# VMEbus FAQs

## Frequently Asked Questions for the Beginning VMEbus User

John Rynearson, Technical Director, VITA

**FAQ - What factors are important for reliable systems design and how does the VMEbus meet these requirements?**

There are a number of important factors to take into consideration. Some of these factors are: the mechanics of the packaging, the electrical interface, the nature of the bus protocol, and the wide range of manufacturers and products available. In this month's issue let's survey the packaging mechanics of VME and see how they enhance reliable system design.

### Mechanical Packaging

When we talk about mechanical packaging we are referring to the racks, card guides, front panels, backplanes, etc. that define how an electronic system is mechanically supported. Electrical and software engineers are notorious for ignoring this area of systems design since it is mechanical and not electrical in nature. However, the mechanics of a system play a key role in overall system reliability. A faulty connector, cumbersome I/O cabling, or modules that easily vibrate out of place can turn a system that works okay in the lab into one that fails frequently out in the field.

### The Connector - The Heart of the Backplane Interface

The connector provides the mechanical structure for the electrical interface between VME circuit modules and the backplane. The DIN connector developed in Germany in the 1970's remains one of the most reliable connectors in service today. Over the years a tremendous amount of data has accumulated to support the reliability of this connector in a variety of demanding environments. Very few system failures are ever attributed to the failure of a connector in a VMEbus system. If you need reliability data about the DIN connector, talk to one of the many connector manufacturers. They can provide you with lots of reliability and test data.

### EMI Protection

Another important factor is the ability of a system to meet electromagnetic compatibility (EMC) requirements. Since most VMEbus systems work in concert with other electronic systems, supporting EMC standards is important for overall system reliability. Certain parts of a VMEbus system may be sensitive to electromagnetic interference (EMI) that occurs in the outside environment. Similarly, a VMEbus system may generate EMI that must be contained within the VMEbus system. Overall reliability in this area is provided by the mechanical packaging. Chassis and card cages can provide part of the answer. Front panels on VMEbus modules provide some EMI shielding, but full shielding requires a front panel EMC gasket. This gasket is a set of spring loaded conductive metal strips on the side of each front panel that mate with the adjoining front panel and provide EMI protection. An alignment pin, part of the new IEEE 1101.10 standard, prevents the stacking of EMC gasket pressure to one side.

### Board Size

How does board size add to reliability? In many systems shock and vibration are of concern. Larger circuit boards are more susceptible to vibration than smaller boards. Thick metal strips called stiffeners can be put on boards to increase resistance to vibration, but over a specific size, stiffeners become less effective. VME supports two board sizes, 3U and 6U, that are both useful in shock and vibration prone environments. 3U modules can usually be used as is while 6U boards with on-board stiffeners provide the required rigidity.

### Keying

Another aspect of reliability is field maintenance. Although VMEbus modules may be plugged into any backplane slot, designers may wish to make sure that specific modules are always plugged into a specific slot. The need for being slot specific may be due to I/O requirements or the need to place a board in a specific slot to establish its bus request priority. During field service plugging a module into the wrong slot may cause the system to function in a less than optimal manner, or it may cause the system to fail completely, or it may cause damage to the system. New keying methods adopted in VME64 extensions provides a reliable method for supporting keying.

### ESD

ESD stands for electrostatic discharge. When a module is inserted into a VME chassis the potential for a static discharge is always present. A static discharge may cause a momentary glitch that a system can recover from, it may cause a fatal system crash, or it may cause physical damage that will require field replacement. To eliminate these problems the VMEbus provides for an ESD strip on the printed circuit board component side at the top and/or bottom of the board. An ESD compatible subrack system has an ESD contact clip embedded in the front end of the guide rail that is connected to the chassis ground. A resistor is provided between the ESD discharge strip and the subrack's power return, limiting the static discharge current. Also, a multipurpose alignment pin provides a path to ground if a static discharge takes place between the front panel and an I/O connector during mating.

### Front Panel Handles

One feature of the VMEbus that was previously not standardized was the front panel handles. Each different design was functional so there appeared to be little need to develop a standard. However, recently the need arose for an injector/ejector system that would facilitate the insertion and extraction of boards with high insertion forces. Additionally, many users desired a system that would not require a screwdriver for front panel access. The VME64x standard provides for such a front panel handle that allows the insertion and extraction of VME modules with the new 5 row connector.

Summary- Each of these mechanical packaging features supports a specific concern regarding reliability. When taken as a whole all the factors for a reliable system design are provided.