# NIXIE TUBE DRIVER MODULES - Part II

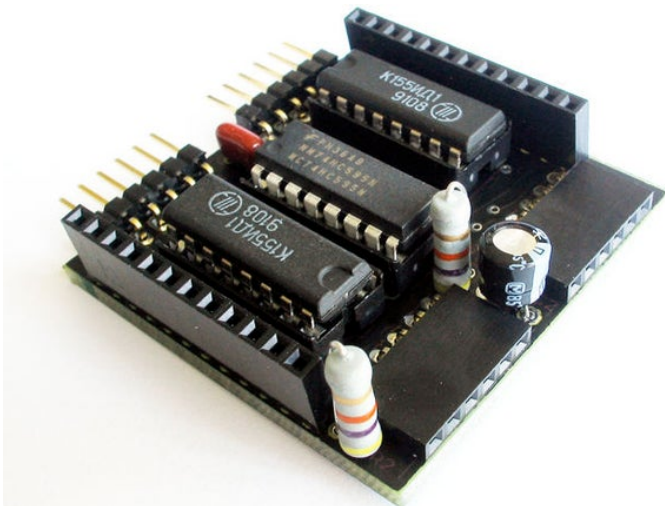by gluplug

This Instructable is a follow-up to the nixie tube driver module (Part I) that I posted here.

The nixie driver board is designed to receive serial input from an external microcontroller (Arduino, etc.) and output decimal information and route power to one pair of nixie tubes. The pair of nixie tubes mount on top of the nixie driver board which supports two IN-12A type nixie tubes in two phenolic sockets. The high voltage requirements of at least eight pairs of IN-12A nixie tubes may be provided a high voltage power supply. The right-angle male and female header pins on the nixie driver board allow multiple pairs of nixie tubes to be joined edge-to-edge. This densely packed configuration permits minimum digit spacing while threading power and serial data connections to all elements.



| | | |
|---|---|---|
| https://www.instructabl… | | Download |
| https://www.instructabl… | | Download |
| https://www.instructabl… | | Download |
| https://www.instructabl… | | Download |
| https://www.instructabl… | | Download |
| https://www.instructabl… | | Download |

## Step 1: Parts List

1 - nixie driver printed circuit board

2 - K155ID1 (74141) 16-pin IC

1 - 74HC595 16-pin IC

3 - 16-pin IC socket

2 - straight 12-pin female header (1x12)

2 - right-angle 6-pin male header (1x6)

2 - right-angle 6-pin female header (1x6)

2 - 47k 1 watt resistor

1 - 100 uF electrolytic capacitor

1 - 0.1 uF metal film capacitor
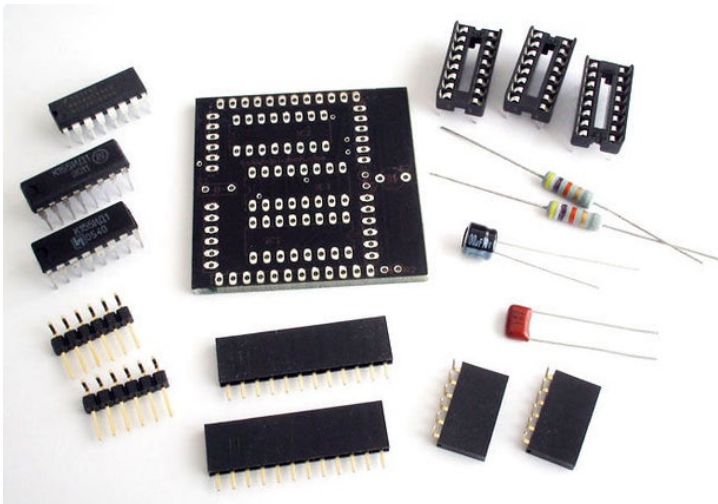
## Step 2: Board Layout

The nixie driver boards can be assembled in about 45 minutes. For those new to electronic assembly, here are two links to excellent soldering tutorials: Sparkfun , and Curious Inventor.

