UMD ProtoLink Architecture

This technical note provides an overview of Unique Micro Design's (UMD*) ProtoLink Architecture* which is a set of hardware and software technologies that provides a foundation for an ever expanding family of Unique Micro Design products.

1 Introduction

The *UMD ProtoLink 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 magnetic card reader interfaces.
- a peripheral interface bus that allows the addition of other modules to the core controller.

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

2 UMD ProtoLink Architecture Specifications

The *UMD ProtoLink Architecture* defines a standard set of interfaces, namely:

Hardware Specifications

- 5 pin DIN cash drawer interface
- 5 pin DIN keyboard interface
- 7 pin DIN host computer interface
- AMP DB9 wand interface

- Bidirectional parallel interface
- Magnetic card reader mechanism interface
- ProtoLink peripheral interface
- UMD standard DB9 serial port
- VGA monitor interface

The *UMD ProtoLink Architecture* also defines software standards by which interfaces and peripherals are linked and controlled:

Software Specifications

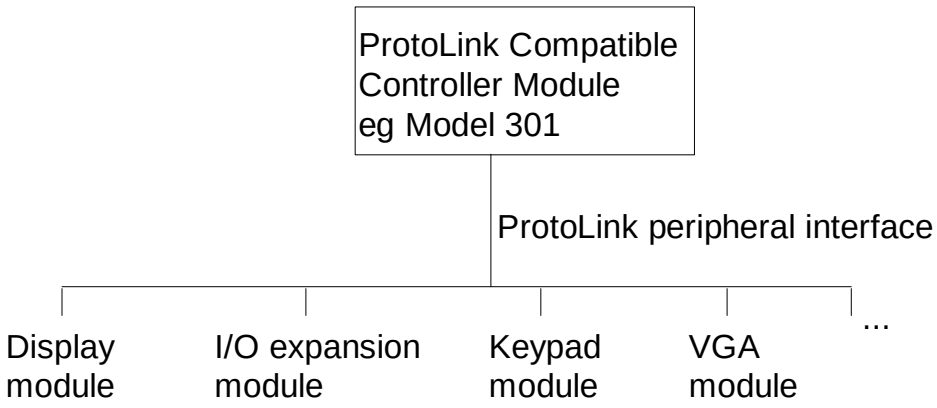
- ANSI Terminal Emulation
- ProtoLink Command Set
- ProtoLink Communication Protocol
- ProtoLink Configuration Parameters
- ProtoLink Key Codes

A range of electronic modules have been developed that use this architecture.

The *UMD ProtoLink peripheral interface* is used to interconnect these modules.

By combining enclosure, controller and modules, a number of different products can be assembled. The *UMD ProtoLink* software is embedded in the controller and is used to configure the modules (eg connect keypad to keyboard interface) and customise operation (eg. keypad scan codes, magnetic card reader header information etc)

For example, Unique Micro Design's premier family of *UMD ProtoLink Architecture* products is based on *the UMD Model 301 Controller Module* which is used internally in our range of custom keyboards, wall mount terminals, multi-in/out wedges, peripheral controllers and custom VGA terminals:



3 UMD Model 301 Controller Module

The UMD Model 301 Controller Module is designed to the *UMD ProtoLink Architecture* specifications.

It has the ability to permanently store configuration details in non-volatile memory.

ProtoLink commands are accepted by the controller via its input ports where the incoming stream of data is checked for command sequences. Data streams from the various onboard peripherals and expansion boards can be redirected to other input/output devices via ProtoLink commands.

It has two RS232 serial ports. The pin configuration for the DB9 plugs are a subset of PC/AT standard serial ports with the exception that pin 7 provides 5 Volts to power bar code scanners.

The host computer interface is a bidirectional port which looks like a PC/AT keyboard port. It connects to the keyboard port of a personal computer. This interface also doubles as the power input connector, receiving regulated 5V power from the keyboard connector of a computer or unregulated 6 to 9V from a DC power supply.

The external keyboard interface accepts input from standard PC/AT keyboards.

Keyboard wedging is provided by allowing a PC keyboard connected to the external keyboard interface to communicate with a PC via the host computer keyboard interface.

The bar code decoder interface connects to industry standard digital wands, slot readers and devices that emulate wands.

A hardware reset button is provided to physically reset the microcontroller, forcing it to perform a power up sequence.

