

# SHOEBOX ELECTRONIX 8385V ECU MONITOR KIT



## ASSEMBLY & INSTALLATION MANUAL

**June 8, 2009**

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# Introduction

## **REVIEW INSTRUCTIONS BEFORE STARTING THIS PROJECT!**

This manual will provide the instructions necessary for you to assemble your ECU Monitor Kit into a useful operational accessory for your Vanagon. Assembly will require mechanical and soldering skills, along with the associated tools and equipment to perform these tasks.

The 8385 ECU Monitor is functionally similar to the 8691 ECU Monitor, and actually utilizes an 8691V ECU Monitor via a Digijet Interface Unit, that adapts the 8691 to your Digijet. The differences between the Digijet & Digifant are normalized by the Digijet Interface, and the end user operation is pretty much the same. All the parts required to assemble a working system are included. You will, however, need the following tools in order to construct the kit and modify your ECU:

- 1) #1 Phillips Screwdriver
- 2) Small Flat Blade Screwdriver
- 3) Flush Wire Cutters (electronics type)
- 4) Needle Nose Pliers (small electronics type)
- 5) Pencil type Soldering Iron (60 Watt Max)
- 6) Small sponge (for cleaning soldering tip)
- 7) Solder Wick (recommended, but not required)

*To simplify building your kit, these tools are provided in the ECU TOOLKIT, by Shoebox Electronix, also available from [www.van-cafe.com](http://www.van-cafe.com)*

Be sure to visit our website <http://www.shoebox-electronix.com> for Vanagon technical and troubleshooting information, as well as documentation updates. We will append online manuals with information as we receive it from users.

After you have reviewed this manual, set aside some space to work on the project, and enough time to complete all the tasks preferably in one sitting, as your Vanagon will not run without the ECU installed. By the way, disconnecting the ECU electrical connector is an effective way to discourage anyone driving off with your vehicle, if you need to park it in one place for an extended period of time.

## **Check Kit Contents**

Use the enclosed list to familiarize yourself with the individual kit components. It is a good idea to place a check mark next to each item as you locate it in the package, and then place the items back in the shipping carton until they are needed.

If, upon receipt, any of the components are damaged or missing, you will need to contact Van Café and/or shipper immediately to coordinate replacement. If you damage any parts during assembly, we will be able to provide you with replacement parts at a nominal cost.

## **Assemble the ECU Monitor**

- ( ) 1. Locate the ECU Monitor Assembly.
- ( ) 2. Install the 9V battery in the battery holder.
- ( ) 3. Check the unit by turning the power switch on (up), and verify the yellow POWER LED illuminates.
- ( ) 4. Turn the power switch back off.
- ( ) 5. Install the Monitor assembly into the top of the black plastic case with the four #4 screws provided.
- ( ) 6. Install EITHER one (we prefer the “hooks”) Velcro Strip on your dashboard just to the right of the instrument cluster, and the other one on the bottom of the black plastic case, OR the four (4) rubber feet on the bottom of the black plastic case. Choice is yours.

This completes the ECU Monitor Assembly

## Removing the ECU from your Vanagon

The ECU is located just ahead of your drivers side tail light assembly:



The first step is to remove the cable connector by prying up on the small metal tab at the upper end of the cable connector socket. Swing the cable out and away from the ECU:



The next step is to remove the three screws that hold the ECU mounting bracket in place. There is one screw tucked up under the cargo shelf:



and two screws holding the two bracket tabs to the engine compartment shelf. You can see these in the photo on the previous page. Once the three screws are removed, you can remove the ECU assembly from your Vanagon. Leave the three screws on the engine compartment shelf, or wherever works best for you. You will need them to reinstall your ECU. Handle the unit with care, as the three exposed mounting screws have **VERY SHARP** pointed ends.

Bring the ECU to your work area, and don't set it down on any valuable wood surface. We work on our ECUs on a piece of Homasote, although any wood or plywood will also work fine.

## **IMPORTANT !**

There are currently two different types of DIGIJET ECUs currently found in 1983 – 1985 Vanagons. The first and most common, is the one described in THIS section of the manual; and is identified by its aluminum cover, held in place by metal tabs. The less common version has a one piece black plastic enclosure, that is connected to its heat sink with four sheet metal screws

If you have the black plastic version, please follow the steps outlined in the section **BLACK PLASTIC CASE** starting on page 17.

Otherwise, continue to page 9, and begin with **Opening the ECU**.

