

THE WORKABOUT MX

GENERAL TECHNICAL INFORMATION

1.1 The Workabout Basics

The *Workabout mx* has been designed to be integrated into any computer system and to meet any application requirement: assisting with the making of deliveries, taking of orders, collecting or distributing information, servicing equipment, and so on.

Every element of the hardware is configurable, from the plug-in megabyte-sized Solid State Disks, to the internal expansion slot for peripheral devices such as a serial port expansion card.

Equally important is the multi-tasking operating system with full graphics and windowing capability. Applications can make productive use of the various fonts and emphases available, and can even display and manipulate diagrams, maps, and pictures. The result: software applications that are highly informative and intuitive to use, and which consequently improve operator acceptance and efficiency.

The multi-tasking facilities - unique to the Psion ranges of handheld and pocket computers - significantly shorten software development times and greatly simplify otherwise complex issues ranging from the simultaneous monitoring of several peripherals through to sophisticated process control applications.

Additionally the *Workabout mx* has built-in programming tools for easy application development. These include both a Command Processor and a graphic user interface (the *System Screen*), a sophisticated program editor and translator, and communications software.

Switching on and off

The *Workabout mx* can be switched on by means of the yellow On/Esc key, or off by means of the light grey Off key near the top left corner of its front face.

There is no need to "exit" programs before switching the *Workabout mx* off. When the *Workabout mx* is next switched on, all current programs continue from their previous state. The contents of the internal RAM memory is preserved throughout the period of being switched off, without any significant current being drawn in the meantime.

Switching on for the first time

Note that when a *Workabout mx* is switched on for the first time (or following a reset), it will go into the *Startup Shell*. This will normally run any *autoexec* file that is found on a *Startup SSD* that is found on any local drive. If such a file is not found, the Startup Shell displays the Psion logo with a copyright message, followed by a start-up message, as in the following illustration:



To select a system interface for development purposes, just press the Menu key. The Startup Shell's Special menu is then displayed.



The Special menu presents three options:

- Selecting the *Command processor* option starts the Command Processor. The *Workabout* in due course presents an `m>` prompt to indicate that its Command Processor is ready to receive commands, and that the current drive is M: (internal). The Command Processor accepts DOS-like commands.
- Selecting the *System screen* option starts the System Screen, displaying a set of icons that represent the built-in PIM applications. They are intended as **demonstration** application to show the quality of software that can be written for the *Workabout mx*.
- Selecting the *Restart shell* option runs the Startup Shell again. The machine then repeats the sequence of operations described above. This is only useful if you want to run a customised shell.

Startup SSD

A Startup SSD must contain a file with the file name *autoexec*. This may be a batch file with a file name extension of *.btf*, or it may be an executable program file with the file name extension *.img*, *.app*, *.opo* or *.opa*. If this is what is required, and you have a Startup SSD, insert the Startup SSD and press Enter as instructed. If the *autoexec* file is subsequently copied to *m:* the startup message will not be seen, because the *autoexec* file will be run immediately by the startup Shell.

1.2 The Basic Hardware

The *Workabout mx* is a member of the SIBO family of machines. This architecture is designed to minimise the size, weight and power consumption of the computer.

All aspects of the hardware of the *Workabout mx* have been designed with the following goals in mind:

- Portability.
- Robustness.
- Splashproof.
- Data security.
- Ease of use.
- Adaptability.
- Long battery life.
- Standards compliance.

Processor

The *Workabout mx* has an industry standard 80C86-compatible 16-bit processor, the NEC V30MX, that runs at a clock rate of 27.684MHz.