Note carefully to orient the nixie driver printed circuit board with the component placement information facing up. This is the side that will receive all of the supplied components.
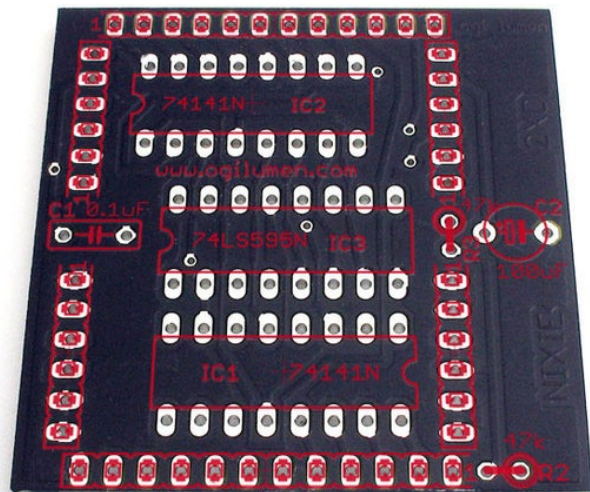


## Step 3: Assembly

Insert the male and female right-angle 6-pin headers as shown and begin soldering. These headers can be held in place by the weight of the board. Anchor the pins with solder on either end first, and confirm final position, before soldering all of the pins.
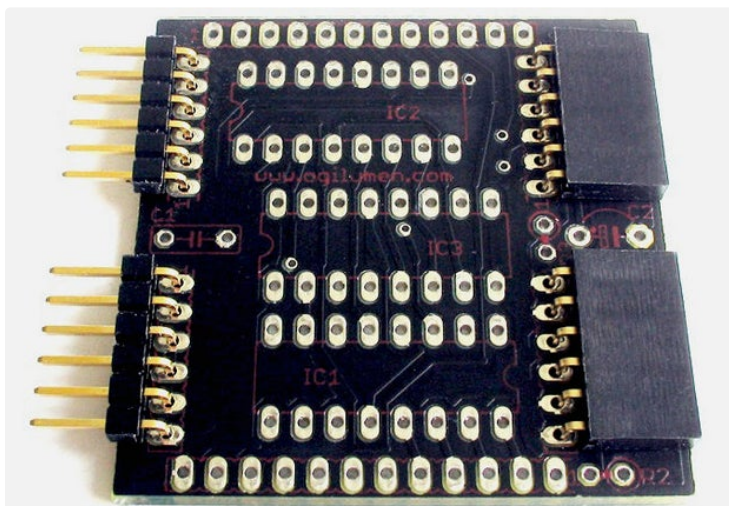
## Step 4: Inserting the 16-pin DIP Sockets

Note the indent on each of the 16-pin DIP sockets. Align this indent with those marked on the board, then insert and solder all three DIP sockets in place. It is very difficult to adjust the position of a DIP socket after it has been soldered to the printed circuit board. A good strategy is to first anchor a socket by soldering two opposing corner pins. In this way, the socket will not shift before the rest of the pins are secured.

The indent on the DIP sockets corresponds to a similar indent on the two K155ID1 (74141) ICs and on the 74HC595 IC. These three ICs should be inserted into the sockets after all soldering is completed.
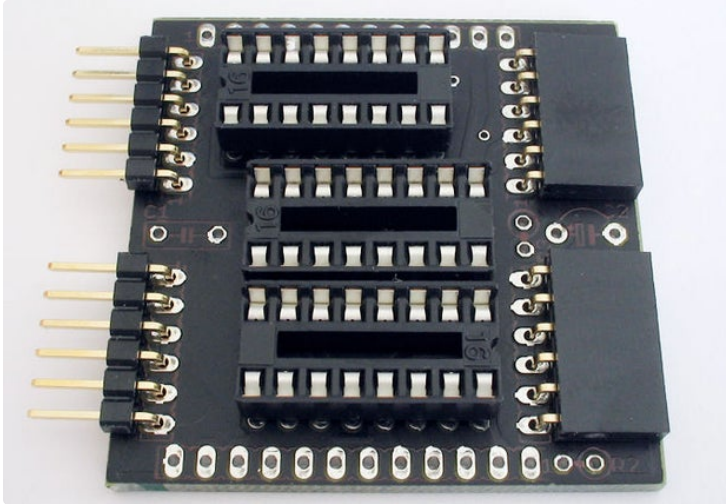