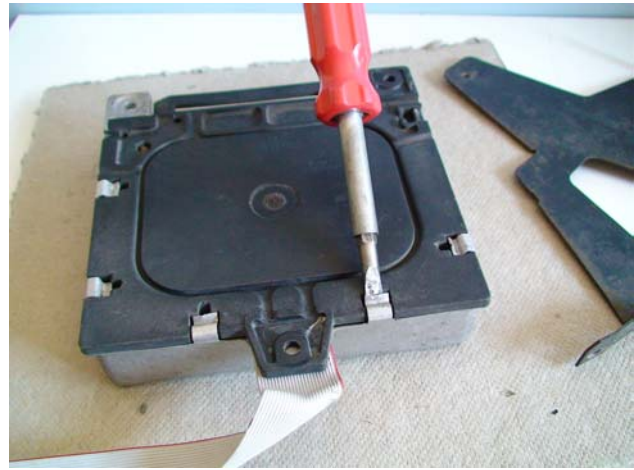
## Opening the ECU

( ) 1. Remove the three screws holding the ECU to its mounting bracket. Again, the ends of these screws are VERY SHARP, so be careful.



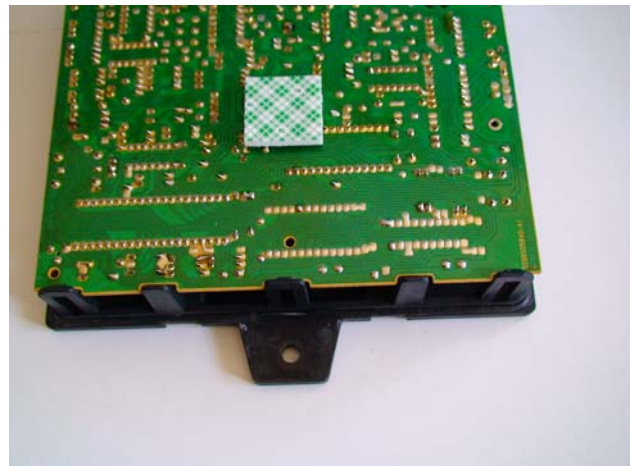
( ) 2. Place the screws in a small tray or cup to prevent them from escaping.

( ) 3. Next, remove the aluminum cover by bending the small tabs holding it in place up and away from the ECU. Try to bend somewhat gently and slowly, to prevent the tabs from breaking. If you break the tabs, you can reattach the cover with Duct Tape.



( ) 4. As you remove the aluminum cover, you will see a rubber gasket come loose. Place this gasket aside, so you can reinstall it upon reassembly.

( ) 5. Locate the 3M adhesive pad. Remove one of the cover papers, and press the pad into position on the circuit board as shown:



# Install the Ribbon Cable

( ) 1. Locate the 12" ribbon cable.

( ) 2. Place the ribbon cable over the 3M pad, with the ends of the wires positioned as shown: (NOTE: the photo shows the wires already soldered)



( ) 3. **Make sure the red stripe is on the LEFT, closest to pin # 1.**

( ) 4. Observe how the contacts on the electrical connector are soldered to the circuit board in two rows of solder pads. These pads are located directly behind the cable connector receptacle.

You should see that the upper row has 13 pads, and the lower row (towards you) has 12 pads, for a total of 25 pads. The pads are numbered from left to right - #1 is at the top left, the top row then counts across to #13. The lower row starts at the lower left with # 14, and counts across to the right, ending at # 25.\*

\* See CIRCUIT BOARD PADS sketch on page 11

# Soldering Tips

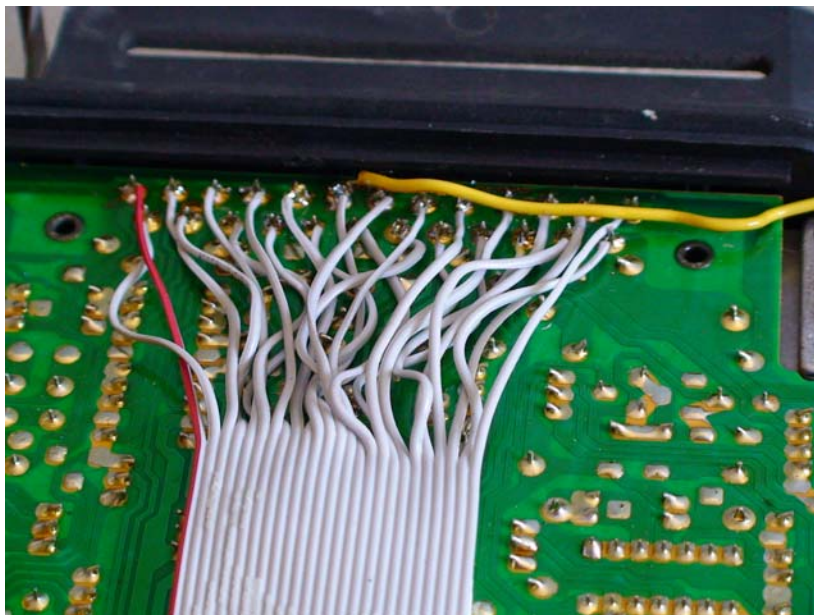
If you are unfamiliar with electronic soldering techniques, you might want to enlist the help of a friend who is familiar with this type of work. Review the Soldering Tips sheet included with your kit. If you feel confident to complete the soldering task yourself, please remember:

