AngelShark Internal M.2 PCIe SSD Expansion Carrier Board for Apple Mac Pro (Late 2013)

Hardware Manual

November 1, 2017

Revision 1.0

www.amfeltec.com

Contents

Figures

Tables

1 About this Document

1.1 Purpose

This document describes the hardware installation, features, specifications and operation of the *AngelShark* Carrier Board™ for two M.2 SSD modules from AMFELTEC Corporation.

1.2 Feedback

AMFELTEC Corporation makes every effort to ensure that the information contained in this document is accurate and complete at time of release. Please contact AMFELTEC if you find any errors, inconsistencies, or have trouble understanding any part of this document.

To provide your feedback, please send an email to support@amfeltec.com.

Your comments or corrections are greatly valued in our effort for excellence and continued improvement.

1.3 Revision History

Rev. No.	Description	Rev. Date
1.0	Initial Release.	November 1, 2017

2 General Description

2.1 Introduction

AngelShark Internal M.2 SSD Expansion Carrier Board is designed to allow the user (of a Mac Pro, Late 2013) to add one or two additional M.2 PCIe SSD modules while keeping their original Mac SSD module. The elegant solution allows the user to do this internally, without having to add external equipment which is both bulky and not cost-effective.

The *AngelShark* Carrier Board™ goes between the Mac and the original SSD Module, while allowing for expansion with up to two more M.2 PCIe SSD modules (user's choice).

The Carrier Board supports any M.2 PCI Express (M-key) SSD modules with standard lengths 2260, 2280, or 22110.

2.2 System requirements

Apple Mac Pro (Later 2013)

2.3 Package Contents

Carrier Board package (depending on the SKU part number) includes the following parts:

1. *AngelShark* Carrier Board™

2. Screwdriver with bit set for supporting Carrier Board installation.

   (Torx T8s bit, Phillips #000 bit, Phillips #1 bit, Slotted bit)

3. Power Standoffs (2 pcs + 1 extra)

4. Power Screws (2 pcs + 2 extra)

5. Mounting Screws (6 pcs + 2 extra)

6. M.2 SSD Heat Sink
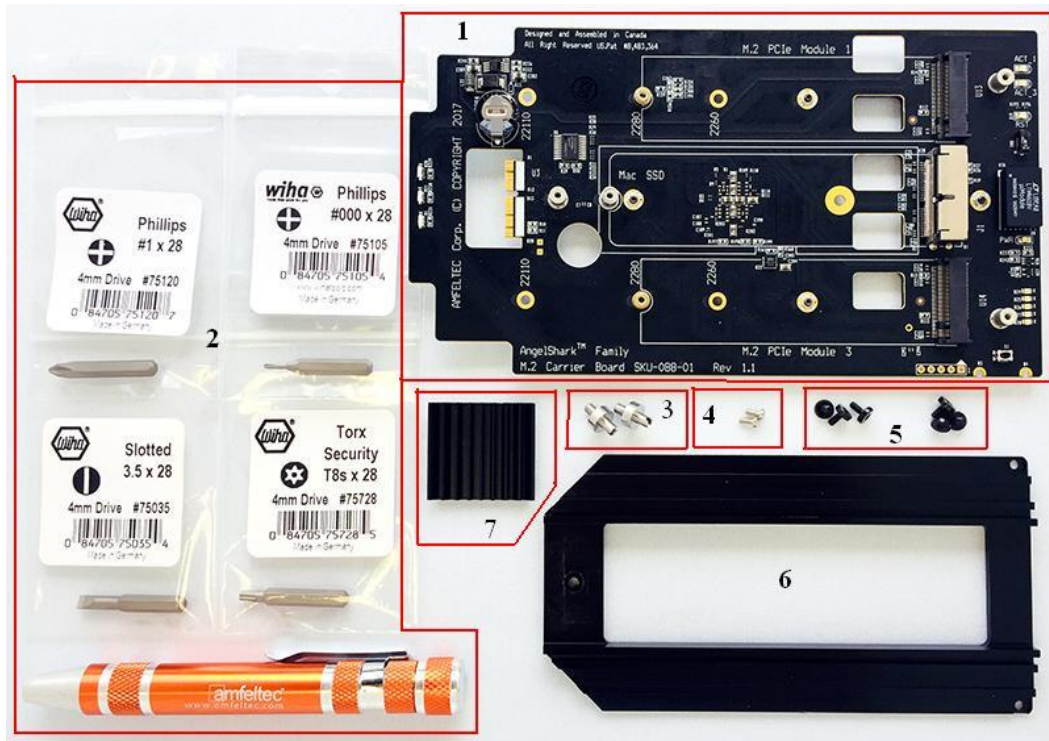
7. Apple SSD additional Heat Sink.

2.4 Figures

Figure 1: All parts included in the package.

