

## Assembly Instructions UNIV-6-V1 Universal Nixie Clock

### IMPORTANT

Unless you are very experienced with kit-building, it is highly recommended to follow the steps below. First read the entire document twice, before starting.

For soldering you need:

- a) thin solder, diameter 0.5-1.0 mm. (0.020-0.040 inch).
- b) nice pointed soldering tip. 25-30 watt iron.
- c) a pot of coffee and chocolate biscuits

First step is to solder all the resistors. The resistors have colored bands on them, and you should not mix them up. Use the 'Bill of Material' (BOM) to check how many resistors you have of each value, this helps to identify them. If you are in doubt or can't read the colored bands, check with a meter for their value.

The resistors are numbered in increasing order, using designators like R1, R2, R2 etc. Their values can be found in the schematic and BOM list.

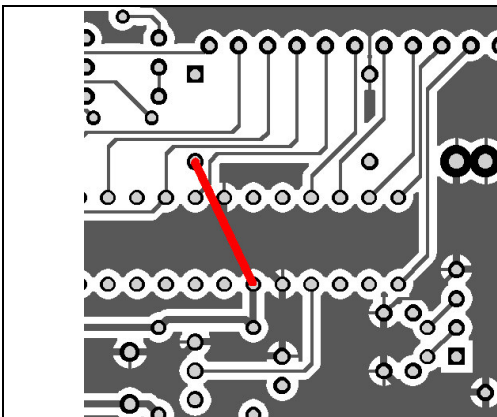
Mount the parts in the same order as listed in the BOM.

Find a resistor and locate on the PCB where it has to go. Insert the leads, turn the board over and put a small blob of solder on each pad. Take your time, and don't panic. If you don't get the hang of it after 5 resistors or so, better stop and ask a friend to help you.

When mounting the larger electrolytic capacitors, notice that the square hole indicates the positive connection. The longest leg of the capacitor indicates plus. Take care to mount these correctly. A reversed capacitor will certainly fail; they pop and your clock won't work.

After mounting C1 and C1B, check if you have 5V on the 78L05 regulator. If you don't have 5V, check the polarity of your DC-adaptor, you may need to reverse the +/- and check things again. Proceed if you have a clear +5V.

The high voltage FET (T26) is very static sensitive. Do not charge yourself by walking over carpets and do not pet your cat before mounting this one. Washing your hands is a good way of discharging yourself.



On the bottom of the board, an extra wire is needed. It provides +5V for the crystal oscillator.

When all parts are mounted it's time to check the board. Do not insert the PIC yet. Turn the potentiometer in middle position. Connect a 12VDC/100mA (not more than 500mA) adapter, and be careful not to touch any parts, after all there is a high voltage converter on the circuit board !!! I assume it won't kill you immediately, it can be quite uncomfortable when touched. Disconnect after 10 seconds, and check if the FET (T26) is cold. It should not even be warm. Also check if the 78L05 stays cool. If something gets warm or hot, try to find what is causing this and do not keep the board plugged in for long periods, as this may cause serious damage to the components. Look for shorts, reversed caps, check and double check.

If everything stays cool, the next step is to insert the PIC processor. Be careful to align the pins, not to bend them as you insert the IC in its socket. All pins first should go in about one millimeter, without any brute force needed... and **then** you may press a bit harder so that it firmly sits in the socket. Please don't insert the PIC in the wrong way, there is a little notch on one end, that should match the notch on the PCB/Socket itself. Inserting it wrong will damage the PIC for 100% sure, your clock will never work, and you have to contact me for a replacement.

Check the 135-180V from the high voltage generator. Set it at 145V for the time being, that's with the pot in the middle position.

You can either connect your own tubes with sockets, cabling and so on, or use the IN17 board with IN17 tubes. The IN17 board can be mounted in two ways, normal or upside down. You can also use wires between the main board and adapter, and put the IN17 adapter board at an angle. The UNIV-6-IN17 kit comes with 10 white LED's. I've added a couple of spare LED's in case one or two look less bright. Be careful with soldering LED's, they are quite sensitive to overheating.