## Step 5: Inserting the 12-pin Female Headers

The two straight 12-pin female headers can be added next. You can use the weight of the board to hold these in place while soldering. Similarly, it is a good idea to start with end pins, and check final position, before soldering the remaining pins.
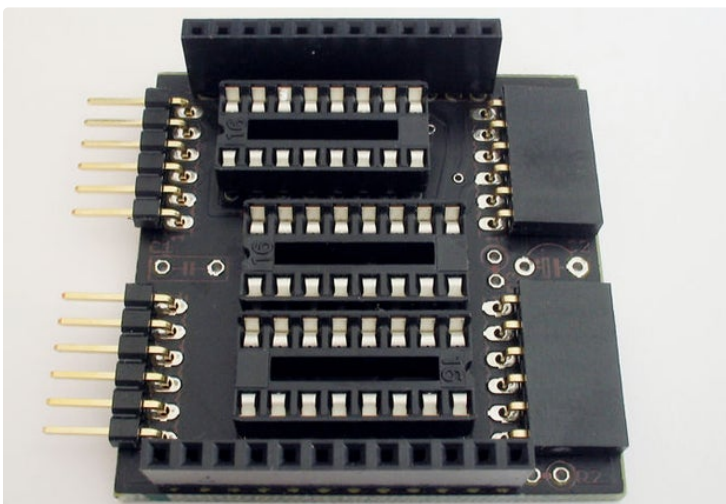
## Step 6: Inserting the De-coupling Capacitors

There are two de-coupling capacitors on each nixie driver board. Locate C1 on the board, and insert the non-polar metal film capacitor (below pictured red). Solder it in place and trim the leads.

C2 is on the opposite end of the board and does have

a polarity. The negative side of C2 is toward the outer edge of the board; the negative lead of this capacitor is marked with a white band. Insert C2 as shown, solder it in place and trim the leads.



1. C1
2. C2
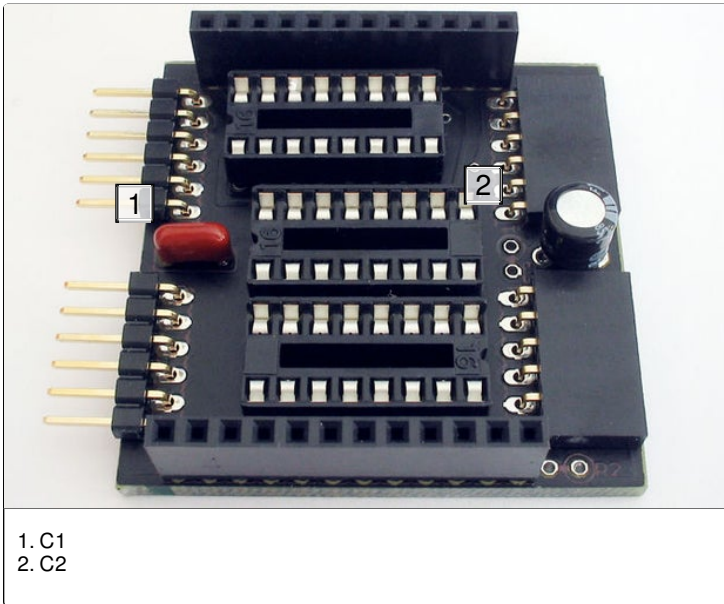
## Step 7: Inserting the Resistors R2 and R3

The final two components of the nixie driver board are current limiting resistors for the two nixie tubes. R2 and R3 should be prepared for minimum height on the board; doing so will ensure a good seat for the nixie tube board above. Turn over one lead of each resistor and insert them vertically into position for soldering. Solder and trim the leads on the reverse side.

