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SuperTracker II

Digital Track Display (and more!)

for 1571 CBM Disk Drives

Installation & Usage Manual

Firmware v1.1

Manual v1.3

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Last Revision: June 12, 2018

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Introduction

Thank you for purchasing the SuperTracker II. This is device will show the track (including half-track), density level, write protect status, motor status, and number of syncs on a track. This is the much more advanced version of the original SuperTracker that was first released in 1987.

Installation Requirements

Some disassembly of the disk drive is required, such as a possible metal shield. The SuperTracker II plugs into one of your disk drive's 6522 VIA sockets, with the original 6522 VIA placed on top on the SuperTracker II board. It may be required to de-solder the VIA chip and install a socket (provided). Holes for mounting the display bezel and push button switch are optional (but recommended). You could mount the display and push button externally.

NOTE: POWER TO THE DISK DRIVE MUST BE OFF WHILE INSTALLING THIS PRODUCT!

Warranty Information

This product carries a limited lifetime warranty. Units subject to improper installation, misuse, abuse, or modifications will not be covered under this warranty. We may at our discretion either repair or replace the unit covered under warranty. The customer will pay all freight charges to and from our facility. cbmstuff.com must be contacted to obtain a return authorization. Any product returned without authorization will be returned without repair or replacement.

Liability

By using this product, you agree to hold cbmstuff.com and Jim Drew free from any type of liability either directly or indirectly while using this product.

Legal Information

The 'look and feel' and functionality of this product are protected by U.S. copyright laws. Various terminology and feature names are protected under U.S. trademark laws.

SECTION 1 – INSTALLATION

The SuperTracker II can be used with a 1540, 1541, 1541-II, or 1571 disk drive. It's likely that the SuperTracker II will also work in Ocean, Accelerator, Blue Chip, and other aftermarket drives. This installation manual is for the 1571 disk drive.

1. Disk Drive Disassembly

Lay down a towel or something soft on a flat table. This will be our work area. Remove the power cord and any serial cables from your disk drive. Place the disk drive upside-down on the work area so that the screw holes are accessible. Remove the four screws and set them aside. Carefully turn the disk drive over 180 degrees and set it down. Lift off the lid and set it aside.

Remove the front LED plug from the motherboard. Remove the drive door latch by pulling it off of the metal shaft. Remove the drive face plate and set it aside.

Unplug the connector from the power supply to the motherboard. Remove the single screw holding the ground straps from the power supply to the drive mechanics. Remove the four screws that hold the power supply to the chassis. Remove the power supply and set it aside.

Carefully unplug the disk drive head from the motherboard. Do NOT pull on the wires! Unplug the three plugs from the disk drive mechanics to the motherboard. Remove the four screws that hold the mechanics to the chassis. Remove the mechanics and set it aside.

Remove the four screws that hold the motherboard to the chassis. Lift out the motherboard and set the chassis aside.

You will find seven “twist tabs” around the border of the motherboard. These tabs need to be twisted flat so that the metal bottom can be removed from the motherboard. You will find that one twist tab is soldered. The solder must be removed so that the tab can be twisted. Set aside the metal bottom (and plastic insert).

2. Locating and Removing the 6522 VIA Chip

For the 1571 disk drives, the 6522 VIA chip labeled "U4" will need to be de-soldered from the motherboard. See Figure 1 for the location.

The 6522 VIA chip you are removing will not be re-used once removed, but hang on to it in case it is needed in the future.

Use the proper de-soldering equipment to remove the 6522 VIA chip! You can easily damage the motherboard if you do not have the correct equipment! If you feel you can't do this yourself, get some who can!

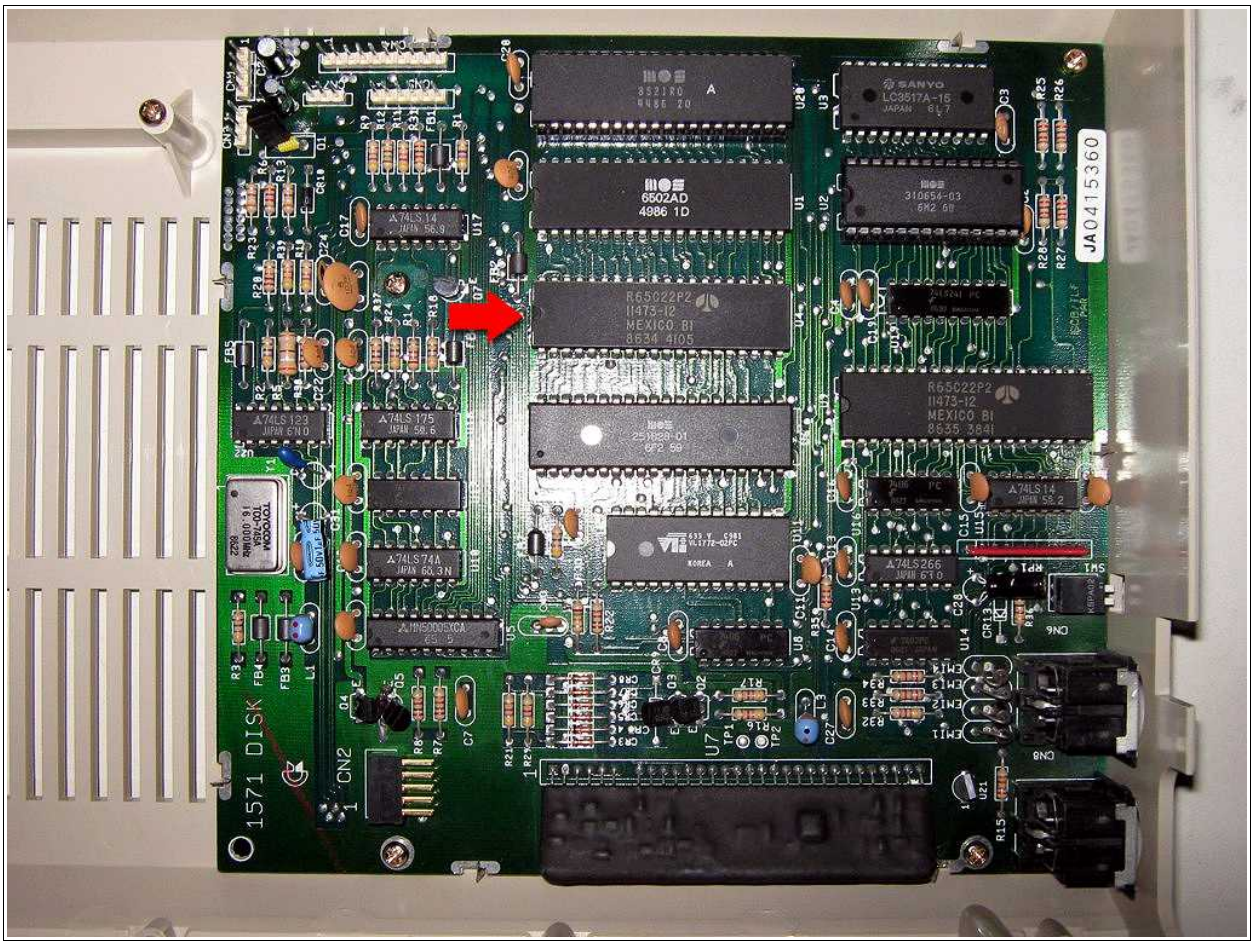

Figure 1 – 6522 VIA Location (Indicated by Arrow)

3. Installing the SuperTracker II Board

The SuperTracker II's gold pins are very fragile and can be bent easily. Care must be taken during handling. Place the SuperTracker II board into the location where the 6522 VIA chip was removed (U4). Note that the connectors on the SuperTracker II **must** be facing towards the rear of the disk drive (same end as the serial plugs) and the notch on the SuperTracker II's included 6522 VIA chip is at the same end as all other chips. See Figures 2 and 3 for details.

