

# Commissioning GreenArrays PCBs

## *Instructions to Staff*

*for Inspection, Configuration, Testing & Packing our Products*

## 1. EVB002 G144A12 Eval Board rev 0ha

Rev 0h applies to all layers on the fabricated boards. 0ha is the final revision of paste layer for assembly. Serial 201-300 built in Apr-May 2019 at Advanced Assembly. Perform the steps called out on the Traveler form, as follows:

### 1.1 Pre-Shipment Steps

These actions are taken en masse to prepare boards for same-day shipment. Materials to have on hand are:

- These instructions and a copy of AN021, *Getting Started with Eval Board EVB002*, for parts bag list & default jumpers.
- Anti-static work area. Wear wrist strap throughout these procedures.
- Voltmeter.
- Serialized quarter-page Traveler forms in forms/shipping: EVB002 Inspection Tags.docx.
- Serialized bag labels in forms/shipping: avery5160x30-EVB002-p.doc.
- P-touch adhesive serial numbers.
- Untested / unopened eval boards.
- Bag of jumpers (each board will use 32 of these.)
- Computer with current release arrayForth-3, and three USB cables.
- Optional Wall-Wart set for 5v. *If using a Wall Wart to power this board using ethernet drivers powered from J41, the wall wart should not be supplying more than 5v after the diode drop, as measured at J41.*

As the following steps are taken, initial the completion of each on the traveler form.

#### 1.1.1 Serialize Board & Bag

Select the next pre-serialized Traveler form. Using label from P-touch printer, put same serial number in lower left corner of board. Select an antistatic bubble envelope bag and apply a bag label with the same serial number.

#### 1.1.2 Initial Power Check

Plug in USB port A, noting the assigned COM port number, and use voltmeter to measure supply voltage at right-hand stakes (pin 3) of any of the power configuration jumpers (J10-11, J14-16). Record voltage in "Remarks" column. If the voltage differs by more than 20 mV from 1.800, seek technical guidance. Unplug the USB cable to de-power the board.

#### 1.1.3 Install Default Jumpers.

Refer to 1.2.1 in AN021 and install jumpers as specified. Watch out for jumpers with missing metal contacts inside; we have found more than a few of these. If you don't feel resistance when inserting the jumper, double check. ***Include the long yellow jumper wire between J41 & J76 temporarily.***

### 1.1.4 Configure FTDI Chips.

This is the most complex of the operations and requires special attention to the computer you use for this step.

#### 1.1.4.1 Windows Setup for Testing

On windows boxes, you will gain six more COM ports for each board you test, and will eventually be wanting to delete surplus ports from the Device Manager.

Your machine should have the FTDI VCP drivers installed for general COM port use by arrayForth and by sF-NT. At the time of this writing, the latest version was 2.08.30 for windows, released 7/12/13 or 8/01/13. In Windows 10 we find .12.24.0 9/28/16.

You will also need to install the ft\_prog utility which is available in the GA SupSW (supported software) repository. It may be obtained from <http://www.ftdichip.com> website; as of the time of this writing, it could be found in the FTDI menu structure at support / utilities. We have used versions 2.2 and 2.6.8 in the past. The latest version at the time of this writing is 2.8.2.0. This utility requires the "D2XX" drivers. As of 2.08.30, the WHQL Certified installer from FTDI appears to install both VCP and D2XX driver sets; the separately downloadable installers are bitwise identical. Install the full driver set by unzipping the distribution and running the executable; you will have to use "run as administrator" instead of simply clicking this program. Install the ft\_prog utility by unzipping its distribution and running its executable and taking a full install.

Run FT\_Prog before proceeding. Perform scan and parse from the Devices menu now, to identify any FTDI chips connected to your machine so you don't program any of them by accident. Your chances of doing this by accident will be reduced, of course, if you disconnect any devices you don't need at this time.

