

6-digit / 7-digit LED displays



“UNO” SINGLE-BOARD MODEL

ASSEMBLY & USAGE

Pinitech

PINBALL INSPIRED TECHNOLOGY

Thank you for your purchase! Awesome people like you help to support new projects and new innovations. So thank you very much for your patronage! =)

Now for a bit of disclaimer that must accompany DIY Kit instructions so Mr. Bill doesn't go soldering on his wife's dining room table and end up sleeping in the dog house..

DISCLAIMER

Due to the nature of DIY Kits & wide range of technical abilities by the people that may be performing the upgrades, PINITECH LLC cannot be held responsible for any damages or injury that may result from assembly or usage of the kit/displays. Failure to follow instructions may cause damage to your display(s) or machine. Please follow the instructions carefully.

Careless use of soldering tools, incorrect or poorly executed assembly of circuit boards or misuse of the information herein could result in material damages, losses, personal injury, property damage or death.

By choosing to proceed with building a DIY Kit, YOU assume any and all risk including but not limited to the risks mentioned above.

SOLDERING / DESOLDERING TUTORIALS

Consider yourself an expert or maybe you're a beginner? Either way, why not take a few minutes of your time to brush up on some proper soldering techniques?

- **Adafruit Guide To Excellent Soldering**
<http://www.pinitech.com/docs/excellent soldering.pdf>



CAUTION!

Use care when soldering and desoldering as the solder & the tool(s) are extremely hot and can produce serious burns. Solder melts at around 400-600 degrees Fahrenheit (200-300 degrees Celsius). Make sure you use an appropriate work surface since hot solder could damage some surfaces or other materials.

- **Use an appropriate work surface since solder could damage some surfaces or other materials.**
- **Use of eye protection is recommended during any soldering or desoldering.**

We are not responsible for damage or injury as a result of assembling this kit.

KIT CONTENTS

QTY 1X DISPLAY	QTY FULL SET	DESCRIPTION
1	5	UNO Display PCB
6 (6-digit) 7 (7-digit)	30 (6-digit) 34 (7-digit)	7-segment LED Digits
1	5	10-position Male 0.156 Header (with locking tab)
1	5	9-position Male 0.156 Header (with locking tab)
1	5	2-position Male 0.1 Header (for comma enable)
1	5	Jumper Block / Shunt (for comma enable)
1	5	1K ohm Potentiometer / trimpot
1	5	330 ohm Resistor [orange-orange-brown]
7	35	20K ohm Resistor [red-black-orange]
8	40	150 ohm Resistor [brown-green-brown] -or- 100 ohm Resistor [brown-black-brown]
1	5	10uf 16v Tantalum Capacitor (marked 10uf / 106) **WARNING: POLARITY SENSITIVE**
1	5	220uf 25v Electrolytic Capacitor **WARNING: POLARITY SENSITIVE**
2	10	0.01uf Ceramic Capacitor (marked 103) or 0.1uf ceramic capacitor (marked 104)
2	10	1N4148 Diode
1	5	SO-223 SMD Voltage Regulator (marked "1117")
1	5	Digit Driver (marked on top with "U2" or GOLD LINE)
1	5	Segment Driver (marked on top with a "U1" or SILVER LINE)
1	5	4543 BCD Decoder
4	20	Nylon Spacers
1	5	Color Filter Of Your Choice (WHITE DIGIT KITS ONLY)
--	2	Double-Sided Tape Strip (WHITE DIGIT KITS ONLY)

While we do our best to verify kit contents before they are shipped, sometimes mistakes can happen. If you do find you are missing something, please contact us at support@pinitech.com

ADVANTAGES OF PINITECH LED DISPLAYS

You may be wondering why, with so many other displays available for Classic Bally/Stern games, we decided to create our own. **Well, it comes down to functional & visual design.. and we wanted something that met our own expectations for a quality LED display set.**

Feel free to skip this page if you just want to get onto assembly or use of your displays. We just wanted to take a moment to explain what makes these displays great!

Functional Design

These displays were designed to be low power, energy efficient & built to last. A typical Bally/Stern game averages about 1.6-1.8 Amps *without* LED displays installed. When you add LED displays, no matter what brand, typically it will add between 0.8-2.0 Amps for the entire set of displays. For the really power-hungry LED sets (not to be named here) you can be adding 1-2 Amp additional load, for a total load near or exceeding the 3A max rated regulators in some of these machines. That means more heat, more strain on the regulator and not-so-great efficiency.

PINITECH displays are designed to consume at most 100-125mA per display at full brightness. That's adding at max 0.5-0.6 Amp additional load if the displays are turned fully up. At a lower brightness setting, it's even less. That means less stress on your game and longer life-span of the LED digits since they are not being driven anywhere near their max ratings.

Visual Design

Great care was taken in making these displays visually attractive. Sure, they spend most of their time behind a backglass.. but why not have them look as nice as they function? Rounded PCB corners & digit spacing that replicates spacing of the plasma digits.