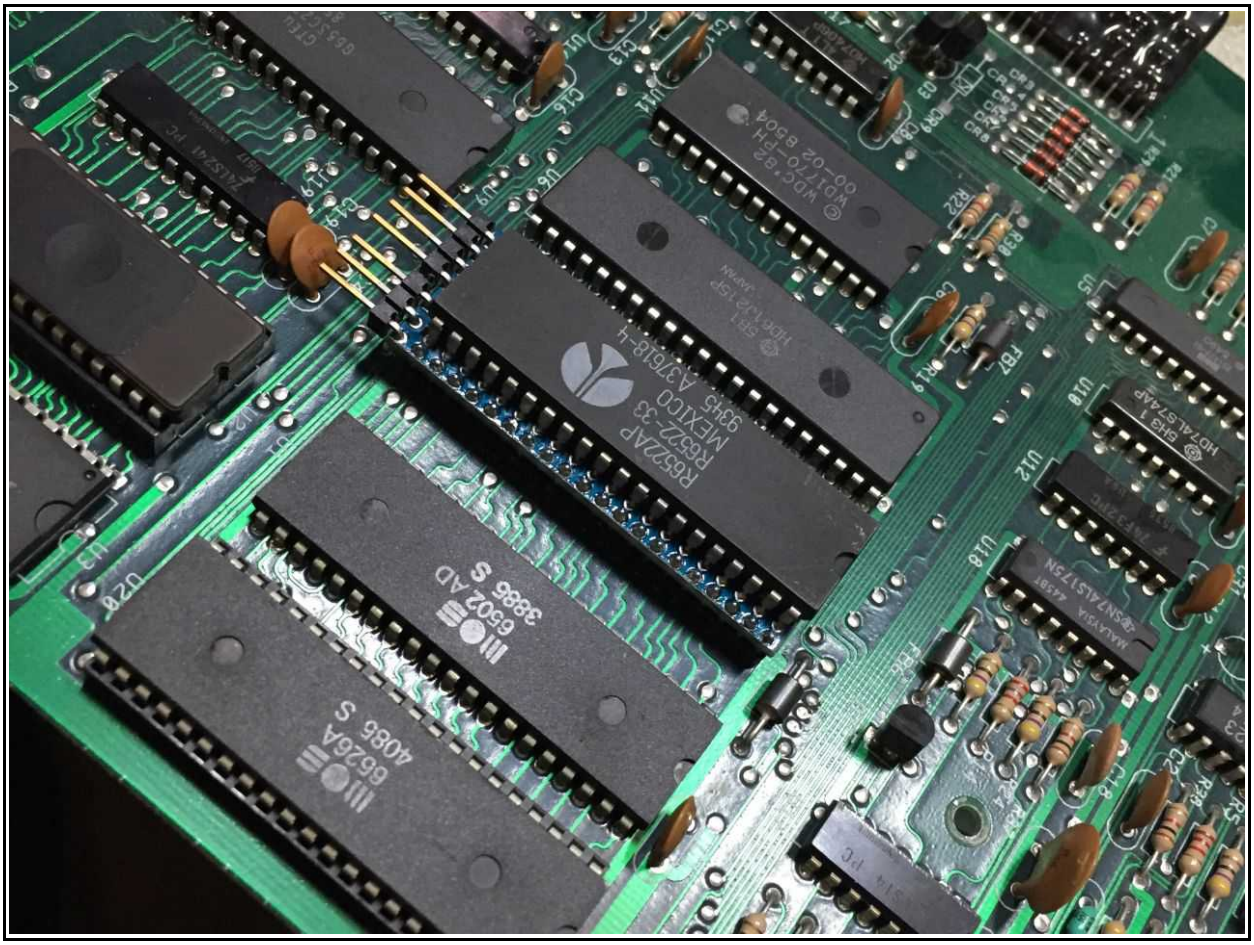

Figure 2 – SuperTracker II Board Installed in Motherboard

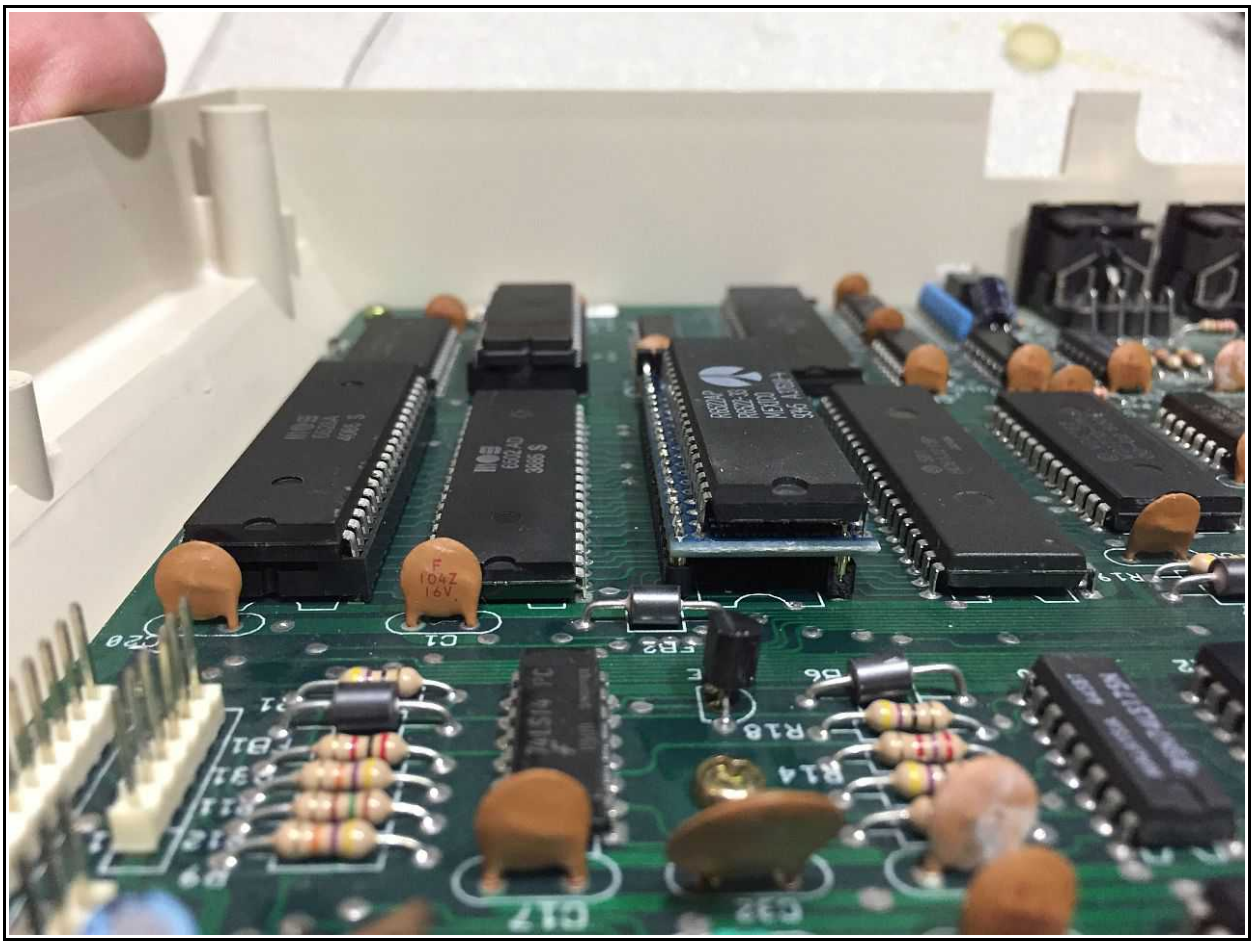

Figure 3 – SuperTracker II Board Installed in Motherboard

4. Soldering the SuperTracker II Board

Take another look at the location of the SuperTracker II board's connectors to make absolutely sure they are facing towards the serial connectors! You don't want to solder the SuperTracker II board in backwards! Once the SuperTracker II is inserted correctly into the motherboard, hold the SuperTracker II board in place, flip over the motherboard, and lay it on the flat work area. Solder two pins of the SuperTracker II board, one at each opposite corner. Flip the motherboard over and make sure that the SuperTracker II board is flush with the motherboard. Once you have confirmed that the SuperTracker II is flush, solder the remaining pins. See Figure 4 for details. Trim the extra pin length. Re-assemble the metal bottom (w/plastic insert), twisting the tabs to hold the metal bottom to the motherboard.

