

# A tari - K eyboard - I nterface

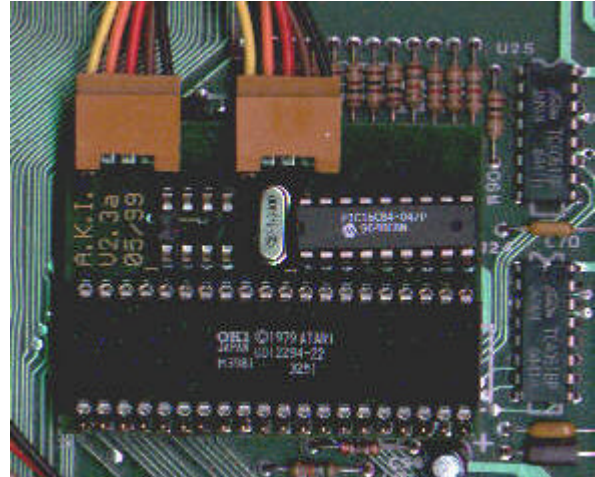
## Connect a PC-Keyboard to your ATARI 800/130!



- all common PC Keyboards (MF2 Standard) can be used
- 99% ATARI-compatible
- several keyboard layouts (languages)
- simple to install, no tuning
- ATARI keyboard can be used at the same time
- macro memory for up to 60 keystrokes, will be retained after power off
- AKI software can be updated

### New professionally manufactured board now available !

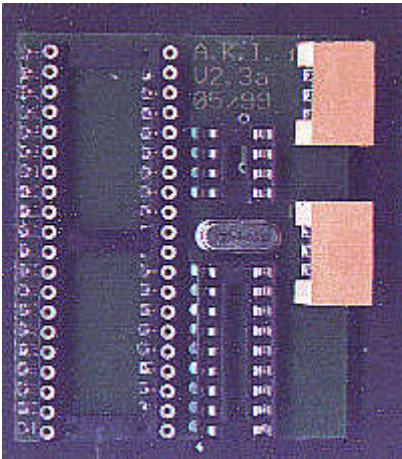
- No more soldering on the POKEY (only if POKEY is socketed)
- passive components in SMD package
- no small SMDs, so it can be soldered by hand
- it can be placed inside the shield
- most connections are plug in, only 5 soldering points
- socket for optinal macro EEPROM (up to 8KByte)



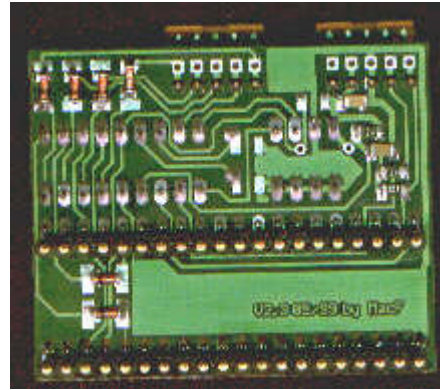
### 1. What is an AKI?

AKI is a small interface platine needed to connect the ATARI 800XL/130XE with any common PC-AT-keyboard (also Windows 95 keyboards). The old ATARI keyboard will be functional at the same time. The AKI interface and the 5 pin DIN connector / or PS2 connector are installed inside the ATARI. Its simple to install with very little soldering. The interface replaces the Pokey chip on the motherboard and then in turn the Pokey is placed in the socket on the interface , therefore the connection is very solid. AKI is 99% software compatible because it is simply parallel switched to the old keyboard. The POKEY chip will not be able to detect the difference between the signals. The AKI CPU can be updated with new firmware\*

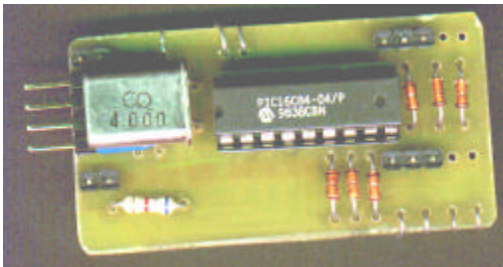
\* The PIC must be placed into a PIC programmer device, programming software will also be required.



