

## CHAPTER 9

# THE OMNIBUS INTERFACE

### INTRODUCTION

Interfacing to the PDP-8/E OMNIBUS is accomplished with both hardware and software. For standard interfaces, DEC supplies necessary option modules and the equivalent programs (subroutines and MAIN-DECs) necessary to perform those DEC defined functions. This software is quite adequate to satisfy the operational requirements of each standard option as defined in Chapter 7. However, in the event that the user desires program functions different from those given in the software packages, he must change the software using the standard input/output devices such as a teleprinter, a card reader, or the console switches. Before undertaking this, however, the user should acquaint himself with the software routines (good documentation of the software is provided with each program tape) and read INTRODUCTION TO PROGRAMMING, a volume in the DIGITAL small computer handbook series.

This chapter provides the necessary information for users desiring to build a special interface. It deals primarily with the hardware consideration and it is understood that the user must create his own program for his own defined functions. If the user lacks sufficient experience to design his interface, he can contact his local DEC Sales Office for special assistance.

The means of transferring commands and signals from module to module is accomplished on what is called the "OMNIBUS." All PDP-8/E modules, including options, plug into the OMNIBUS in a significantly accessible manner.

The OMNIBUS is an etched board with rows of connectors soldered to the board. The pin assignment is the same on all connectors. Thus, the OMNIBUS accommodates 96 signals, which feed to 96 pins on the connectors. The user is generally only concerned with those signals that control data transfers, address memory, or contain the data to be transferred. However, the additional signals, such as timing, are readily available on the OMNIBUS to accommodate any tailor-made requirement in the event that the user should design and build his own interface module.

Many advantages are derived from the OMNIBUS approach. Because all connectors on the OMNIBUS contain the same signals, a module can be placed anywhere on the bus at the convenience of the user. All random wiring is eliminated with this type of arrangement. This feature provides greater performance, and reliability. Considerable space is conserved; thus providing a unique packaging capability that allows a high density of electronic circuitry in a small area.

The information in chapter 9 is presented in two sections. The first section describes the many aspects of the OMNIBUS in terms of its physical qualities, the types of interfaces placed on the bus, and the input/output transfer schemes. This information is intended to provide the reader with sufficient background to begin designing an interface control module.

When interfacing to the PDP-8/E, the designer may consider the OMNIBUS as his interface. If he follows the rules specified in section 1 of this chapter, he is more than half way toward designing his own interface. The nature of the OMNIBUS and all 96 signals are defined in a manner that makes interfacing relatively easy to accomplish.

Section 2 identifies the Data Transfer types and some guidelines to help the designer choose the transfer techniques for his needs; section 3 provides a general guideline for the designer building a Programmed I/O Interface Control Module; section 4 provides a general guideline for the designer building either a single-cycle or a three-cycle Data Break Interface; section 5 provides general design and construction guidelines. Section 6 includes some PDP-8/E interface hardware.

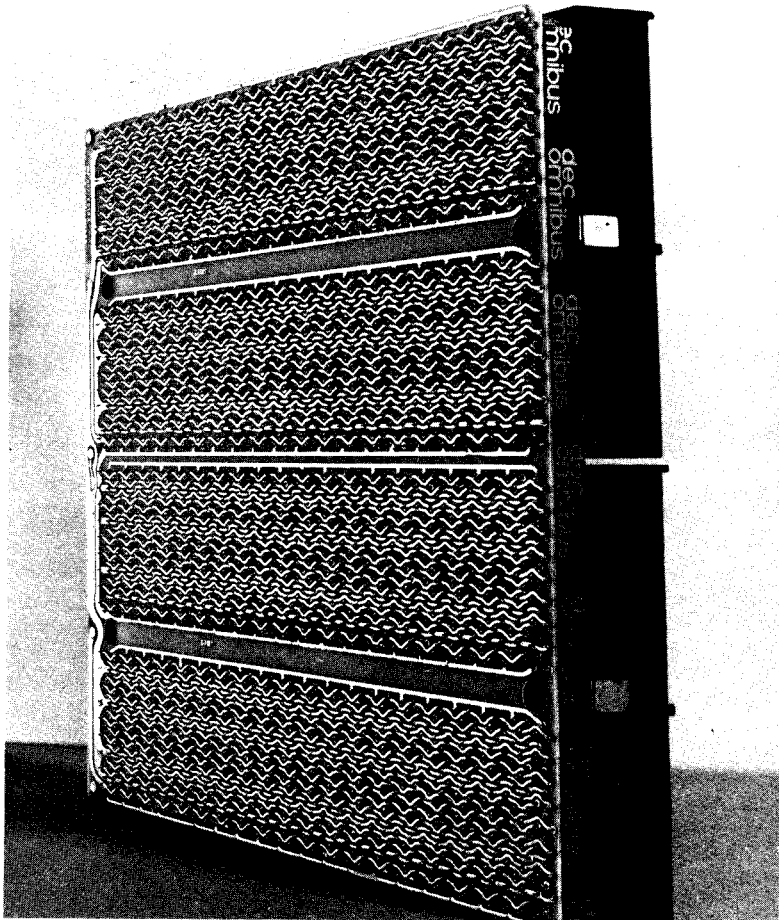


Figure 9-1 PDP-8/E OMNIBUS

## SECTION 1 OMNIBUS DESCRIPTION

### BUS STRUCTURE

The OMNIBUS (H919 OMNIBUS Assembly) is a back plane etched circuit board with ten H803 connectors mounted onto the board and wave soldered. The OMNIBUS is 10½ inches by 10½ inches with a 1⅝ inch thickness. The OMNIBUS is attached to the bottom of the PDP-8/E mounting box and is the means by which all modules are connected. Figure 9-1 shows the OMNIBUS with all connectors mounted. A single assembly accommodates 20 PDP-8/E modules.