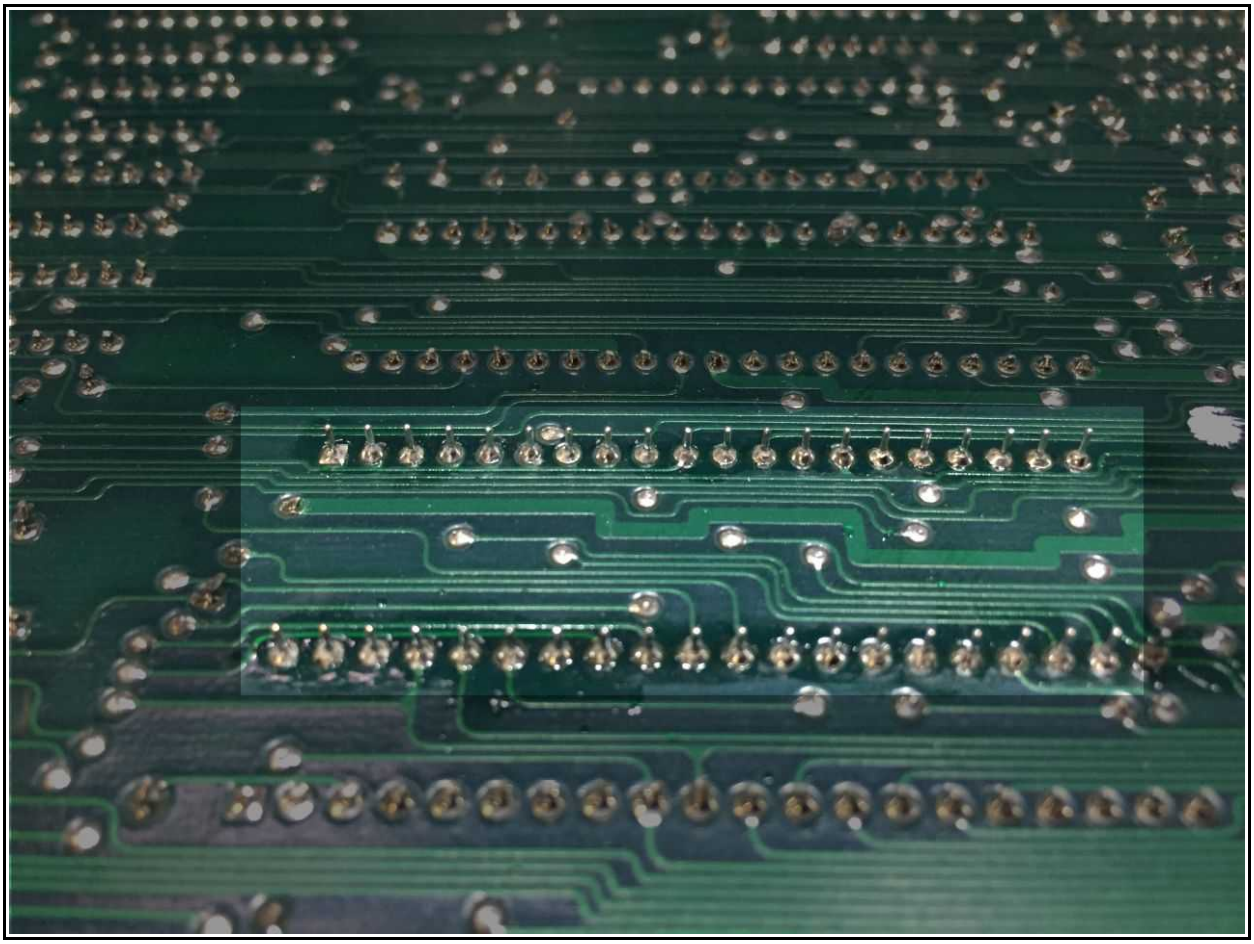

Figure 4 – SuperTracker II Board Soldered to Motherboard

Place the assembled motherboard in the chassis. Put the four screws back that hold the motherboard in place, and tighten the screws. Put the drive mechanics back onto the chassis. Plug the head connector and three remaining plugs into the motherboard. Put the four screws back that hold the mechanics to the chassis, and tighten the screws.

5. Plugging in Switch/AUX and OLED Cables

Once the SuperTracker II board is installed you will need to temporarily plug in the cables for the switch/AUX and the OLED screen. Refer to Figure 5 to determine the SuperTracker II's two connector pinouts. You will need to follow the connector pinout for proper cable connection. The switch/AUX connector pinout (from right to left) is GND, AUX, and SWITCH. The switch connection uses the outer two pins (GND and SWITCH). The center AUX pin would connect to either the drive 8/9 device jumper pad, or a ROM select line if you are using an alternate ROM set such as JiffyDOS.

The OLED connector pinout (from left to right) is VCC, GND, SCL, and SDA. The OLED screen itself is labeled with the pinout. Make sure that the cable you are using has the matching set of pins for the SuperTracker II's connector and the OLED's connector. Cable coloring doesn't matter. The connection from SuperTracker II to the OLED does!

Drape the OLED screen and switch/AUX outside of the disk drive so that they do not touch the disk drive mechanics.

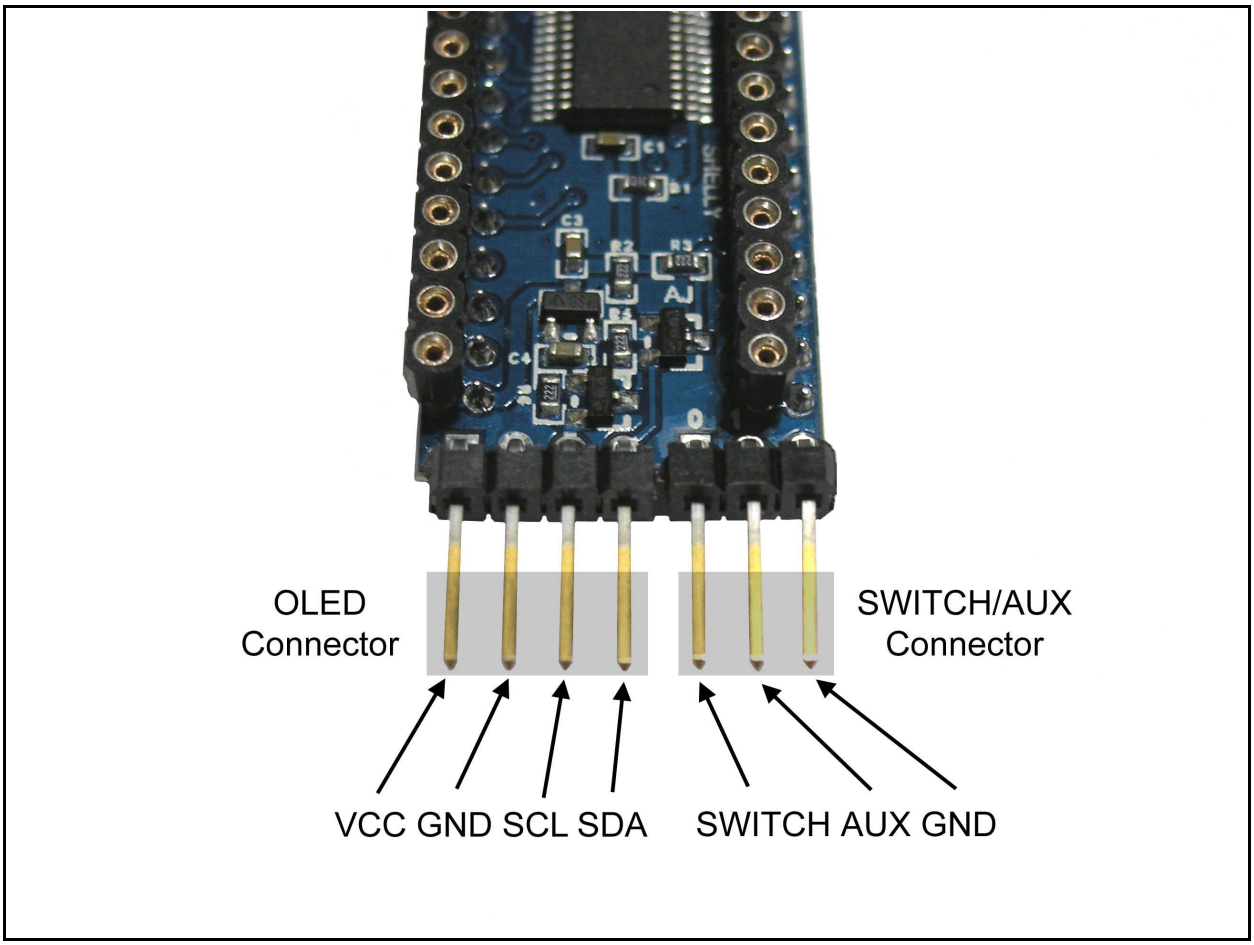

Figure 5 – SuperTracker II Connector Pinouts

6. Quick Test Procedure

Once the cables are plugged into the proper positions, you can do a quick test to make sure that everything is installed correctly. Place the power supply back in its original location and plug the power supply connector into the motherboard. You can not damage the motherboard by accidentally plugging the power supply connector in backwards, but it won't power up if you do! Note: Figure 18 shows the proper connector direction.

Attach the power cable to the power supply. Turn on the power to the drive. The disk drive should power up. If the installation was done correctly, the OLED screen will show information. If the display is blank, power off the drive and check the installation! You could have the power supply connector backwards. Check to make sure that you have the OLED cable attached correctly. Typical causes for this problem are the one end of the cable being reversed or the cable plugged in one pin off.

If the SuperTracker II passes the quick test then you are ready to mount the OLED screen and switch.

Leave the drive setup as it is. You will need to have the OLED screen working for determining the exact amount of material that needs to be removed from the face plate.

SECTION 2 – INSTALLING THE OLED SCREEN AND SWITCH

1. Preparing the Plastic Face Plate

For the 1571 there is really only one location for mounting the OLED, and that is in the plastic face plate just below "POWER and DRIVE". A hole will be cut just below these words.

Get the face plate and hold it so you can see the LED board. Remove the two screws that hold the LED board in place, and set the LED board aside.

Note: you will have to disconnect the OLED from the cable to test fit it during the plastic removal process.

You will need to use small side cutters and a hobby knife (Xacto or similar) to remove various parts of the plastic from the face plate. This includes part of the bottom rails, the edge just below the LED holes, and the LED board post. A Dremel tool can also be helpful doing this. See Figures 6, 7, and 8 for details.