AngelShark **Internal M.2 PCIe SSD Expansion Carrier Board for Apple Mac Pro (Late 2013)**
Hardware Manual, Revision 1.0

Page 3
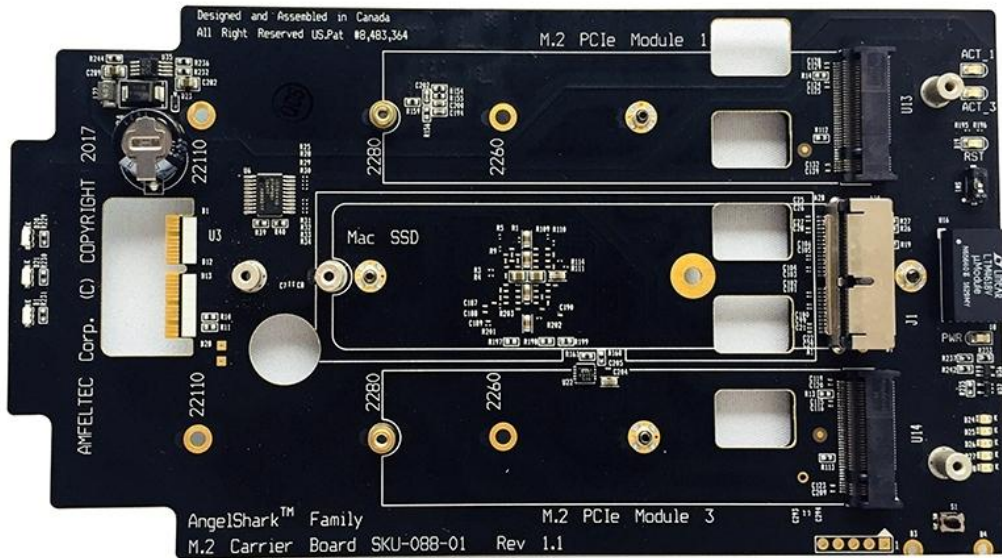
Figure 2: *AngelShark* Carrier Board™ (top).
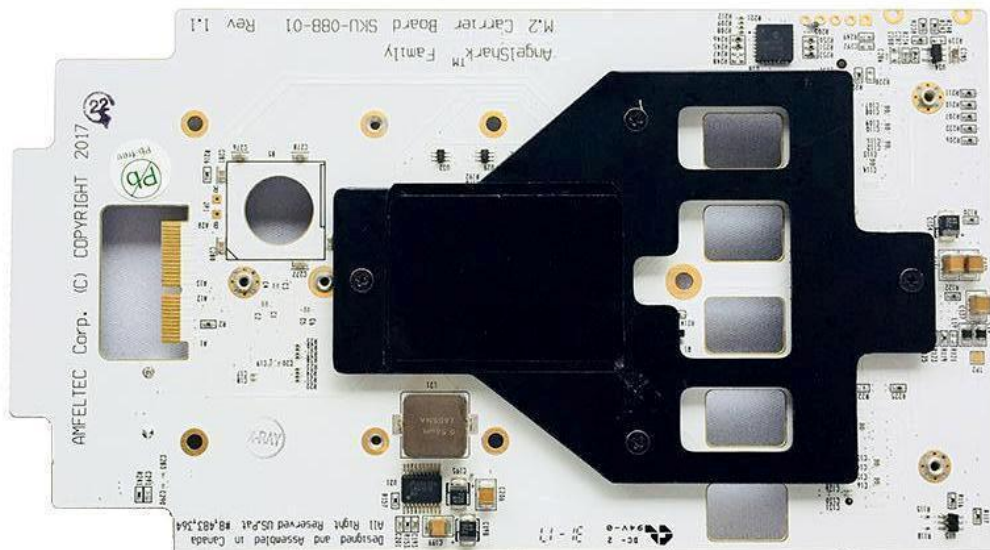
Figure 3: *AngelShark* Carrier Board™ (bottom).