Starting in October 2018 the display sets are now using custom LED digits with a comma that was designed completely from scratch. We compared dozens of Bally and Stern displays to combine some of the best elements and create something truly different. The custom digits are about as close as you'll ever get to matching the original look of plasma displays! This should please just about anyone looking for LED displays that have that close-to-original look. They not only look great in a line-up with other games that are using plasma displays, but you can even mix-and-match displays in the same game and barely notice which displays are LED.

Years In The Making

Truth be told, the main reason we created these kits is we always wanted to bring a quality DIY Kit to the market, dating as far back as 2011. No other DIY Kits were available at the time & we thought it would be cool to offer a DIY Kit to the pinball community. Just one problem – PCB costs were too high. So instead we turned our designs into a bench led display diagnostic tool (2014). Following this, we had a crazy idea to create DIY Kits for converting out-gassed plasma displays into LED via the RETROFIT conversion displays (2016). Finally, this lead to the awesome full UNO & TRADITIONAL displays (2017).

Thanks Again!

To say we are truly grateful for those individuals that have supported our ideas & products over the years to help unique products like this become possible would be an understatement.

So thank you again for your purchase! We really hope you enjoy the displays!

We'd love to hear what you think or see pictures of the displays installed in your games! Email us at support@pinitech.com with any questions, feedback or action-shots :)

ASSEMBLY INSTRUCTIONS

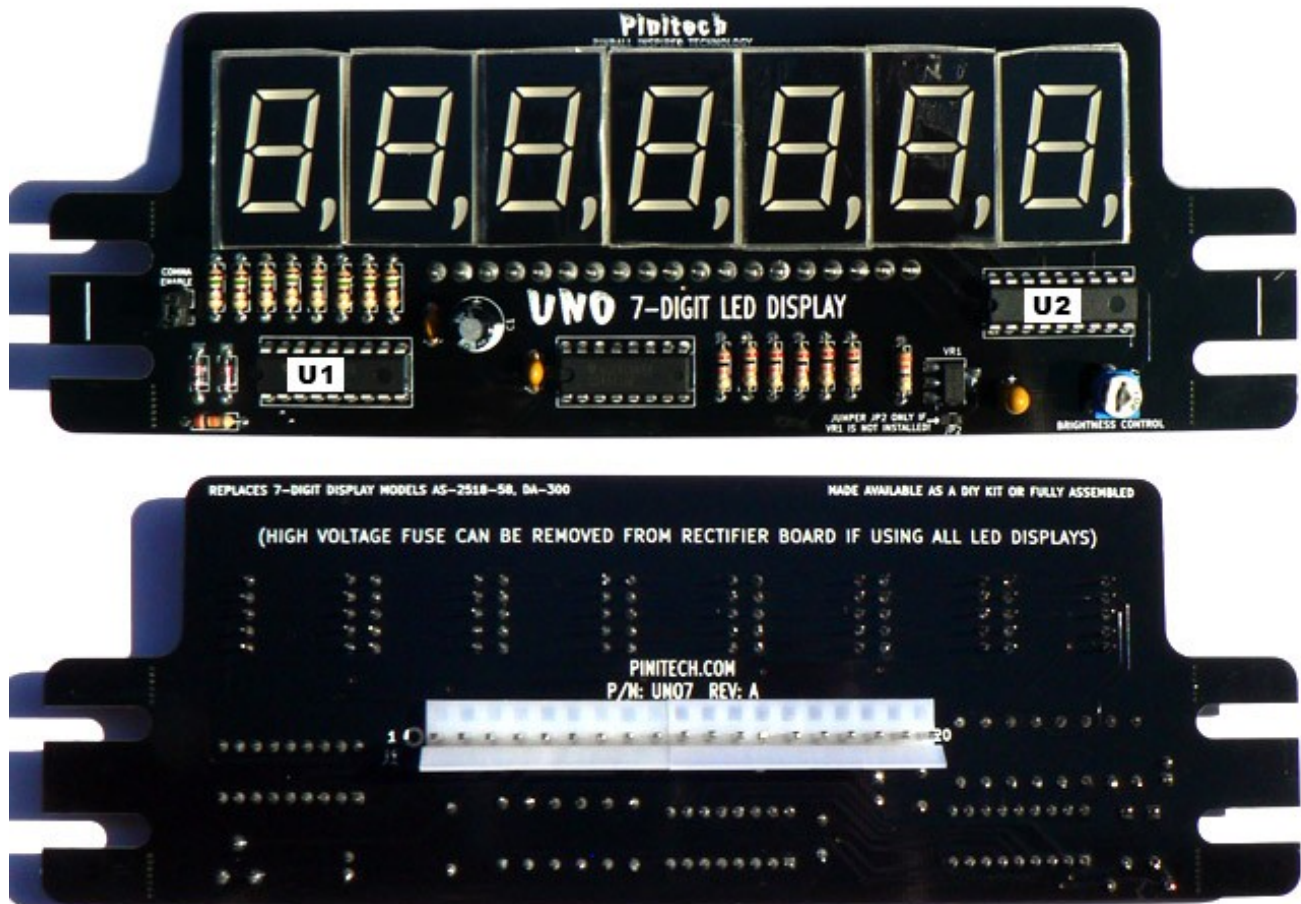
We understand some people may jump right into assembly without following the steps below since the boards look straight-forward enough to build out. Please skim through the steps regardless and observe a few tips below so you can ensure your boards are built correctly.