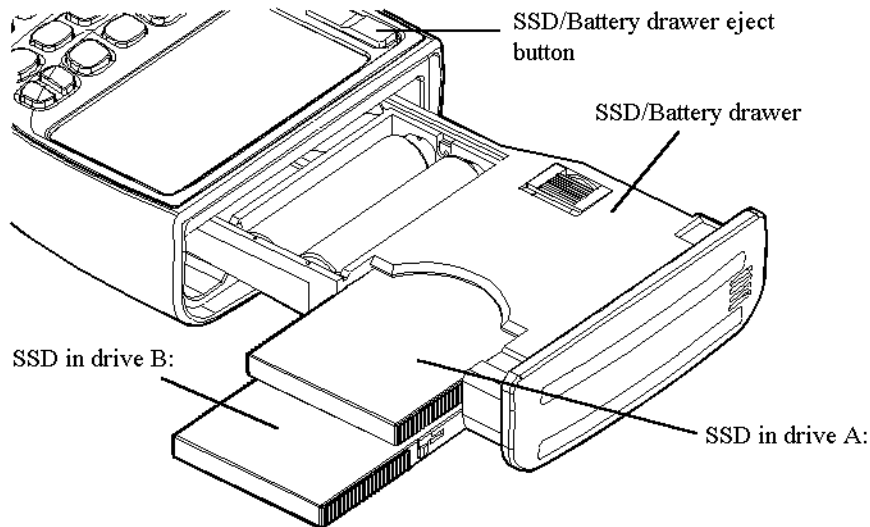
The *Workabout mx* also contains a number of proprietary-designed custom-built chips called *ASICs*, which are responsible for many of its more exclusive features.

Internal Memory / ROM

The internal RAM memory on a *Workabout mx* is 2MB and 2MB masked ROM

Solid State Disks (SSDs)

The standard *Workabout mx* has two solid state disk drives, which are the equivalent of disk drives on a PC. To access them, open the top cover by pressing the catch at the back. The drawer then slides out of the machine. SSDs can be inserted into the disk drives in the top right and the bottom right of the drawer.



SSDs should be inserted with their upper faces (displaying large writing) uppermost. If you try to insert them upside down, by accident, you will find they don't fit properly into their slots - so there is no risk of any untoward damage, (unless you try to force them). The SSD drive at the top of the *Workabout mx* drawer is drive A:, and that at the bottom is drive B:.

Expansion Slots

There is an expansion slot inside the bottom end of the *Workabout mx*. This can contain a wide variety of interface devices.

Sockets for the ports of these modules, (where fitted), are mounted as standard at the top end of the machine, above the screen. One socket may optionally be located on the left of the bottom end of the casing, below the keyboard.

These are factory fitted options, and it is not possible for the expansion module or port sockets to be exchanged "in the field". Retro-fitting of expansion modules and sockets is possible, however. Contact Psion for further details.

Communications Ports Identifiers

On the *Workabout mx*, the port names (e.g. TTY:A) depend on the way that the port is being used (e.g. RS232 or TTL).

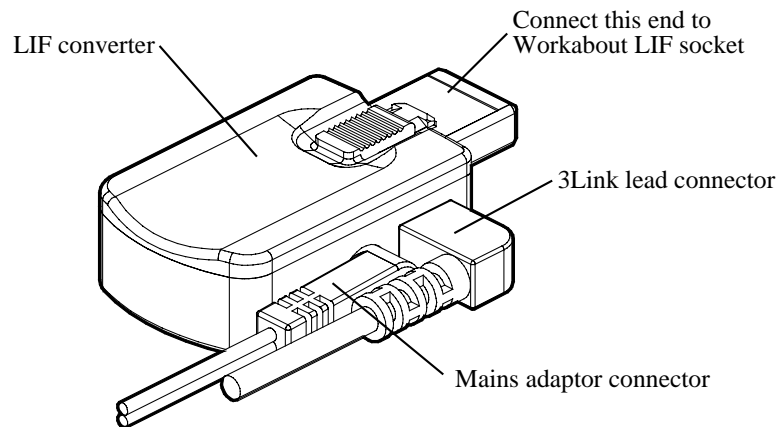
Port type	RS232	RS232 (Barcode variant)	RS232 (LIF)	TTL	Barcode	Inverted TTL
Port name	A	B	C	D	E	G
Possible position	Bottom left / top right	Top right	Bottom right	Top left	Top left	Top left

The Holster

A plastic holster is available for docking / storing the *Workabout mx* when it is not being used. It can be mounted on any convenient vertical surface. The holster incorporates positive latching to ensure that the *Workabout mx* is held reliably. A hand recess guarantees easy insertion and removal. It may be mounted in any suitable position.

Power Supply

The *Workabout mx* can be powered using a rechargeable nickel-cadmium or nickel metal hydride battery pack, standard AA batteries, or an optional mains adapter. The *Workabout mx* will not switch on if there is no power source, or if the batteries are too low. Power is needed to operate the *Workabout mx* and to maintain the data stored in internal memory. The storage of data on SSDs, however, doesn't rely on the main power source.