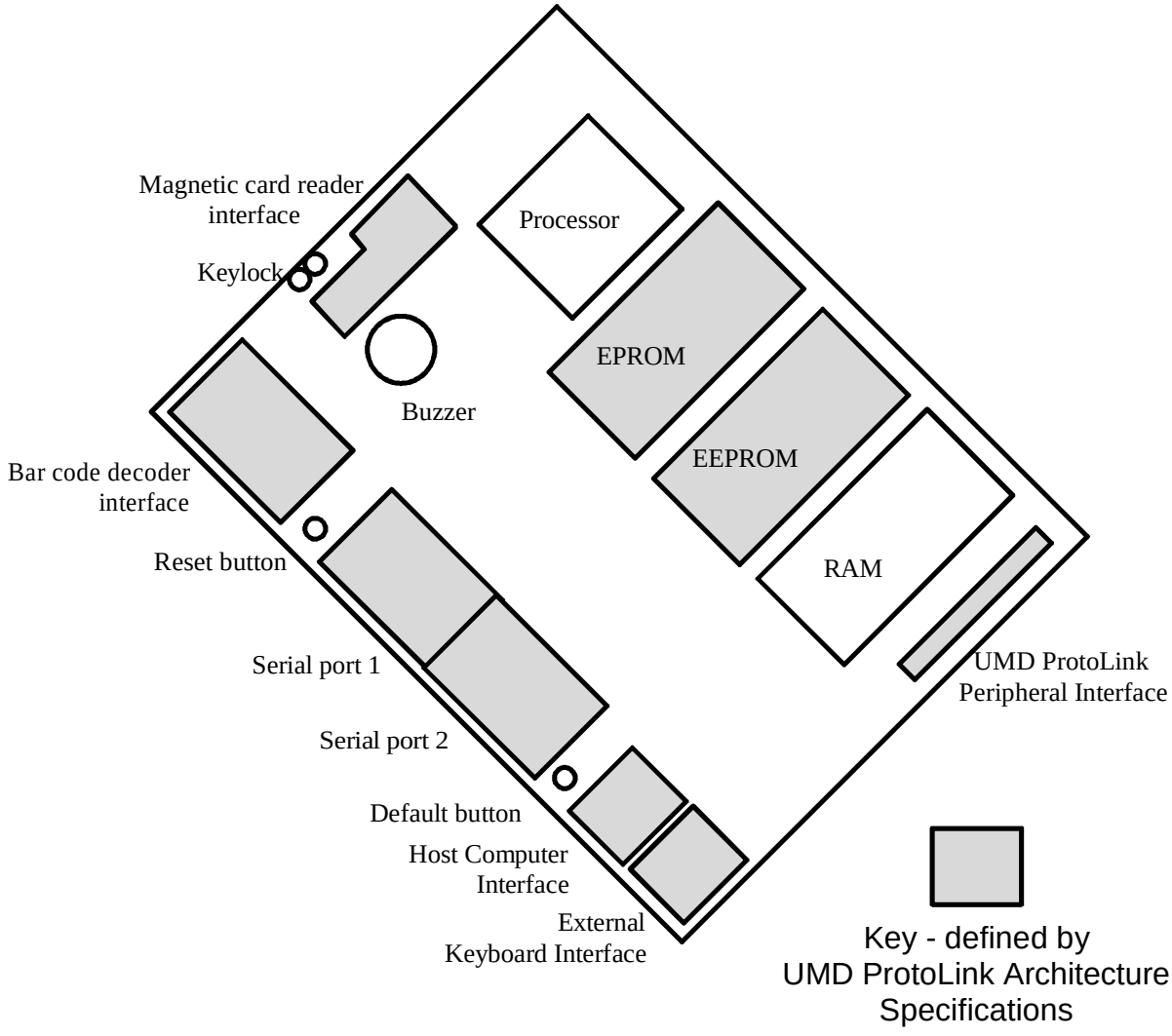
A default button is also provided which is used in conjunction with the reset button to return the non-volatile configuration memory back to factory default settings.

The magnetic card reader interface connects to standard single or dual track MCR mechanisms.

An optional keyboard lock facility disables scanning of keypad modules.

The Model 301 has a ProtoLink peripheral interface for attaching external modules.

There are a number of firmware options available for different applications.



UMD Model 301Controller Module
Physical layout

4 UMD ProtoLink Expansion Modules

The expansion modules are connected to the controller by the *UMD ProtoLink* peripheral interface, generally via a ribbon cable.

The *UMD Model 301 controller* can accommodate a number of expansion modules which depends on the number and type of modules used.

4.1 Display Module

The liquid crystal display (LCD) module provides a backlit character based display.

Currently these displays are available in 2x16 and 2x40 formats. They are commonly used in conjunction with keypad modules to create small serial terminals and industrial control panels.

Typical products with the Model 301 and display module combination are the UMD Model 211 Custom LCD Terminal and the UMD Model 330 Industrial Wall Mount Terminal.

4.2 I/O Expansion Module

The I/O expansion module provides two full duplex UMD standard DB9 serial ports, a bidirectional parallel port (ie either input or output) and a cash drawer driver interface.

Typical products with the Model 301 and I/O expansion module combination are the UMD Model 221 Peripheral Controller and the UMD Model 264-I Custom Keyboard with I/O expansion.

4.3 Keypad Module.

Each keypad module provides a matrix of key switches currently available in 4x5 and 8x16 matrices. There are two types of keys switches, sealed for wet or dirty environments and keycap (in single, double or quad combinations).

It also provides up to 16 individually controllable LED indicators.

Typical products with the Model 301 and keypad module combination are the UMD Model 264 Custom Keyboard and the UMD Model 252 Wall Mount Keypad.

4.4 VGA Monitor Driver Module

The VGA monitor driver module provides standard VGA (640 x 480 pixel, monochrome and colour) output via its high density DB15 connector. This allows the family of *UMD ProtoLink Architecture* products to provide visual display unit functionality. Standard ANSI terminal emulation firmware is provided. This module also contains a bidirectional parallel port (ie either input or output).

A typical product with the Model 301 and VGA module combination is the UMD Model 290 Custom VGA Terminal.