- Your soldering iron should be a 40-50W PENCIL type unit, similar to a Weller WES-50 or WES-51. Adjustable temperature units like this are preferable, but not necessary. The fixed output 40W pencil units are fine. Make sure you do not use a soldering GUN. A soldering gun will ruin your ECU printed circuit board.
- Use a small tapered tip, not the large thicker chisel type tip.
- Clean your soldering iron tip on a dampened sponge (usually included with the Weller style units) to keep the tip clean. Touch the end of your solder to the tip, and melt a small amount of solder onto the tip, then wipe it clean on the sponge. This is done to remove excess flux buildup on the tip. You might do this two or three times during this procedure.
- To solder the wires to the pads, bend a small hook in the tinned end of the wire, and crimp it lightly onto the connector lead protruding up through the solder already on the circuit board pad.
- Place the tip of your soldering iron onto the solder on the pad, and heat the solder until it begins to flow (about two seconds). There should be plenty of solder on the pad to flow around the wire and solder the wire to the pad. Remove the soldering iron tip, holding the wire still, until the solder hardens (about another second or so)
- Make sure the solder joint is bright and shiny, NOT coarse and dull. If it is coarse looking, reheat the joint, and re-solder the connection.
- You can remove any leftover flux from the pads when you are finished, using the alcohol pads provided.
- If you end up with a solder “bridge” or excess solder flowing across two pads, you can use Solder Wick to “soak up” the excess solder. Simply place the end of the solder wick on top of the solder you want to remove, then press the tip of your soldering iron onto the wick, pressing down against the solder. You should see the solder flow up into the wick, turning it silver. This should only take a few seconds. Clip off the silver portion of the wick, and it is ready to use again.

## Solder the Ribbon Cable Wires

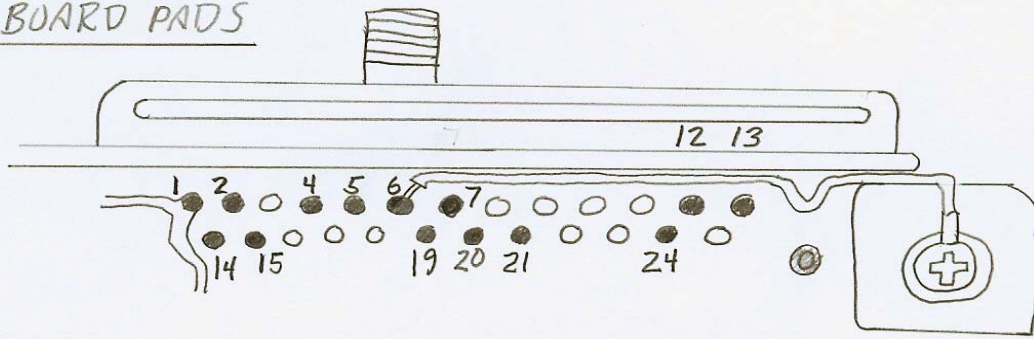
The end of the ribbon cable to be connected to the circuit board has been prepared with wire labels to identify where to solder the wires. The red striped wire is soldered to pin #1, wire labeled 2 to pin #2, and so on. There are a total of fourteen wires to solder. The ends of the wires have been prepared so they are ready to solder to the circuit board pads. It is recommended that you use needle nose pliers to bend a small hook in the timed lead end. This hook can then be placed over and around the connector pin, and crimped lightly to hold it in place prior to soldering.

Solder the wires to the circuit board pads by heating the circuit board pad for approximately 1-2 seconds – you should see the solder start to melt. Holding the wire with needle nose pliers, place the hooked end of the wire into the heated solder, hold the wire in place, and remove the soldering pencil tip. Hold the wire still for another two seconds or so, and proceed to the next wire.