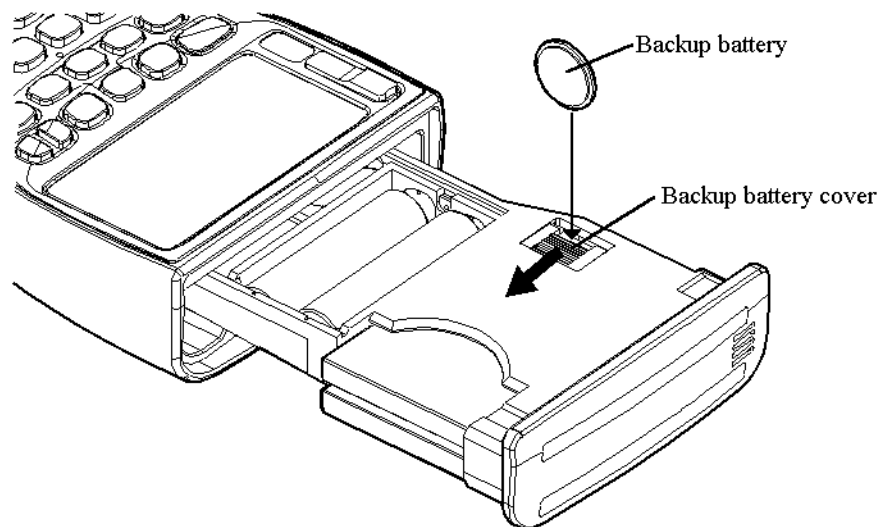
At the bottom of the machine to the right, below the keyboard, is a socket. Plug the cable from the mains adapter into the LIF Converter and then plug the LIF Converter into this socket. The green power indicator light will come on, (near the Del key). This light indicates that the *Workabout mx* is being powered by an external source, such as the mains adapter - even if the *Workabout mx* itself is not switched on.

(Please note – this is not the only method of powering the *Workabout mx* via the mains. You can use the Docking Station, Workabout Charging Station and Charger also)

The *Workabout mx* is also supplied with a small round lithium battery. This is the backup battery. It is essential because it keeps the internal memory secure if the main batteries are being changed. It should be fitted before the main batteries. However, the *Workabout mx* cannot be run using only the backup battery.

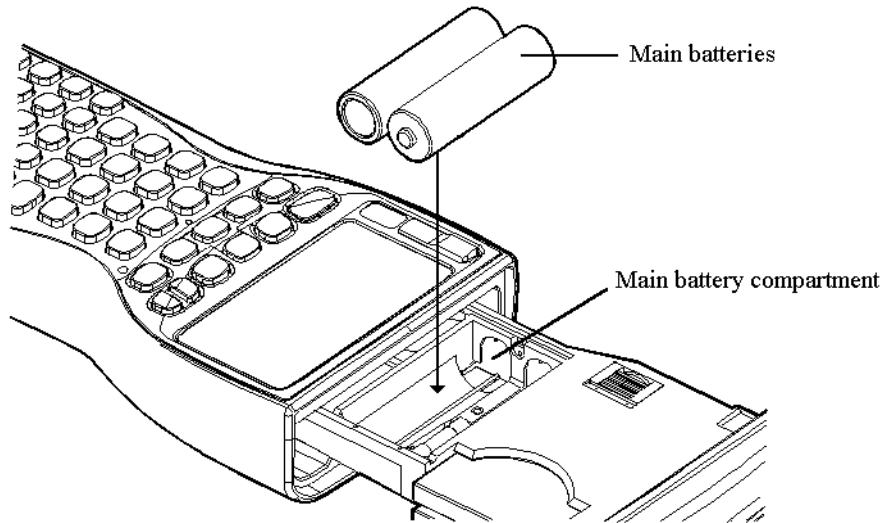
To see where to fit the backup battery, release the drawer at the top of the *Workabout mx* by pressing the drawer eject button at the back of the unit (as for SSDs). Pull out the drawer to reveal the backup battery cover in the top of the drawer, towards the left hand side.

