



Stillorgan Industrial Park, Stillorgan, Co. Dublin, Ireland.
Tel: +353-1-295 2529 Fax: +353-1-295 3625 Email:info@ferrotec.ie

Orbita Products and Technologies

Overview

Table Of Contents

1	OVERVIEW OF ORBITA TECHNOLOGIES	3
2	STANDARD ORBITA BASED PRODUCTS	4
2.1	MAILPAD (ORBITA MP)	4
2.2	WEIGHPAD.....	4
2.3	MEMBERPAD.....	4
3	ORBITA SOFTWARE SUITE	5
3.1	ORBITA EMBEDDED MMI SOFTWARE	6
3.2	ORBITA CONNECTIVITY SOFTWARE.....	14
4	ORBITA HARDWARE	15
4.1	PROCESSOR SYSTEM.....	15
4.2	I/O SUBSYSTEM.....	16
4.3	DISPLAY.....	17
5	ORBITA PLATFORM OPTIONS	18
5.1	ORBITA WB	18
5.2	ORBITA XT	18
5.3	ORBITA XS	18
6	ORBITA HARDWARE SPECIFICATIONS AT A GLANCE	19
7	ORBITA HARDWARE PART NUMBER.....	20
8	PRODUCT / PLATFORM CROSS REFERENCE	21
9	ACCESSORIES.....	22
9.1	PRINTERS	22
9.2	SMART CARD READER.....	22
9.3	SMART MEMORY CARDS.....	22
9.4	PC CARD MODEMS.....	22

1 OVERVIEW OF ORBITA TECHNOLOGIES

The Orbita System is a combination of software and hardware platforms, which provide a powerful processing system – a Lean PC – without the overhead of a conventional operating system. This is leading edge technology but it is transparent to the user, giving functionality without computer knowledge or jargon.

A range of Orbita hardware platforms are available providing a choice of power/performance and interfaces. All models include support for a large graphic LCD. One also has a composite video output for displaying data/information on Televisions, LCD projectors etc. The Orbita™ is powered by a 32-bit RISC processor running at speeds up to 96MHz and driven by the Orbita MMI Operating System and Application software. Both of which are easy to customise to support a wide range of applications, producing an Application Specific Device, which is easy for the user to operate. The platform can provide facilities for mobile data collection and transfer, Email, Direct Banking, E-Commerce, Remote Education, Security and Health Care.



Orbita™

2 STANDARD ORBITA BASED PRODUCTS

2.1 *Mailpad (Orbita MP)*

Mailpad[®] represents the latest in personal communications and is ideal for the travelling executive. This compact, lightweight, fully portable unit permits sending and receiving email at the touch of a *single* button from a GSM or cellular phone. Although primarily intended for mobile use *mailpad* can also be connected to a standard phone line. To send or receive email, simply press the "MAIL" button and *mailpad* automatically connects to the service provider(s). *Mailpad* is designed for the average person and is very simple to use and no knowledge of computers is necessary. *Mailpad* can be operated with its own keypad and large in-built graphical LCD.



The Mailpad WBTV model is supplied with a composite video output for connection to an LCD projector or a TV. A wireless version called *Mailpad Plus* is available and this supports SMS, Voice and email/data over the GSM network. We know that the Mailpad system is the best Mobile communicator on the market and offers TRUE email not web based email. The Mailpad will also be able to be used on the GPS and 3G networks when these are in place.

2.2 *WeighPad*

The WeighPad has been developed to provide an automated Membership Management System for Weight Watchers. The system uses Smart Cards in place of traditional paper based member cards and systems. It provides features to accurately track member attendance, personal, weight and payment details.

The system is currently being rolled out in the Republic of Ireland, installation has been completed in Northern Ireland. These units will be linked to a single head office and will provide electronic updates of member records to the head office, thereby enabling members to move easily between branches and at the same time providing the head office with accurate financial reports.

It is possible to customise WeighPad so that it supports the rules of other Weight Loss organisations.

2.3 *MemberPad*

MemberPad is a derivative of WeighPad and includes many of the same features as WeighPad with the exceptions of Weight recording/tracking and the rules/permutations of Weight Watchers. The system is ideal for use by any membership-based organisation such as sports and leisure clubs.