Once again, before you begin, make sure the red stripe is oriented as shown above. *NOTE: You will not be soldering ALL the wires seen in this photo, only the wires with the number tags, and the red wire (#1) See sketch on next page.*

## CIRCUIT BOARD PADS



Solder each of the wires to the circuit board according to the previous sketch and the following list. We have found it is easier to start with the red wire (pin #1), and work to the right (1, 14, 2, 15, 4...), but you can reverse the order, or do whatever works for you. The important thing is to verify each wire as you solder it to the circuit board. This should prevent you from ending up with one “extra” wire. (been there, done that). Use the following check list to record each wire by soldering the wire, and then placing a check mark in the SOLDER column.

SOLDER	WIRE #	PAD #	OK
	1 (RED)	1	
	14	14	
	2	2	
	15	15	
	4	4	
	5	5	
	6	6	
	19	19	
	7	7	
	20	20	
	21	21	
	24	24	
	12	12	
	13	13	

When you are finished soldering the wires, recheck your work by placing a check mark in the OK column as you verify each wire termination point. After you are satisfied that all the wiring is correct, remove the cover paper from the 3M adhesive pad you placed on the circuit board earlier, and press the ribbon cable down onto the pad. If necessary, you can clean up the flux around the pads you soldered with the swabs and alcohol pad provided. You may want to use the alcohol pad as is, or squeeze the pad in it’s foil envelope, and “dip” the swab into the alcohol. This step also allows to inspect all the pads that you soldered for good connection quality and no solder bridges.

## ECU Reassembly & Reinstallation

1. Position the ribbon cable towards you, centered on the circuit board and the square mounting tab at the rear of the circuit board holder.
2. Position the rubber grommet in the groove around the cable connector area, and place it against the the lower edge of the circuit board mounting frame.
3. Place the aluminum cover back over the circuit board assembly.
4. Make sure the grommet is captured between the cover and the frame evenly, and the ribbon cable is straight and even.
5. Bend the tabs back in place to hold the aluminum cover against the circuit board frame, and holding the ribbon cable in place.
6. Reattach the ECU assembly to the ECU mounting bracket using the two screws at the connector end of the ECU. We opted to run the ribbon cable straight out the back of the ECU, not reinstalling the rear screw.



7. Reinstall the ECU in its mounting location behind the left tail light, using the screws previously removed.
8. Reconnect the ECU cable to the ECU cable connector, and latch into place.

9. Locate the 18' ribbon cable. This cable has a female connector at each end.
10. Connect one end of this cable to the male cable connector on the 12" ribbon cable extending out of your ECU.
11. Route the 18' cable around the left side of the engine compartment as shown:



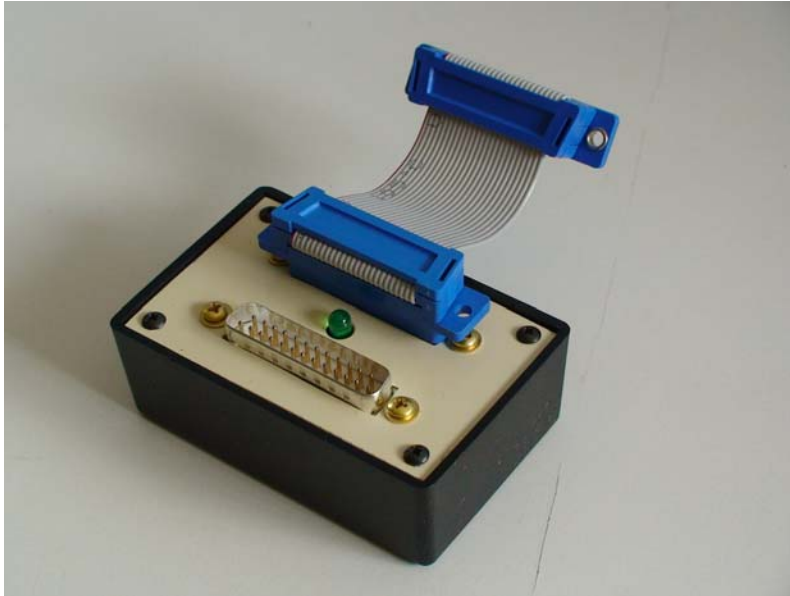
12. Reinstall your engine compartment cover, making sure the ribbon cable is not crimped or twisted by the latch retainer.