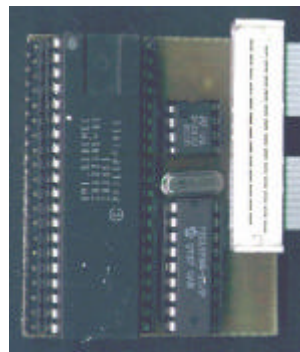
AKI component side (new layout)



AKI solder side (new layout)



One of the first attempts at the AKI hardware :-)



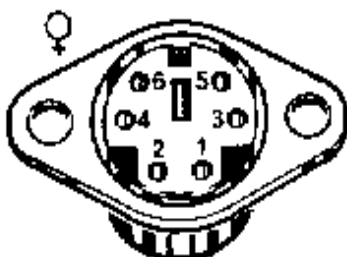
handmade board of the new layout with POKEY, EEPROM and PIC. Some SMDs are on the soldering layer

## 2. Build in

First, before you start, you will need a PC-keyboard. They are very cheap right now. If you want to use an ergonomic cherry keyboard, you can do this also :-). Look for 101/102 keys and MF2 standard. 5 pin DIN and PS2 can be used. Newbies should use the DIN connector because the PS2 connector is a little more difficult to solder.

All work should be done when the ATARI is unplugged and turned off. Also a basic electronic tool set should be available (theres no need for an oscilloscope etc.).

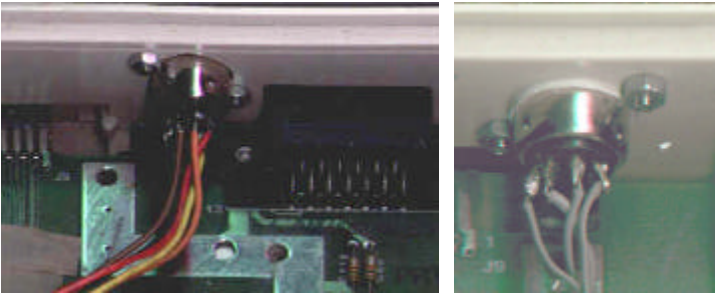
### PS2-Tastatur 6-pol. Buchse



1 DATA  
2 n.c.  
3 GND  
4 +5V  
5 CLK  
6 n.c.

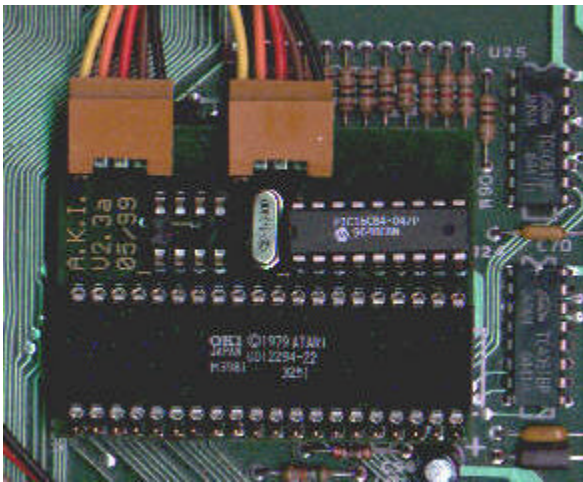






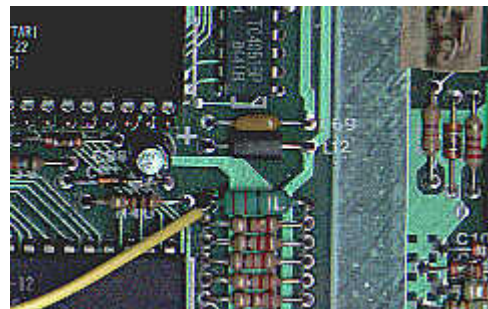
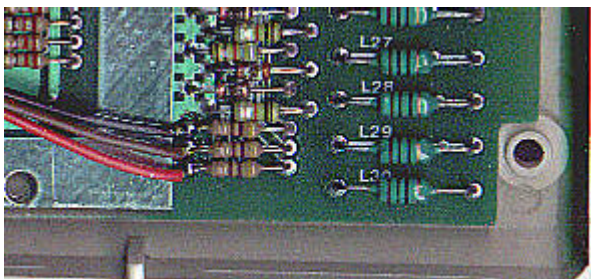
can kill the PC keyboard. A swapping of the datalines will have no destroying effect (normally :-)).