Observe Polarity!

While assembling the board(s), it's important to observe polarity on a few components (16uf tantalum capacitor, 220uf electrolytic capacitor, diodes). ICs must be installed with notches matching the silkscreen notch on the PCB. Installing these components wrong may damage the board or in the case of capacitors may cause them to explode. Please follow the steps below carefully to ensure your board gets built correctly.

REFERENCE PCB

For reference, here is a picture of a completely soldered display. Please follow the step-by-step instructions for important information on the assembly.



COMPONENT BOARD ASSEMBLY

STEP #1: CHECK COMPONENTS VERSUS COMPONENT LIST

First, lay out & verify the components listed under "KIT CONTENTS" a few pages back. If anything is missing please let us know.

STEP #2: SOLDER 1117 VOLTAGE REGULATOR

Solder the 1117 voltage regulator onto the VR1 footprint on the board. This is a surface mount part, but large enough to hand-solder. The easiest way to install this component is to first line it up so all the pins are on the SMD pads of the VR1 footprint, making sure there's some space between the edge of the pads & the leads on the component so solder can flow. Then solder one of the 3x bottom pins of the IC while holding the 1117 voltage regulator down. Adjust if necessary to align properly with the SMD pads. Once aligned, solder the 2x remaining bottom pins, along with the top pin.

STEP #3: SOLDER 8X 150 OHM (OR 100 OHM) RESISTORS

Depending on the LED color you chose for your DIY Kit, it will include either 150 ohm resistors [brown-green-brown] or 100 ohm resistors [brown-black-brown]. These get soldered into R1-R8 located on the left-side of the PCB. Once soldered, trim the leads from the back of the board just above the top of the solder point.

STEP #4: SOLDER 7X 20K OHM RESISTORS

Solder 1x 20K ohm resistors [red-black-orange] into R9 (left-side of PCB, below U1) and R10-R15 (center of PCB, just to the right of U3). Trim leads after soldering.

STEP #5: SOLDER 1X 330 OHM RESISTOR

Solder the 1x 330 ohm resistor [orange-orange-brown] into R16 (left of VR1). Trim leads after soldering.

STEP #6: SOLDER 2X 1N4148 DIODES

Solder the 2x 1N4148 diodes into D1 and D2, making sure to match the orientation of the line on the diode with the silkscreen representation of the diode on the PCB. Trim leads after soldering.

STEP #7: SOLDER IC MARKED "U1" INTO U1

Solder the Segment Driver IC, marked with a "U1" on top, into U1 (left-side of PCB). Make sure to orient the notch on the IC with the silkscreen notch on the component board.

STEP #8: SOLDER IC MARKED "U2" INTO U2

Solder the Digit Driver IC, marked with a "U2" on top, into U2 (right-side of PCB). Make sure to orient the notch on the IC with the silkscreen notch on the component board.

STEP #9: SOLDER IC MARKED 4543 at U3

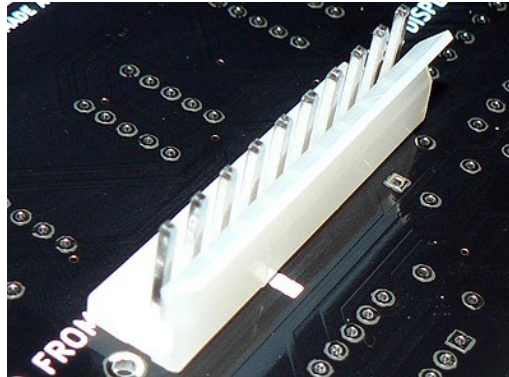
Solder the 4543 into U3 (center of PCB). Make sure to orient the notch on the IC with the silkscreen notch on the component board.

STEP #10: SOLDER POTENTIOMETER

Install and solder the potentiometer / trimpot into R17 at the front of the board.

STEP #11: SOLDER THE 10-POSITION 0.156 HEADER

The 10-position header gets placed between pin #11-20 on the J1 footprint on the UNO board. The header should be installed so the locking tab is facing the bottom of the board when the board is oriented so the silkscreen text is readable. The pins get soldered from the front side of the board. **Only solder a single pin on this header for now so it can be adjusted/aligned with the 9-POSITION header in the next step before soldering in completely.**



STEP #12: SOLDER THE 9-POSITION 0.156 HEADER

Now you can insert the 9-position 0.156 header at pin #2-10 at the J1 footprint on the UNO board. Solder a single pin on this header as well to get it lined up with the 10-position header & flush to the board. Once happy with alignment of both headers, solder all remaining pins.

Note: You may need to reorient the board 180 degrees for better access to soldering these headers. Positioning the board so the LED footprint is at the bottom of the board should give clear access for soldering.

STEP #13: CUT KEY PIN ON 0.156 HEADER

Snip the keying pin at PIN #14 (marked with a silkscreen line on the back-side of the board).