1. R2
2. R3
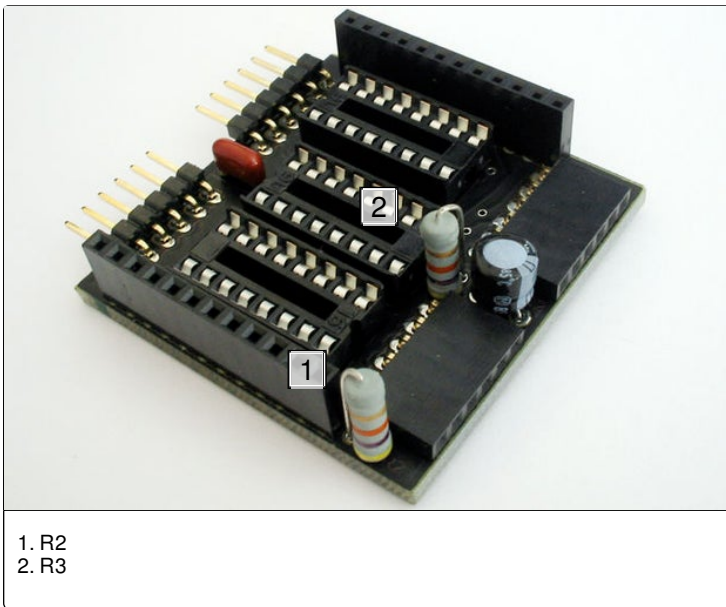
## Step 8: Inserting the Resistors R2 and R3 - Options

Depending on the size of the resistors R2 and R3 that you have, you may find that it is difficult to install them so that the nixie tube board will lay flat above the nixie driver board. You could also choose, therefore, to mount R2 and R3 horizontally as shown. Given that these resistors are rated at one watt, you could also choose to replace them with 1/2 watt rated resistors (smaller in size), depending on the nixie tubes being driven. (This is adequately the case for the IN-12A type nixie tubes.)
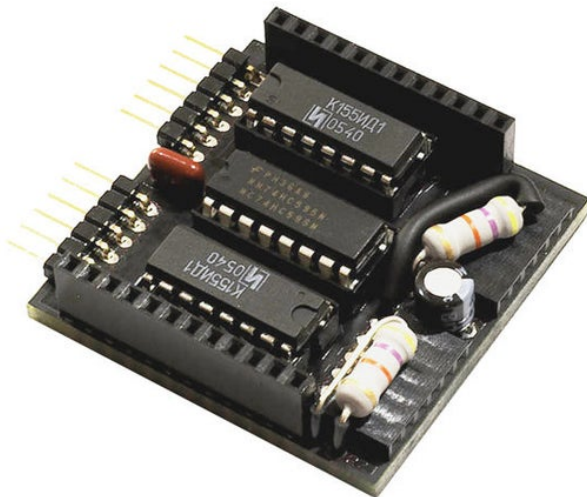


## Step 9: Inserting the ICs Into the Sockets

The three ICs can now be safely inserted into their sockets. Neither of these ICs are of the CMOS variety, and are not especially sensitive to static electricity. Note that ICs from the factory have pins set at a slightly wider angle than will fit into an IC socket. You can gently roll an IC on its side to uniformly bend in each row of pins so that it can then be inserted into its socket. This should be done with care, however, once the IC pins are well aimed into the socket receptacles, considerable force may be applied to seat the IC.
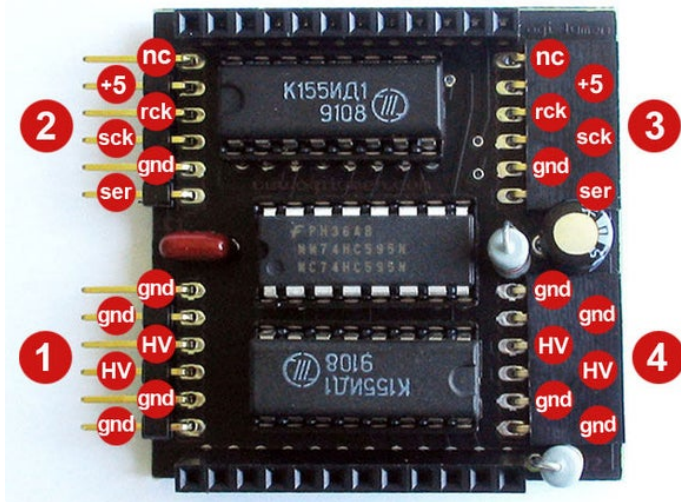


## Step 10: Positioning of R2 and R3

When attaching a <u>nixie tube board</u> above the <u>nixie driver board</u>, direct the top of R3, as shown, into the hole in the board above. This prevents accidental contact with the nixie tube pins. Also, slightly bend in R2 to permit the two boards to seat flat.
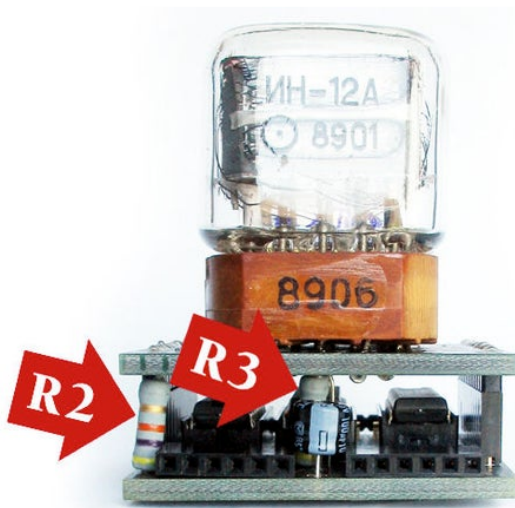