The figure shows how the 5 pin DIN connector was mounted in an ATARI 800XL. Its placed between the SIO connector and the bus expansion port.



The AKI interface is placed 'up packed' to the POKEY chip (10 soldering positions). It will be nice to have an ATARI with sockets for the chips !!! Pull out the POKEY, plug in the AKI and place the POKEY back. If your POKEY has no socket there are 3 options: The first one, you solder the AKI directly onto the Pokey, this is something complicated cause there's not much space to solder. The second is you solder a socket on the POKEY, but this is a lot of work and should only be done by professionals. The third option is you solder a 40 pin carrier up to the PIC and plug the AKI inside. In this case you must put a hole in the ground shield (the ATARI can also work without the shield, but there can be reduced video picture quality). Eventually, a capacitor, right under the POKEY must be layed down.

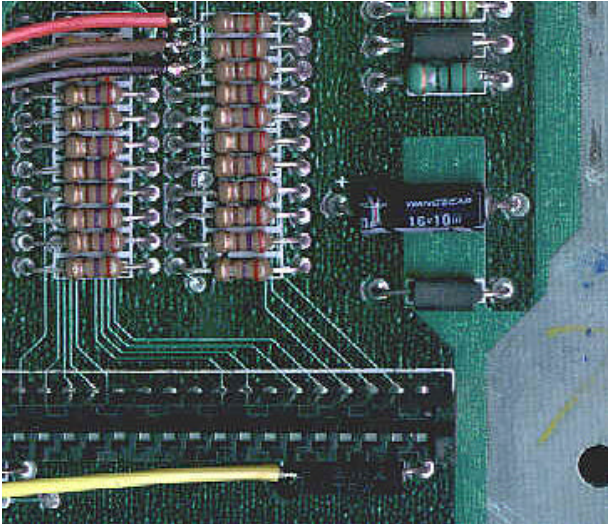
Insertation of the first prototype in an ATARI 800XL.



Connecto  
of STAR'  
SELECT  
and  
OPTION  
in an  
ATARI  
800 XL  
(the 3  
resistors  
are right  
down  
outside th  
ground  
shield).

Connecti  
RESET  
line (ye),  
right und

the AKI.



Connecton of START, SELECT and OPTION in ATARI XE computers.

Connecting RESET line (ye), right under the keyboard connector.

Signal definition	ATARI 800XL / 130XE
START	left side from R134
SELECT	left side from R135
OPTION	left side from R136
RESET	left side from L14

Now, a connection to a switchable RAM-Disc can also be done. This can not be specified without knowing of the inserted RAM-Disc technology, see section "AKI and RAM Extensions" for more details.

Now turn on your ATARI, test the function of the old ATARI keyboard. If it works, plug in the PC keyboard and start ... You can start the ATARI built in keyboard test, but this will not be a good indicator to test the PC keyboard. If only one key doesn't work, there is a defect in the PC keyboard. If nothing works the whole installation must be checked. Lastly, after pulling out the PIC of the AKI, the old ATARI keyboard should work.

Some tips for troubleshooting:

- First: on a selfmade platine all connections must be tested for **micro breaks** and **bridges**. Check the **polarity of the diodes!** The '**nose**' of the **PIC** must be placed in the direction of the **keyboard connector!**
- Check the supply voltage **directly between** PIN 5 (GND) and PIN 14(+5V), there must be 5V +-10%, if this is incorrect check the connections to the POKEY
- On the keyboard connector, 5V must be present, also. On the PC keyboard, after switching on, the three lamps should flash on (PC keyboard selftest). If the supply is ok, and theres no flashing, the PC keyboard is defective or it is a very old one.
- Check RESET PIN 4 with a logictester. There must be a hi, if not check R1 and C1 for bad connections.
- On PIN 15 (16) there must be pulses (2 / 4 MHz), if not, check the **crystal** and **PIC CPU** (is

the **PIC correctly programmed ?**).