*You can route this cable as you like behind the rear seat, under the carpets, so the front end of the cable is between the front seats, in the neighborhood of the shifter.*

13. Connect the remaining female connector to the Digijet Interface Unit. Do not connect the 4" ribbon cable to the ECU Monitor yet.
14. Turn your ignition switch to the ON position without engaging the starter.
15. You should observe the green LED on the Interface Unit illuminates. If it does not, make sure your ignition switch is on by verifying the normal red warning LEDs in your instrument cluster are illuminated. If they are, and the green LED is OFF, turn your ignition OFF, and then recheck your cable connections, and if necessary verify the ECU cable connector is properly seated. If that does not rectify the problem, it may be necessary to recheck your soldering on the ECU circuit board.

## Connect the Digijet Interface Unit

1. Once you have verified the green LED, turn your ignition OFF, and connect the male connector on the 4" cable to the female connector on the Interface Unit:



2. Connect the female connector on the 4" cable to the male connector on the ECU Monitor front panel.

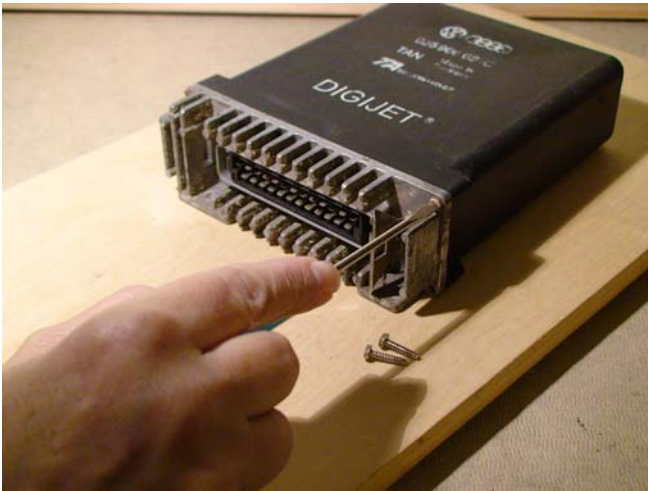


Turn the ECU monitor ON. Start your engine, and you are ready to observe ECU analog and digital signals on your ECU Monitor. Please refer to the User Manual & Troubleshooting Guide for initial setup and normal signal status.

# Black Plastic Case

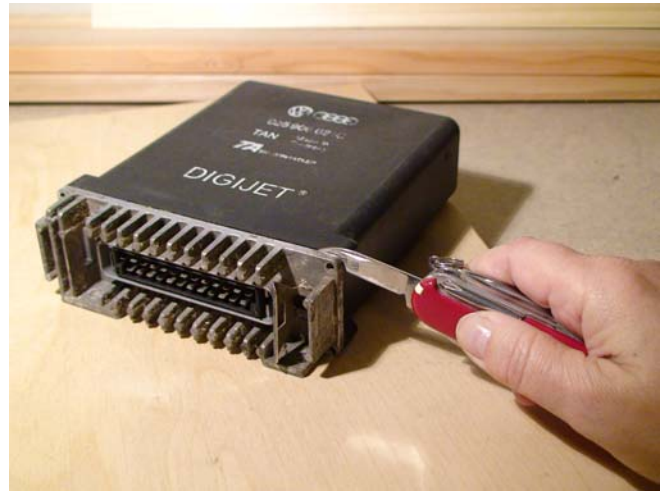
## Opening the ECU(BPC)

( ) 1. Remove the six screws at the heat sink end of the ECU assembly.

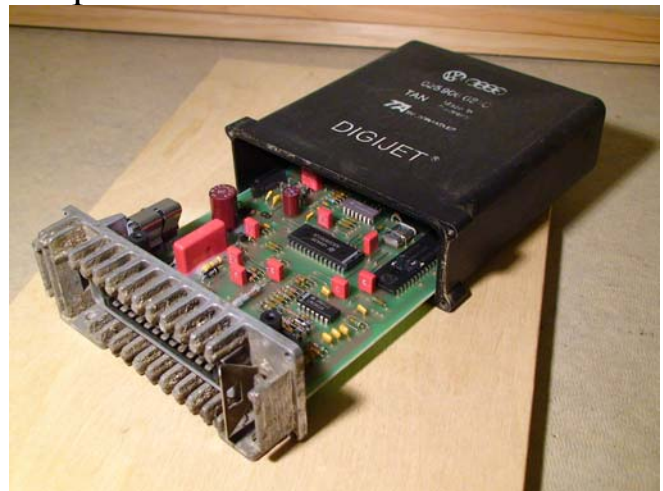


( ) 2. Place the screws in a small tray or cup to prevent them from escaping.

