INTRODUCTION

The purpose of this Application Note is to assist the user in packaging a Megatel Quark single board computer into a system. The note discusses several methods of making the electrical connections between the Quark and the peripherals, power supply requirements, and heat dissipation considerations.

METHODS OF MAKING THE ELECTRICAL CONNECTIONS

The Megatel Quark is designed to serve as a "component computer" in a wide variety of applications. For this reason, the standard Quark configuration is a densely packed 160mm x 100mm circuit board, with all electrical connections being made through a simple and highly reliable 96-pin ESIC connector. The user is thus offered the maximum flexibility in packaging the Quark into his system.

The Megatel Quark can be interfaced directly to industry-standard peripherals, such as printers, floppy disc drives, modems, keyboards, and CRT monitors. Normally, no additional electronics are required for connection to these devices.

Frequently, special I/O devices must be added to the Quark or the Quark must be interfaced to industry-standard busses. This can be done by using the Quark's Peripheral Expansion Interface. This Interface provides 8 data, 6 address, and 6 control lines of the Z80 on the Quark's 96-pin connector.

A variety of alternatives are available for making the electrical connections between the Quark and other circuitry or peripheral devices. Megatel provides a number of standard alternatives, and can also be of assistance in developing a special or custom interface to fit a particular application. Some alternatives are discussed below.

1. Transition Boards

A Transition Board is a small printed circuit board which provides an interface between peripheral I/O cables, and the Quark. It is suitable in situations in which no external electronics are required between the Quark and its peripherals (see Figure 1).

Megatel offers a general-purpose transition board called Quark Transition Board-3 (QTB-3). It provides industry-standard connectors for all of the Quark's I/O features and power supply connections. A 96-pin male ESIC connector provides a spot for the plug in of any Quark model. A fully assembled and tested QTB-3 is included with the QUARK OEM DEVELOPMENT PACKAGE. QTB-3 may be ordered separately as well, either bare or assembled. It includes a small kluge area. For more technical information, refer to the QTB-3 datasheet (Order #DST00000).

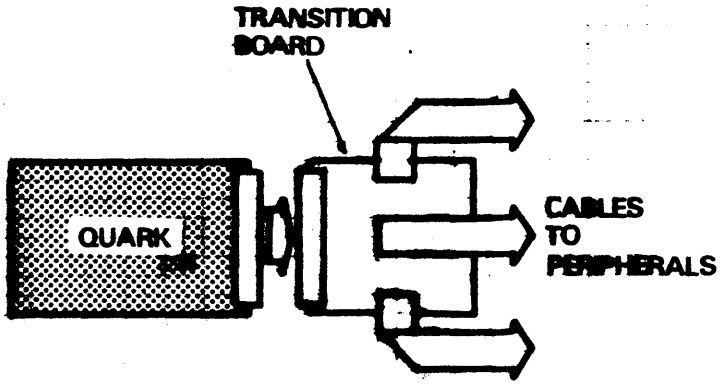

FIGURE 1. Using a Transition Board

2. I/O Expansion Boards

The additional electronics required to expand the I/O of the Quark can be placed on an expansion board. Many physical configurations are possible, depending on whether the the circuitry is incorporated into a transition board, interface board, or motherboard.

Megatel engineers can assist Quark users in the development of their I/O expansion boards through other application notes and direct technical support. Further, Megatel offers some expansion boards as standard products. One such board is the EPROM Expansion Board, which permits EPROM, EEPROM, Static RAM with optional battery back-up, a Time-of-Day Clock, and EPROM programmer to be added to the Quark. For further information see the datasheet for this product (Order #DST00020).

 Order #QT000060-R1

3. Interface Boards

The Quark's small size and the direct access provided to several of the Z80's signal lines allow it to be partially adapted to several industry-standard busses. Megatel offers interface boards to allow the Quark to be used with the STD, S-100 (IEEE-696), and Multibus busses (see Figure 2). Interface products to other busses are planned. For further information, see the datasheets on these products or contact Megatel.