STEP #14: SOLDER 2X 0.01UF CAPACITORS

Locate the two 0.01uf capacitors marked with a "103" (or 0.1uf marked with "104"). These capacitors have short leads that are the same length. These can be installed either direction, polarity doesn't matter on this capacitor.

Solder 1x 0.01uf capacitor into C2 located (near where you just installed the 10-position 0.156 header). Solder the other 0.01uf capacitor into C3, just to the left of the U3 footprint. Trim leads after soldering.

STEP #15: SOLDER 1X 10UF CAPACITOR **OBSERVE POLARITY**

Solder the 10uf tantalum capacitor into C4, located just to the right of the VR1 "1117" voltage regulator. **POLARITY MATTERS!** The longer lead is the positive lead and must be installed into the hole marked with a "+" in silkscreen. **VERIFY THE CAPACITOR IS INSTALLED CORRECTLY BEFORE SOLDERING! INCORRECT INSTALLATION MAY**

CAUSE THE CAPACITOR TO EXPLODE OR DAMAGE YOUR BOARDS!

STEP #16: SOLDER LED DIGITS

Solder in 6-7x LED digits (depending on the kit you are assembling) into their locations. Make sure they are oriented correctly before soldering these in fully. The comma should face the bottom of the board. You may want to solder just a single pin on each of these LED digits and make sure they are flush to the board & aligned how you want them before soldering the remaining pins.

STEP #17: SOLDER 1X 220UF CAPACITOR **OBSERVE POLARITY******

Solder the 220uf electrolytic capacitor into C1 (near where you just installed the 10-position 0.156 header). POLARITY MATTERS! Find the side with a line and "-" symbol on it, this is the negative lead. The other terminal is the positive. Make sure to install the capacitor so the polarity matches the silkscreen markings on the board. **VERIFY THE CAPACITOR IS INSTALLED CORRECTLY BEFORE SOLDERING! INCORRECT INSTALLATION MAY CAUSE THE CAPACITOR TO EXPLODE OR DAMAGE YOUR BOARDS!** Trim leads after soldering.

STEP #18: ENABLE THE COMMA (OPTIONAL)

The led digits have a comma that will light up at the thousands and millions digit. This comma can be enabled or disabled by using the jumper(s) near the silkscreen marking "COMMA ENABLE". You can either bridge the SMD jumper using solder or solder in the included 2.54mm 2-position header and use the jumper block to enable the comma.

*NOTE: The credit display ***should not*** have the COMMA enabled.*

STEP #19: CLEAN UP BOARD & LOOK IT OVER

Check for any solder bridges, solder flecks & verify polarity-sensitive components were installed correctly. If you wish, you can clean up solder flux with your preferred flux remover. Any components with long leads should have been trimmed near the solder point. If not, make sure to trim these leads off before using the board.

YOUR DISPLAY IS NOW COMPLETELY ASSEMBLED!

**BEFORE INSTALLING IN YOUR GAME PLEASE READ READ THE
PRE-INSTALLATION & "UNO" SPECIFIC INSTALLATION
INSTRUCTIONS ON THE FOLLOWING PAGES**

PRE-INSTALLATION (KITS OR ASSEMBLED DISPLAYS)

STEP #1: REMOVE THE PROTECTIVE PLASTIC FROM THE LED DIGITS

The LED digits have a protective plastic film on them to prevent damage during shipping / assembly. You can remove this film if you'd like or leave it on (as it will not affect brightness or appearance of the lit up digits).

STEP #2: INSTALL SMOKE FILTER / COLOR FILTERS

As of November 2018, display sets are shipping with smoke filters to mimic the look of unlit segments on a plasma display. If you purchased a WHITE digit display, your set will also come with plasma amber filters & additional filter(s) of your color choice.

To install a filters, you'll first need to trim them slightly at the left & right edges. When laying against the face of the digits, the filter should not extend beyond the edges of the LED digit blocks. After trimming, cut a few thin strips of double-sided tape off the tape strip, peel off the backing & install on the LED block (recommended locations are below in RED and GREEN *See Note Below). Peel the other side of the tape strip off & do the same on the other side. Then press the filter against these spots, making sure the filter is covering the numbers and commas, and not extending outside of the edges of the LED blocks.

*Note: Some people have reported that only using two thin strips as shown in RED below (as previously recommended) the filter may come loose. We are now recommending adding a few more thin strips at the top/bottom of the filter as shown in GREEN.



RESUSING FILTERS VERSUS. PERMANENT MOUNTING

Using small pieces of tape tacked in a few places, as shown above, allows you to easily swap filters or reuse them in the future. However, if you don't plan on switching filters and want a more permanent solution, you can purchase double-sided tape rolls and cover a larger portion of the back of the filter with tape adhesive.

STEP #3: REMOVE HIGH VOLTAGE FUSE(S)

If you're replacing all displays in your machine with LED displays, it's a good idea to remove the High Voltage fuse from the rectifier board & optionally the SDB since high voltage is no longer used for the displays. No need to leave this circuit running and possibly have it fail over time since it's not needed when upgrading to LED.