- On PIN 12 and 13 there must be frequencies with 31KHz and 500Hz, if not test the **connections to the POKEY**.
- When keypressing on the PC keyboard, PIN 2 and 3 must have a pulse raster, output PINS 10 and 11 must have a pulse also, if not check the datalines to the keyboard (**CLK and DATA swapped ???**, is the **PIC correctly programmed**, PIC defective, **polarity of diodes** correct?)
- On pressing F5, F6, F7, F8 (also SHIFT-F8) on PIC pins 6,7,8,9,17 a static low must appear, on PIN 17 (only RAMDISC) the signal must change after RESET / SH-RESET (is the **PIC correctly programmed ?**)
- Now check for the same signals on (START, SELCT, OPTION, RESET), if there's no signal, then check **diodes** and its **polarity**.

### 3. Keyboardlayout

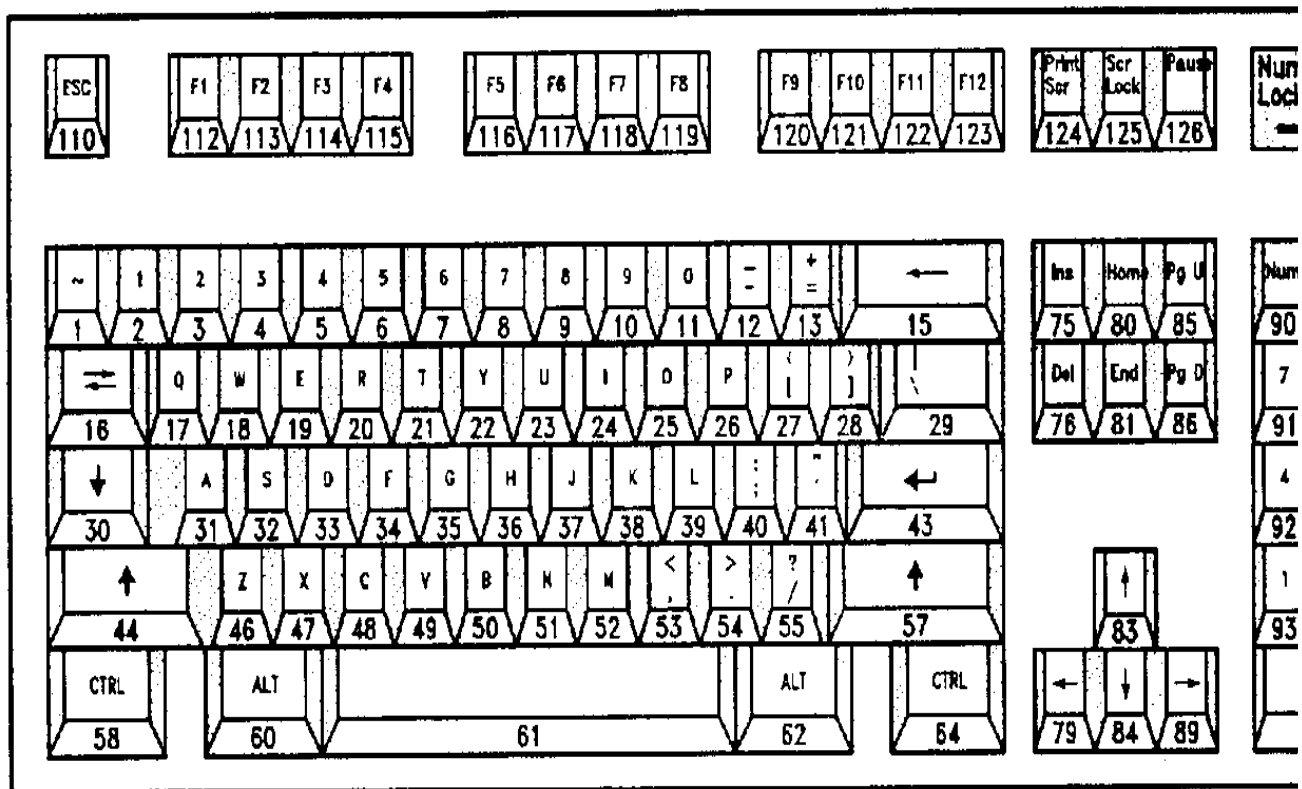


fig. 8: PC-MF2-standardkeyboard (english Version, keys 42 and 45 added on german layout)

The PC-keyboard layout is almost identical with the printed symbols on the keys with the german / english (american) keyboard. The english layout is mostly common with the original ATARI layout, maybe some german PC users prefer her layout.