The backup battery should last for approximately one year, provided the *Workabout mx* doesn't spend long periods with no other power supply. It is recommended that a new backup battery is fitted yearly. If the *Workabout mx* is left powered only by the backup battery, the battery will preserve the internal memory for approximately five days.



To fit a new backup battery, slide back the backup battery cover and remove the old battery. Insert the new battery so that the positive side of the battery faces left (towards the outer edge of the drawer). Slide back the backup battery cover.

The main batteries are also stored in the drawer of the *Workabout mx*, next to the two SSD drives. The main battery recess may contain a rechargeable battery cartridge pack. *Do not attempt to disassemble a rechargeable battery pack.*



To remove the rechargeable battery pack or batteries, switch the machine off and open the drawer (as for the backup battery), pull the drawer out until the main battery compartment is revealed, then push and lift any battery pack or AA batteries from the top of the drawer. To fit the rechargeable battery pack or batteries back into the *Workabout mx*, slide into place, (left end first). Ensure that good connections have been made between the battery terminals and the contacts inside the battery recess, and close the drawer. The machine can now be switched on.

The *Workabout mx* automatically gives a warning message, when switched on, if either the main or backup battery is low. Independently of this, there is a battery information dialog available from any application. This is accessed by pressing the Shift-Ctrl-B key combination. It displays the state of the main and backup batteries, and whether the batteries are alkaline or rechargeable, or whether an external power supply is being used. For correct information ensure that the drawer is securely closed.

When the main battery is low, the *Workabout mx* may have enough power to display the screen and accept input from the keyboard, but not enough to write to Flash SSD or access expansion devices. The *Workabout mx* will turn off if an operation is attempted for which it does not have enough power. New batteries should be fitted, (or the existing batteries recharged), before the operation is tried again.

In order to save power, the *Workabout mx* will by default switch itself off automatically, if left alone for five minutes. The "auto-switch-off" time can be changed to another value, if desired, or the *Workabout mx* set so that it does not auto-switch-off at all.

The Fuse

The drawer of the *Workabout mx* contains a fuse (in the bottom of the battery compartment). This is to generally protect the circuitry of the machine if too much current is being drawn through the batteries. If the computer will not switch on, or has suddenly stopped working, it could be that a fault has caused the fuse to blow. It may be possible to see the melted wire inside the fuse through its glass tube. If the fuse has blown you should contact your Psion Teklogix Service Centre. The fuse is specified as 1.25A (typically written F125 on the fuse itself).

Note that, if the fuse blows, the backup battery will still preserve the memory of the machine. Furthermore the *Workabout mx* can still be powered from a mains adapter via a LIF Converter.

Caution regarding Lithium Batteries

Note that there is a risk of explosion if lithium batteries are fitted incorrectly. Be sure that the backup battery is fitted so that the face of the battery containing the plus symbol is the one towards the outer edge of the machine. This is the flatter of the two faces.

A Lithium battery should be replaced only with one of the same or equivalent type as the one supplied by Psion. Used lithium batteries should be disposed of according to the manufacturer's instructions. Always tape over the terminals before disposal.