3 ORBITA SOFTWARE SUITE

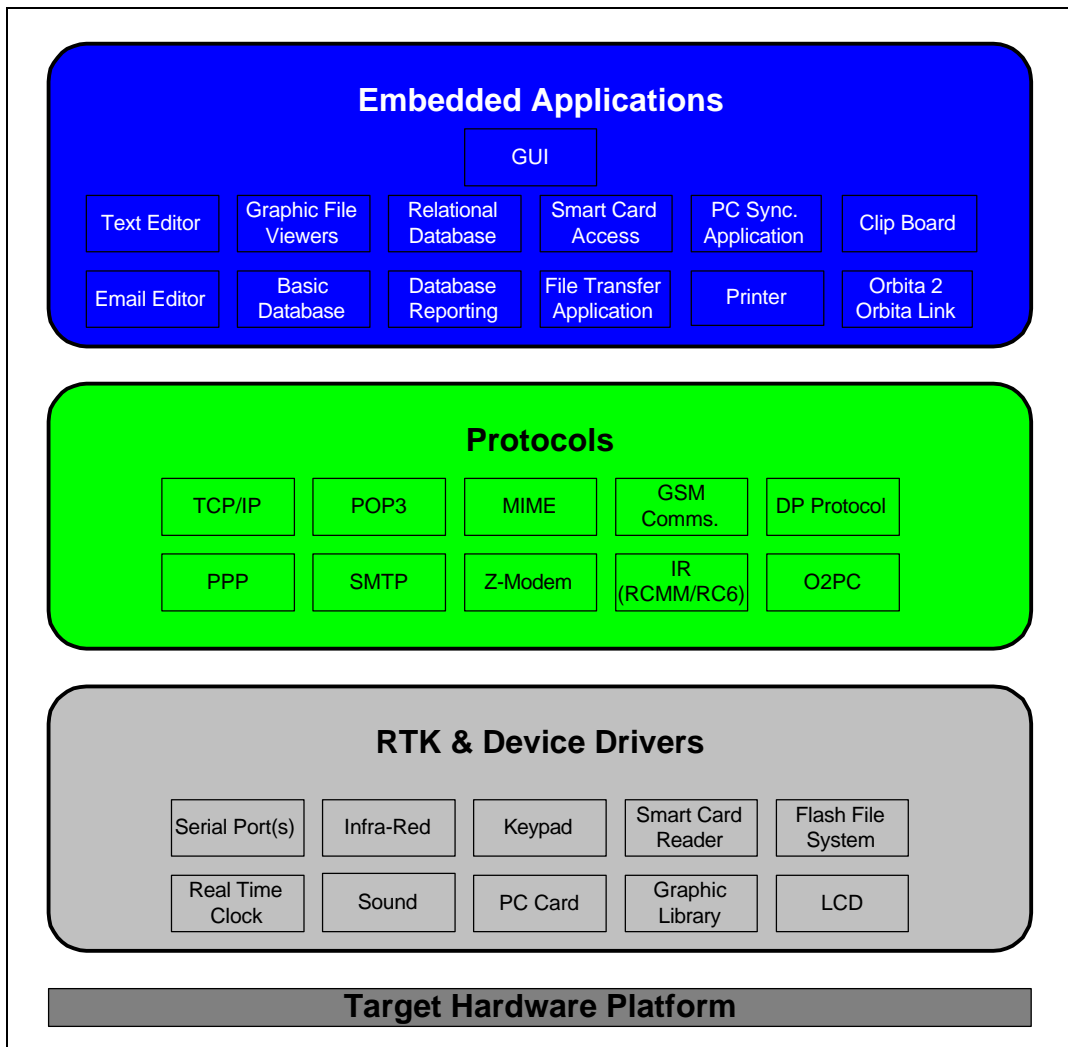
The Orbita Software Suite is comprised of two types of software; Embedded Software and Connectivity Software. This section provides an overview of the existing standard software modules, it should be noted that additional modules are continually added to the suite and that it is possible to rapidly add customised modules.

3.1 Orbita Embedded MMI Software

These modules have been written in ANSI C and will run directly on any of the Orbita Hardware platforms, it is possible to rapidly port the modules to other processors or platforms.