UNO INSTALLATION INSTRUCTIONS

MOUNTING THE DISPLAYS

Included with your kit should be 4x nylon stand-offs per display & displays can be mounted with or without display holders left in the game. We recommend leaving the display holders in there, rather than removing them completely, but it's up to you. The screws from the original display holders are re-used when mounting the UNO displays. The PCB will be sandwiched between the screw head and nylon spacer.

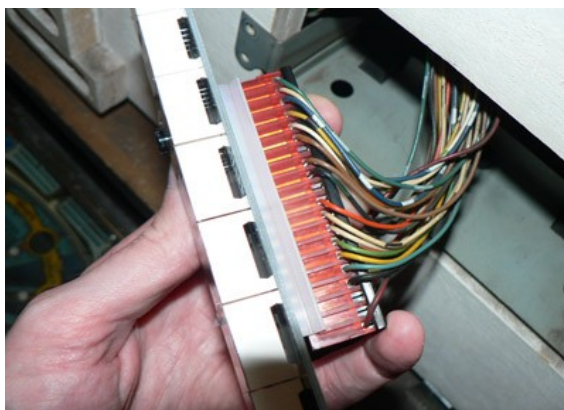
STEP #1: Remove both screws from one side of the display holder. Insert screws through nylon stand-offs & reinstall screws such that there's a space between the screw head and nylon spacer if possible (see picture). Just a few turns on the screw is all that's needed. We want to be able to slide the UNO pcb between the screw and nylon spacers.



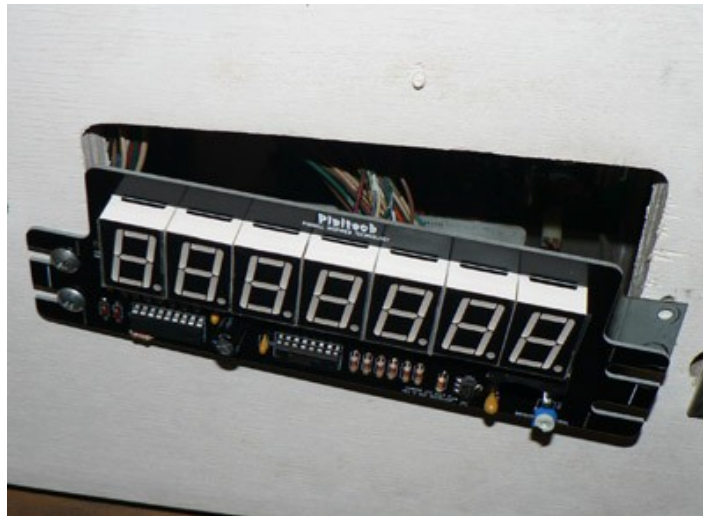
STEP #2: Remove the two screws on the other side of the display holder.. Insert the screw through the nylon spacers on these screws as well, but leave them uninstalled.

Note: If once the full weight of the display holder causes previously installed screws to drop out, you'll need to re-insert the screws and tighten them a bit more.

STEP #3: Take the UNO display and plug the wire harness connector from the back, while supporting the opposite side with your hand/fingers so the board doesn't flex too much while inserting the connector into the locking tab. See picture below, though you can use two hands since you aren't trying to take a picture at the same time :)



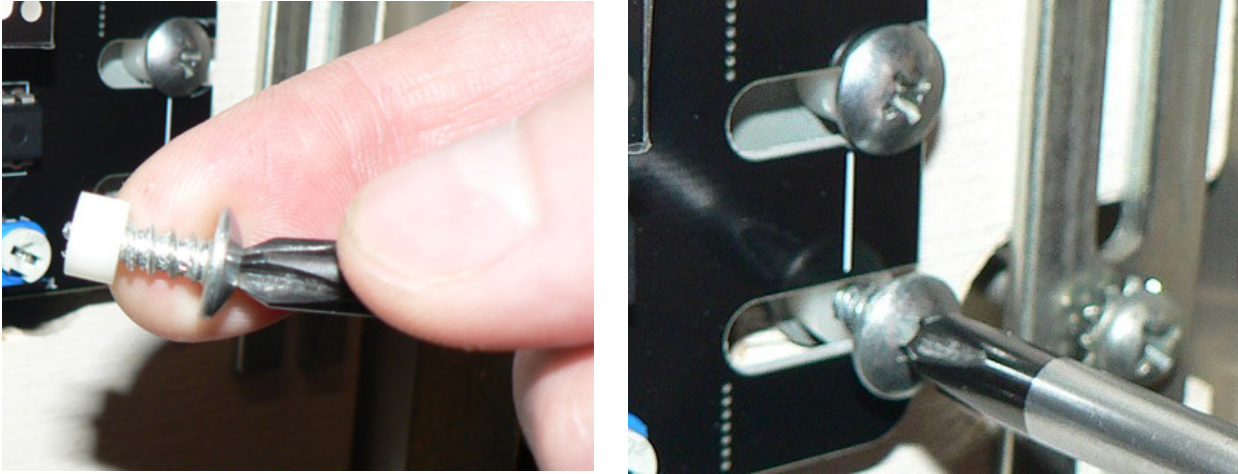
STEP #4: Slide the PCB between the nylon spacer and screw-head on the two screws of the bracket you previously "loosely" installed. Shift the display PCB furthest to the left it will go and tighten the screws a bit so the display is no longer "loose" feeling.