Keynumbers with several language functions: 3,7,8,9,10,11,12,13,22,27,28,40,41,42,45,46,53,54,55.

Here are the special funtioin keys:

PC key	ATARI-Emulation

CTRL-ALT-DEL	RESET
F1	ATARI (1200er) F1 key* , also SHIFT / CTRL
F2	ATARI (1200er) F2 key* , also SHIFT / CTRL
F3	ATARI (1200er) F3 key* , also SHIFT / CTRL
F4	ATARI (1200er) F4 key* , also SHIFT / CTRL
F5	START
F6	SELECT
F7	OPTION
F8	RESET
F9	free
F10	HELP
F11	INVERS
F12	BREAK
ALT-F9	sending macro 1
ALT-F10	sending macro 2
ALT-F11	sending macro 3
ALT-F12	sending macro 4
CTRL-ALT-F9	recording macro 1 (max. 15 keystrokes)
CTRL-ALT-F10	recording macro 2 (max. 15 keystrokes)
CTRL-ALT-F11	recording macro 3 (max. 15 keystrokes)
CTRL-ALT-F12	recording macro 4 (max. 15 keystrokes)
ALT-F1	sending AKI version number
ALT-F2	sending fixed macro 'POKE' (for a faster keyboard in BASIC)
ALT-F3	switching between german and english keyboard layout (stays after power off)
ALT-F4	stop macro recording

\* there are some ATARI models which have keys F1...F4. These keys are supported from the

ATARI OS (also 800/130 OS!) and have following functions:

F1	Cursor up
F2	Cursor down
F3	Cursor left
F4	Cursor right
SHIFT-F1	goto top of screen (HOME)
SHIFT-F2	goto end of line
SHIFT-F3	goto start of line
SHIFT-F4	goto bottom of screen
CTRL-F1	switchs off keyboard until CTRL-F1 is pressed (Attention trap!!!)
CTRL-F2	switchs off screen until any key is pressed
CTRL-F3	toggles keyboard click
CTRL-F4	toggles charset (graphic / international)

#### 4. Software compatibility

Like I said above, AKI is 99% software compatible, because the ATARI is not able to detect the difference between the two keyboards. Here are some exceptions (the 1 percent):

- The keys START, SELECT, OPTION, RESET, also BREAK, SHIFT and CONTROL, are sampled in combination from the atari. A standard PC keyboard can't sample combination codes\*. Pressing more than one of these keys at the same time, under several circumstances can't be detected. The AKI user will not be able to press START, SELECT, OPTION and RESET at the same time (F5, F6, F7, F8). On a tested FUJITSU N860-8725-T853 and a NCR H0150-STD1-12, START, OPTION and RESET can't be pressed at the same time (is there anybody working with cassette drive and an AKI ?). Combinations from not more then 2 keys are working correctly. For other crazy keystrokes use the ATARI keyboard. Im not sure that the 100% compatible TRANSKEY can handle these situations :-).
- Through the several language keyboard layouts it can be that some chars are not reachable. Mainly this is a concern for users of the german layout and an english keyboard hardware. On the english hardware the key 45 is not present, therefore a '|' cant be reached under german software layout. Other problems can occur on other hardware/software combinations.

\* If it comes to a ghosting effect (the keyboard controller detects keys that are not stroked) through pressing more than two keys at the same time, the keys they are first scanned (in matrix order!) are guilty. This can be readed in the technical documents for the keyboards.

- Keyboard macros are sent by the AKI. In the actual version the sending speed is not configureable, it can be that slow ATARI programs ignore some keystrokes sent by macros.