The entire Orbita MMI set of modules includes everything from device drivers, Real Time Kernel to Applications. There are over 30 individual modules available for use, which can be combined to provide the features and functions required for a particular application. This enables Ferrotec (and developers) to produce Application Specific Devices.

The following diagram illustrates the different software levels within the Embedded Orbita MMI software and the key modules in each level.



3.1.1 Embedded Applications

3.1.1.1 Text Editor

The Orbita text editor and viewer provides an Embedded application which can be used to create/view ASCII Text Files, the file extension for files created using the text editor is “.MPM” this file extension can easily be changed. The text editor module includes features functions such as Cut, Copy, Paste, and Undo.

3.1.1.2 Email Editor

This is a powerful email editor and viewer. It provides a full text editor including editing functions such as Cut, Copy and Paste together with an Undo function whereby the last N actions will be undone, one action at a time. The number (N) of actions to step back through can be set by the programmer. The Orbita Email Editor supports all normal fields in the header of an Email such as To, Subject, Cc, Bcc, Date and Attachment. The application also includes an intelligent word-wrapping function so that it will wrap a sentence based on a programmer defined line length (nominally 40 characters).

3.1.1.3 Graphic File Viewers

Currently there is a set of graphic file viewers for decoding and displaying the following common file formats - GIF, JPG and BMP. As part of this application the images can be automatically resized so that they fit within a defined viewing area while maintaining the Aspect Ratio of the image.

3.1.1.4 Basic Database

The basic database provides a method of storing/retrieving data in a series of fields. This information is stored and pointed to by a unique key field. The key field is sorted in either ascending or descending order. These fields can be renamed and expanded so that the Database could easily be used as an address book, price list, order form, report etc.

The Database will provides an interface to other modules so that they can pass value (Key Field) to the Database, the Database will perform a search based on the value and return any matching records.

3.1.1.5 Relational Database

The Orbita Relational Database provides functionality rarely found in an Embedded System. The Database will support multiple tables, which can be linked/related and accessed through a single Form. The database is configurable so that at run time it will provide different levels of access to the data depending on the rights/permissions of the user. It is possible to essentially have multiple forms and multiple tables so that one group of users use a form to access restricted table/fields while other users have a separate form which allows full access to all tables/fields. Further control of the access is provided through the ability to set which actions users can perform (Read, Read/Write, Read/Write/Delete) on records/fields.

3.1.1.6 Database Reporting

Both the basic and relational databases provide support for creating custom reports based on any/all of the tables and fields.

3.1.1.7 Smart Card Access

The Orbita system provides both an API and Application for accessing Smart Memory Cards. A variety of cards and capacities are supported including both protected and unprotected memory cards. The Smart Card application can be linked to various other modules including the Database module so as to provide the facility to use Smart Cards for user identification/access control and to retrieve data related to the smart card, which is being read. For example a Smart Card could be used for membership management, so that when a card is inserted the member ID is read and the relevant details for the member are retrieved from the database.

3.1.1.8 File Transfer Application

This application will provide for the system to run in client/server mode so that a remote device can connect to the system and request files, these files are then located and transferred to the client.

3.1.1.9 Orbita-2-Orbita Link

The Orbita-2-Orbita application provides a method for connecting two Orbita systems together for the purpose of sharing data. This application can also be used to synchronise the databases of two Orbita systems.

3.1.1.10 PC Synchronisation

Similar to the Orbita-2-Orbita application, the Orbita PC Synchronisation utility allows an Orbita system to be connected to a PC so that data can be synchronised between the Orbita (E.g. Database) and the PC. The synchronisation is often done across a serial connection but other methods are possible.

3.1.1.11 Printer

The printer application/API can be accessed by other applications to print data from the Orbita system across a serial interface (software or hardware flow control) to a printer.

The Printer module can be used in “Print file”, “Print string” or “Print byte” mode.

3.1.1.12 Clip Board

This is a clipboard feature utilised by the Cut/Copy functions of the Editor, Memo, and Addressbook etc. It allows module to copy data to the clipboard, then switch to another module and retrieve the data from the clipboard.