Get the OLED screen and **carefully** clip the center of the mounting holes as shown in Figure 9. **DO NOT cut the amber colored flexible circuit board!** Test fit the OLED inside of the plastic face plate. See Figure 10 for details.

Plug the OLED screen back into the harness.

Figure 6 – Rail Plastic Removal

Figure 7 – LED Post Removed

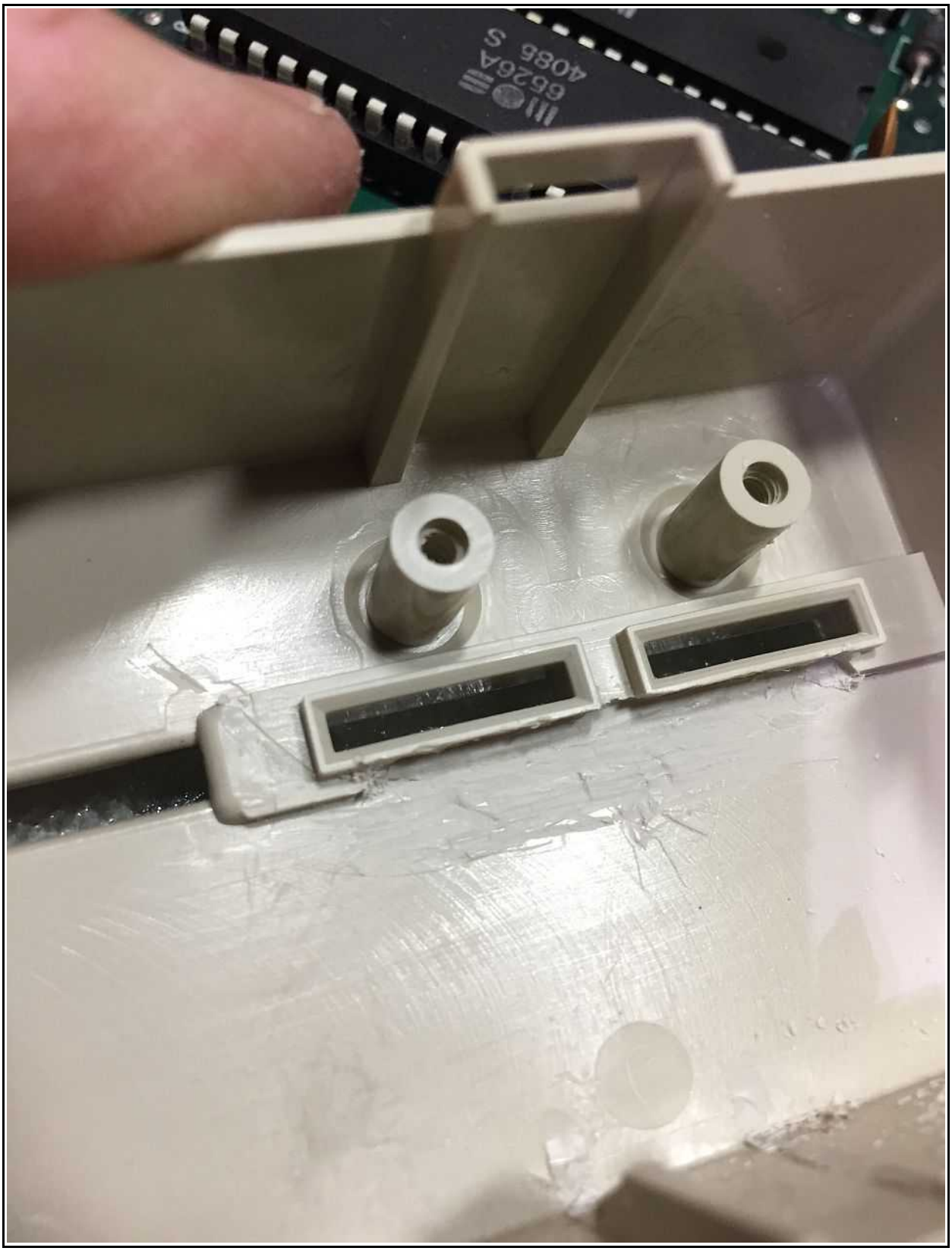

Figure 8 – Top Edge Removed

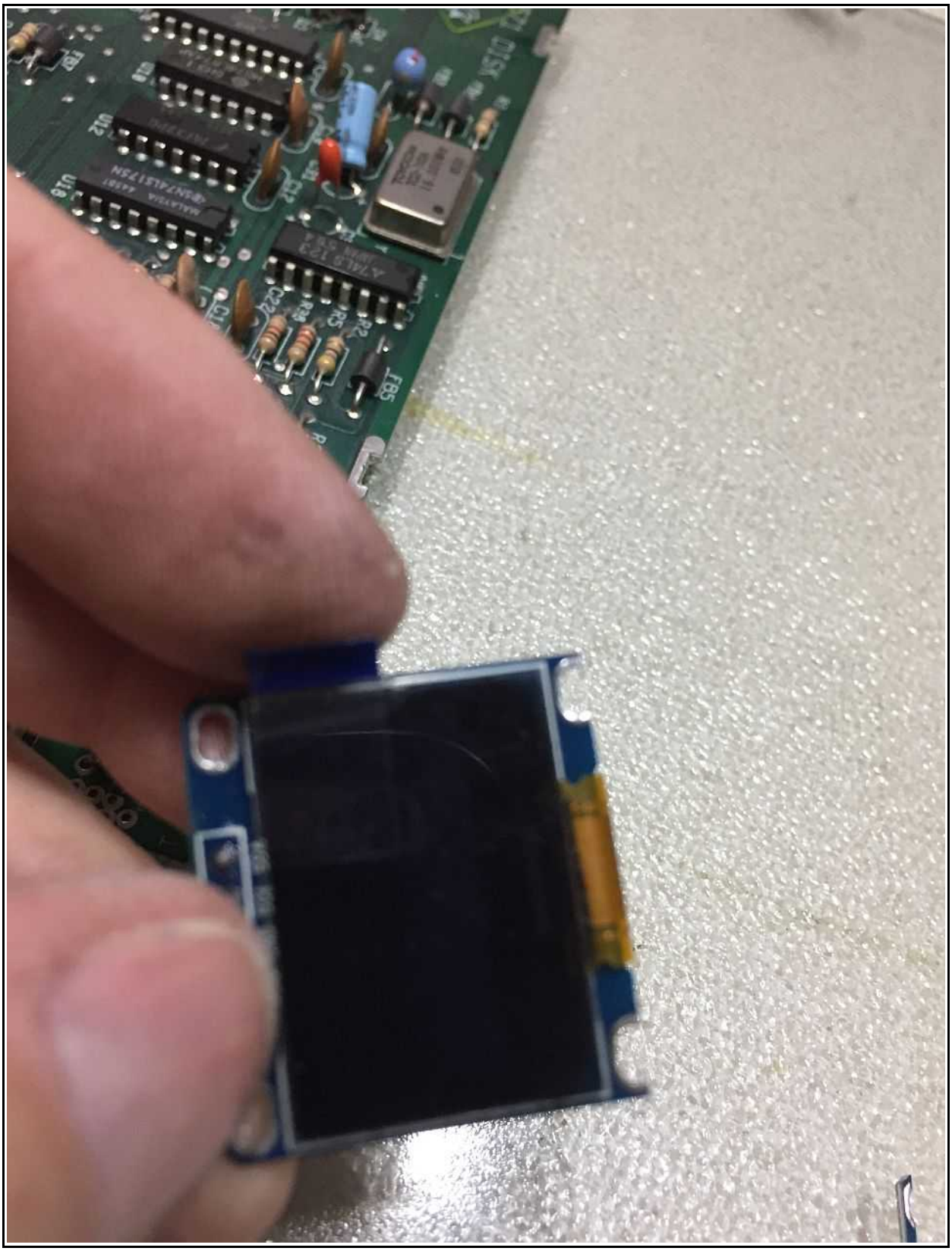

Figure 9 – Clip Center of OLED Mounting Holes

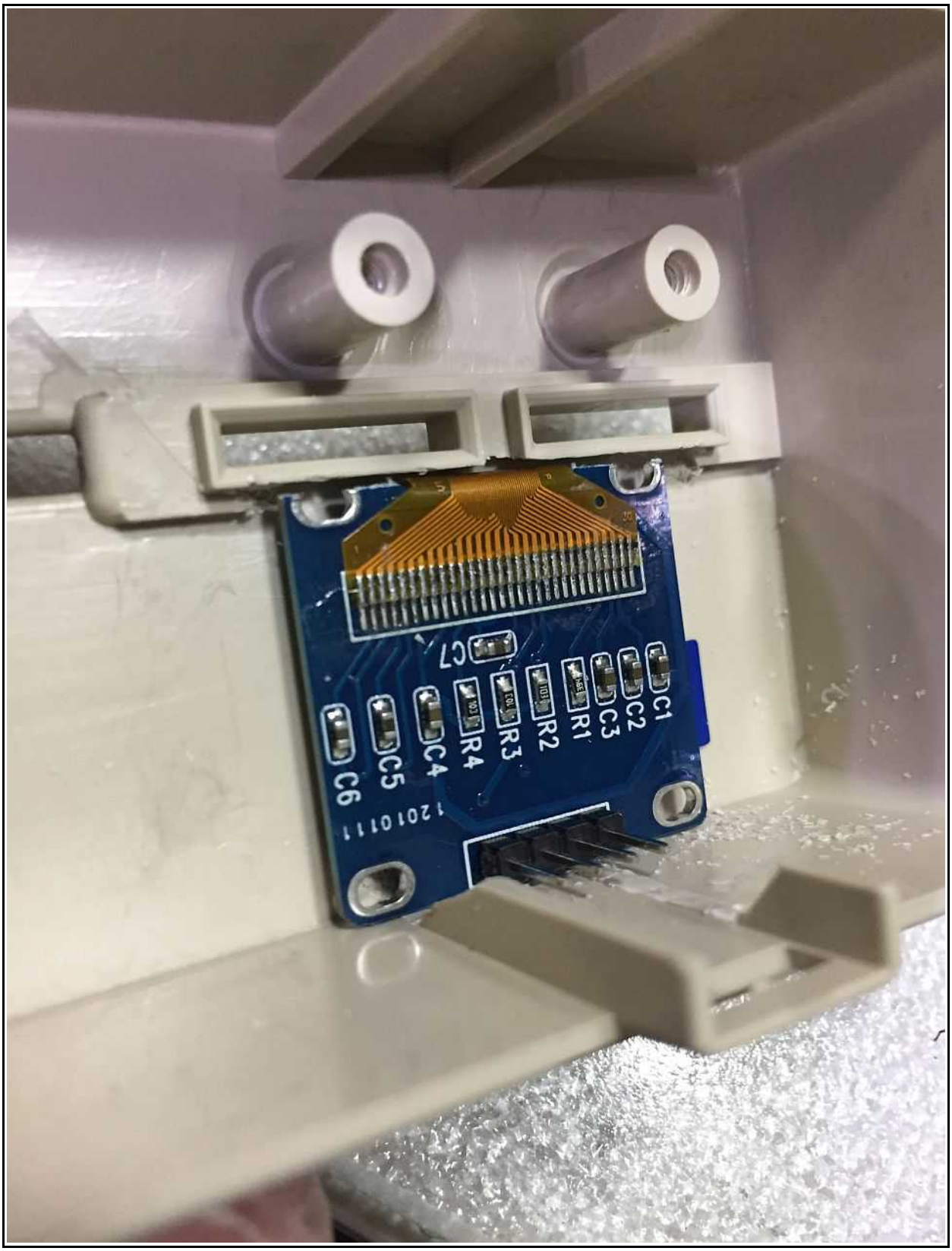

Figure 10 – Test Fit OLED After Plastic Modifications

2. OLED Bezel Installation

Use the included OLED bezel and mark the inside area of the bezel as a guide of where to the cut the bezel hole. See Figures 11 and 12 for details.

Once you have marked the location to cut, use a 1/4” drill bit to drill several overlapping holes and then use a file to shape the hole. Don't take too much material! See Figure 13.

Turn on the drive so you can see the OLED information. Go to the menu and select the **Flip Display** option (see section 3 for usage details). After flipping the display, select the **Screen Align** option. This will fill every pixel in the display. You can use this as a reference when removing material to install the bezel. Since you can not shift the display up or down (only left and right), it is critical that you frequently check the visible display through the hole while removing material! You want to remove the proper amount of material so the bezel is centered top to bottom in the OLED's visible area. Left to right centering can be done by simply moving the OLED.

See Figure 14 for a finished bezel installation (with the normal display info showing).

Once the OLED bezel has been installed you can then mount the OLED screen. You will need to use a rubber or silicon based glue (like “ShoeGoo”) to hold the display in place. Hot glue would also likely work. See Figure 15 for mounting details