Once you got some tubes connected, everything should work. Remember that this is a multiplexed driven design. One single tube with an internal short may cause all tubes to display multiple digits at the same time. If possible, check your tubes first to make sure they are okay. I also recommend connecting 1 tube first, check it, then connect a second tube, check it again, and so on.

If you are out of luck, and it doesn't work and you can't find what is wrong, just send me an email at [support@franktechniek.nl](mailto:support@franktechniek.nl)

Bill of Material for UNIV-6-V1, MAIN BOARD

USED	PART TYPE	DESIGNATOR	DESCRIPTION
1	120	R101	RESISTOR SFR16
1	330	R41	RESISTOR SFR16
6	2K7	R7-R12	RESISTOR SFR16
8	4K7	R1-R6	RESISTOR SFR16
		R43,R50	
4	10K	R103,R104	RESISTOR SFR16
		R107,R111	
1	22K	R200	RESISTOR SFR16
19	47K	R19-R24	RESISTOR SFR16
		R28-R39	
		R201	
6	470K	R13-R18	RESISTOR SFR16
1	680K	R42	RESISTOR SFR16
2	22P	C103 C104	CAPACITOR
1	470P	C3	CAPACITOR
5	100N	C4,C101	CAPACITOR
		C102,C107	
		C110	
1	DC SOCKET	X102	DC SOCKET 2.5MM
1	1N4002	D101	RECTIFIER DIODE
1	78L05	IC102	5V REGULATOR
1	100U/16V	C108	CAPACITOR
2	100U/35V	C1,C1B	CAPACITOR

FIRST CHECK IF +5V OKAY, THEN PROCEED...

1	BYV27	D3	DIODE
12	1N4148	D200-D210	ANTIGHOSTING DIODE
		D4	DIODE
1	IC SOCKET 28 PIN	IC101	SDIP28-SOCKET
18	MPSA42	T7-T24	TRANSISTOR NPN
1	OSCILLATOR-DIP14	IC103	18.1818 MHz OSCILLATOR
2	BC556	T27 T28	TRANSISTOR PNP
6	MPSA92	T1-T6	TRANSISTOR PNP
1	MC34063A	IC1	IC SWITCHER
1	2u2/350V	C2	HIGH VOLTAGE CAPACITOR
1	330uH	L1	INDUCTOR
1	PCB-SWITCH	S1	SWITCH
1	2K5	P1	HIGH VOLTAGE ADJUST
1	IRF740	T26	MOSFET

FIRST CHECK IF 135V-180V HIGH VOLTAGE OKAY, THEN PROCEED...