3.1.1.13 Graphic User Interface

The GUI provided with in Orbita is easily customised for various applications. It is based around the use of a mixture of text and graphics with details provided in two panels. This is easily navigated using either the integral keypad or the IR Keyboard. The image to the right is an example of the composite output of one implementation of the GUI for an email device. The GUI is supported on both the LCD and composite video output. Another feature of the GUI is the ability to generate customised forms, which can be easily downloaded to the units.

The GUI can also be configured to provide a mixture of “List Menus” and “Panel Views”. There is also support for a range of Information, Error, Data Entry Popups, which can be displayed over a menu or other screen. The Popups are dynamically sized according to the amount of data to be displayed.

The GUI calls on a set of Icons and other images, which are drawn to the screen at locations determined by the designer. It is easy to combine text and graphic images. The standard GUI is supplied with over 60 Icons, 80 Bitmap Images and 2 ISO fonts.

3.1.1.14 Web Browser

The Orbita Web Browser is also available. This module exists in Full C Source code but has not yet been ported/integrated Web Browser, this is a HTML 3.2 browser and handles common features including tables, background images, frames, and client-side image maps. SSL2, SSL3, HTTP, FTP, & graphic files.

3.1.2 Embedded Protocols

3.1.2.1 TCP/IP & PPP

In order to support Network communications (LAN, Internet, Etc.) a fully featured TCP/IP and PPP stack is available. This will support all Internet applications such as email and Web browsing. Naturally it is possible to use only the TCP/IP layers for Ethernet networks. A SLIP module is also available.

3.1.2.2 SMTP

For the transmission of email, an SMTP application complying with RFC821 is provided in the form of Phoenix SMTP. SMTP is the standard method used for email transmission and will run over TCP/IP (and PPP) protocol stack. The module includes a parsing function/algorithm to parse outgoing emails and attachments, links to Ediview, SMTP and MIME modules. Complies with RFCs.

3.1.2.3 POP3

The POP3 standard is probably the most widely used standard for retrieving email from a server. The Phoenix POP3 application operates in conjunction with a TCP/IP (and if required PPP) stack and conforms to the RFC1939 "standard" for POP3 communications. The POP3 Module includes a parsing function/algorithm to parse incoming emails and attachments, links to Ediview, POP3 and MIME modules. Complies with RFCs.

3.1.2.4 MIME

Internet email is frequently encoded using MIME (RFC's 1341, 1521, 2049), the Phoenix application accepts and decodes such emails (or attachments). A MIME encoding engine is also provided.

3.1.2.5 DP-Protocol

The DP protocol has been developed for use on the expansion port of the Orbita™ platform. It allows another device be connected to the platform via the expansion port. The external device can contain Dual Ported RAM, which will be used to communicate between the Orbita™ platform and the external device. The protocol can be used for data transfer or to issue commands to the external device.

3.1.2.6 Z-MODEM

The Z-Modem Protocol (transmit and receive is available for use across the serial interface on the Orbita™ platform.

3.1.2.7 GSM Comms.

This module is comprised of an Application, an API and a protocol. It is based around an Editor for sending and receiving SMS Text messages. It also provides functions for connecting to a GSM Phone Card to make voice calls.

3.1.2.8 IR (RCMM/RC6)

The Orbita provides support for a range of infra-red protocols including RCMM, RC5 and RC6 which are used for keyboards and remote controls.

3.1.2.9 Custom Protocols

With Orbita it is easy to create and implement proprietary or custom protocols examples of this are the DP and Z-Modem Protocols.

3.1.3 Embedded RTK & Device Drivers

3.1.3.1 Flash File System

Flash Memory is now commonly used on Embedded systems for data storage, a feature of all Flash Memory Devices is that there is a limitation on the number of erases/rewrites, which can be performed on each block of the chip. If a section of a block has to be *rewritten*, then the entire block containing that section needs to be erased before the new data can be placed on the chip. The Orbita Flash File System is optimised so that the number of *rewrites* is minimised and so the life of the Flash memory is prolonged.