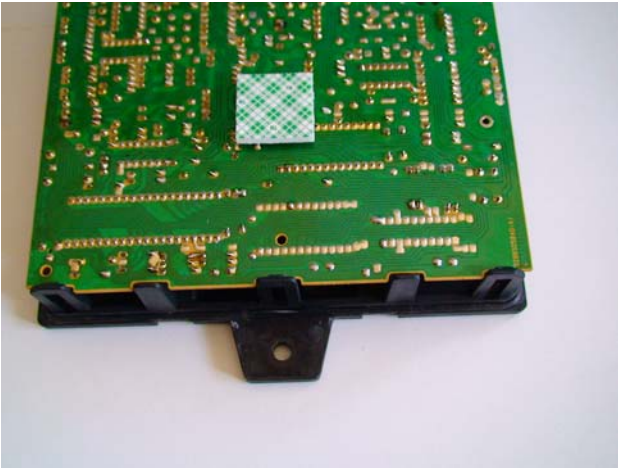
( ) 3. Next, remove the plastic case from the heat sink. You may need to pry the heat sink away like we did, using a knife or a similar tool.



( ) 4. Slide the circuit board out of the plastic case.



( ) 5. Locate the 3M adhesive pad. Remove one of the cover papers, and press the pad into position on the circuit board as shown: NOTE – This photo is of the BPC type, but the pad should be located the same way, on the foil side of the board, half way between the connector pads and the end of the board, centered left to right.

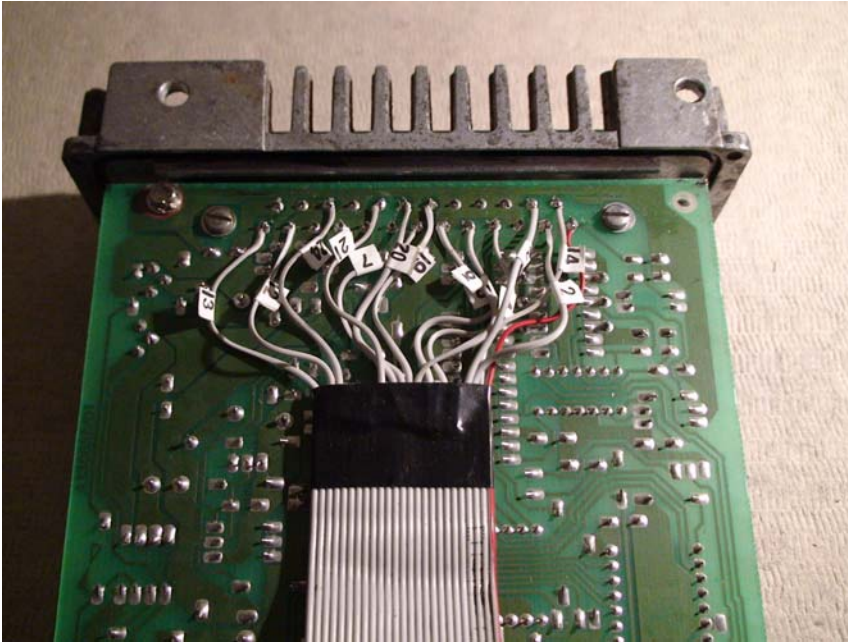


( ) 6. Turn the circuit board over, noting the location of the connector solder pads. Two rows, 12 pads on the top row closest to the heat sink, and 13 in the second row. Pin #1 is the lower right hand pad, with the heat sink positioned as shown:

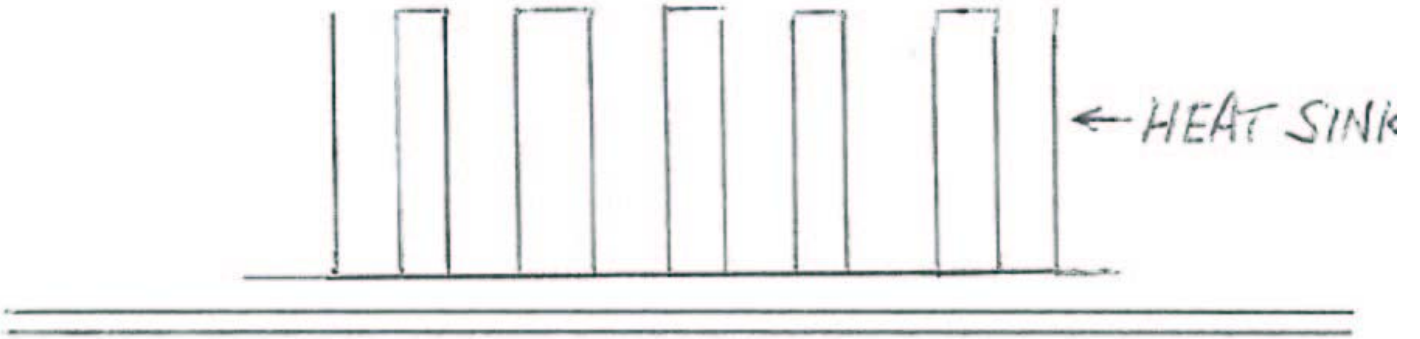


## **Install the Ribbon Cable (BPC)**

- ( ) 1. Locate the 12" ribbon cable.
- ( ) 2. Place the ribbon cable over the 3M pad, with the ends of the wires positioned as shown: (NOTE: the photo shows the wires already soldered)