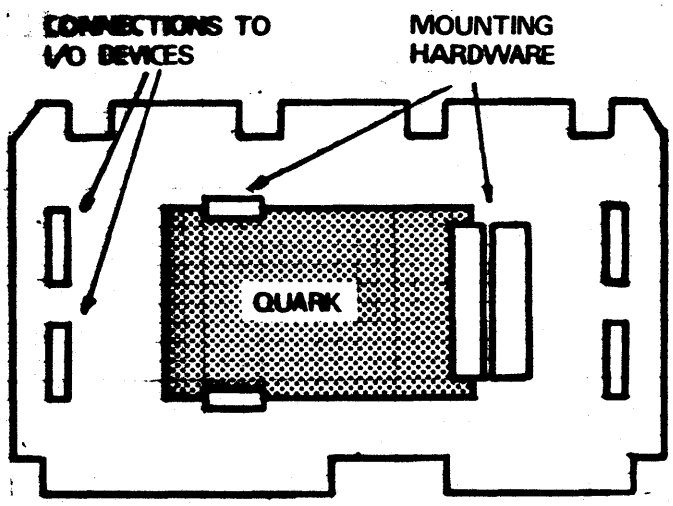

FIGURE 2. Bus Interface Board

3. Card Cage or Rack Mounting

All Quarks are 100mm wide, which is the Eurocard standard. Hence the Quark can be physically mounted in industry-standard Eurocard or single-height VME card cages with an appropriate backplane (see Figure 3). One method for making the peripheral I/O connections in such an arrangement is to plug a transition board such as QTB-3 into the ESIC connector pins protruding out the back of the card cage.

Some users have experienced difficulty sliding the Quark into some manufacturer's card slides, because of the proximity of the Quark's components to the edges of its PCB. To avoid this difficulty, care should be made in the selecton of card guides. Shallow guides are available which can accommodate the Quark quite easily without the necessity of shaving them down.

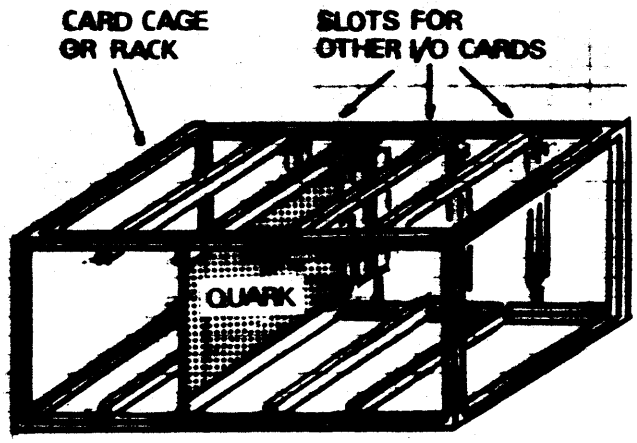

FIGURE 3. Card Cage or Rack Mounting

4. Motherboards

An alternative which avoids the use of cables is the "motherboard" approach. Here, a single printed-circuit board is used to make all of the connections between the Quark, additional circuitry, and the various peripherals, without cables where possible. The motherboard has installed on it the female ESIC connector for the Quark, connectors for the disk drives, external connectors for printers or modems, and appropriate connectors for the CRT, keyboard, and power supply (see Figure 4). The suitability of a motherboard approach is, of course, very dependent on the packaging of the Quark and its peripherals.

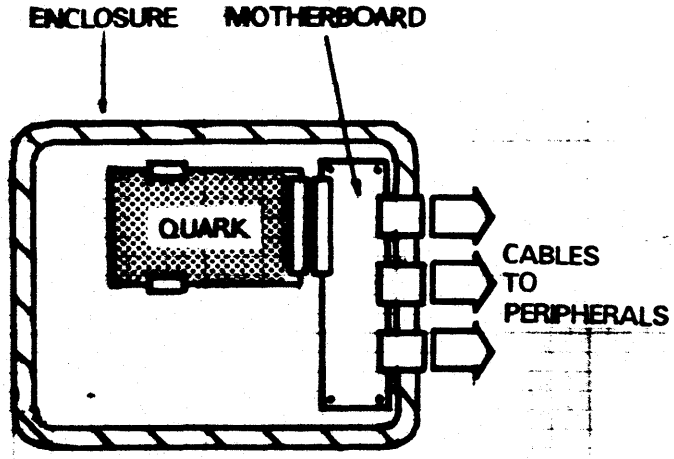

FIGURE 4. Using a Motherboard

5. Cable Harnesses

An alternative to the board approach is to use a cable harness. The cable harness would terminate in a "poke-in" or solderable 96-pin female ESIC connector, which would connect directly to the Quark board. Individual bundles of wires would connect the appropriate sets of pins on the female ESIC connector to the disk drive edge connectors, the CRT monitor, the keyboard connector, and the external connectors for printers, modems, or other peripherals (see Figure 5). Female ESIC connectors with crimpable or solderable socket inserts are available from some connector manufacturers. This approach eliminates the need for an additional circuit board, and provides considerable flexibility in the design of an enclosure for systems using the Quark.

