

# K4S Flash Language

## Contents

The K4S Flash language kit contains

- 1 off 29F040 Flash memory programed with the latest K4S Language version
- 1 off K4 Language Release Note
- 2 off Jump links
- These instructions

## Making application ROMs

The K4S uses the AMD 29F040 Flash memory to create K4S application ROMs. To do this you will need:

*This Flash Language Kit*

*A K4S with 128K of RAM (Product Code 5521)*

*A knife or other tool to cut the link on the bottom of the K4S*

### Converting the K4S to Flash

- Make sure any program or data in the K4S is safely backed up somewhere.
- Remove any existing ROM from the K4S's ROM socket.
- Turn over the K4S and cut the thin track linking pins 1 & 2 of LK1.
- Connect pins 2 & 3 of LK1 and pins 1 & 2 of LK2 using the jumpers in the Flash kit.
- Plug the Flash memory into the K4S.

The K4S should respond normally when turned on.

*Note that connecting pins 1 & 2 of LK2 enables writing to the Flash device.*

### Putting your application into Flash

- Having converted your K4S to Flash, reset the K4S in program mode, clearing the memory. The K4S should report 96K of expansion RAM.
- Make sure any program or data in the K4S is safely backed up somewhere.
- To clear out any existing application type

```
system.Protect(32)
```

The K4S will give the following report.

```
Erasing...[3S]done
- Clearing memory and restarting.
RAM cleared - 32K of main RAM and 96K of expansion RAM
found.
```

The [3] indicates a 3 second delay. If the K4S restarts before the full report is given then it is likely that the Flash memory is not write-enabled.

- Load your application program in the normal way (See the *Designing with the Scorpion K4*, page 53).

- To 'ROM' the application type

```
System.Protect(20)
```

The K4S will respond with the following report.

```
Copying application into ROM...[17S]FLASH programmed
- Clearing memory and restarting.
RAM cleared - 32K of main RAM and 96K of expansion RAM
found.
Expansion ROM loaded - any changes will be lost at the
next startup!
```

The application program is now in the K4S's Flash memory. To completely disable further alteration or erasure of the Flash memory you can remove the jumper from LK2.

### Making your application 'Secure'

If you don't want your application code to be listable then using `System.Protect(22)` will create an unlistable version of your application. The K4S should clear its memory and restart reporting that the application is secured. It will also ask if the application should be erased. Don't respond with a 'Y' else the K4S will immediately erase the application again!

### Removing a 'Secure' Application

- Make sure link LK2 has pins 1 & 2 linked to write enable the Flash memory.
- Put the K4S into program mode.
- Answer the K4S's normal 'Clear Memory Y/N/S ?' message with 'S' (just in case the application's startup doesn't return).
- Answer the Erase? prompt with 'Y'.
- The K4S should erase the application as with `System.Protect(32)` above.

### Making an application EPROM

As Flash devices are currently expensive you may want to copy the frozen application program into EPROM (either 256K or 512K). To do this you will need an EPROM programmer that recognises both the AMD 29F040 and the EPROM.

*Note that if your EPROM programmer does not recognise the AMD 29F040 then it can be made to look like a normal EPROM by creating yourself a special socket that swaps pins 1 and 31*

- Read the bottom 256K bytes of the Flash device into the programmer's memory.
- Set up the programmer for the EPROM and burn in the data. If you are using a 512K EPROM, burn the data into the UPPER 256K bytes.
- Plug the new application EPROM into a K4S. Make sure pins 1 & 2 are connected on LK1 and LK2 has no links (these are the factory settings on a new K4S).

*Suitable EPROMs for use in the K4S include: 27C2001, 27C4001. Devices must be 150nS or faster.*

### Link Settings

The table below summarises the different link settings on the K4S.

ROM type	Mode	LK1	LK2
EPROM*	-	1-2	OPEN
FLASH	WRITE ENABLED	2-3	1-2
FLASH	WRITE PROTECTED	2-3	OPEN

\* This is the factory setting before the copper link on LK1 is cut.