STEP #5: Now take one of the uninstalled screws (with nylon spacer on it) and position it into one of the mount-points on the other side of the UNO PCB so the screw head is at the front and nylon spacer at the back. Then fish this screw through the display holder and finally through the pre-existing screw hole on the light panel. Once in-place, tighten the screw a few turns.



STEP #6: The remaining screw with the nylon spacer can now be installed in the same manner. Position the nylon spacer just at the end of the threads of the screw and hold the screw/nylon spacer with your fingers. You can now slide the screw / nylon spacer in on the remaining screw hole where it's supposed to go & tighten the screw a bit.



STEP #7: You can now adjust the display PCB as necessary. Loosen any tightened screws that prevent the PCB from sliding slightly so the PCB can be freely shifted left-or-right. Position the silkscreen vertical line (as shown on the right-hand picture above) so it's roughly centered with the philips head screw, then while holding the display PCB from moving, tighten the two top screws on each side of the PCB and "loosely" tighten the bottom screws so they aren't hanging out. Reinstall backglass in the game and see where the display is lining up. Adjust as necessary and tighten all screws when finished.

The nice thing is, once you get one display installed, the remaining displays will likely all need to shift the same amount, so you can use this silkscreen vertical line as a reference for shifting all the displays the same amount.

STEP #8: Install all remaining displays as in previous steps & reconnect wire harnesses.

ISSUE WITH CLEARANCES AROUND DISPLAYS?

On some games you may find there are lamp surrounds or backbox lamps that prevent the UNO display from being mounted. We do not know how many games this may affect, but we have seen a few games with this issue.

The UNO design has some "mouse bites" or PCB snap-points on the tabs where the UNO normally gets mounted. If there are clearance issues with mounting on a display, you should only need to break one of these tabs off. You may need to use cutters since the mouse bites are set in a bit from the edge of the PCB. Once snapped, you can sand/file the rough edge. Install the unused screw back into the display holder bracket (screwed all the way down) and mount the display with 3x screws with stand-offs.'

If you have a game that has clearance issues, we'd love to know about it so we can compile a list. If you find you need to modify the displays in addition to these snap-points please also let us know!

TURN ON YOUR MACHINE!

NO ISSUES? AWESOME! (Especially those of you that built the DIY Kits)

You can try the display test (part of the self-test routine initiated by the self-test button inside the coin door) and verify the displays are all cycling through the digits correctly.

HAVING ISSUES?

If you built the displays as a DIY Kit, first check through the assembly steps again to see if anything was missed. If you're still having issues, contact support@pinitech.com and let us know your symptoms and we will try to offer some suggestions to get you going.

Some things that will help us to diagnose..

- What is the issue you're having?
- Does it affect all displays or just a single display?
- Were there any display issues BEFORE the upgrade to LED displays?
- Is the machine booting (7-flashes at the MPU led)?
- Is the display harness connected to the display?
- Are there balls in the machine? (some machines need all balls in the trough)
- Does swapping the display to a different position change anything?

ADJUST BRIGHTNESS

Set the brightness for one display by turning the potentiometer with a small flat-head screwdriver. All other displays can then be adjusted to the same brightness by orienting the flat-head screw slot in the potentiometers the same way on remaining displays.

A note on LED brightness:

Some people may be familiar with aftermarket displays that have LED digits that are nearly blinding when lit. Some of these displays aren't very efficient & may be pushing their LEDs to their maximum ratings, shortening their lifespan. We chose to set the max brightness of the displays to what most users would find plenty adequate, while resembling the plasma displays & maintaining an efficient design.

Using dark color filters on WHITE DIGIT displays?

You can omit adding the neutral filters that are now included by default with the kits if you're using dark filters with WHITE digits. This gains a bit of brightness back since the LED segments will be naturally hidden with a darker color filter on top of them.

Building a DIY Kit & Want Displays Brighter?

With a DIY Kit, you can increase the max brightness slightly by swapping out resistors R1-R8 for lower values. We'd suggest keeping it above 100 ohms so the displays are still relatively efficient. Keep in mind, LED brightness isn't exponentially related to current & going much below 100 ohms won't gain you much in brightness, it'll just be pushing more unnecessary current through the LEDs.

FEEDBACK

We love hearing from customers! If you have questions, comments or feedback – or want to send us some photos of the displays installed in your game, just email us at support@pinitech.com

ADDENDUM: OTHER TROUBLESHOOTING NOTES

MR. & MRS. PAC-MAN DISPLAY INSTALLATION

We have had a few customers install a 7-digit display set in Mr. & Ms. Pac-man and report the 7th digit (millions digit) on the displays was not lighting up. This was due to the IDC (insulation displacement connector) display wire harnesses having a wire go to pin #11 where there is not typically a wire going to this pin.