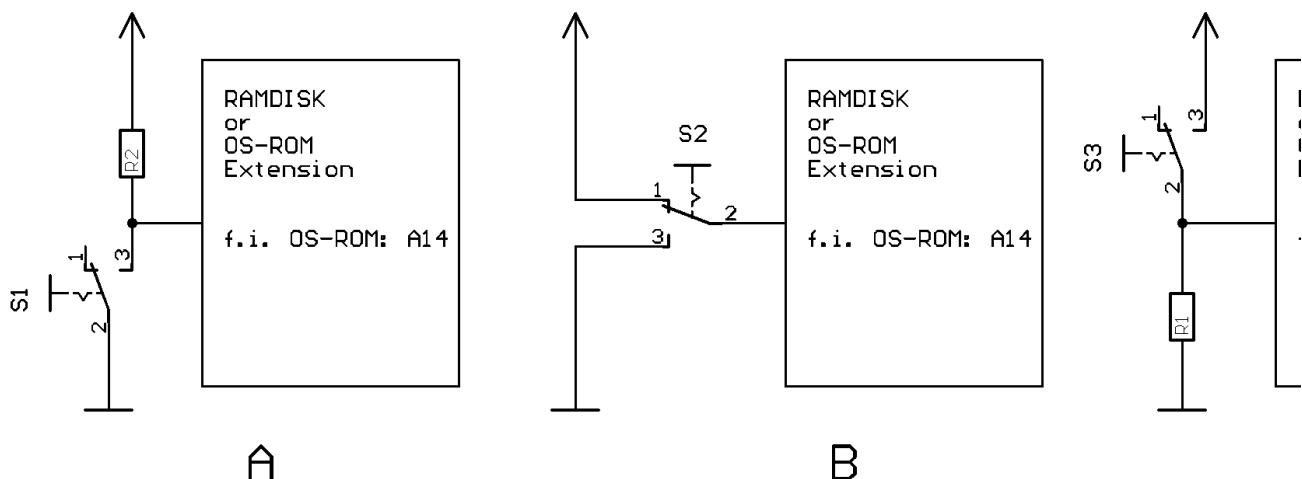


The macro sending speed is tested in the standard BASIC there its ok. Perhaps in a new software version, there will be an option to change macro sending speed.

Another interesting effect is occuring when two keys are pressed very quickly. The ATARI-OS is not able to detect 2 or more keys in 100ms. Now with a new keyboard you can press the keys quicker, therefore it can be that some strokes are ignored. (for instance LDA > LA or STA > SA). Now AKI software caches 2 keystrokes, so this effect will be reduced.

## 5. AKI and RAM-Expansions

There is an output on the AKI interface, especially designed to switch RAM-Disc systems with a bank switching option. The 2 ATARI switching is very easy with the AKI. Press RESET for the first one, SH-RESET for the second. The output is switched some time after activating the RESET signal, so a sure switching is guaranteed. There are several extensions for the ATARI available, so I cant give an exact description, on how to do it. Mostly the OS / RAM selection is done by a mechanical switch. The following methods are common:



The AKI output has a so called 'open collector' therefore not all variants are not crucial to connect. Variant "A" gives no problem, the AKI switching output can be directly connected to the input of the extension (take care that the resistor dimension is >1KOhm). **Dont connect to variant B or C, or damage to the PIC can result.** If you have variant B or C in your ATARI, rewire it to variant A, the switching ability stays the same. Now you can contact your AKI output additionally.

## 6. Technical infos

The AKI is a one chip processor system with a PIC processor with 64 byte internal EEPROM. The hardware is mostly the standard application for the PIC processor. The PIC is receiving the serial AT keyboard codes, interpreting it and simulate a keystroke in the ATARI keyboard matrix. The SHIFT and CONTROL keys are 1:1 software connected. The supply current is typically 20mA and the PC keyboard needs 70mA-160mA, and its no problem for the ATARI power supply.

[Schematic \(GIF, 30KByte, 300dpi\)](#)

[Layout \(GIF, 12KByte, 300dpi\)](#), [new SMD Layout \(GIF, 20KByte, 300dpi\)](#)

[Hexfile for PIC-Programming, actual Version! \(Intellec8, 6KByte\)](#)

The following components are needed:

- a programmed PIC in a DIL package (4MHz version), a socket will be recommended for updates
- 6 small signal diodes, for instance 1N4148
- 1 crystal (approx. 4MHz)
- R1 resistor 100KOhm
- R2 resistor 2,2 ... 10KOhm
- C1 capacitor 100nF
- 4 p PF connector, 2.54 mm (1/10")
- 1 platine

Some information for the insider (sorry, only in german this time):