AngelShark **Internal M.2 PCIe SSD Expansion Carrier Board for Apple Mac Pro (Late 2013)**
Hardware Manual, Revision 1.0

Page 4

3   Features

3.1   Features

- Helps increase Mac Pro storage capacity by facilitating installation of additional M.2 PCIe SSD modules

- Supports up to two (2) M.2 PCI Express add-in SSD modules (M-key)

- x4 PCI Express connection to each M.2 module circuit

- x4 PCI Express connection to Apple SSD circuit

- Supports PCI Express Gen 3 (8.0 Gbps) operation

- Meets PCI Express 2.1 and M.2 1.1 Specifications

- Dimensions: 178mm x 65mm

- RoHS-compliant
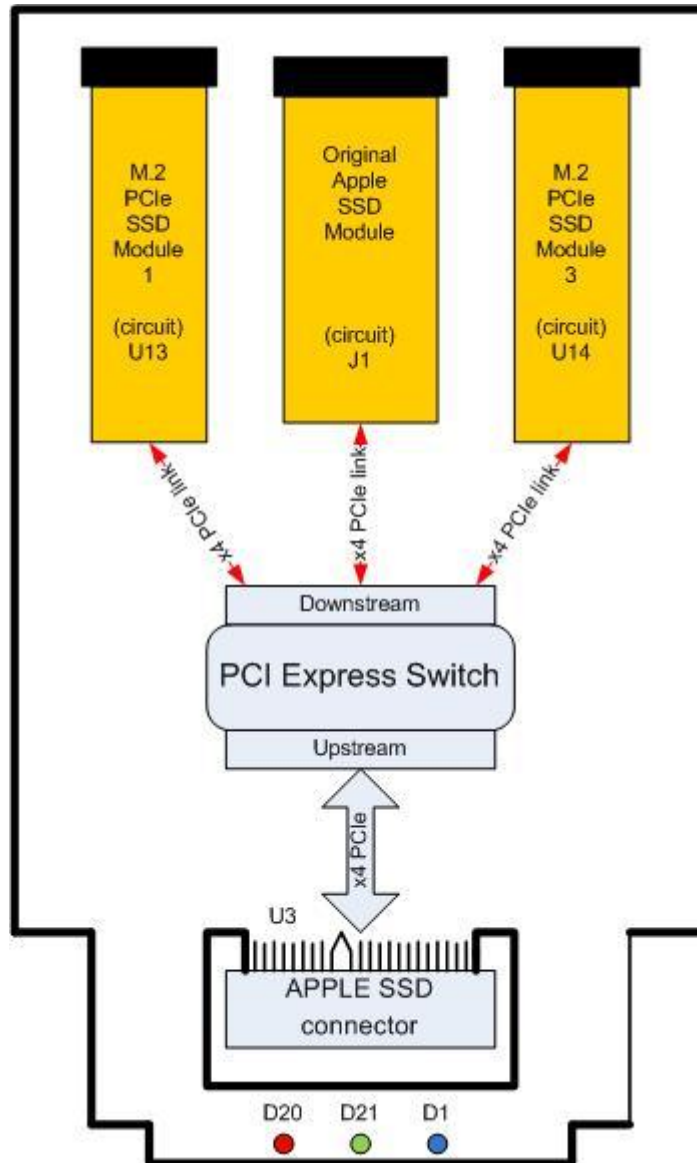
3.2 Carrier Board SSD modules connection.

Figure 4: SSD modules to Carrier Board connection diagram.

AngelShark **Internal M.2 PCIe SSD Expansion Carrier Board for Apple Mac Pro (Late 2013)**
Hardware Manual, Revision 1.0

Page 6

4 Installation

4.1 Carrier Board Installation

IMPORTANT: Unplug your Mac from electrical source.

Opening your Mac:

1) Slide the highlighted switch to the "unlock" position

2) Lift the outer casing off of the Mac, and set it aside.