The Orbita Flash File System complies with the ANSI X3J11 standard for data storage and file access functions. Orbita supports all the following functions:

fopen	Prepare a file for i/o processing.
fclose	Complete i/o operations on a file.
fwrite	Write data to a file.
fread	Read data from a file.
fseek	Set the current position in the file.
ftell	Read the current position in the file.
rewind	Set the current file position to the start of the file.
fputs	Write a data string to a file.
fgets	Read a data string from a file.
fputc	Write a single character to a file.
fgetc	Read a single character from a file.
remove	Remove/Delete a file from the system.
feof	Test if the current file position is at the end of the file.
ferror	Test if an error has occurred on an opened file.
rename	Rename a file.

In addition to the ANSI standard functions the Orbita Flash File System also includes an automatic Defragmentation routine for freeing memory blocks.

3.1.3.2 Smart Card Reader

The Orbita software provides an API and Driver for Smart Card Readers (SCR), please see the "Accessories" section for details of support products. This driver/API handles all SCR I/O and handles CSC exchange for protected memory Cards. The software provides support for using card readers over either a 2 or 4 line serial interface.

3.1.3.3 LCD

The LCD drivers and library provides control for standard monochrome graphics LCDs. The LCD size is configurable so that different LCD sizes may be used without requiring major software changes.

3.1.3.4 Serial Port

Device drivers for 16550 UART's are provided the Orbita WB hardware platform support TX and RX lines, while the XT & XS models support TX, RX, CTS, DTR. this is supported by the serial device driver.

3.1.3.5 PC Card

The PC Card Library provides support for the PCMCIA interface and includes drivers for modems. The driver will accept any modem (PSTN, GSM, ISDN etc.), which complies with:

- ◆ PCMCIA Standard
- ◆ AT Command set

Other PC Card (PCMCIA) devices can be connected to the port, these could include Ethernet Interfaces, GPS Cards, Disk drives etc.

3.1.3.6 Graphic Library

The Phoenix OS Graphics library is comprised of a set of drivers for the graphics processor and drawing routines. The library provides the designer with method of producing in Hi-Colour (32,768 Colours) composite video output and incorporates double buffering for flicker free display. Now knowledge of double buffering algorithms are required as a simple function call is provided for the developer.

3.1.3.7 Infrared

All Orbita modules feature and Infrared receiver for use with devices such as IR Keyboards and Remote Controls, this driver provides the support for the receiver and decoding the signals.

3.1.3.8 Keypad

These libraries relate to the main method for user input, namely the integral Keypad The code is structured so that individual keys or key combinations can be easily defined/redefined for customised functions.

3.1.3.9 Sound

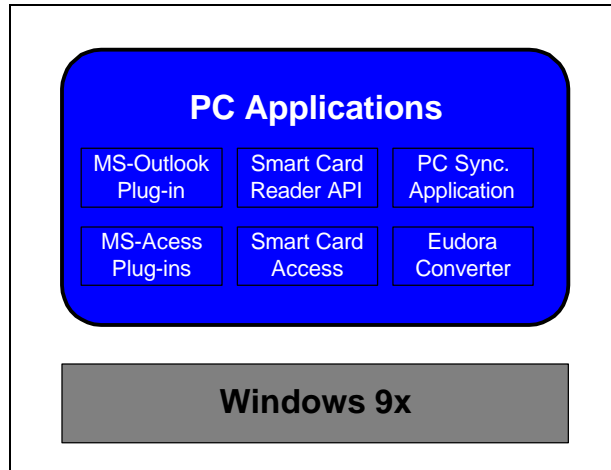
The sound module is used to driver a Piezo speaker on Orbita platforms, this allows sounds ranging from simple key-clicks, beeps to DMTF Tones to be used.

3.1.3.10 Real Time Clock

The Orbita XT & XS Models provide a Real Time Clock. This module is the driver for the clock so that applications can make use of date time information.

3.2 *Orbita Connectivity Software*

Ferrotec can supply a number of software modules to provide Orbita-PC connectivity so as to allow the exchange of data between Orbita and a PC. The modules currently available include:



While these modules have been designed to run on a Microsoft Windows 9x platform some modules are available for DOS.

4 ORBITA HARDWARE

4.1 Processor System

Fig. 1 shows the block diagram of the processor system. A 32 Bit RISC/DSP processor represents the main processing unit of the system. It can be operated at a frequency of up to 96 MHz¹, the frequency can be altered using clock multipliers so that it can be stepped up/down as required.