Figure 11 – Use OLED Bezel as Template For Marking

Figure 12 – Marking Made Using OLED Bezel

Figure 13 – Rough Cut Hole

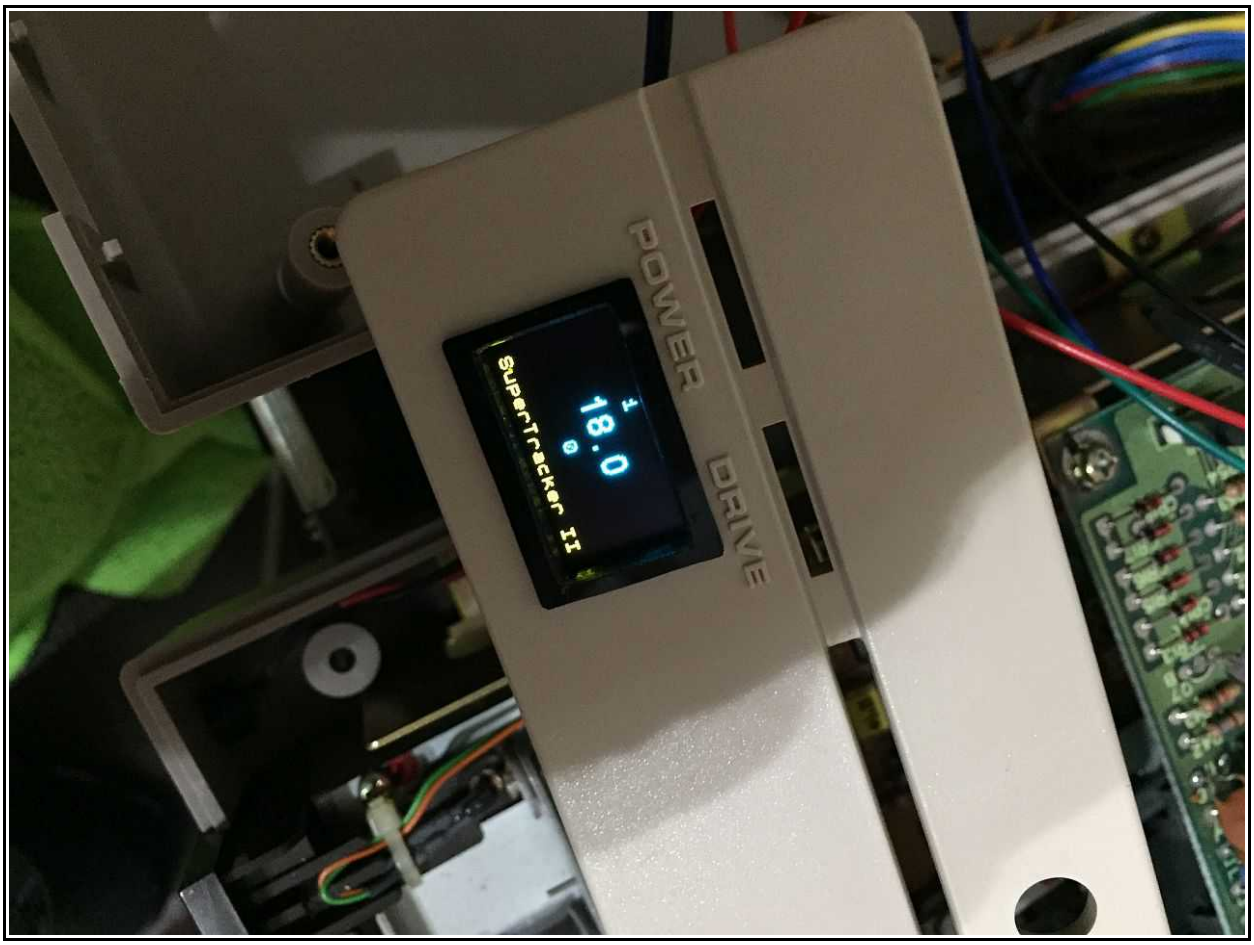

Figure 14 – Finished Bezel Installation

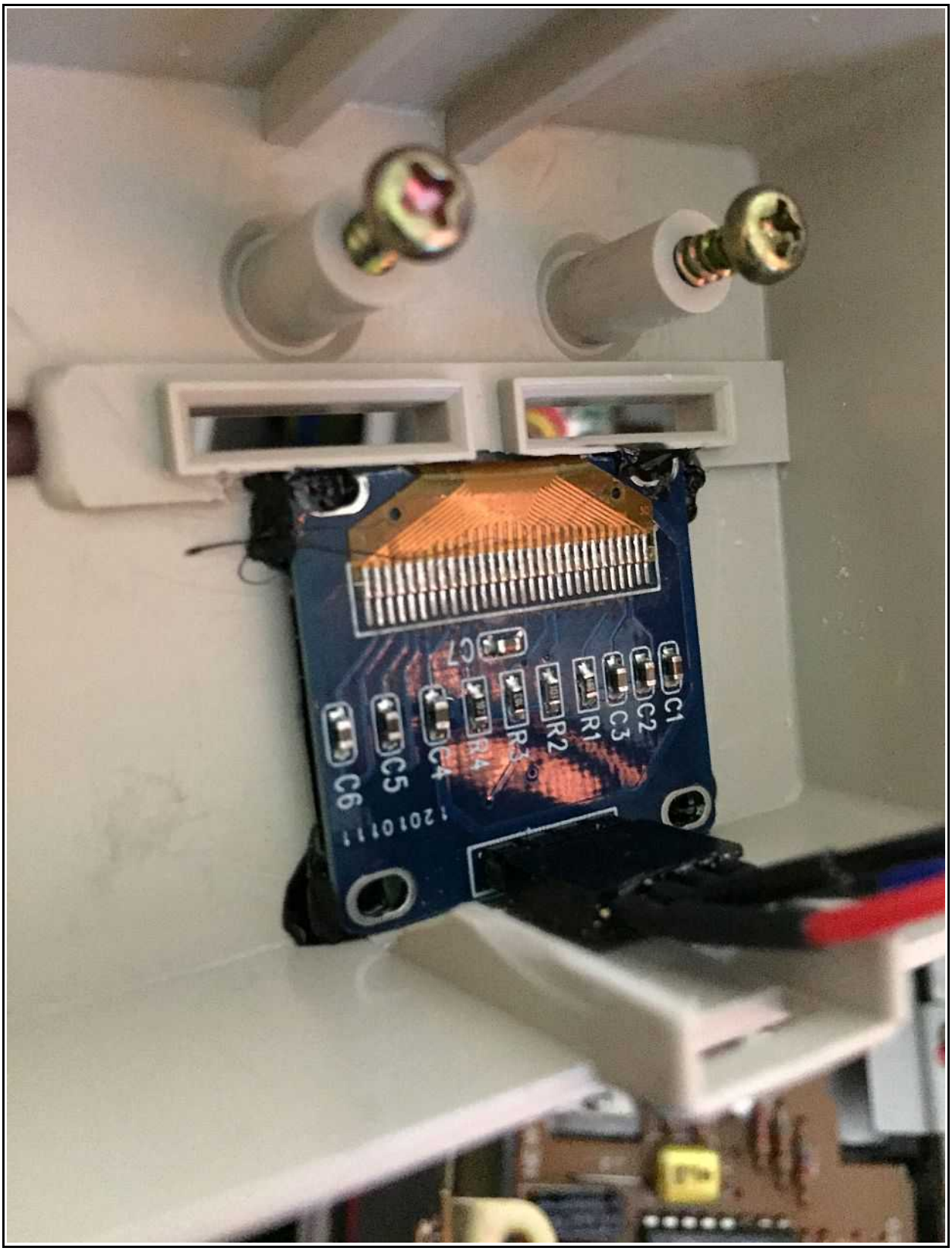

Figure 15 – OLED Glued in Place With "ShoeGoo"

3. Mounting the Switch

There are two switch options. One is standard size switch that uses a .25" mounting hole, and the other is a micro-switch that uses a .20" mounting hole.

The location of the switch is entirely up to you. Some may want the switch hidden away on the back side of the disk drive, while others may want the switch to be conveniently located on the front of the drive.

Use a 3/16 drill bit to drill the mounting hole for the micro-switch. Use a 1/4" drill bit be to drill the mounting hole for the standard size switch.

Mount the switch using the same glue that you used for the OLED screen. See Figure 16 for the recommended switch location.

Get the LED board and re-install it using the two screws. See Figure 17 for details. This completes the OLED and switch installation.

Unplug the power supply connector from the motherboard, remove the power supply, and set it aside.

Put the face plate on the drive and insert the disk door handle to hold it in place. Connect the OLED and switch harnesses to the SuperTracker II board, routing the cables under the drive mechanics as shown in Figure 18.