#### 1.1.4.2 FTDI Chip Programming

Perform the following steps for each of the three Eval Board USB ports in the order A, B, C:

1. Plug USB cable into socket on EVB and let Windows install drivers, watching Device Manager till COM port appears.
2. Perform a Scan & Parse on FT Prog to see the new device in its list. Note: It will not necessarily appear at the end of the list if you have other devices! Recognize the un-programmed FTDI chip by selecting its root entry in the Device Tree on left of FT Prog window. Product Description will by default be "FT232R USB UART" and serial number will clearly not be GreenArrays assigned.
3. If there are any other FTDI devices shown than the one you intend to program, you will need to right-click each of these and say "close device". This is the price for not unplugging them in the first place.
4. Rightclick the device root and say "Apply Template from File". Navigate to the current arrayForth release directories and find three files named in the form *EVB002-?-std-190430.xml* where "?" is A, B or C for ports A, B, or C respectively. Select the appropriate file for this port and say "open". Expect a dialog saying template was successfully applied.
5. Navigate down the device tree to FT EEPROM / USB String Descriptors / SerialNumber. Put the cursor in the Serial Number field on the right hand side and be careful because the box is not big enough to show the whole number. Each port of each board should have a globally unique serial number of the form GAEVB002S0201A (this is the default serial number in the template for port A). GAEVB002 identifies the product. S0201 is serial number. A is port. You will need to replace the serial number 0201 with the actual serial number for this PCB.
6. Menu select Devices/Program, make sure the right device is checked, and say "Program". Wait till it completes and check the display for the device root: Double check that it says "EVB002 Port x" and has the correct serial number. When using this menu item you may need to re-scan & parse to see the correct serial number in the root; right clicking the root and saying "Program Device" seems to work without this step, although you don't get a completion dialog.
7. Unplug the USB cable from this port.

When you have completed the above steps for each of the three ports, use three USB cables to plug ports A, B and C in, waiting to see the COM port numbers assigned them in Device Manager. These will be three new COM port numbers, not the same as those you saw above; when Windows is correctly configured, our Serial Numbers are used to identify the devices so that the

same port on the same board has the same COM port number regardless of where you have plugged that port into your computer's complex of USB hubs and connectors.

**YOU STILL AREN'T DONE YET.** *Plug each of the USB connectors in, one at a time*, noting new COM port numbers. You will need to set advanced port settings for each of the new ports using Device Manager. *USB Transfer Sizes* should be reduced from 4096 to 128 bytes; *Latency timer* from 16 to 1 ms. Turn off *Serial Enumerator*, turn on *Set RTS On Close* and *Disable Modem Ctrl At Startup*. While this step is not absolutely necessary, failing to do so will make the next few things abysmally slow. Initial the box when this is all complete.

### 1.1.5 Host Chip Self-Test

*In sF, type <a> SELFTEST* where <a> is the COM port number for port A. Initial the box when the status is **Ok!**

### 1.1.6 Target Chip Self-Test

*In sF, type <c> SELFTEST* where <c> is the COM port number for port C. Initial the box when the status is **Ok!** Note that you can save time by doing this in parallel with the Host Chip Self Test; all it requires is starting a second instance of aF3. If you run multiple instances, pick one for editing the disk and stick with it. Initial the box when the status is **Ok!**

### 1.1.7 Two Chip Selftest

After both chips are done, type *<a> AUTOTEST* in sF. Initial the box when the status is **Ok!**.

### 1.1.8 Serial boot pF, run Extended SRAM tests

*Using sF, edit* block **CONFIG** so that **A-COM** has the correct port number for USB port A *and edit* block **SERIAL** to use the correct port number for USB port B. If you already have AFORTH loaded, reload it by saying **RELOAD** then **HI AFORTH**.

Ensure no-boot jumper J26 and the USB reset enable J20:1-3 are installed on the EVB002.

*In sF, type:*

- If this system has been used for general chip development, **STOCK LOAD** for standard object.
- **2205 LOAD** to reset the EVB002 and send a serial boot stream for polyFORTH. **?CLK** and **?ETH** don't matter here.
- Type **SERIAL LOAD PLUG**.

