

Reviving a Seemingly Dead 495/497 Autostar Controller

Disclaimer

The steps below describe my experience in successfully bringing back a dead autostar controller to life. Neither I nor any of the individuals named here bear responsibility for any damages following your actions in trying to fix your dead autostar controller by trying to replicate the following experience.

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Symptoms:

Hand controller looked dead. Occasional clicks - single or multiple on power ups. LED and key pad lit up, but no information displayed. Motors will slew periodically if left on.

Cause:

1. Faulty solder joints, or bad capacitors
2. Dip in power (brown-out) or interruption of power (black-out) during updates. In my case it was a power interruption during a slew. Other forms of power interruption can probably do this as well. The root cause may be the garbling of information in the EEPROM of the MC68HC11 controller.

Fix:

1. Checked the hand box cable and the battery cable. Jiggled them, pushed them in, reconnected them, flipped the ends of handbox cable, checked continuity of the handbox cable. Repowered the mount after each trial. No luck.
2. Tried turning off power, then booting into safe mode pressing Enter + Scroll Down key to put the hand box in SAFELOAD mode. No luck here either. If this had worked I could have used the #505 cable you can upload the firmware using the Autostar Updater from Meade or Starpatch. Saw this suggestion by Richard Seymour on Mike Weasner's ETX site.
3. So I prepared to open up the handbox. The only trouble shooting tool I have is a voltmeter - something many of us have. I didn't have the time or inclination to go any deeper than this.

Opened up the handbox. Removed the back cover, but let the circuit board stay in the other half. Laid it down so that the keypad was face down. Did a good physical inspection with a good light and a magnifying glass. Checked solder connections on the handbox cable connector. Checked continuity with an ohmmeter. Examined other solder joints. A bad capacitor and a capacitor with a broken lead have been known to be the cause of dead controllers as reported by David Grosky on Cloudy Nights and The Yahoo Roboscope Group.

With all the above steps failing, I prepared to clear the EEPROM of any garbled data and reset the HC11 controller. This idea was suggested by David Grosky.

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Using HCLoad to reset to erase EEPROM and reset the controller:

1. To reset the EEPROM I installed a program called "HCLoad" by Sylvain Bissonnette available at: <http://www.microsyl.com/> . Downloaded the latest version 6.0b10. Also got the KeyGenerator which will be required for registration. The KeyGen is an executable and ran directly.
2. Unzipped hcoad6.zip and extracted contents of the folder and clicked setup. There are a number of files in this package that were older than versions installed on a modern computer. The installer asked if I would like to keep original versions. I said yes.
3. Ran HCLoad from Start Menu. Went to the Misc tab and clicked register to get a serial number. Ran the KeyGenerator. Typed in the serial number into the KeyGen and pressed "find KeyCode". Entered the KeyCode into the HCLoad application and pressed enter. Without registration step I could have only run HCLoad 20 times. I had to run it a few more times to get my handbox working. Explored the tabs of the application.
4. Identified the HC11 controller on the circuit board. Understood the pin layout of the 68HC11 controller. A nice pin-out diagram was available on page 4 of the following document: <http://www.arlabs.com/acom1.pdf>
The controller in the 495/497 handbox had the same packaging as the smallest of the three controllers shown in the above document. Pin 1 is marked with a circle. I have closed up my controller, but I think the edge with pin zero is parallel to the top of the controller. Pin numbers increased counter clockwise. This document is shorter than the full manual for the HC11 available at: http://www.freescale.com/files/microcontrollers/doc/ref_manual/M68HC11RM.pdf
5. Connected the handbox to my computer's serial port with #505 cable. Connected the handbox cable as well.
6. Pins 1 (GND), 2 (MODB) and 3 (MODA) needed to be shorted. These are the pins marked with the circle and the next two pins going counter-clockwise. David Grosky used wrap wire soldered to the legs to achieve this. I am not a skilled solderer. So I used a 3mm flat head screw driver from a jeweler's kit. The width of the chisel like point is just right to short three pins. Practiced holding the screw driver in the shorting position. As I pushed down the board moved, and some times the handbox case slid. So I butted up the handbox case against a book. I held the screw driver at shallow angle. At a steep angle it slid down a number of times. With power on this could have shorted something else on the board. Once you are sure your shorting technique, I moved on.

I found that here is no need to use a short (between pins 0 and 17) to RESET the controller. That is needed only if the power is on the entire time. A power cycle does an automatic RESET. I chose to power cycle after each step described below.

7. With Pins 1,2 and 3 shorted powered up the mount. Clicked the "Comm Port" tab and "Test communication". Got a positive comment in a pop-up. Reset power and continued to the next step

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8. Selected the EEPROM tab. Pressed Erase. Reset Power.
9. Still in the EEPROM tab, pressed "Check Stat". Reset power, checked that I had good connection on the 3 pin short and retried this until I got a "No Data" message. Otherwise the pop-up showed "Data"
10. Selected the "Config Regs" tab
Checked EEPROM ON, NO COP and NO SEC
Did NOT Check ROM ON
Pressed Program.
Reset Power.
11. Put the handbox together. At this point I did not use the screws but simply snapped the case shut.
12. Did a SAFELOAD with Enter+Scroll Down pressed. Controller came to life. Use Starpatch to reflash the handbox.