Product Overview: UMD Custom Keyboards

This application note provides a basic overview of the UMD Custom Keyboard Family consisting of the UMD Model 211, 250, 264, 490 and 520 series of products of products.

1 Introduction

The UMD Custom Keyboard Family comprised of a series of programmable keyboards and terminals that find use in applications which require non-standard key layouts, multiple sequences of keystrokes per key or enhanced I/O options.

The UMD Custom Keyboard Family is a platform product based on UMD's *ProtoLink Architecture* (refer to UMD Technical Note 107 for further details). This architecture is a product development system whereby a common controller is combined with a variety of modules such as keypads, displays, expansion boards and equipment enclosures to form a variety of products. Also a common programming standard is used to uniquely configure each product.

1.1 Features/Benefits

Features	Benefits
• Common controller and firmware	• Common programming commands across all products.
• Common keyboard types (ie sealed and keycap)	• Minimize inventory requirements.
• User configurable	• Minimize support and maximise product appeal.
• Key caps are user configurable	• Provide flexibility to customer to uniquely configure keyboard to suit applications.
	• Layout can be changed at any time.
• Many market applications (point of sale, hospitality, industrial, wharehousing, office etc.)	• Able to be applied to many market segments thus creating greater market penetration and appeal.
• Internally modular system	• Ease of service and maintenance.

1.2 Model Variations

To help distinguish between the various keyboard/terminal product combinations, the basic keyboard name is modified :-

UMD Model 264   UMD Custom Keyboard

UMD Model 250   UMD Custom *Industrial* Keyboard

UMD Model 211   UMD Custom LCD Terminal

UMD Model 490   UMD Custom *Industrial* Terminal

UMD Model 290   UMD Custom VGA Terminal

UMD Model 520   UMD Custom *Industrial* VGA Terminal

The industrial variation of the keyboard series uses an aluminium housing rather than the standard plastic injected moulded housing.

For each series, there are two type of keyboard styles, sealed (type S) and keycap (type K).

Furthermore, each series has a range of options.

These model variations can be summarised in the following table:

	K type - Mechanical	
	S type - Sealed	
Custom Keyboards	Model 264	Model 250
Custom LCD Terminal	Model 211	Model 490
Custom VGA Terminal	Model 290	Model 520

Standard (plastic)   Industrial (aluminium)

1.3 Common Features

The UMD Custom Keyboard Family can have up to 128 keys arranged in an 8 x 16 matrix (96 keys for the LCD Terminal). Each key is programmed to return user defined codes by downloading a text file via the keyboard or serial port with details being permanently saved. There are no configuration switches to be tampered with. The customisable keycaps and layout provide a visual aid to the operator through key legend, colour and position cues. Connectors are recessed to reduce footprint and contact with spilled liquids.

There are two types of keypad modules: *keycaps type* (Model xxx-*K* Series) and *sealed* type (Model xxx-*S* Series). With both types, the 8 x 16 grid spacing is flexible allowing a mixture of QWERTY style (half space offset keys) with chess board style layouts.

The *keycaps type* has removable keycaps, allowing the user to reposition the keycaps within the switch matrix. A selection of keycaps can be ordered with variations in colour, legends, spacers, style and size (single, double width and quad (double width/height)). Double width keys can be readily oriented horizontally or vertically.

The *sealed type* has a flexible plastic sheet which covers short travel mechanical keys, which provide tactile feedback. The keyboards may be labelled by writing on a paper legend insert sheet or pre-printing the plastic overlay.

The legend insert sheet and plastic overlay are held in place by registration studs and a fixing lid which is readily opened to enable quick changes. The sealed keyboard is suitable for wet areas such as those found in bars, laboratories and restaurants. The sealed keyboard can be quickly wiped down, making it ideal for hygienic use.

Products in the UMD Custom Keyboard Family have two major modes of operation - *keyboard* and *serial*. In keyboard mode personal computers connect via the keyboard interface. External standard keyboards may also be used in series. There are two serial ports on the keyboard available to attach devices such as bar code scanners to the PC without the need to alter software. In this mode the serial ports can be used to communicate with display or I/O module options.