*In terminal emulator, type:*

- Hit space bar to autobaud the EVB002, expect to see pF/G144 ID line, followed by **hi**.
- **20 DRIVE HI**

**Type 261 LOAD** to compile the extended memory tests and then run each of these tests by typing its name:

- **HEX .PAGES** shows 8 words starting at each consecutive 64k words of external SRAM. Scan down this list looking for any lines that seem identical. There should be none. If any exist that is a probable failure implying shorted or open high order address lines.
- **?LOW** will simply reply **ok** if the X@ function is working correctly for the low order 64k words of SRAM.
- **!ALL** simply replies **ok** after writing a pattern into all of the 2 MB RAM above the first 64k words.
- **?ALL** simply replies **ok** if the pattern checks out.

Initial the box if and only if all the above occurs as expected. Leave aF-3 sitting as is for use in the next step.

### 1.1.9 Install polyFORTH in flash with arrayForth-3

If polyFORTH is not already running on the EVB002 under test, repeat the above steps through 20 DRIVE HI . Otherwise just pick up below:

*In terminal emulator, type:*

- AFORTH
- If this is not a vanilla system, you may need STOCK LOAD for standard object.
- Check block 2211 for ?CLK = 2 and ?ETH = 1. 2211 LOAD WRITE-FLASH
- AT MINIMUM, WRITE polyFORTH NUCLEUS TO FLASH:

```
BULK LOAD 0 DRIVE 24000 0 9 BLOCKS 0 24000 9 MATCHES
```

- OPTIONALLY, WRITE ONE OR MORE UNITS OF SOURCE:

```
BULK LOAD 0 DRIVE 24000 0 4800 BLOCKS 0 24000 4800 MATCHES
```

*Remove EVB002 no-boot jumper J26 and hit the reset button* nearest front edge of the board.

- Hit space bar to autobaud the EVB002, expect to see pF/G144 ID line, followed by hi .
- 20 DRIVE HI (or simply HI if ≥4800 blocks copied to flash above)

You are now running from flash boot; initial the box.

### 1.1.10 Configure Ethernet

Connect the board to a switch capable of negotiating 10baseT full duplex (our software defined NIC requires this). After a short while the link should come up, reflected usually by LEDs on the switch. ***If the link does not come up, something is very wrong and until it's been debugged you will not be able to complete this step.***

*Edit block 559* as follows (instructions for use in GreenArrays Cheyenne office):

- Connect the board to a switch capable of negotiating 10baseT full duplex (our software defined NIC requires this). After a short while the link should come up, reflected usually by LEDs on the switch. ***If the link does not come up, something is very wrong and until it's been debugged you will not be able to complete this step.***
- Set S/N to the board's serial number, important so this board has an unique MAC address.
- Verify the IP address in the INET line is the one reserved for testing evaluation boards. In Cheyenne, this address is 192.88.236.76 (uut.owl-fort.com).

Check block 540 for time server address of 192.88.236.6

*Edit block 9* to select Ethernet crystal as clock source (Change 1 to 0 at start of line 8, 0 to 1 at start of line 9.)

### 1.1.11 Test/Exercise Ethernet

- Connect the board to a switch as above if not already done.
- RELOAD or reset, boot and say HI (on whichever drive you edited when configuring).
- ETHER LOAD which takes a while. Ideally you will see a line indicating that the clock has been set.
- .SUMM to display counts. There should be both incoming and outgoing traffic with no Ethernet layer errors.

```
.SUMM
.SUMM Redefined
Portal-name # <In-Sub Forward Errs -Forwd> <Out-Sub Forward Errs -Forwd>
1_ETHER    0   547495  547495   0     0   17313  17313   0     0
IEEE802.3  1   547495  469630   0     77865  17313  17313   0     0
ETHERTYPE  2   469630  365217   0     104413  17313  17313   0     0
ARP        3   212530  212393   0     137    7636   7636   0     0
DOD-IP     3   152687  17616    0     135071  9677   9677   0     0
ICMP       4   6322    6322    0     0     6307   6307   0     0
UDP        4   6050    4        0     6046   4      4      0     0
TCP        4   5244    0        10    5234   3366   3366   0     0
```