AngelShark **Internal M.2 PCIe SSD Expansion Carrier Board for Apple Mac Pro (Late 2013)**
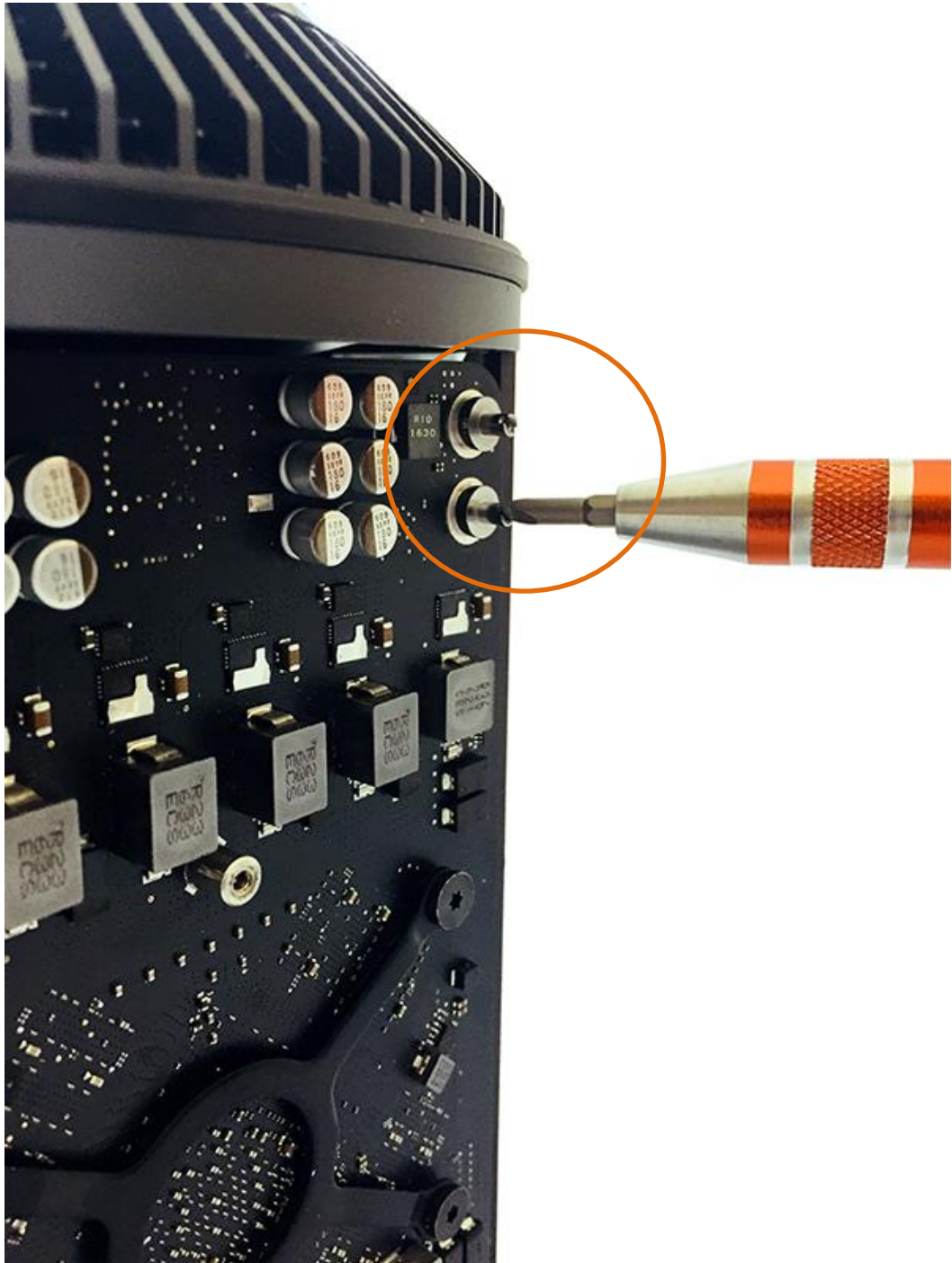**Hardware Manual, Revision 1.0**

Page 7

Removing the SSD module and power screws:

3) Use the screwdriver with Torx T8s bit (item #2) to remove the black screw that secures the Mac SSD module in place (original). Set the black screw aside.

4) Lift the black (original) Mac SSD module up, until it pops out. Set it aside.

5) Use the screwdriver with Torx T8s bit (item #2) to remove the two power screws (top-right corner). These screws are no longer required, because they will be replaced (with power standoffs items #3 & #4).

AngelShark Internal M.2 PCIe SSD Expansion Carrier Board for Apple Mac Pro (Late 2013)
Hardware Manual, Revision 1.0

6) Use the screwdriver with "Slotted" bit to **_carefully_** insert the power standoffs (item #3), as shown.

