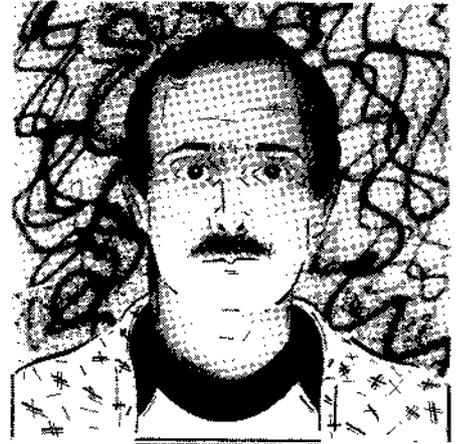


# EXPANSION FACTOR

## What does the Plus-1 add to the Elk?

### Bruce Smith makes the connection



**P**LUS-1, the long-awaited Acorn interface for the Electron, has arrived, and without any of the delays that beset the computer industry these days. It adds the following capabilities to the Elk:

- Two cartridge slots for ROM-based software.
- A parallel printer port.
- Four eight bit analogue-to-digital input channels.

Aesthetically the interface is without frills but it complements the Electron to provide a neat and professional unit. Connecting the Plus-1 to the Elk is extremely simple and no difficulty should be encountered.

First, the plastic cover on the expansion bus must be removed to expose the edge connector. With both units upside-down, the protruding front edge of the interface is pushed over the expansion bus and into the recess at the rear underside of the computer.

Fixing the Plus-1 to the Elk is done with the aid of a coin! Two large bolts locate into the threaded holes in the Elk's case. The connection is firm and only a slight flexing is possible, so no problems with data corruption should be encountered. Once in place, the Plus-1 adds another 100 millimetres (4in) to the depth of the computer.

Externally there are four ports, two for the cartridge software and one each for the printer and ADC connector. Internally the main printed circuit board is more spaciouly laid out than previous Acorn boards. Software for the Centronics printer interface, the ADC drivers and for downloading cartridge software were contained within an EPROM version 1.00 on the review model. Apart from the ADC chip, an ADC0844, and the OS EPROM, all chips are soldered directly to the main PCB.

The ROM cartridges can provide a variety of applications, including games, utilities and paged languages. Supplied with the review model were the six cartridges currently available: *Snapper*, *Hopper*, *Starship Command*, *Tree of Knowledge*, *Countdown to Doom* and *Lisp*.

Two sprung flaps on the rear mark the cartridge ports. A cartridge is inserted through a flap and into the

socket at the base. If two cartridges are inserted the nearer of the two has the higher priority and will be selected.

Once in position cartridge software is Chained simply by pressing the Break key, which boots the first file on the cartridge. Language ROM cartridges – Lisp in the review bundle—are switched in at &8000 and therefore replace Basic, which can be reselected by removing the language cartridge or typing \*BASIC.

The filing system used by the ROM cartridge system is in fact the \*ROM filing system (RFS) as used on the Beeb, making it a simple task for commercial establishments to blow their own cartridge ROMs. \*CAT, LOAD and CHAIN are all available with the RFS.

The ROM cartridges themselves are neat, slightly smaller than a cassette and the plug-in portion is a PCB edge connector. An interesting aspect of their design is that the silicon itself has been bonded onto the main PCB and coated with plastic to protect it, thereby doing away with the more expensive standard ROM packaging.

The printer port is a standard Centronics compatible parallel interface. CTRL B (VDU2) and CTRL C (VDU3) 'switch' the printer on and off for print

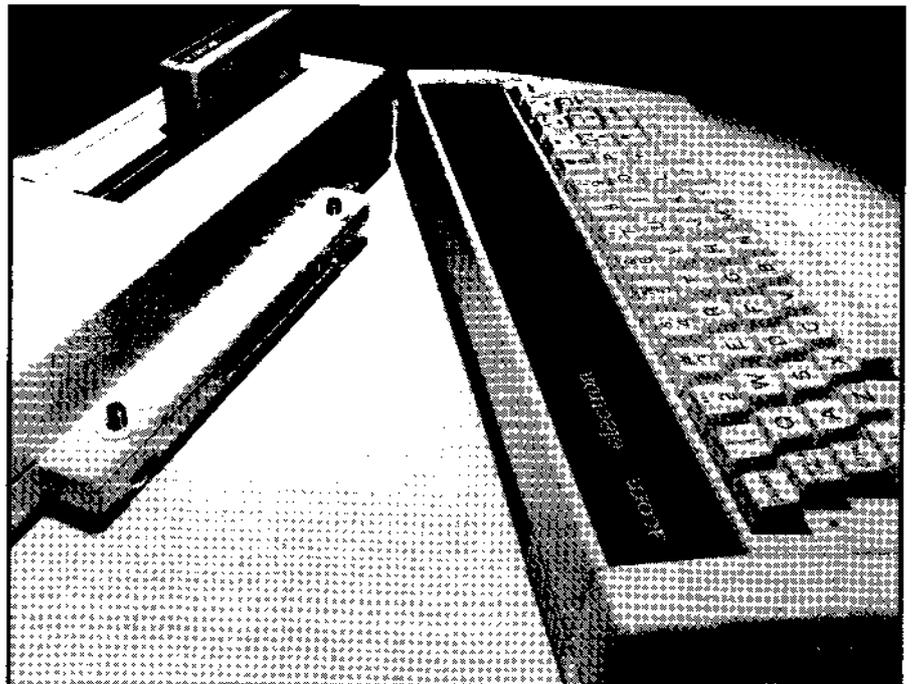
ing purposes, while VDU1 will send control characters to the printer. I had no problem using my Star Delta, and my screen dumps performed correctly. Several \*FX commands are included within the Plus-1 OS to help matters.

The most obvious use of the analogue interface for the home user is for connecting a joystick. Most of the games ROM cartridges are joystick-compatible and my Voltmace stick performed as expected, and any joystick with an impedance of at least 10 ohms would be suitable.

The ADC channels can be read from Basic using the ADVAL command, while \*FX16 allows channel selections to be made. The analogue port also allows various peripherals to be interfaced to the Electron, provided they are electrically compatible.

Full details on using the ADC and printer ports and on the cartridges are provided in the Plus-1 *User Guide*. The 22-page spiral-bound volume also contains lucid accounts of connecting the Plus-1 to the Elk.

The price of the Plus-1 – £59 – represents good value for a very useful unit. Acorn has got its sums right with the Plus-1, and it must be the first serious buy for an Electron owner.



The Plus-1's edge connector is simply pushed into the back of the Electron and bolted on