- Try a PING or two:

```
PING 192.88.236.1
PING Redefined
Pinging [192.88.236.1] with 32 bytes of data:
Reply from [192.88.236.1]: bytes=32 time=6883.2 us TTL=255
Reply from [192.88.236.1]: bytes=32 time=6816.1 us TTL=255
Reply from [192.88.236.1]: bytes=32 time=6816.5 us TTL=255
Reply from [192.88.236.1]: bytes=32 time=6816.9 us TTL=255
```

If you have something else to do for a while, leave the board running and check .SUMM again later. Watch for errors in .SUMM or "flapping" of link status. If you see either, don't initial this box but refer the board to Greg.

### 1.1.12 Install No-Boot Jumper

*Re-insert J26* so that flash will not boot on reset. **Remove the temporary long yellow jumper wire.** Initial the box.

The board is now ready to await shipment. Insert the board and the traveler into the antistatic bubble envelope bag, ensuring that the same serial number is on all three items, leave the bag unsealed, and place it in the carton of boards ready to ship.

## 1.2 Shipping Day Steps

Materials to have on hand are:

- As many boards, with travelers in unsealed bags, as you plan to ship.
- One bagged USB cable for each board.
- One parts bag for each board. See AN021 section 3.1 for a list of what should be in the bag.
- Anti-static work area. Wear wrist strap throughout these procedures.
- Tape gun for sealing boxes.
- For each single board going to US, the following:
  - One small flat rate box
  - One 3M plastic parts list envelope
  - One serialized box label in forms/shipping: avery5162x14-EVB002-p.doc.
  - One printed copy of AN021.
- For multiple-board US shipments substitute a medium flat rate box.
- For each foreign shipment, the following:
  - One medium flat rate box
  - One 3M plastic parts list envelope
  - One USPS plastic external shipping label envelope
  - One serialized box label in forms/shipping: avery5162x14-EVB002-p.doc.
  - One printed copy of AN021.
  - Bubblepack or other material as needed so it will not rattle.

As the following steps are taken, initial the completion of each on the traveler form. This will require cheating on the last couple of steps :)

### 1.2.1 Visual Inspection & Bag

Remove board and traveler from bag. Make sure serial numbers match on all three items. Check that traveler shows finished down to this step. Then examine the board visually, particularly giving attention to correct settings of all jumpers. When satisfied, insert board (but not traveler) in bag and seal; initial the box on traveler form.

### 1.2.2 Add Parts & App Note

Stack a USB cable in its own bag, other parts in their own bag, and a copy of AN021 with the bagged board and initial.

### 1.2.3 Pack For Shipment

Assemble and tape box as appropriate, then stuff contents:

- For small boxes, insert all three bagged items with no packing material. Slide quarter folded AN021 in.
- For medium boxes, pack the three bagged items with packing material so the box won't rattle. Insert half folded AN021.

Apply serialized box label(s) as appropriate; on end of small box, on side of medium. Initial traveler.

### 1.2.4 Print & Apply Commercial Invoice

Fold commercial invoices and insert in 3M bag (1 copy if domestic, 3 copies if foreign.) Stick bag to bottom of small box, side of medium. Initial traveler. Also initial the next step, put traveler in box, and seal the box.

### 1.2.5 Print & Apply Shipping Label

For domestic shipment the ½ page self-adhesive label goes directly on the top of the box, either size. For foreign shipment four copies of the ½ page foreign papers go into a USPS plastic envelope that is then attached to top of box.