AngelShark **Internal M.2 PCIe SSD Expansion Carrier Board for Apple Mac Pro (Late 2013)**
Hardware Manual, Revision 1.0

Page 9

Mounting your desired M.2 PCIe Module(s)

7) Lay the Carrier Board (item #1) flat on your table for easier access

8) Use slots "M.2 PCIe Module" #1 and/or #3, <u>not the center slot</u>.

9) Slide your desired M.2 PCIe Module(s) directly into the carrier board's connector(s).

10) Use the screwdriver with Phillips #1 bit to insert a mounting screw (item #5), as shown, to secure each SSD module.

<u>IMPORTANT</u>: DO NOT mount the original Mac PRO SSD module in the center slot yet.
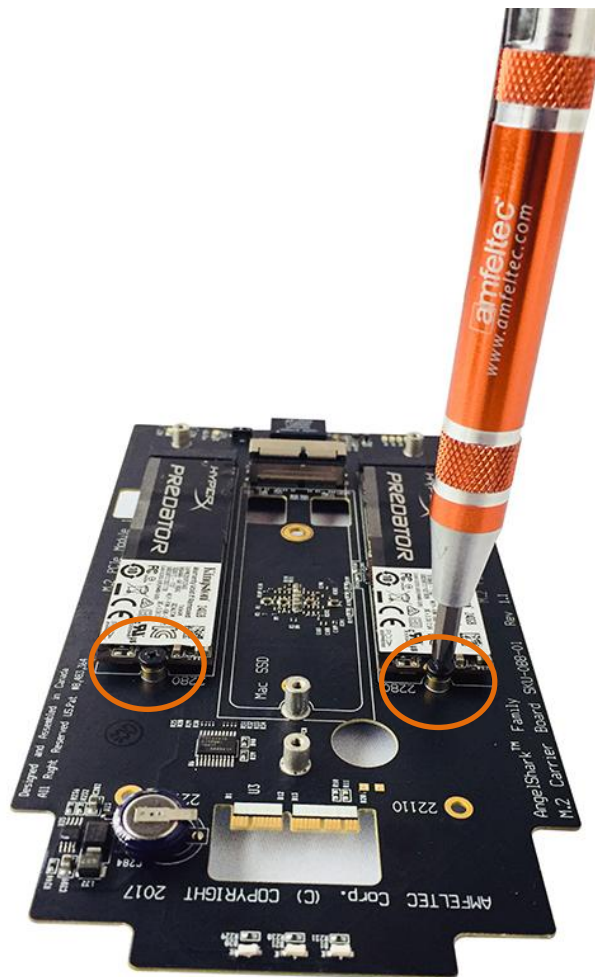
Mounting the *AngelShark* Carrier Board™

13) Carefully insert the carrier board directly into the Mac PRO PCIe slot until it pops into place, as shown.

14) Align the carrier board's yellow hole (in the center) with the appropriate Mac Pro hole, behind it.

15) Use the screwdriver with T8s bit (item #2) to insert the original black screw (which you removed in Step 3), as shown. <u>DO NOT TIGHTEN</u>.

16) Use the screwdriver with Phillips #000 bit to **_carefully_** insert the two power screws (item #4) and tighten them.