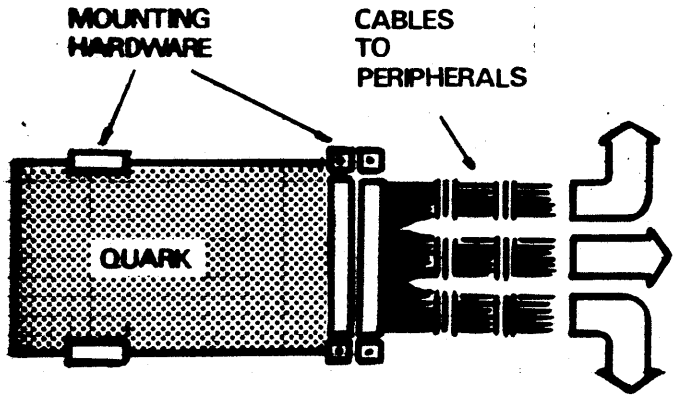

FIGURE 5. Using a Cable Harness

If a "round-wire" cable harness (rather than ribbon cables) is used, it is recommended that certain sensitive signal lines be twisted with a wire connected to ground to form a twisted pair. These lines include the Read Data, Write Data, Index, and Step lines for the disk drives, and the Transmit Data and Receive Data lines for the Full Duplex Serial Port connector.

6. Custom Engineering by Megatel

Megatel engineers have a wealth of experience in designing electrical interfaces between the Quark and the rest of a system. They can provide advice and assistance, and quickly re-design or modify any of Megatel's interface products to meet a customer's packaging requirements. If you require such assistance, please inquire.

POWER SUPPLY REQUIREMENTS

All Quark single board computers require regulated +5 and +12 volt supplies with a common ground. These are the same voltages required by 5.25-inch floppy disk drives. The current drawn by a Quark at +5 volts is between 1.4A and 2.8A, depending on its model. The current required at +12 volts is about 100mA for all models. For further details, refer to the datasheets for the various models.

The -12V required by the RS-232C drivers on the Quark is developed by an on-card charge pump, therefore no negative power supply is necessary.

All Quarks use a four-layer PCB, with the internal two layers being largely devoted to +5 and Ground. The capacitance between these layers helps ensure that the signals on the Quark are quite clean in normal situations.

If a Quark-based system fails to operate properly, the power supply connections and voltage levels in the system should be one of the first things to be checked. Be aware that reversed or incorrect polarities may cause damage to the Quark which is not covered by Megatel's limited warranty.

The power supply chosen for a system must be able to handle normal current surges. Some Quark users have experienced video display or CPU problems because their power supply was not able to maintain +12 and +5 volts during periods of disk drive activity. Since the Quark is largely TTL logic, the +5v supply must never fall below +4.75v.

HEAT DISSIPATION

Megatel Quarks draw roughly 10 watts of power, but do not run excessively hot under normal conditions. When packaged in a system, the ambient temperature should not exceed 55 Celius (131 Fahrenheit). Under such conditions, none of the Quark's parts will be operating above their maximum junction or case temperatures. Please note also that 55C is above the maximum recommended operating temperature for most floppy disk drives, which are often packaged in the same enclosure as the Quark.

Air must be permitted to flow around the Quark, but heat sinks or forced air (fans) are not required in most situations. Adequate ventilation holes in the enclosure and an unrestricted air flow are often sufficient.

All Quarks are burned-in for a minimum of 72 hours under power at 55C ambient temperature, and pass functional testing at both room temperature and 55C ambient.

LOWER-POWER MODELS OF THE QUARK

Many components on the Quark are available in CMOS at a slightly higher cost. Megatel engineers have successfully demonstrated the feasibility of lower power versions of the Quark. If your application requires lower power consumption, contact Megatel. Given a target power consumption value, we can quote price and delivery of a lower-power Quark model.

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