## Step 11: Arduino or Freeduino Interface

The nixie driver board permits a microcontroller (Arduino, etc.) to address two nixie tube digits, and via a shift register chain, multiple pairs of nixie tube digits. The 74HC595 shift register is used here to extend the mic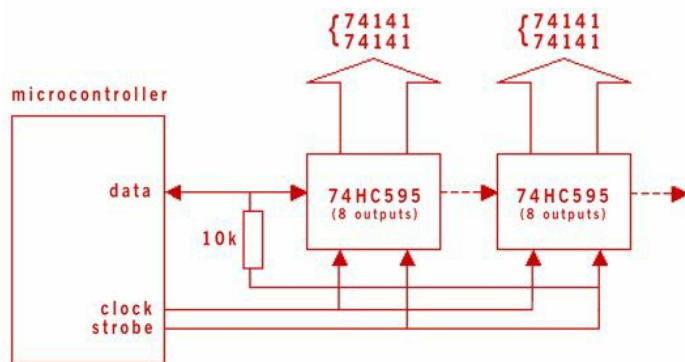rocontroller output functions. The 74141s are unique in that they are made to withstand the high voltage at which the nixie tubes operate.

You'll find test code for Arduino microcontrollers in the links, and a schematic and board layout details for the nixie driver board here.

For other great projects, also see the Freeduino site for open source code.



I have giant Nixies. Do you think they might work?

Yay!! Please see respectable links here: https://www.instructables.com/id/NIXIE-TUBE-DRIVER...

This is fantastic rated 5 \* have a look at my ibles as well

Yay!! Please see respectable links here: https://www.instructables.com/id/NIXIE-TUBE-DRIVER...

Hi was just wondering what size the boards come out at.

Yay!! Please see respectable links here: https://www.instructables.com/id/NIXIE-TUBE-DRIVER...

board size is 44 x 44 x 2.4 mm (chunky thick)

hi again just wondering which pins on the driver goes to the data strobe and clock of an arduino

Yay!! Please see respectable links here: https://www.instructables.com/id/NIXIE-TUBE-DRIVER...

You can check out page 5 and 7 of the driver guide posted here: http://www.ogilumen.com/guides/driver.pdf

Can you show to connect the nixie driver in this kit exactly to Arduino board?

Yay!! Please see respectable links here: https://www.instructables.com/id/NIXIE-TUBE-DRIVER...

hey! this looks awesome, could you provide a link with the Eagle files?, seems like most of the links are now broken =(

Yay!! Please see respectable links here: https://www.instructables.com/id/NIXIE-TUBE-DRIVER...

Does anyone have the pcb images or the schematics to parts 1-3 anymore? It seems that all the links are outdated, and ogilumen.com no longer exists.

i`m looking for them aswell. Have you something yet?

Yay!! Please see respectable links here: https://www.instructables.com/id/NIXIE-TUBE-DRIVER...

This instructable is almost entirely cut-n-pasted from the assembly PDF on the ogilumen.com....which makes this dangerously close to spam... Still think it's cool, though. Adding the schematic, and some more info about the usual Russian driver ICs would make it less spammy..

Now that the site went down, people visiting the site are 'trapped' by the links, making this 'ible pretty useless. Way to go Gluplug.

Yay!! Please see respectable links here: https://www.instructables.com/id/NIXIE-TUBE-DRIVER...

Added a direct link to the Eagle pcb files for this project.

The Russian-type 74141 driver ICs used to throttle the nixie tube elements are BCD-to-Decimal-Decoders, but importantly are able to withstand the high peak-inverse-voltage that is the case when driving nixie tubes. These chips are available through eBay and other sources as NOS (new old stock) items, and also are available new from NTE.

What are the capacitors for?

Круто)

Never mind. I have been told what I have are filament Nixies.

thats called a numitron tube.

A couple year's ago, *Mike* was in Vancouver, and by chance I met him at a Dorkbot meeting. He's got a great intro a lot of things, including a range of nixie tubes here: http://www.electricstuff.co.uk