## 2. EVB001 GA144 Eval Board rev 0.1.1a

Serial 0-100 did not have the GP LEDs D12-15 populated. Serial 101-200 added amber LEDs that may be driven high by pins. In either case, follow the steps called out on the Traveler form, as follows

### 2.1 Pre-Shipment Steps

These actions are taken en masse to prepare boards for same-day shipment. Materials to have on hand are:

- These instructions and a copy of AN004, *Getting Started with Eval Board*.
- Anti-static work area. Wear wrist strap throughout these procedures.
- Voltmeter.
- Serialized quarter-page Traveler forms in forms/shipping: EVB001 Inspection Tags.docx.
- Serialized bag labels in forms/shipping: avery5160x30-EVB001-p.doc.
- P-touch adhesive serial numbers.
- Untested / unopened eval boards.
- Bag of jumpers (each board will use 28 of these.)
- Computer with current release arrayForth and three USB cables.

As the following steps are taken, initial the completion of each on the traveler form.

#### 2.1.1 Serialize Board & Bag

Select the next pre-serialized Traveler form. Using label from P-touch printer, put same serial number in lower left corner of board. Select an antistatic bubble envelope bag and apply a bag label with the same serial number.

#### 2.1.2 Initial Power Check

Plug in USB port A, noting the assigned COM port number, and use voltmeter to measure supply voltage at right-hand stakes (pin 3) of any of the power configuration jumpers (J10-11, J14-16). Record voltage in "Remarks" column. If the voltage differs by more than 20 mV from 1.800, seek technical guidance. Unplug the USB cable to de-power the board.

#### 2.1.3 Install Default Jumpers.

Refer to 1.2.1 in AN004 and install jumpers as specified. Watch out for jumpers with missing metal contacts inside; we have found more than a few of these. If you don't feel resistance when inserting the jumper, double check.

#### 2.1.4 Configure FTDI Chips.

This is the most complex of the operations and requires special attention to the computer you use for this step.

##### 2.1.4.1 Windows Setup for Testing

On windows boxes, you will gain six more COM ports for each board you test, and will eventually be wanting to delete surplus ports from the Device Manager.

Your machine should have the FTDI VCP drivers installed for general COM port use by arrayForth and by sF-NT. At the time of this writing, the latest version was 2.08.30 for windows, released 7/12/13 or 8/01/13.

You will also need to install the ft\_prog utility which is available in the GA SupSW (supported software) repository. It may be obtained from <http://www.ftdichip.com> website; as of the time of this writing, it could be found in the FTDI menu structure at support / utilities. We have used versions 2.2 and 2.6.8 in the past. The latest version at the time of this writing is 2.8.2.0. This

utility requires the "D2XX" drivers. As of 2.08.30, the WHQL Certified installer from FTDI appears to install both VCP and D2XX driver sets; the separately downloadable installers are bitwise identical. Install the full driver set by unzipping the distribution and running the executable; you will have to use "run as administrator" instead of simply clicking this program. Install the ft\_prog utility by unzipping its distribution and running its executable and taking a full install.

Run FT\_Prog before proceeding. Perform scan and parse from the Devices menu now, to identify any FTDI chips connected to your machine so you don't program any of them by accident. Your chances of doing this by accident will be reduced, of course, if you disconnect any devices you don't need at this time.

#### **2.1.4.2 FTDI Chip Programming**

Perform the following steps for each of the three Eval Board USB ports in the order A, B, C:

8. Plug USB cable into socket on EVB and let Windows install drivers, watching Device Manager till COM port appears.  
Note: When Windows is correctly
9. Perform a Scan & Parse on FT Prog to see the new device in its list. Note: It will not necessarily appear at the end of the list if you have other devices! Recognize the un-programmed FTDI chip by selecting its root entry in the Device Tree on left of FT Prog window. Product Description will by default be "FT232R USB UART" and serial number will clearly not be GreenArrays assigned.
10. If there are any other FTDI devices shown than the one you intend to program, you will need to right-click each of these and say "close device". This is the price for not unplugging them in the first place.
11. Rightclick the device root and say "Apply Template from File". Navigate to the current arrayForth release directories and find three files named in the form *EVB001-?-std-110831.xml* where "?" is A, B or C for ports A, B, or C respectively. Select the appropriate file for this port and say "open". Expect a dialog saying template was successfully applied.
12. Navigate down the device tree to FT EEPROM / USB String Descriptors / SerialNumber. Put the cursor in the Serial Number field on the right hand side and be careful since the box is not big enough to show the whole number. Each port of each board should have a globally unique serial number of the form GAEVB001S0001A (this is the default serial number in the template for port A). GAEVB001 identifies the product. S0001 is serial number. A is port. You will need to replace the serial number 0001 with the actual serial number for this PCB.
13. Menu select Devices/Program, make sure the right device is checked, and say "Program". Wait till it completes and check the display for the device root: Double check that it says "EVB001 Port x" and has the correct serial number. When using this menu item you may need to re-scan & parse to see the correct serial number in the root; right clicking the root and saying "Program Device" seems to work without this step, although you don't get a completion dialog.
14. Unplug the USB cable from this port.

When you have completed the above steps for each of the three ports, use three USB cables to plug ports A, B and C in, waiting to see the COM port numbers assigned them in Device Manager. These will be three new COM port numbers, not the same as those you saw above; when Windows is correctly configured, our Serial Numbers are used to identify the devices so that the same port on the same board has the same COM port number regardless of where you have plugged that port into your computer's complex of USB hubs and connectors.

You still aren't done yet. Now you will need to set advanced port settings for each of the new ports using Device Manager. *USB Transfer Sizes* should be reduced from 4096 to 128 bytes; *Latency timer* from 16 to 1 ms. Turn off *Serial Enumerator*, turn on *Set RTS On Close* and *Disable Modem Ctrl At Startup*. While this step is not absolutely necessary, failing to do so will make the next few things abysmally slow. Initial the box when this is all complete.

#### **2.1.5 Host Chip Self-Test**

In arrayForth, type **<a> selftest** where **<a>** is the COM port number for port A. Initial the box when the selftest status is **ok!**

### 2.1.6 Target Chip Self-Test

In arrayForth, type **<c> selftest** where <c> is the COM port number for port C. Initial the box when the selftest status is **ok!** Note that you can save time by doing this in parallel with the Host Chip Self Test; all it requires is starting a second instance of arrayForth. If you did this, say **bye** to the second instance after running the test.

### 2.1.7 Two Chip Selftest

After both chips are done, type **<a> autotest** on the arrayForth instance that you used for talking to the Host chip. Initial the box when the autotest status is **ok!** (If you try doing this with the arrayForth instance you were using to talk with the target chip you will get an error message.) When completed, say **bye**.

### 2.1.8 Install polyFORTH in flash

Using a new arrayForth, used in 1.1.5 and 1.1.7 above, edit block 202 so that **a-com** has the correct port number for USB port A and type **warm**. Then type **460 load** and follow instructions on screen, burning boot stream and nucleus. Initial the box when you see "checking nucleus success". Keep this instance around, you will be able to use it later.

Run the "Terminal Emulator" (sF-NT), say **HI** and then edit the block **SERIAL** to use the B port of this board. Say **SERIAL LOAD** after editing the block. This may be done while the flash is being burned.

Once the program is in flash, type **PLUG** and hit the reset button on the eval board. Hit the space bar on the terminal emulator to allow polyFORTH to autobaud, and expect to see a pf/G144 version ID line followed by **hi**. Respond to this with **HI**. After a while expect to see a G144A12 polyFORTH development system ID screen and **ok** as the last thing displayed. Initial the box when this has happened.