17) Tighten screw in Step 15.
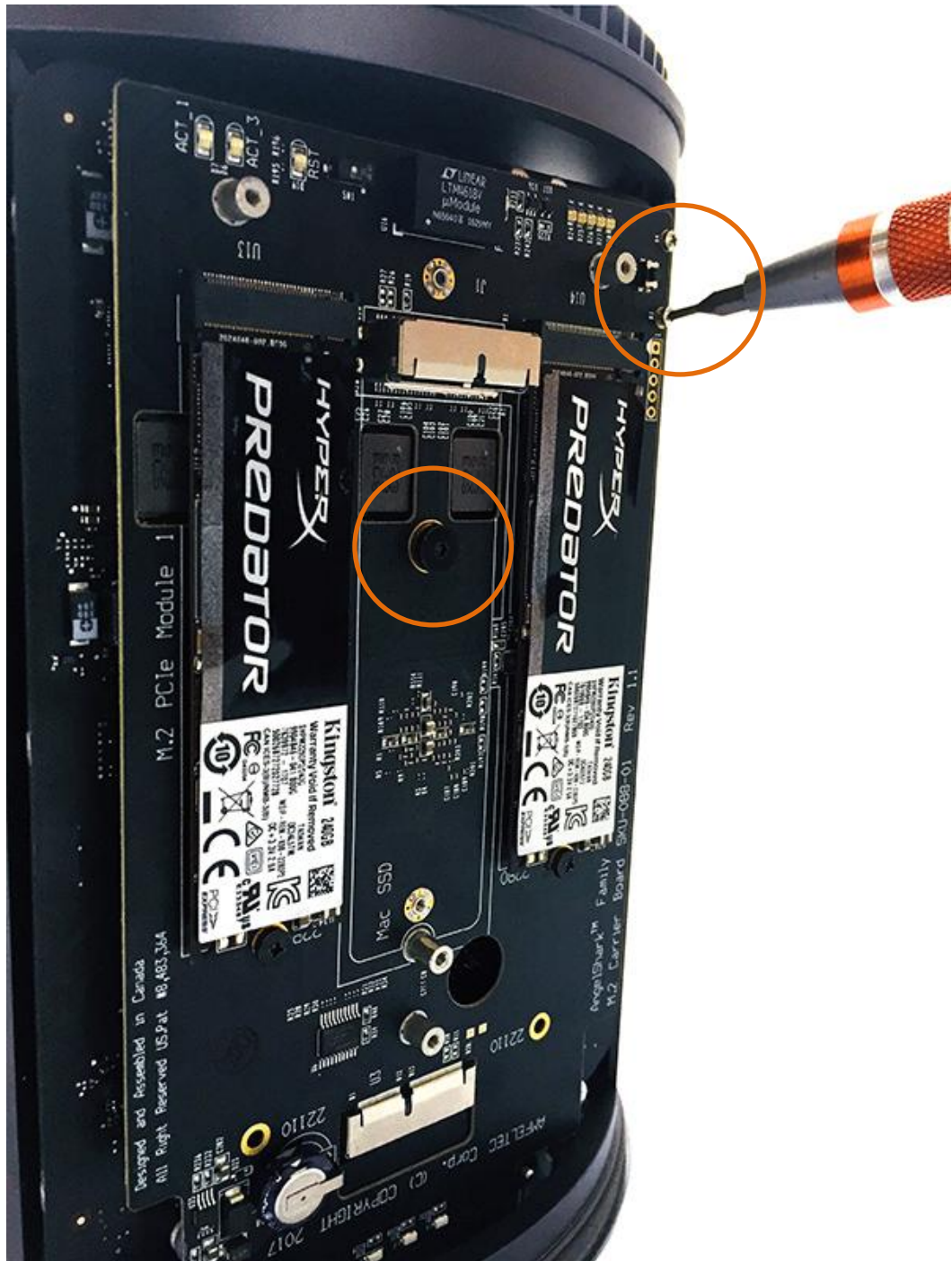
Mounting the original Mac Pro SSD Module on the carrier board's center slot.

18) Gently slide the module directly into the carrier board's center connector, until it pops into place.

19) Use screwdriver with Phillips #1 bit to insert mounting screw (item #5), as shown, to secure the module.

Attaching a heat sink (item #7) to cover the M.2 SSD Module

20) <u>IMPORTANT</u>: Remove the plastic tape to expose the adhesive side of the heat sink (item #7).

21) Take care to align the three mounting holes, as shown, when placing the heat sink on the module. Use screwdriver with Phillips #1 bit to insert three (3) mounting screws (item #5), as shown, to secure the heat sink.

Attaching a heat sink (item #6) to cover the (original) Mac SSD Module.

22) Remove the plastic tape to expose the adhesive side of the heat sink (item #6).

23) Take care to stick the heat sink as shown, in the <u>top</u> portion of the module (as shown on the picture below).