When used in the keyboard wedge mode Custom Keyboards are totally transparent to the PC which accepts the keyboard, bar code, magnetic card and serial inputs as if they were typed from the standard keyboard. With the *serial mode* of operation, a plug pack provides power to the unit. Any key depression, bar code or magnetic card data read is output on a serial port. The second serial port is available for auxiliary I/O, eg with a printer or bar code scanner.

Some options available include low cost bar code wand, a variety of bar code scanners, integrated magnetic card reader, expanded I/O, keylock or "Touch Memory" security. A customisation service is provided by Unique Micro Design to meet specialised requirements.

1.4 UMD Model 264 & 250 Custom Keyboards

The UMD Custom Keyboard is a user programmable keyboard.

The Model 250 is the aluminium enclosured industrial variant. Note that the magnetic card reader option is not available for the Model 250.

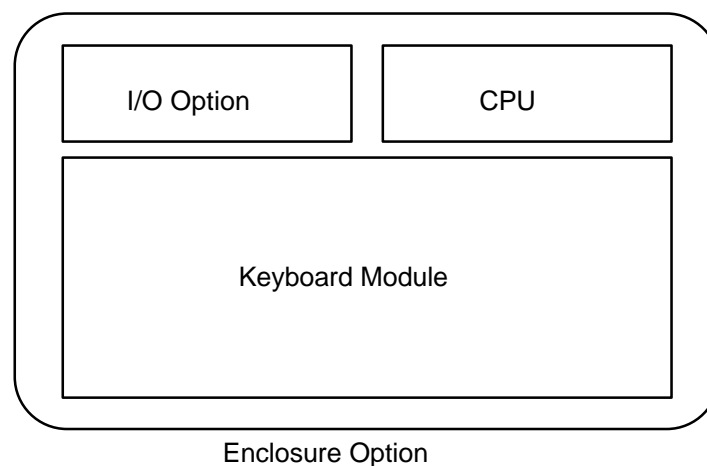## 1.5 UMD Model 211 & 490 Custom LCD Terminals

These two models have identical features to the Model 264 and Model 250 series except that they incorporate a 2 line by 40 character LC display module and have 96 instead of 128 user programmable keys. The LC display is controlled by the serial port.

1.6 UMD Model 290 & 520 Custom VGA Terminals

These models have a VGA monitor driver module installed and firmware to enable the keyboard to emulate a basic ANSI compatible terminal. The VGA ports connects to standard VGA 640 x 480 pixel monitors (monochrome or colour).

2 Module Descriptions

The keyboard family is made up of a number of modules. It is the different combination of these modules which enable the models to be configured to suit your applicaton. This is illustrated in the following diagram:

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┌─────────────────────────────────────────────┐
│  ┌──────────────────┐   ┌──────────────────┐ │
│  │                  │   │                  │ │
│  │   I/O Option     │   │      CPU         │ │
│  │                  │   │                  │ │
│  └──────────────────┘   └──────────────────┘ │
│  ┌──────────────────────────────────────────┐│
│  │                                          ││
│  │                                          ││
│  │            Keyboard Module               ││
│  │                                          ││
│  │                                          ││
│  └──────────────────────────────────────────┘│
└─────────────────────────────────────────────┘
                Enclosure Option
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2.1 Controller Module

The heart of the UMD Keyboard Family is the controller module. This electronic module contains the main microcontroller, memory and interfaces. Other modules (I/O and keypad) are connected by UMD ProtoLink peripheral bus.

Controller	High performance 16 bit microprocessor
Program	8Kb (EPROM)
Non Volatile Memory	8Kb (EEPROM) For data storage of user configuration parameters
Static RAM	8Kb
Keyboard Interface	PC, AT or PS/2 protocol (others available on request). Keyboard wedge mode.
Serial Interface	2 x RS232 DB9 Plug with DTR, XON/XOFF handshake (1)
Serial Baud Rates	300, 1200, 2400, 4800, 9600, 19.2K & 38.4K
Bar Code Decoder	Digital wand type (via AMP DB9 connector) Code 128, 39, ITF and EAN/UPC

(1) 5V dc output is provided on pin 7. This is suitable for providing power to attached devices such as bar code scanners.

2.2 Keypad Modules

All keypad modules are available in either sealed type or keycap style.

2.2.1 Sealed/Keycap Type

This is a full size keypad with 8 x 16 keys.