As it turns out, the signal going to this pin was a LAMP STROBE. If you are experiencing the same issue, disconnect all 7-digit Player displays except Player #1. Check the display wiring at the connector that plugs into the display at the Player #1 position. You will need to count over from PIN #1 on the connector to see if there's a wire going to pin #11. Customers have reported it's a yellow wire with a red stripe going to two of the Player displays. It's a different wire color on the other two Player displays. Try removing this wire or snipping it near the connector.

If in-doubt, please email us at support@pinitech.com with a picture of your display connector(s) for the 7-digit displays and we will help identify which wire needs to be cut or removed. This would affect most aftermarket displays on the market since on the display PCB they wire pins #11 & #12 together to account for differences in how Bally and Stern both wired the displays. **This info is ONLY for Mr. & Mrs. Pac-Man IF your game is having the issue described above with the 7th digit not lighting.**

Below are some additional troubleshooting steps if you're building the displays as a DIY Kit or are having an issues with a display.

MISSING SEGMENT (SINGLE DIGIT)

Missing a segment on a single digit? Do all the other digits light this segment correctly during display test? If so, check the pins on the back of the digit aren't touching anything or bent into each-other.

MISSING SEGMENT (ALL DIGITS)

If a segment is missing on all digits, inspect the U1 solder joints closely for any solder bridges or conductive material between the pins. Also check resistors R1-R8.

MISSING A DIGIT

If a single digit (or several digits) are not lighting up in display test, inspect the U2 solder joints closely for any bridges or conductive materials between the pins.

PARTIALLY ILLUMINATED SEGMENT THAT SHOULD NOT LIGHT

Check that the 1n4148 diodes (D1, D2) were installed with the band oriented per the silkscreen markings.

DISPLAY IS NOT WORKING AT ALL

First, run through the installation steps again to see if you missed anything. If you bought an entire set of LED displays, try a different LED display in that same position. If no LED displays are working, test a plasma in the Player 1 position and run display test to verify plasma display functionality. If it's just a single display not working, run through the assembly steps again to see if you missed any steps.

COMMA STAYS LIT

On the UNO model display, if you leave the original display holders in the game and don't use the included plastic stand-offs that should have been included with your displays *AND* the displays are shifted over to the left, the solder point on the back of the 2.54mm header for the comma may contact the metal display holder. This will complete the comma jumper circuit and the comma will stay lit. Using the stand-offs will elevate the solder points away from the display holder.

(OPTIONAL) ROLL YOUR OWN LIGHT BLOCKS

As of March 2024 we are no longer including foam light blocks with display kits. The foam light blocks were 5x pieces of rectangle foam with a window cut out in the middle that fit around the led digits to help reduce ambient light from the backglass lamps.

A picture of a foam light block:



We know it's a bit of a bummer these are not included, but if you do want foam light blocks you can roll your own without too much trouble..

Tools Needed:

- Heavy Duty Scissors (to cut larger foam sheet into initial pieces)
- Utility Knife (to cut window)
- Ruler / Straight Edge (to cut window)

What to purchase:

- Black EVA Foam. At least 8in x 12in sheet. Non-adhesive backing unless you're going to be using thinner foam (see below).
 - For thickness similar to the foam light blocks we previously included with kits, you'll want 10-12mm thick foam. Typically this is about \$12-25 per sheet depending on size. This foam requires heavy duty scissors to cut through and a utility knife cut the window for the digits. Digits would go **INSIDE** the window you cut.
 - If you want something easier to work with you could go with 4-6mm foam thickness and either buy adhesive-backed foam or use double-sided tape to adhere it to the digits. The foam would sit on the surface of the digits. The window you cut would be smaller so the foam can sit on top of the digits.
- Double-sided 3M tape (only needed if using 4-6mm foam)