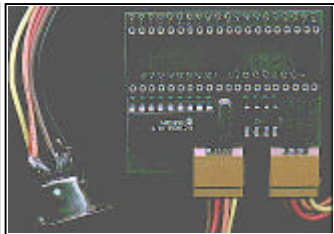
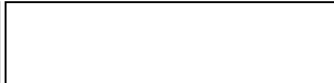
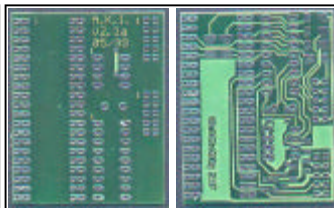
[Funktionsweise von AKI, Matrixcodes \(Scancodes\) der ATARI-Tastatur ... u.v.m ! \(TXT, 7KByte\)](#)

[Liste mit allen bisher durchgeführten Änderungen \(Bugreport\) !](#)

## 7. Selling, Handling, Quality and further development

This is a hobby project of mine, that is free available for all ATARI freaks. This document and all linked files are '**Freeware**' and can be copied free or for a selfcost price. The copying of CAD and assembler sourcefiles is **not allowed**. Reproducing the hardware is free for single boards and for private/friends. The reproducing for commercial is **not allowed**.

Please contact me for availability / delivery outside germany [MacFalkner@aol.com](mailto:MacFalkner@aol.com)

AKI complete and tested, incl. all wires and plugs		<b>30,- Euro/US\$*</b>
AKI PIC programmed with the newest software version		<b>15,- Euro/US\$*</b>
AKI board (empty), double sided, solderstopmask		<b>15,- Euro/US\$*</b>

**\* all prices without P+S.**

I would be grateful for tips to upgrade the PIC software or reports of bugs found, or contact me if you have some questions: [MacFalkner@aol.com](mailto:MacFalkner@aol.com)

**Sources:**

- SAMS computerfacts (ATARI schematics), copies from ABBUC-Bauplanservice, [ABBUC-HOME](#)
- Der ATARI mit IBM-Tastatur (TRANSKEY), copies from ABBUC-Bauplanservice, [ABBUC-HOME](#)
- PC-Tastatur am ATARI XL (description of the ATARI matrixcodes), copie from ABBUC-Bauplanservice, [ABBUC-HOME](#)
- National Semiconductor: Application Note 734: 'MF2 Compatible Keyboard With COP8 Microcontrollers', [NS-HOME](#)
- Motorola: Application Note 1723: 'Interfacing MC68HC05 Microcontrollers to the IBM AT Keyboard Interface', [MOTOROLA-SEMICONDUCTOR-HOME](#)
- PIC16C84 from Microchip, [MICROCHIP-HOME](#)

**Many thanks to:**

- Burkhard Rau (Media-Inside) for beta test and Nörgeln,
  - the A.B.B.U.C. - Bauplanservice for the technical documents,
  - Erhard 'Floppy-Doc' Pütz for the betatest, the infos about TRANSKEY, and the inspiration to make this side!.
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**Bugreport:**

- **30.04.1998** - PIC-program: <END> and <HOME> key new translated, error on <F4> eliminated, SHIFT isnt hängig anymore in mixed keyboard mode (ATARI & PC keyboard same time) new release is **V1.0B**.
  - **03.07.1998** - HOME, INSERT and DELETE work with SH / CTRL like ATARI wise. The keys +,-,=,\* are generated on pressing CTRL and one of the cursor keys, some ATARI programmes use this for cursor moving. The DEL key works like on pc, emulates ATARI-CTRL-BS. The positioning keys on cursor section (NUMLOCK deactivated) work like on pc too. **Thanks to Erhard Pütz and Burkhard Rau for testing and the impulses for the changes above.** New release is **V1.0C**.
  - **03.07.1998** - PS2 plug added.
  - **06.11.1998** - The Ramdisc now is switched with CTRL-F8, not SHIFT-F8 anymore, now the IDE-Interface-Software works better, ALTGR-Q creates @, the 'hanging bug' (incorrect timeout) is removed (i hope so :-)), only pressing the SHIFT key is now send to the ATARI immediately, now the ATARI is able to test for pressing SHIFT key. **Thanks to Stefan Birmans for testing and the impulses for the changes above.** New release is **V1.1A**.
  - **10.11.1998** - New Layout released, additional memory for macros added, but pic software doesnt support this this time.
  - **18.05.1999** - Professionell maded board available !
  - **24.06.1999** - Some hints for connecting to ramdisks and OS extensions added, some new pictures. **Thanks to Stephan Pollok for testing and the impulses for the changes above.**
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