Two 2Mb 8-bit DRAM (total 4Mb RAM) devices are used to build up a 32-bit wide main memory system. The main memory is used for storing the Core Code² and application code. Both will be downloaded from a flash memory during the boot-up procedure. The main part of DRAM memory is used as working memory for temporary data storage and processing.

A flash memory device holds the Core Code and application code as well as memory space for data storage. The standard flash memory size is 2Mbytes but may be increased on most models. Memory devices are connected directly to the processor without any additional logic. The Expansion port shown as a small debug connector allows the connection of a Debug Adapter for connection to a PC for development purposes.

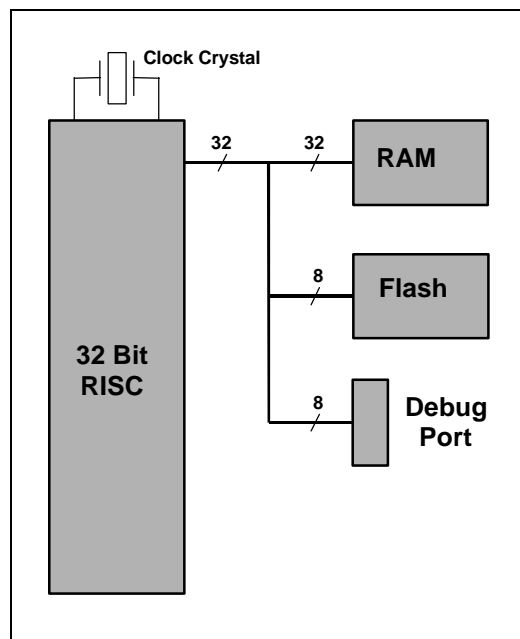


Figure 1: Processor System

¹ Depends on platform used. XT provide 24-48MHz, XS offer speeds up to 96 MHz

² In other systems the core code is often an operating system such as Windows CE, which have high memory requirements and are demanding on the processor and memory. In the Orbita™ the core code is comprised of a Real Time Kernel (RTK) with required device drivers and applications. This is described later in this document.

4.2 I/O Subsystem

There are basically 5 I/O interfaces:

- ◆ RS232 serial interface
- ◆ I/R Input
- ◆ PC Card
- ◆ Integral Keypad
- ◆ Expansion Port

Figure 2 shows a block diagram for the I/O subsystem. A device, which combines an UART and I/R decoder, is employed to provide the IR and RS232 interfaces. The RS232 is used for communications with other devices such as printers, PCs etc. I/R is used to support keyboards and controllers.

The PC Card interface for modems etc. A small PLD device is used for additional control signals. It is also used to implement a keypad matrix for user interaction and to control 3 LED's for showing status information.

The Expansion port is connected directly to the RISC processor and provides address and data lines, which may be used to connect to extra memory cards, Digital Cameras etc. The port is designed to provide a large number of address and data lines so that it can be easily used for a wide variety of applications.