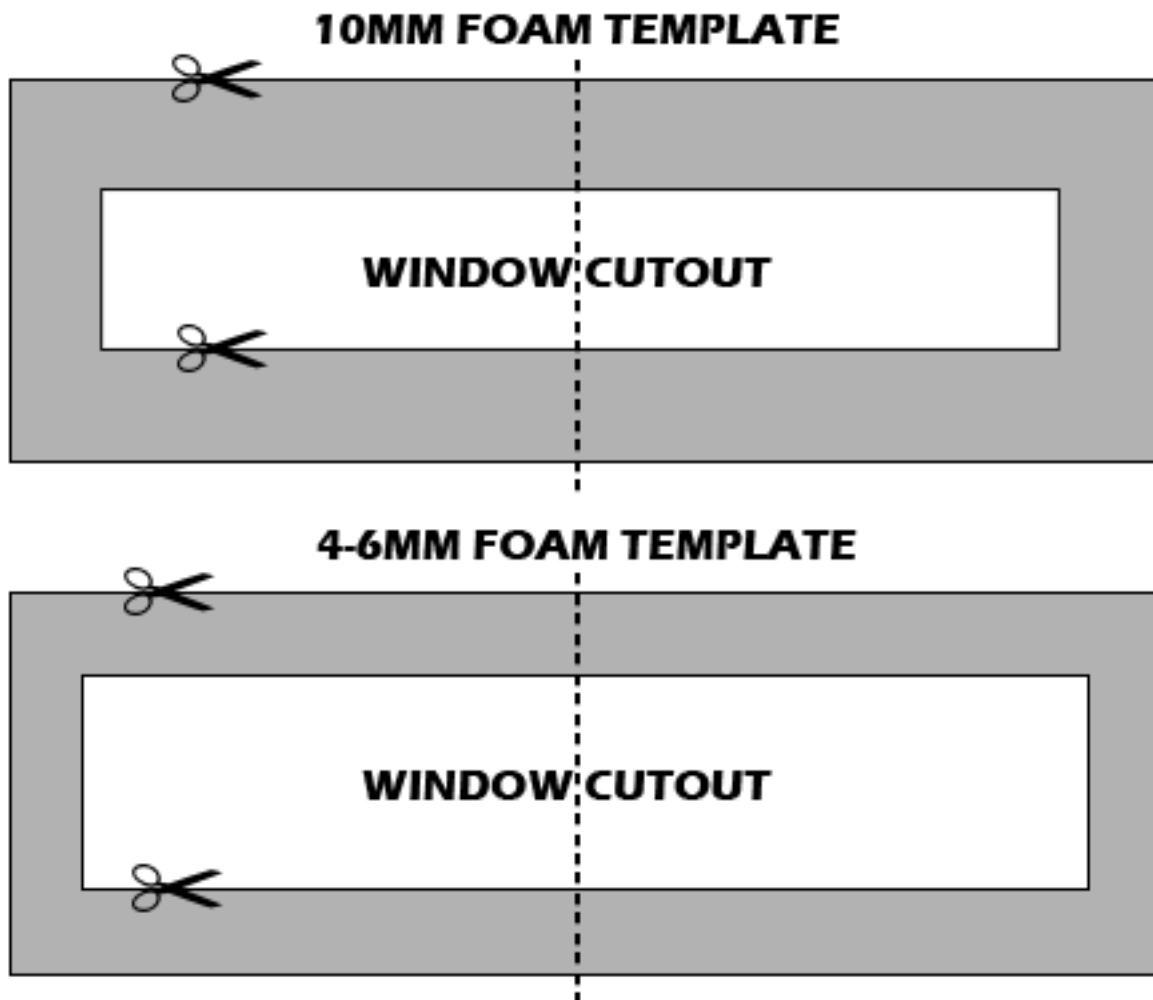
We suggest searching on Amazon as people use this type of foam for Cosplay costumes. Michael's may also carry thinner foam sheets.

Templates For Foam

To make things easier we have templates below that you can print and cut out.

Use the template that corresponds to the thickness of foam you purchased. For thicker 10mm foam the window cut-out will slip over the digits. For 4-6mm foam the foam will sit on top of the face of the digit.

We suggest first cutting a single display piece and test-fitting to ensure you're familiar with the entire process BEFORE cutting all of the pieces for your displays.



Step #1: Cut Out The Template & Verify Dimensions

Choose one of the templates above based on foam thickness. Verify the dimensions of the foam template (6" width x 2" height). If the template does not match these dimensions, you'll have to adjust scaling in your print settings until it matches and/or make sure "Actual Size" is selected under printer scaling settings.

Step #2: Cut Out Window Cutout

Fold the paper template in-half at the dotted line and then use scissors to cut out the "window cutout" (inside rectangle cutout).

Step #3: Trace Outline On Foam Using Pencil / Sharpie

At this point the template should be cut-to-size and look like a picture frame border. Using the template, lay it over the foam sheet you purchased and trace around the inside and outside edges using a #2 pencil or sharpie.

Step #4: Cut The Foam

Cut the outside edge of the foam with scissors. You may need heavier-duty scissors if you're cutting 10mm foam.

For the window cut you may need to use a utility knife. Make sure you're cutting on top of a cardboard box or surface you don't mind scratching. Scissors may work fine on the 4-6mm foam.

Step #5: Test Fit The Foam

Now test fit the foam on your display and see how it worked out.

Step #6: Install The Foam

For the thinner 4-6mm foam you'll need to adhere it to the face of the digits in several places around the border with thin strips of double-sided 3M tape. For thicker 10mm foam the window cut-out should allow you to slip the foam entirely over the digit blocks.

Don't Want To Have To Cut Foam?

If you don't want to mess with buying foam sheets and cutting foam, there are some other alternatives.

One is to try and track down a supplier selling Bally displays that offers individual foam pieces for sale. You can email manufacturers selling displays and it's likely they'd be willing to sell you some foam light blocks by themselves for \$10-15 a set. You'll want to verify dimensions of their foam (outside dimensions and window cut-out) BEFORE purchasing as there may be large variances in digit spacing between display manufacturers.

The other option is you can use foam / RV weather stripping. Usually this is adhesive-backed and unfortunately it *can* get messy, so it's not the best solution, but it can work in a pinch.