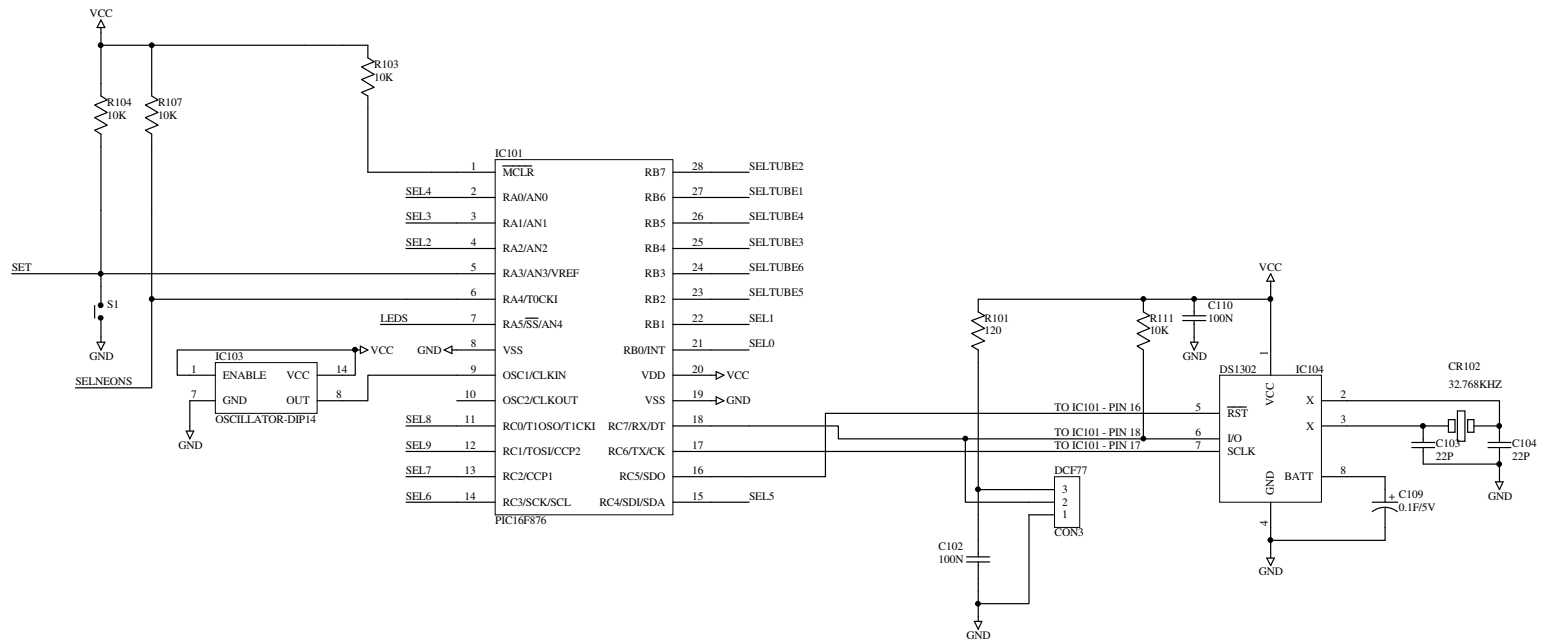
1	PIC16F876	IC101	PIC16F876 PROGRAMMED
1	PRINTED CIRCUIT BOARD		
4	HEX STUDS DI5MM		
1	SCREW M3x8		
5	NUTS M3		
1	DC PLUG 2.5MM		

Bill of Material for UNIV-6-V1, RTC OPTION

USED	PART TYPE	DESIGNATOR	DESCRIPTION
1	0.1F/5V	C109	SUPERCAP
1	32.768KHZ	CR102	32768 HZ RTC CRYSTAL
1	DS1302	IC104	RTC CLOCK

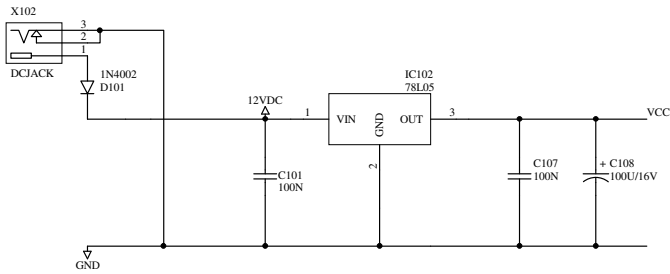
Bill of Material for UNIV-6-V1, IN17 ADAPTER BOARD