The OMNIBUS is designed so that all back plane wiring is eliminated and so that every pin in a given connector slot is defined. All modules plugging into the bus are PDP-8/E modules. If a functional unit on the bus requires more than one module, Type H851 edge type connectors on the top of the board connect multiple boards together. For cables to the "outside world," connectors on the side of the module connect to a shielded coaxial or flat ribbon cable. In this arrangement, up to 2 connectors for each module may be used.

Figure 9-2 shows the OMNIBUS with modules plugged into it. Each module functional unit can be placed anywhere on the bus or removed from the bus without affecting the operation or performance of the rest of the system not requiring that module.

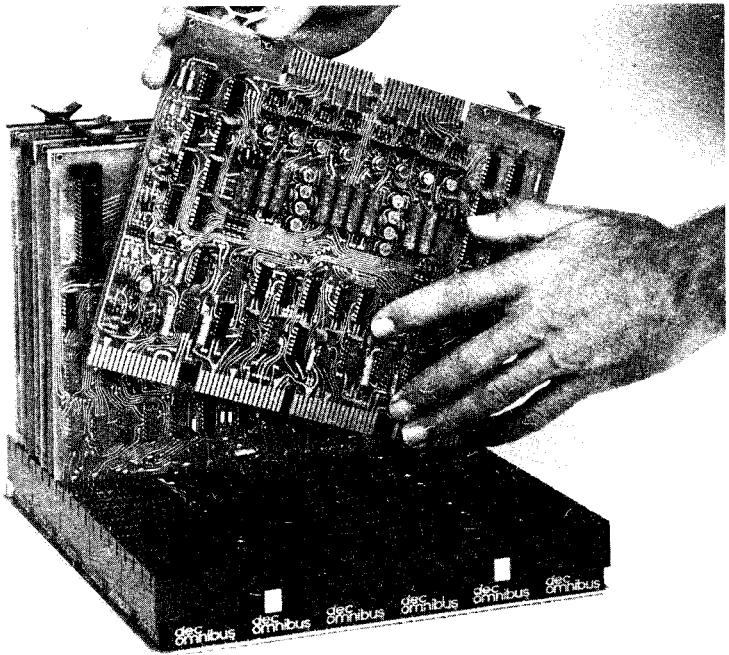


Figure 9-2 PDP-8/E Modules mounted on the OMNIBUS

Each OMNIBUS contains 20 slots; two assemblies with a M935 bus connector provides 40 slots, two of which are used to interconnect the assemblies. Thus, 38 slots are available when the OMNIBUS Expansion unit is used. However, the OMNIBUS can be expanded to accommodate an additional 37 modules. This is illustrated in Figure 9-3, which shows the basic OMNIBUS connected to the OMNIBUS expansion unit.

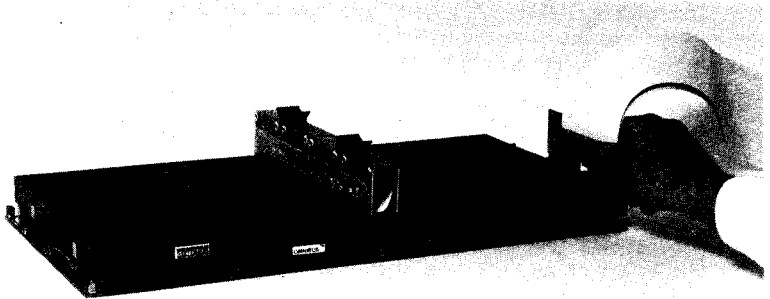


Figure 9-3 The System Expansion Capability.

### **BUS SPECIFICATIONS**

Logic Levels

Logic 1—Max Voltage: 0.4V  
Min Voltage: -0.5V

Logic 0—Max Voltage: 5.0V  
Min Voltage: 3.0V

### **SYSTEMS CONFIGURATION**

The PDP-8/E with all primary options is identified in Figure 9-4. The basic system contains the central processor (4 modules) the programmer's console (1 module), 4K memory (3 modules), a shield (1 module) and a console Teletype control (1 module).

System expansion is easily accomplished simply by adding "off-the-shelf" control units necessary to accommodate the corresponding peripheral equipment, if additional machine capability is desired. For example, if it were desired to add additional memory capability to a basic PDP-8/E, a Memory Extension Control and Time Share Option, type KM8-E, could be added. Then 4K memory units could be added, up to a maximum 32K capability. For those customers who wish to use PDP-8/I or PDP-8/L compatible peripherals, an external bus option such as the Positive I/O Bus Interface Module, type KA8-E, and the Data Break Interface Module, type KD8-E, connects to the OMNIBUS to provide interfacing capabilities.