Figure 16 – Recommended Location for Switch

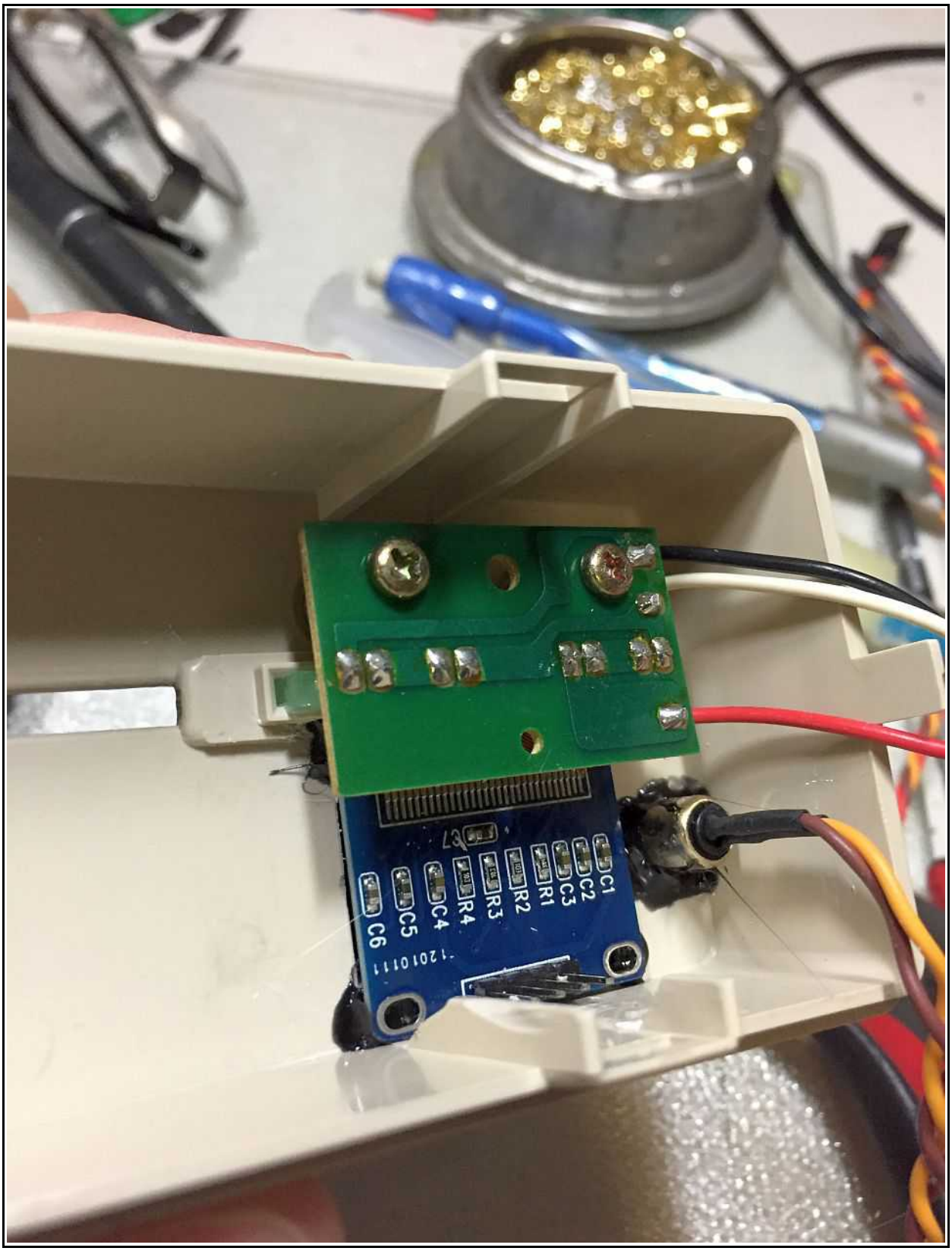

Figure 17 – OLED Installation Complete

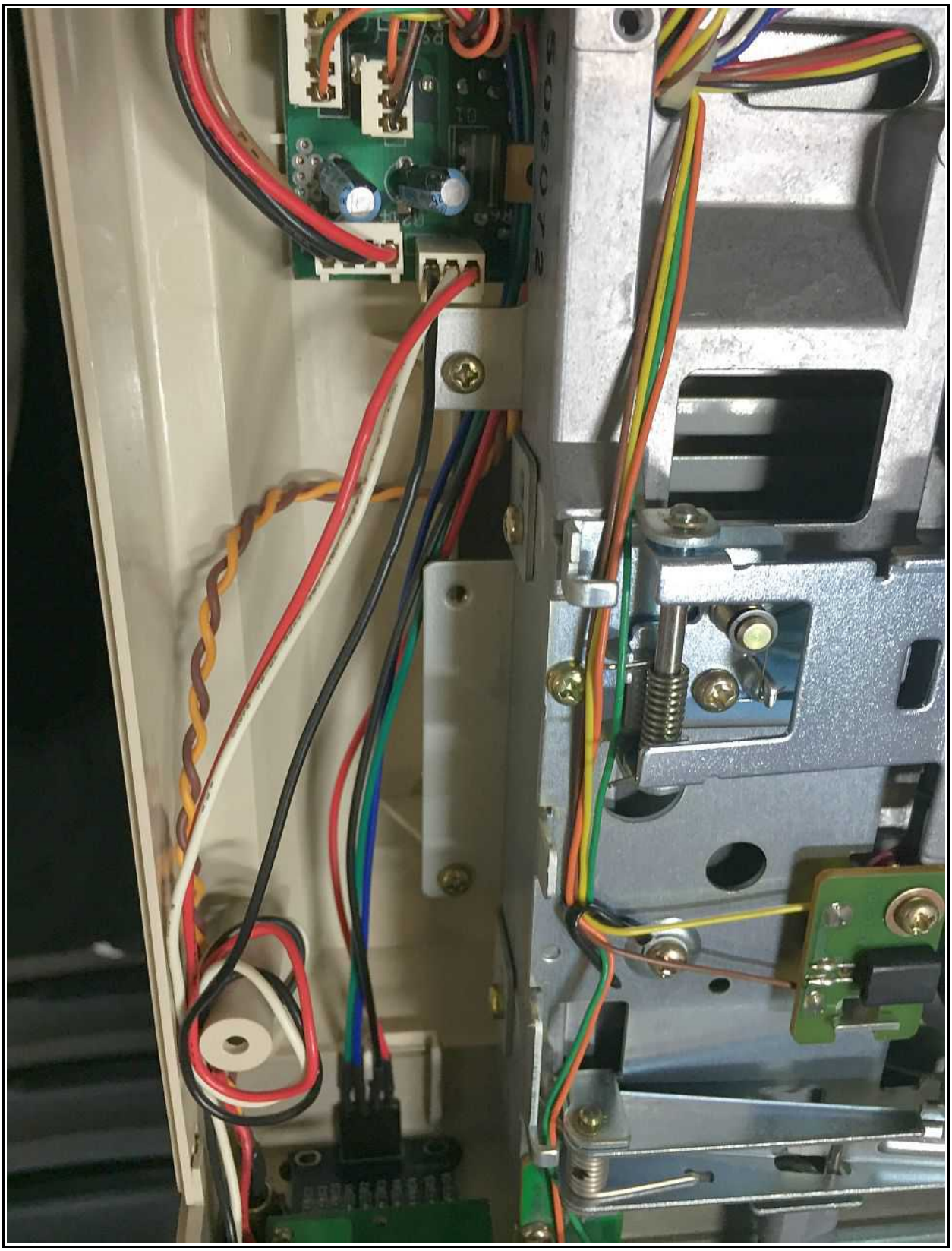

Figure 18 – OLED and Switch Harness Routing

3. AUX Output

The middle pin/wire on the Switch/AUX connector can be driven either "high" (+5v) or "low" (ground), via the menu. See Section 3 for details.

If you have a drive ROM (or EPROM) that has selection capabilities using a toggle switch (common for JiffyDOS), you can connect the AUX output to the bank select input on the ROM/EPROM to control which half of the ROM code is used.

For this example, a M27512 (32K) EPROM was burned with the stock 1571 ROM in the first half of the EPROM and the 1571 JiffyDOS ROM was burned in the second half of the EPROM. A M27512 EPROM uses pin 1 as the select line for the two halves. This makes installation very convenient as the wire length from the SuperTracker II to pin 1 of the EPROM is very short. Pin 1 of the EPROM was bent out to the side so that when the EPROM is put into the socket, pin 1 does not go into the socket. The AUX wire is soldered directly to pin 1 of the EPROM. See Figure 19 for details. If you do not use the AUX output, it is recommended that you neatly wind the AUX wire and place it next to the SuperTracker II board as shown in Figure 20.

Once you have connected the AUX output to where you want it, you can re-assemble the disk drive. The installation is complete!