<u>IMPORTANT</u>: Ensure the ridges are vertically aligned.
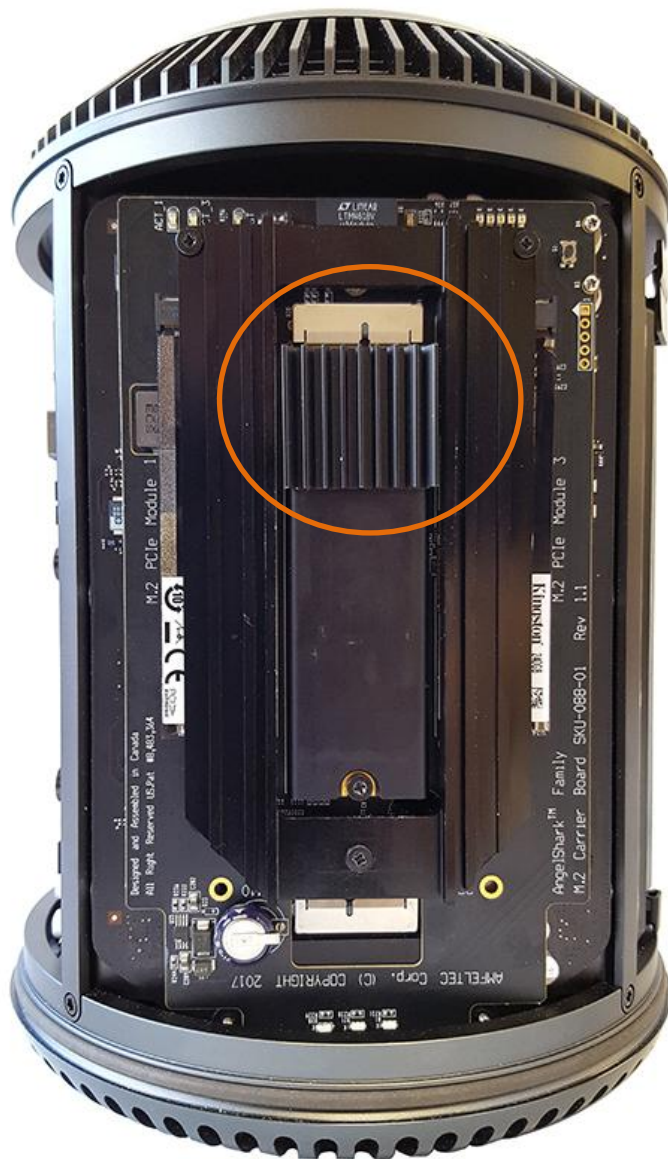
You may now carefully return the outer case into place, performing steps 1 & 2 in reverse.

You may now also connect your Mac to an electrical source and any of your peripherals, as desired, and power it on.

5 Hardware Description

5.1 LEDs

Table 1: Carrier Board LEDs

Name	Ref. Des.	Color	Usage
Status 1	D20	Red	Carrier board status indication
Status 2	D21	Green	Carrier board status indication
Status 3	D1	Blue	Carrier board status indication.

5.2 Connectors

Table 2: Carrier Board connectors

Ref. Des.	Type	Usage
U3	Connectors	Upstream male connector for connection to Mac Pro (upstream connection).
J1	Connector	For original Apple SSD module connection (Module 2)
U13	M.2 connectors (M key)	M.2 add-in module connection (Module 1)
U14	M.2 connectors (M key)	M.2 add-in module connection (Module 3)

6   Appendix A: Legal Info

Copyrights and Trademarks:

© 2017 AMFELTEC Corp. All rights reserved.
AMFELTEC is a trademark of AMFELTEC Corporation. Apple, Mac and Mac Pro are trademarks of Apple Inc., registered in the U.S. and other countries. Other marks may be the trademark or registered trademark property of their owners.

7   Appendix B: Limited Warranty

AMFELTEC Corporation does not warrant that the operation of the hardware, software or firmware products will be uninterrupted or error free. AMFELTEC products are not intended to be used as critical components in life support systems, aircraft, military systems or other systems whose failure to perform can reasonably be expected to cause significant injury to humans. AMFELTEC expressly disclaims liability for loss of profits and other consequential damages caused by the failure of any product which would cause interruption of work or loss of profits, such as shipboard or military attachment.

THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. THE WARRANTIES PROVIDED HEREIN ARE BUYER'S SOLE REMEDIES. IN NO EVENT SHALL AMFELTEC CORPORATION BE LIABLE FOR DIRECT, SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES SUFFERED OR INCURRED AS A RESULT OF THE USE OF, OR INABILITY TO USE THESE PRODUCTS. THIS LIMITATION OF LIABILITY REMAINS IN FORCE EVEN IF AMFELTEC CORPORATION IS INFORMED OF THE POSSIBILITY OF SUCH DAMAGES.