Key switch types	S type - sealed (special low travel) K type - keycap (Cherry switch)
Keypad matrix	upto 128 keys in 8 x 16 matrix
Spacing	19.05 mm (3/4") centers (one row can be offset by half key width)
Reliability	Keycap type > 10,000,000 operations Sealed type > 1,000,000 operations

2.2.2 LCD Type

With the UMD Model 211 and Model 490 Custom LCD Terminals a 2 line by 40 dot matrix character, LED backlit LCD module replaces a bank of keys (3 rows of 11 columns in the top left hand section of the the keyboard). This display is connected to the controller module via the UMD ProtoLink peripheral interface.

Display Type	Dot matrix liquid crystal display

Charaters	2 lines by 40 characters
Backlighting	LED
Character height	3 mm

2.3 Housing Type

Two housing types are available, plastic and aluminium. Both housing use a common metal base which mounts the CPU and optional i/o expansion modules. The keypad, display and magetic card reader (MCR not available in industrial housings) modules are mounted to the top housing.

The plastic housing is made from ABS injected plastic. A seperate plastic lid with integral hinge is used to hold the legend insert sheets and cover the magnetic card reader slot.

The aluminium housing is fabricated from a single aluminium block which is machined to match the design of the plastic housing. The same legend insert sheets and keypad modules are used. No provision is made for the internal attachment of a magnetic card readers. A simple aluminium bar is used to hold the legend insert and overlay sheets and is fixed via thumb scews for easy removal.

2.4 Expansion Module

The keyboard housing has provision for ether an I/O expansion or VGA monitor driver module.

2.4.1 I/O Expansion Module

This provides an additional two RS232 serial ports, bi-directional parallel port and cash drawer interface.

Serial Interface	2 x RS232 with DB9 Plug
Serial Baud Rates	300, 1200, 2400, 4800, 9600, 19.2K and 38.4K baud
Parallel Interface	Bi-directional DB25 Socket
Cash Drawer Interface	24V dc pulse, sutiable for triggering external cash drawer solenoids.

2.4.2 VGA Monitor Driver Module

This expansion module incorporates a video controller and bi-directional parallel port. The video controller interfaces to a standard VGA 640 x 480 pixel monitor (colour or monochrome). The UMD ProtoLink firmware enables the keyboard to emulate industry standard terminals.

Terminal interface	VGA standard, High density DB15 connector
Terminal emulations	ANSI (subset)
Parallel Interface	Bi-directional DB25 Socket

2.6 Options

2.6.1 Magnetic Card Reader

Integrated single or dual track magnetic card reader options are available with the plastic keyboard housing only.

Tracks	1, 2, 3, 1 & 2 or 2 & 3
Format	Conforming to ISO 3544
Swipe	From left to right

2.6.2 Keylock

Keylock options can either dissable keyboard operations or enable additional keyboard tables.

2.7 Summary

The following table provides a visual aid in relating the module options to the model types.

	Keyboard		LCD Term		VGA Term	
Model Series	264	250	211	490	290	520
Controller Module	•	•	•	•	•	•
Housing Type						
- Plastic	•		•		•	
- Aluminium		•		•		•
Keypad Type						
- Sealed	•	•			•	•
- Keycap	•	•			•	•
LCD Keyboard (2)						
- Sealed			•	•		
- Keycap			•	•		
Expansion Option						
- I/O Expansion	•	•	•	•		
- VGA Montor					•(1)	•(1)
MCR Option	•		•		•	

(1) Not Optional - ie. must be installed.

(2) Either Sealed or Keycap keypad can be used.

3 Programming

All keyboards are based on *UMD's ProtoLink Architecture.* This is a set of hardware and software technologies that provides a foundation for an ever expanding family of Unique Micro Design products.

In essence, the *UMD ProtoLink Architecture* is a versatile product development system.

The architecture specifies the following:
- standard definitions for configuration parameters that can be consistently used across a broad range of products.
- a standard command set and peripheral control philosophy.
- a standard set of hardware facilities which includes non-volatile memory to hold configuration parameters, a peripheral interface bus, serial ports which provide power for scanners and bar code wand, display, external keyboard, keyboard wedge and mag netic card reader interfaces.
- a peripheral interface bus that allows the addition of other modules to the core controller.