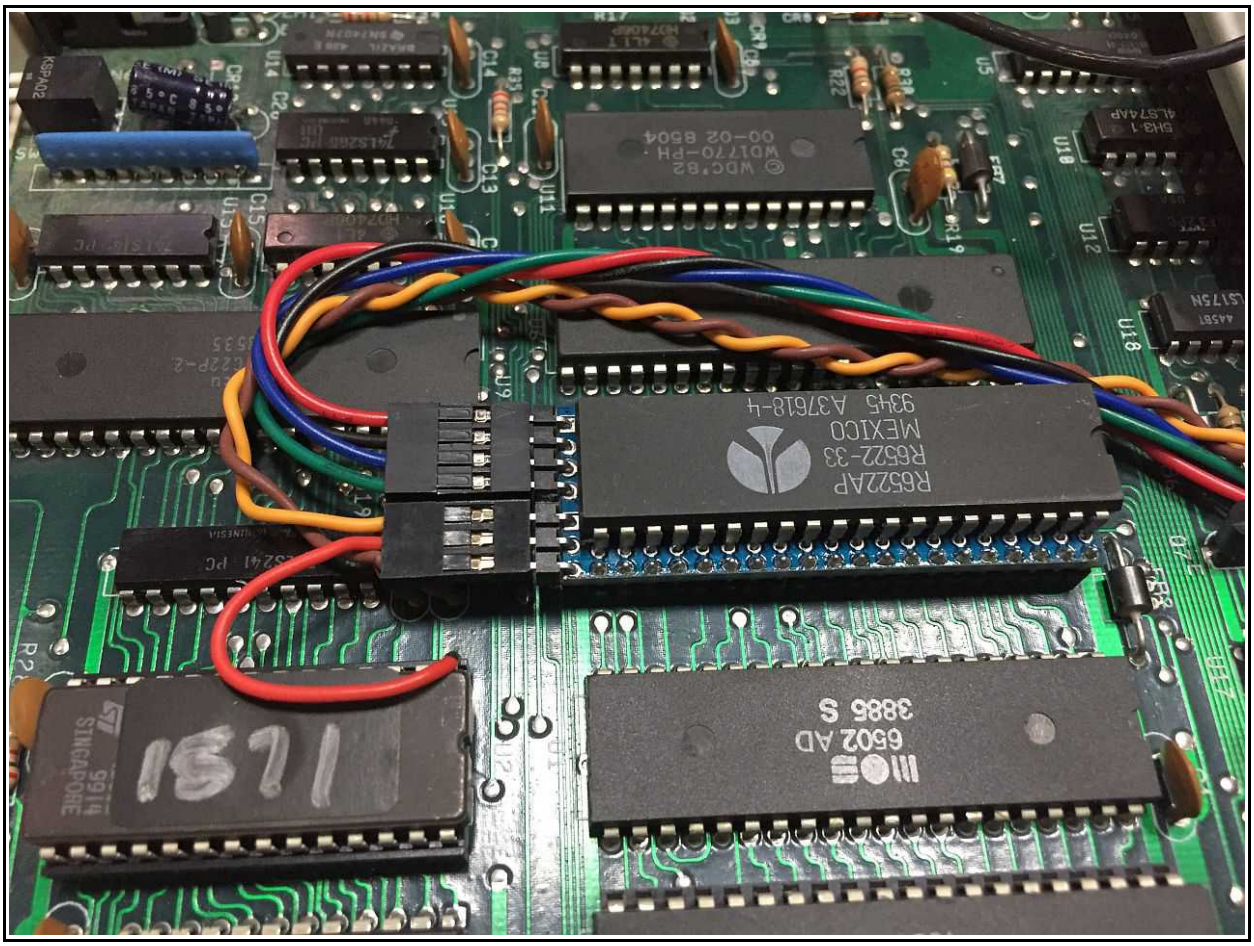

Figure 19 – AUX Connection for ROM Selection

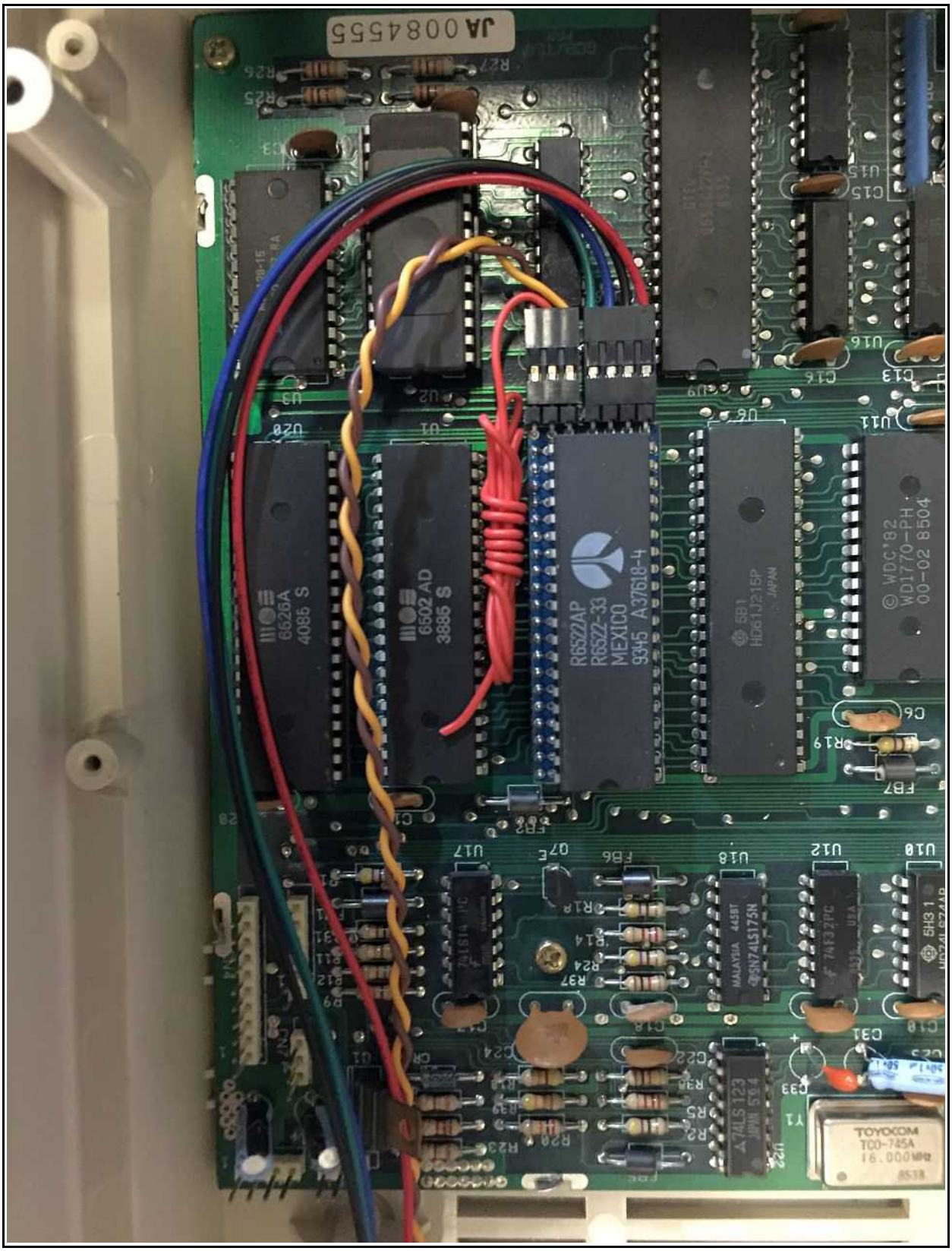

Figure 20– AUX Connection Unused

Installation Complete!

SECTION 3 – USAGE

1. Introduction

The Commodore 1571 disk drives do not have ability to provide a reference point for any particular track using a hardware means. In order for the SuperTracker II to know where the disk drive's head is, it must be first set to a known location. The directory track on all Commodore drives is track 18. If you load a directory using LOAD"$",8 the head will step to track 18. You can also step the head to track 18 using the DOS "initialize" command:

OPEN15,x,15,"I":CLOSE15

'x' = the device number, which would be device 8 for a stock disk drive.

Using JiffyDOS, you can use @$ to view the directory or the @I command to initialize the disk drive.

Once the head is on track 18, briefly pressing and releasing the switch will cause the track display to reset to track 18.0. From this point, the SuperTracker II's track display will follow the head stepping. You need to do this procedure after first powering up the drive or when the drive is reset. You typically do not need to do this procedure after changing disks.

If you press and HOLD the switch, the text that displays "SuperTracker II" will change to **RESET**, then to **Record**, and then to **Playback**. If you continue to HOLD the switch longer, the menu will appear.

If you immediately release the switch while **RESET**, **Record**, or **Playback** is shown, then that function will be done.

If you press and HOLD the switch until you see **RESET** and then immediately release the switch, the drive will reset.

If you press and HOLD the switch until you see **Record** and then immediately release the switch, the record mode will be started.

If you press and HOLD the switch until you see **Playback** and then immediately release the switch, the playback mode will be started.

2. OLED Screen Information

The OLED screen shows the following information: *track number (including half-track)*, *density level, drive motor status, write-protect status*, and *number of syncs* on the current track.

The *track and half-track* is the position of the head on the disk. Commodore disk drives normally use tracks 1 to 35, but some copy protections and extended DOS systems use up to track 42. However, most disk drive mechanics can not physically move the head beyond track 40 without the head being jammed due to nothing stopping the head from moving too far.

The *density level* can be 1 to 4, representing one of the possible four density levels that the disk drive's data separator hardware can use for clocking in the bits of data from the disk. Many copy-protection schemes will use non-standard density levels for tracks.

Commodore DOS uses the following density levels for regions of the disk:

Tracks	Density Level	Number of Sectors
1 – 17	1	21
18 - 24	2	19
25 - 30	3	18
31 - 35	4	17

The *drive motor status* is an important feature because custom DOS loaders will often times turn off the red activity LED, so you may not know that the drive motor is actually turned on. 'MTR' is displayed when the motor is running. The MTR text will be briefly reversed (blue background with black text) when the drive motor is on and spinning up to speed. When the drive motor has been spinning long enough to reliably read or write data, MTR is shown as normal text (black background with blue text).

If you see the MTR text constantly showing as reversed it means that the loader code is deliberately turning off and on the drive motor. Some loaders and copy-protection schemes do this.

The *write-protect status* shows WP any time the write-protect sensor's optical beam is broken. This can occur when a disk is write-protected, and occurs while a disk is being inserted or removed.

The *number of syncs* is the number of sync marks that appear on the track. With Commodore DOS, there are two sync marks for every sector. So, for track 18, which has 19 sectors, the number of syncs would normally be 38. A sync mark is a series of 10 or more 1 bits in a row. Commodore DOS uses a series of 40 bits (1's) in a row for each sync mark. Many copy-protection schemes use a different number of sync marks on a track.