- ( ) 3. **Make sure the red stripe is on the RIGHT, closest to pin # 1.**
- ( ) 4. Observe how the contacts on the electrical connector are soldered to the circuit board in two rows of solder pads. These pads are located directly behind the cable connector receptacle. You should see that the upper row has 12 pads, and the lower row (towards you) has 13 pads, for a total of 25 pads. The pads are numbered from right to left - #1 is at the bottom right, the bottom row then counts across to #13. The upper row starts at the upper right with # 14, and counts across to the left, ending at # 25.:



# Soldering Tips

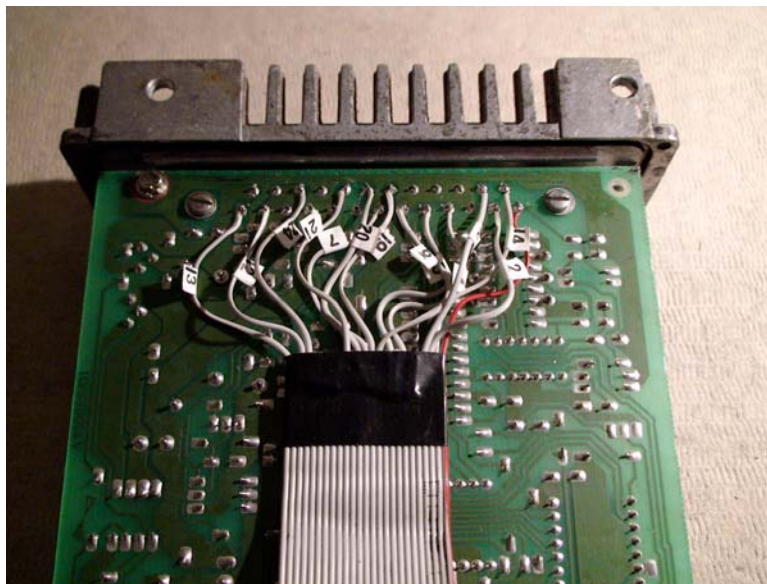
If you are unfamiliar with electronic soldering techniques, you might want to enlist the help of a friend who is familiar with this type of work. Review the Soldering Tips sheet included with your kit. If you feel confident to complete the soldering task yourself, please remember:

- Your soldering iron should be a 40-50W PENCIL type unit, similar to a Weller WES-50 or WES-51. Adjustable temperature units like this are preferable, but not necessary. The fixed output 40W pencil units are fine. Make sure you do not use a soldering GUN. A soldering gun will ruin your ECU printed circuit board.
- Use a small tapered tip, not the large thicker chisel type tip.
- Clean your soldering iron tip on a dampened sponge (usually included with the Weller style units) to keep the tip clean. Touch the end of your solder to the tip, and melt a small amount of solder onto the tip, then wipe it clean on the sponge. This is done to remove excess flux buildup on the tip. You might do this two or three times during this procedure.
- To solder the wires to the pads, bend a small hook in the tinned end of the wire, and crimp it lightly onto the connector lead protruding up through the solder already on the circuit board pad.
- Place the tip of your soldering iron onto the solder on the pad, and heat the solder until it begins to flow (about two seconds). There should be plenty of solder on the pad to flow around the wire and solder the wire to the pad. Remove the soldering iron tip, holding the wire still, until the solder hardens (about another second or so)
- Make sure the solder joint is bright and shiny, NOT coarse and dull. If it is coarse looking, reheat the joint, and re-solder the connection.
- You can remove any leftover flux from the pads when you are finished, using the alcohol pads provided.
- If you end up with a solder “bridge” or excess solder flowing across two pads, you can use Solder Wick to “soak up” the excess solder. Simply place the end of the solder wick on top of the solder you want to remove, then press the tip of your soldering iron onto the wick, pressing down against the solder. You should see the solder flow up into the wick, turning it silver. This should only take a few seconds. Clip off the silver portion of the wick, and it is ready to use again.