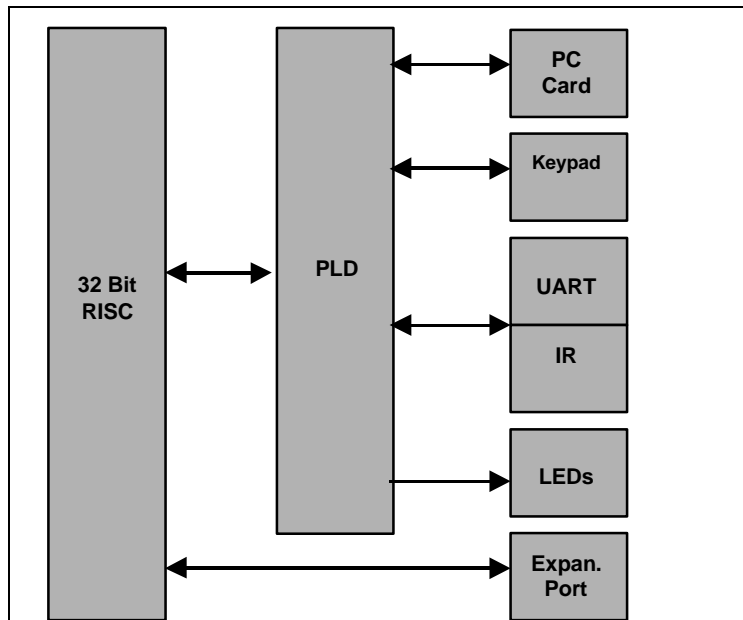


Fig. 2: I/O Subsystem

4.3 Display

Figure 3 shows the block diagram of the display outputs. Support for a monochrome LCD is standard on all models, the standard size is 240 x 128 pixels, other size can easily be accommodated with minimal software changes. The WB-TV model also offers graphics processor, which generates a RGB output display; VRAM is used as an image buffer. A PAL/NTSC encoder generates and outputs a composite video signal from the RGB signal of the graphics processor. Hence, a standard Television (or other device equipped with composite video input) can be connected for image display.

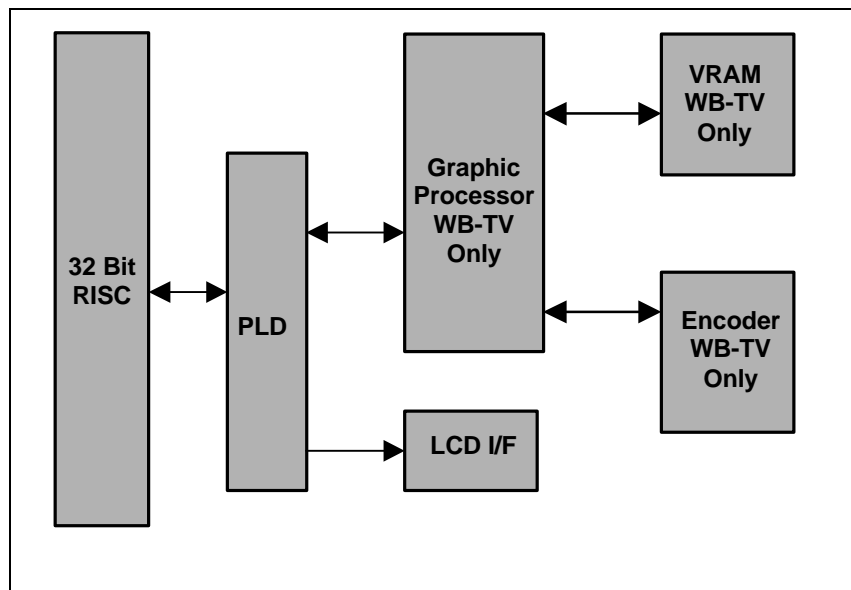


Fig. 3: Display

5 ORBITA PLATFORM OPTIONS

There are a number of models of the Orbita Hardware platform providing a selection of processor speeds, RAM memory types and external ports. All of the platforms feature

- 32 Bit RISC/DSP processor running at up to 80 MHz
- 4 Mbytes of 32-bit wide DRAM as main memory
- 2 Mbytes flash memory for Core System, Application and Data Storage
- 1 RS232 serial port
- I/R Receiver (RC-MM, RC-5, RC-6 Protocols)
- PC Card slot for modems etc.
- Monochrome Graphic LCD, 240x128 pixels, 114mm x 63mm
- Expansion Port
- Integral 50 button keypad (with cursor and special function keys)
- 3 Status LED's

a PC Card port, an expansion board, LCD interface, 1 or more serial ports. The following sections provide an overview of the general design of the platforms.

5.1 *Orbita WB*

The Orbita WB platform is available in two versions WB-TV and WB-NTV. Both versions include an integral battery charger and power management system and an internal NiMH battery pack.

The WB-TV version also includes a Composite Video output by use of Graphic co-processor.

5.2 *Orbita XT*

The XT Model (which runs at speeds up to 48Mhz) has a second serial port and a real time clock. A variety of Flash and RAM memory types can be used giving a choice of memory configurations above the base 2Mb flash and 4Mb RAM.

5.3 *Orbita XS*

The XS Model (which runs at speeds up to 96Mhz) has a second serial port and a real time clock. A variety of Flash and RAM memory types can be used giving a choice of memory configurations above the base 2Mb flash and 4Mb RAM.