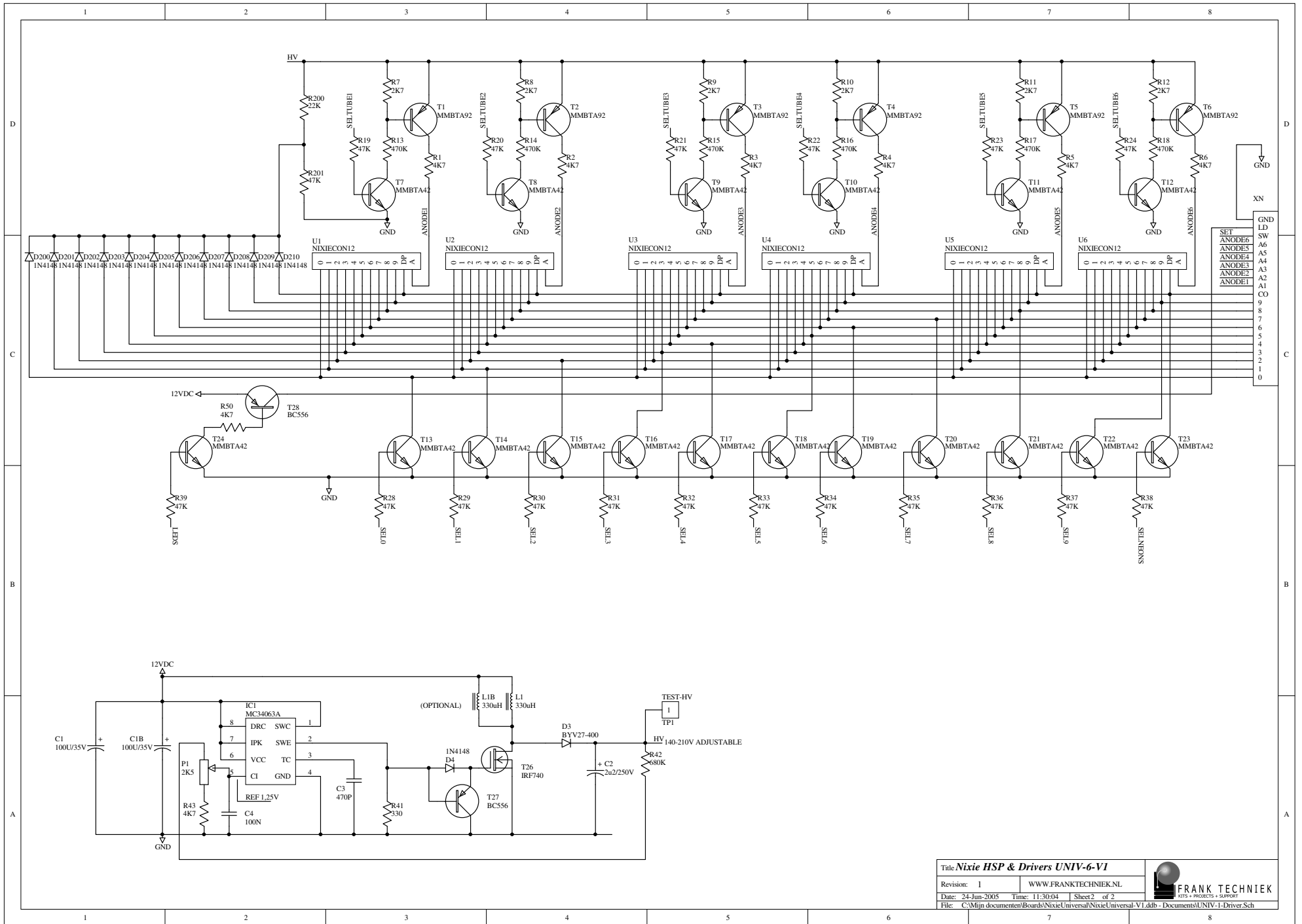
USED	PART TYPE	DESIGNATOR	DESCRIPTION
1	470	R403	RESISTOR SFR16
1	PCB-SWITCH	XS1	SWITCH
10	LED	LD1-LD6	WHITE 3MM LED
2	NEONBULB	TNL1 TNL2	NEONBULB
6	NIXIETUBE	TU1-TU6	NIXIE-IN17
2	100K	R401,R402	RESISTOR SFR16
1	SOCKET 10+10 WAY	U1	SOCKET
1	HEADER 10+10 WAY	XTU OR XT2	PIN HEADER
1	PRINTED CIRCUIT BOARD		
2	SPACERS FOR NEONBULBS		
2	HEX STUDS DI5MM		
4	HEX STUDS 12MM		
4	SCREW M3x8		



CONRAD MODULE 641138 INCLUDING ANTENNA  
 ALWAYS PLACE DCF77 RECEIVER AT 1 METER DISTANCE AWAY FROM CLOCK ! TYPICALLY, THE RTC CAN RUN FOR 2 DAYS WITHOUT POWER  
 CLOCK MAY GAIN OR LOOSE A SECOND IN BACKUP MODE