## Solder the Ribbon Cable Wires (BPC)

The end of the ribbon cable to be connected to the circuit board has been prepared with wire labels to identify where to solder the wires. The red striped wire is soldered to pin #1, wire labeled 2 to pin #2, and so on. There are a total of fourteen wires to solder. The ends of the wires have been prepared so they are ready to solder to the circuit board pads. It is recommended that you use needle nose pliers to bend a small hook in the timed lead end. This hook can then be placed over and around the connector pin, and crimped lightly to hold it in place prior to soldering.

Solder the wires to the circuit board pads by heating the circuit board pad for approximately 1-2 seconds – you should see the solder start to melt. Holding the wire with needle nose pliers, place the hooked end of the wire into the heated solder, hold the wire in place, and remove the soldering pencil tip. Hold the wire still for another two seconds or so, and proceed to the next wire.



Once again, before you begin, make sure the red stripe is oriented as shown above. *NOTE: You will not be soldering ALL the wires seen in this photo, only the wires with the number tags, and the red wire (#1) See sketch below:*

Solder each of the wires to the circuit board according to the previous sketch and the following list. We have found it is easier to start with the red wire (pin #1), and work to the left (1, 14, 2, 15, 4...), but you can reverse the order, or do whatever works for you. The important thing is to verify each wire as you solder it to the circuit board. This should prevent you from ending up with one “extra” wire. (been there, done that). Use the following check list to record each wire by soldering the wire, and then placing a check mark in the SOLDER column next to the wire soldered. Do this for each of the fourteen wires.

SOLDER	WIRE #	PAD #	OK
	1 (RED)	1	
	14	14	
	2	2	
	15	15	
	4	4	
	5	5	
	6	6	
	19	19	
	7	7	
	20	20	
	21	21	
	24	24	
	12	12	
	13	13	

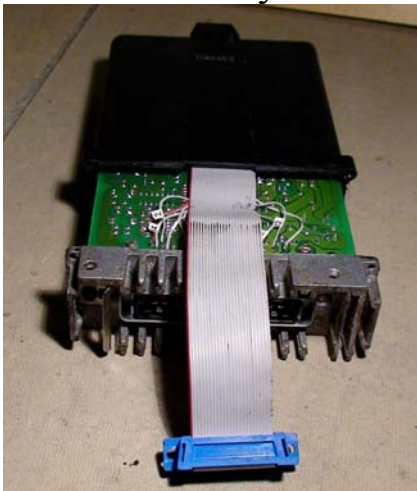
When you are finished soldering the wires, recheck your work by placing a check mark in the OK column as you verify each wire termination point. After you are satisfied that all the wiring is correct, remove the cover paper from the 3M adhesive pad you placed on the circuit board earlier, and press the ribbon cable down onto the pad. If necessary, you can clean up the flux around the pads you soldered with the swabs and alcohol pad provided. You may want to use the alcohol pad as is, or squeeze the pad in it’s foil envelope, and “dip” the swab into the alcohol. This step also allows to inspect all the pads that you soldered for good connection quality and no solder bridges.

## ECU Reassembly & Reinstallation (BPC)

1. You will need to make a small notch in the plastic case in order to allow the ribbon cable to exit without being crimped or damage. We used a small file to create one. Use the small piece of ribbon cable supplied as a gauge. File the notch on the same side as the square locating tab:



2. Slide the circuit board assembly back into the case, with the cable aligned with the notch you created as shown:



6. Reattach the ECU assembly to the ECU mounting bracket using the two screws at the connector end of the ECU.
7. Reinstall the ECU in its mounting location behind the left tail light, using the screws previously removed. Reconnect the ECU cable to the ECU cable connector, and latch into place.

**RETURN TO PAGE 15 – STEP #9**

## **Addendum**

- While you are not using the ECU monitor, disconnect the 18' cable from the 12" cable, and place the red connector cover on the 12" cable connector. This will protect the 12" cable connector.
- Store the ECU Monitor in the burlap bag provided in order to protect it from dirt and moisture. We suggest you store the two ribbon cables in the burlap bag also. You can use the small cotton bag for the 18' cable if you like.
- In order to provide our customers with the most recent updated information, more files are available online at our website <http://www.shoebox-electronix.com>.

Thank you for your purchase and your support. We trust you find the ECU Monitor both useful and time-saving. Please feel free to contact us with comments, suggestions, and experiences via email at:

[shoebox-electronix@earthlink.net](mailto:shoebox-electronix@earthlink.net)

or snail mail at:

**SHOEBOX ELECTRONIX  
4805E GRACE STREET  
CAPITOLA CA 95010**