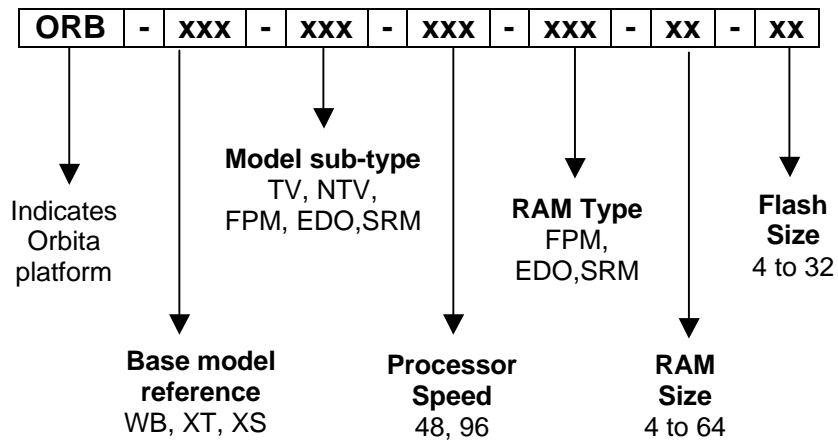
6 ORBITA HARDWARE SPECIFICATIONS AT A GLANCE

	Orbita WB		Orbita XT		Orbita XS		
	TV	NTV	FPM	EDO	FPM	EDO	SRM
Processor	RISC	RISC	RISC	RISC	RISC	RISC	RISC
Processor Speed (Mhz)	48	48	48	48	96	96	96
Flash (Mb)	2	2	2+	2+	2+	2+	2+
RAM Type	FPM	FPM	FPM	EDO	FPM	EDO	SDRAM
RAM Size	4	4	4	4	4	4	16-64
RAM Expansion	-	-	-	-	✓	✓	✓
Serial Ports	1	1	2	2	2	2	2
Exp. Port	✓	✓	✓	✓	✓	✓	✓
PCMCIA	✓	✓	✓	✓	✓	✓	✓
Comp. Video	✓	-	-	-	-	-	-
Graphic Processor	✓	-	-	-	-	-	-
VRAM (Mb)	512Kb	-	-	-	-	-	-
Infrared	✓	✓	Option	Option	Option	Option	Option
Battery	✓	✓	-	-	-	-	-
Input (V d.c.)	5.5	5.5	5	5	5	5	5
Max current	1300mA	1300mA	1000mA	1000mA	1000mA	1000mA	1000mA
Reverse Polarity Protection	-	-	✓	✓	✓	✓	✓
LCD (Pixels)	240x128	240x128	240x128	240x128	240x128	240x128	240x128
LED's	3	3	3	3	3	3	3
Clock	-	-	✓	✓	✓	✓	✓
Keypad	✓	✓	✓	✓	✓	✓	✓

7 ORBITA HARDWARE PART NUMBER

This section provides information on how to construct a part number for a desired specification for an Orbita Platform.

For example the part number for the Orbita platform used for the Mailpad product is: ORB-WB-TV-48-FPM-04-04



8 PRODUCT / PLATFORM CROSS REFERENCE

This table provides a cross reference to show which Orbita hardware platforms are normally used for a standard product.

	Orbita WB		Orbita XT		Orbita XS		
	TV	NTV	FPM	EDO	FPM	EDO	SRM
Mailpad	✓		✓	✓			
Mailpad NTV		✓					
WeighPad			✓	✓	✓	✓	✓
MemberPad			✓	✓	✓	✓	✓

9 ACCESSORIES

The following accessory devices or 3rd party products have been approved for use with the Orbita family of products:

9.1 *Printers*

Orbita provides support for Serial printers such as the Kyosha Kyoline range.

9.2 *Smart Card Reader*

The ORB-ACR-30S Card Reader is a specially customised Smart Card Reader for use with Orbita. The Card reader supports Memory cards.

9.3 *Smart Memory Cards*

Orbita will support a range of different memory capacity Smart Cards. The most common cards in use are based on the SLE4442 chip.

9.4 *PC Card Modems*

Standard PC Card (PCMCIA) modems may be used with Orbita. Cards should conform with PCMCIA Type II specifications. This includes GSM capable modems and GSM Phone Cards.