RTC CLOCK OPTION





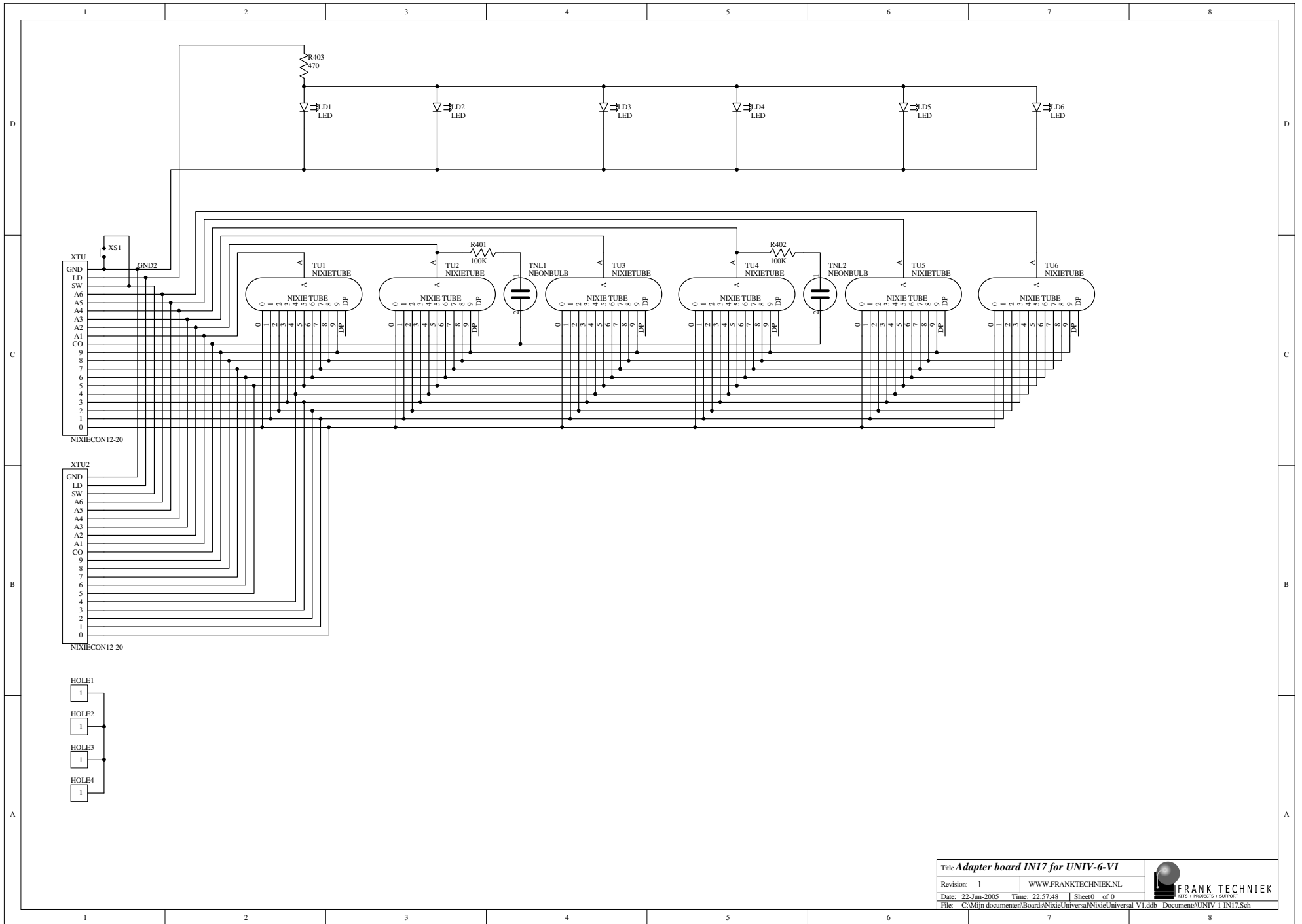
Title: **Nixie HSP & Drivers UNIV-6-V1**

Revision: 1 WWW.FRANKTECHNIEK.NL

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Title: **Adapter board IN17 for UNIV-6-V1**

Revision: 1 | WWW.FRANKTECHNIEK.NL

Date: 22-Jun-2005 | Time: 22:57:48 | Sheet 0 of 0

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