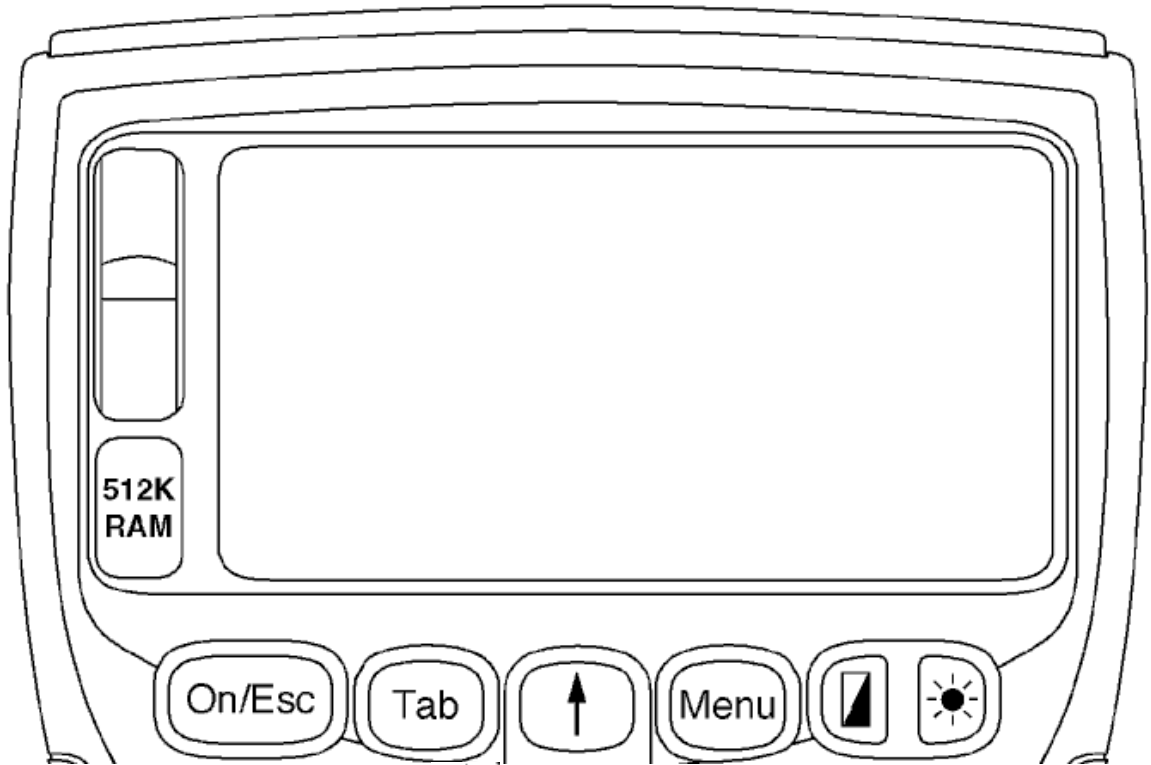
Screen


The normal *Workabout mx* screen is a retardation film LCD, 62.4mm (2.45 inches) wide by 30mm (1.18 inches) high, displaying 240 pixels horizontally and 100 pixels vertically. The pixel dimensions are 0.27mm by 0.23mm, with a pitch of 0.30mm by 0.26mm.


In the default (proportional) font, the screen displays seven lines, each with around 24 characters. If fewer characters are required to be displayed, a larger font can be used, to achieve a more striking screen image, (and vice versa).

Changing the font is only one example of the graphics support supplied by the resident software.

By default, the screen is illuminated by reflected light, using, (as throughout the *Workabout mx*), state-of-the-art technology. In case additional lighting is required, all variants are provided with a factory-fitted backlight. This backlight can be switched on or off whenever the user requires, (bearing in mind that there is an inevitable additional drain on the batteries whenever the backlight is used).



The switch for the backlight has a  symbol on it. In addition, the *Workabout mx* can be configured to switch off the backlight automatically once a given time period has

