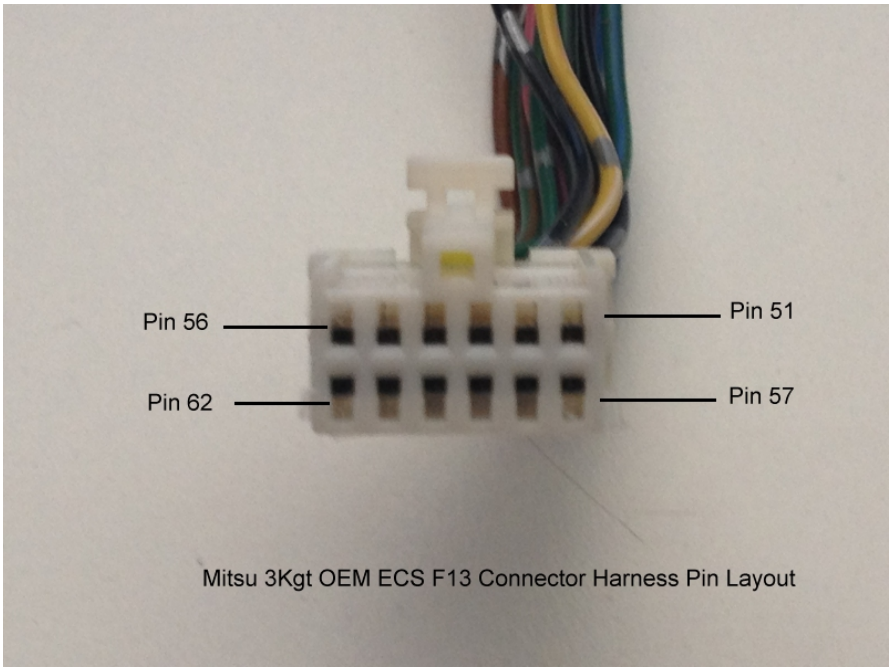
3000gt Factory ECS Body Harness Plugs F12 & F13

Pin Layouts

This pinout information is provided in case for some reason you are hacking the oem harness connectors for re-use. These are the Factory connectors that plug into the OEM ECS control module or the TechWorks ECS Controller



Mitsu OEM ECS F12 Connector Harness Pin Layout



Mitsu 3Kgt OEM ECS F13 Connector Harness Pin Layout