3. Record Mode

One special feature of the SuperTracker II is its ability to record and playback up to 1500 changes of the track, motor state, density, and number of syncs.

To start the **Record** function, press and HOLD the switch until **Record** appears, and immediately release the switch. You will see **Recording...** with a counter number.
That counter is the number of changes that have occurred while in record mode. There will be a flashing square while in record mode to let you know it is recording data.

If you briefly press and release the switch while in record mode, the counter will be reset to 0.

If you press and HOLD the switch, the record mode will be terminated. At that point the SuperTracker II can be put into playback mode if you want to view all of the changes.

4. Playback Mode

To start the **Playback** function, press and HOLD the switch until **Playback** appears, and immediately release the switch. You will see **Playback...** with a counter number. That counter is the current step in the sequence of changes that occurred during the recording.

There will be a right-arrow symbol while in playback mode to let you know recorded data is being played back.

Briefly pressing and releasing the switch while in playback mode will advance the step by one, and the display will be updated with the next change. When all steps have occurred a warning message will be shown and the counter will reset back to 0 and start the playback over.

If you press and HOLD the switch, the playback mode will be terminated.

5. Menu Options

There are five menu options. Briefly pressing and releasing the switch will advance to the next menu item. If you press and HOLD the switch while a menu item is highlighted, then that function will be executed.

The first menu item is **Set AUX**, which will allow you to set the what output level is on the AUX output line. Press and HOLD the switch until a second menu appears with the options to set the AUX output LOW or HIGH. Select which output level you want by briefly pressing and releasing the switch to toggle between the two options, and then press and HOLD the switch to select that option. The main menu will re-appear after choosing one of the two options.

The second menu item is **Flip Display**, which will let you invert the display 180 degrees. This may be necessary depending on how you intend to install the OLED screen. With example mounting given in this manual, the display had to be inverted.

The third menu item is **Screen Align**, which will fill the entire display with color so that you can use the viewable display area as a reference when aligning the OLED screen with the bezel. Press and HOLD the switch until all of pixels are filled in and then release the switch. Press and HOLD the switch to exit back to the menu.

The fourth menu item is **Info**, which will show you the firmware version number and copyright information. Press and HOLD the switch to view the Info. Press and HOLD the switch to exit back to the menu.

The last menu item is **Exit Menu**, which will return the SuperTracker II to it's normal display. Press and HOLD the switch to exit the menu.

SECTION 4 – FAQ

Q: What is the difference between the "Kit" and "Plug-n-play" versions?
A: The Kit version requires that you solder one end of the OLED connector and solder the switch to the switch/AUX cable. Both versions require soldering if you want to use the AUX output to set the device number or be able to select a ROM.

Q: Can the SuperTracker II be installed in a 1581 disk drive?
A: No, this design only works with the 5.25" Commodore disk drives.

Q: Can the SuperTracker II be installed in a Indus GT disk drive?
A: Yes, but there is already a track display!

Q: Can the SuperTracker II be installed in a MSD-1 or MSD-2 disk drive?
A: No, these drives are not supported.

Q: Can the SuperTracker II be installed in an Accelerator or Ocean disk drive?
A: Yes, but these drives are small so the OLED and switch would have to be mounted externally.

Q: Can the SuperTracker II be installed in a Blue Chip disk drive?
A: Yes.

Q: Can the SuperTracker II be installed in a 1541-II disk drive?
A: Yes, but the 1571 version is required and the OLED screen has to be external.

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