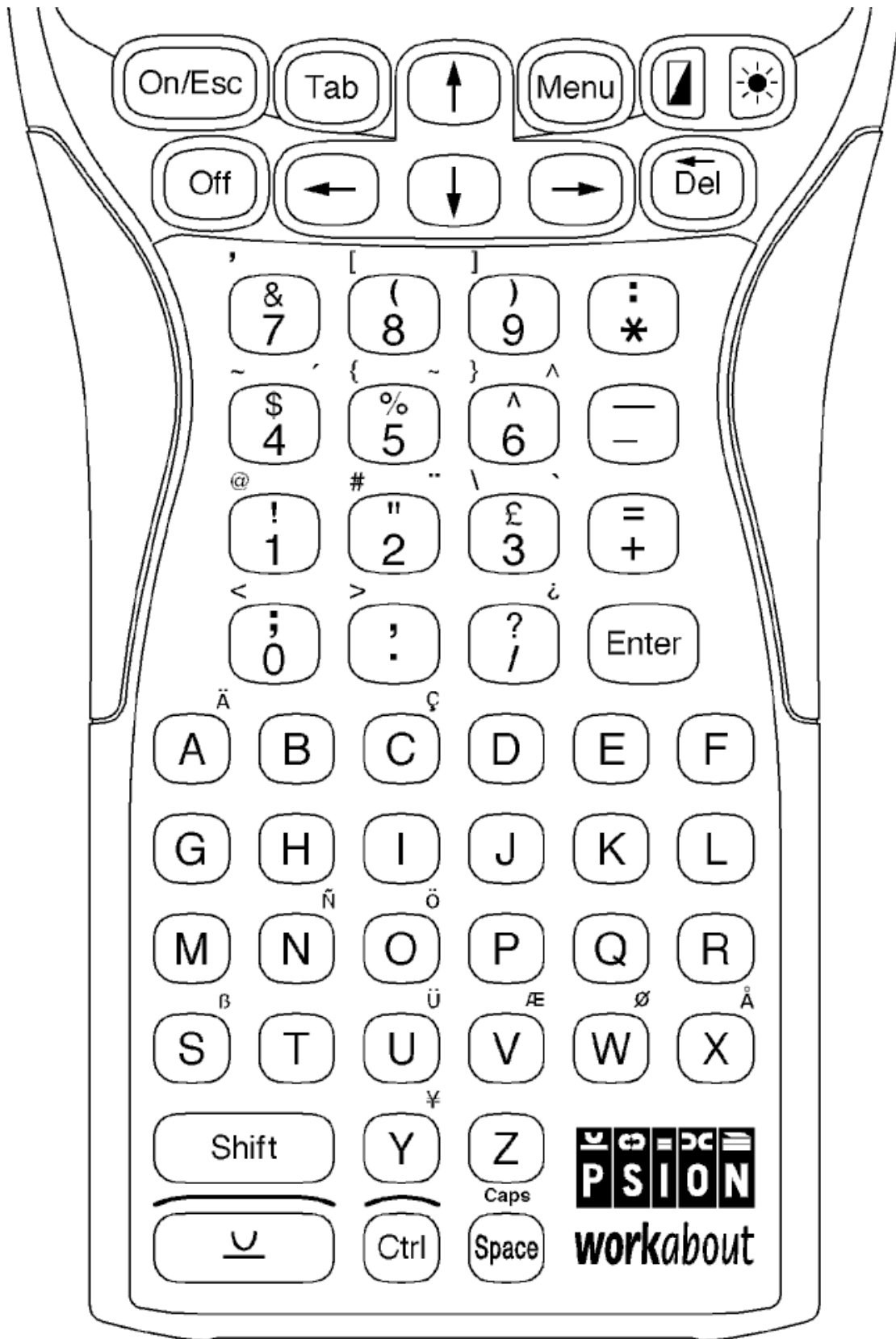
elapsed. Screen contrast may be adjusted using the contrast key, which has a  symbol on it. Pressing this key on its own makes the background darker. Pressing Shift-Contrast makes the screen background lighter. In both cases the operation cycles round when the adjustment reaches the end of its range.

Keyboard




The keyboard features positive travel rubber keys with durable legends.

Two keyboard layouts are available, depending on how the *Workabout mx* is to be used:

- The standard full alphanumeric keyboard, (57 keys).
- A numeric keyboard, (35 keys).



The following special keys are present:

On/Esc	Switches the <i>Workabout mx</i> on, and functions as an Escape key, (used to clear a line of input or cancel an entry).
Off	Switches the <i>Workabout mx</i> off.
Menu	The use of this is under <i>application control</i> , i.e. it is not used by any core system code. It may be acted upon by the foreground process, or by any process that captures the keypress including the Command Processor and System Screen. Used to bring up a set of menus. In the Startup Shell it brings up the Special menu that allows you to choose a system interface, or to restart the shell.
 (Contrast)	Controls the contrast of the LCD display.
 (Backlight)	Switches the backlight on and off
Del	Used to edit typing, delete database records, etc.
Enter	Terminates a line of input, closes a dialog, etc.
 (Psion)	An extra modifier key (analogous to Alt on a PC), recognisable by its familiar "cup and saucer" Psion logo.