### 2.1.9 Extended SRAM tests

Type **261 LOAD** to compile the extended memory tests and then run each of these tests by typing its name:

- **HEX .PAGES** shows 8 words starting at each consecutive 64k words of external SRAM. Scan down this list looking for any lines that seem identical. There should be none. If any exist that is a probable failure implying shorted or open high order address lines.
- **?LOW** will simply reply **ok** if the **X@** function is working correctly for the low order 64k words of SRAM.
- **!ALL** simply replies **ok** after writing a pattern into all of the 2 MB RAM above the first 64k words.
- **?ALL** simply replies **ok** if the pattern checks out.

Initial the box if and only if all the above occurs as expected. Leave sF-NT sitting as is for use in the next step.

### 2.1.10 Install eForth in Flash

On the same instance of arrayForth as you employed in 1.1.8 above (or a new one with the correct a-com value if you had closed the instance), type **1190 load** and follow instructions. Initial the box after "checking nucleus successful."

### 2.1.11 Verify eForth Runs

Once it has fully installed, hit reset on the eval board and type a space on the terminal emulator to autobaud. Expect to see **eForth btc:20110826 ga144:20110826** followed by **ok**. Type a line like **100 1 2 3 + + +**. and expect to see **106 ok**. Initial the box if all this happens as expected.

### 2.1.12 No-boot Jumper Installed

Re-insert J26 so that flash will not boot on reset. Initial the box.

The board is now ready to await shipment. Insert the board and the traveler into the antistatic bubble envelope bag, ensuring that the same serial number is on all three items, leave the bag unsealed, and place it in the carton of boards ready to ship.

## 2.2 Shipping Day Steps

Materials to have on hand are:

- As many boards, with travelers in unsealed bags, as you plan to ship.
- One bagged USB cable for each board.
- One parts bag for each board. See AN004 section 3.1 for a list of what should be in the bag.
- Anti-static work area. Wear wrist strap throughout these procedures.
- Tape gun for sealing boxes.
- For each single board going to US, the following:
  - One small flat rate box
  - One 3M plastic parts list envelope
  - One serialized box label in forms/shipping: avery5162x14-EVB001-p.doc.
  - One printed copy of AN004.
- For multiple-board US shipments substitute a medium flat rate box.
- For each foreign shipment, the following:
  - One medium flat rate box
  - One 3M plastic parts list envelope
  - One USPS plastic external shipping label envelope
  - One serialized box label in forms/shipping: avery5162x14-EVB001-p.doc.
  - One printed copy of AN004.
  - Bubblepack or other material as needed so it will not rattle.

As the following steps are taken, initial the completion of each on the traveler form. This will require cheating on the last couple of steps :)

### 2.2.1 Visual Inspection & Bag

Remove board and traveler from bag. Make sure serial numbers match on all three items. Check that traveler shows finished down to this step. Then examine the board visually, particularly giving attention to correct settings of all jumpers. When satisfied, insert board (but not traveler) in bag and seal; initial the box on traveler form.

### 2.2.2 Check & Add Parts Kit

Stack a USB cable and parts bag with the bagged board and initial.

### 2.2.3 Pack For Shipment

Assemble and tape box as appropriate, then stuff contents:

For small boxes, insert all three bagged items with no packing material. Slide quarter folded AN004 in.

For medium boxes, pack the three bagged items with packing material so the box won't rattle. Insert half folded AN004.

Apply serialized box label(s) as appropriate; on end of small box, on side of medium. Initial traveler.

#### **2.2.4 Print & Apply Commercial Invoice**

Fold commercial invoices and insert in 3M bag (1 copy if domestic, 3 copies if foreign.) Stick bag to bottom of small box, side of medium. Initial traveler. Also initial the next step, put traveler in box, and seal the box.

#### **2.2.5 Print & Apply Shipping Label**

For domestic shipment the  $\frac{1}{2}$  page self-adhesive label goes directly on the top of the box, either size. For foreign shipment four copies of the  $\frac{1}{2}$  page foreign papers go into a USPS plastic envelope that is then attached to top of box.

### **3. Ethernet Boards for EVB001**

xxx