There are also several special keypress combinations:

Shift-Esc	The "Help" hotkey combination. The use of this is under <i>application control</i> , i.e. it is not used by any core system code. It may be acted upon by the foreground process, or by any process that captures the keypress including the Command Processor and System Screen. It is used to bring up a Help menu. It appears to any application exactly like the Help key on a Psion Series 3a.
Ctrl-Esc	The "Help index" hotkey combination. It is used to bring up a Help index.
Psion-Tab	The "Task" hotkey combination. It allows switching between tasks.
Psion-Space	The "Caps lock" key combination. This is used to switch between normal and "Caps lock" modes. In normal operations lower case characters are the default, with upper case only when the Shift key is held down. In "Caps lock" mode, upper case characters are the default and lower case characters are obtained by holding down the Shift key.
Psion-Left	The "Home" key combination. The use of this is under <i>application control</i> .
Psion-Right	The "End" key combination. The use of this is under <i>application control</i> .
Psion-Up	The "Page Up" key combination. The use of this is under <i>application control</i> .
Psion-Down	The "Page Down" key combination. The use of this is under <i>application control</i> .
Shift-Ctrl-B	The "Battery" hotkey combination. It displays battery information: main battery state and type, backup battery state and whether external power is present. It is available at all times regardless of what application is running, (it is implemented in the Startup Shell). Note: for correct information the drawer must be securely closed.

Buzzer

The *Workabout mx* contains a piezo buzzer for beeps, key clicks, etc.

1.3 The Basic Software

The software running on a *Workabout mx* at any one time is a mixture of:

- ROM resident core software (the "operating system") and the OVAL runtime software.
- ROM resident utilities, such as the MS-DOS like Command Processor, OPL program editor and the Link communications software.
- ROM resident PIM application software, (the System Screen, database, calculator, spreadsheet and communications terminal emulator).
- Application software, from an SSD or internal memory.
- Library software, again from an SSD or internal memory.

Versions of the *Workabout* software

To see which version of ROM software is contained in any *Workabout mx*, enter `ver` at the `>` prompt in the Command Processor. The *Workabout mx* ROM version number is given, plus a separate version number for the EPOC operating system, and another one for the *Workabout mx* System Interface. Note that version below V2.00F of the ROM do **not** include the OVAL runtime software and cannot be retro-fitted to do so.

Command Processor

This application is included in the ROM for the benefit of program developers. It provides a DOS-like command line interface. In addition to the familiar DOS commands there are several commands peculiar to the *Workabout mx*. Some provide information, such as `LSEG`. Others invoke features of the *Workabout mx* which are beyond the scope of DOS, such as `START` which runs processes asynchronously.

This application can also run batch files. It is invoked transparently by the Startup Shell to run *autoexec.btf* if required.

System Screen and PIM applications

The System Screen application is included in the ROM as an example of a GUI application.

It provides much of the same functionality as the Command Processor.

Modified versions of the Series 3a personal information manager (PIM) applications, Data (database), Calc (calculator) and Comms (communications), and of the Series 3 Sheet (spreadsheet) are included by way of examples of the machine's potential. Most of these modifications concern the size of dialog boxes, in that a smaller dialog box font is used when the applications run on a *Workabout mx*.

Details of the use of the System Screen and the PIM applications are beyond the scope of this document.

1.4 Resetting the *Workabout*

It is rarely necessary to reset the *Workabout mx*. Even a dreadful bug in the application being developed is unlikely to cause the entire *Workabout mx* system to hang.

For example, any illegal attempt by an application to write to data outside its own data segment will make the operating system terminate the application in a so-called *panic*. The same thing happens if an application leaves interrupts disabled for too long.

In some instances of software failure, however, a reset may prove necessary.

Before resetting, terminate all applications and save any important data to an SSD or a PC.

Note: There are two holes at the top and bottom centre of the keyboard on the *Workabout mx*. Neither of these is for a recessed reset switch.

Soft reset

To reset a *Workabout mx*, press Psion-Ctrl-Del. You will hear a short warning beep. The *Workabout mx* then turns off, abandoning all programs running at the time, without saving any data currently in use by them. The files in the internal memory (*m:*) will *not* be lost, however. This is known as a *soft* reset.

Hard reset

If, unusually, all the internal memory (including environment variables) is to be erased too, keep the Shift key held down while resetting the machine, i.e. press Psion-Shift-Ctrl-Del. You will hear a short warning beep. This is known as a *hard* reset.

Cold reset

If neither a soft nor a hard reset work, remove all power and wait a few minutes before restoring power. The machine must then be switched back on. You will hear a short warning beep. This is called a *cold* reset, and will also wipe all internal memory.

What happens after a reset

Following a hard or soft reset, or the temporary removal of all power, the *Workabout mx* displays the Psion logo and start-up message, as if switched on for the first time.