THE NEW COMPUTER FOR THE
SPEECH SYNTHESIS GROUP

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I. INTRODUCTION

In 1981 the Speech Synthesis Group at the Institute of Phonetics obtained a grant from the Thomas B. Thrige Foundation and the Tuborg Foundation for the purchase of a PDP11/60 computer system. The computer was acquired in November 1981 and installed in the laboratory where the required physical conditions have been provided (ventilation, cooling, and electricity). In December a grant from the faculty made it possible to further enhance the system by installing a huge background storage device together with a magnetic tape station.

II. SPECIFICATION OF THE NEEDS

In specifying the computer system we have aimed at a solution which would fulfil the following demands:

1) Hardware and software support for both real-time and multi-user time-sharing applications. I.e. we must have a fast response time generating synthetic speech for interactive purposes and yet have all the advantages of a time-sharing system: Programme development, editing facilities, and data preparation for several users.

2) The hardware should be serviceable to the technical staff of the laboratory. The operating system and utility programmes should appear as a comprehensive, versatile, and fail safe tool for the user so that we will not have to re-invent the wheel.

3) Choice of a computer which has already become a de facto standard in various phonetic laboratories for better portability of programmes and for the exchange of experience.
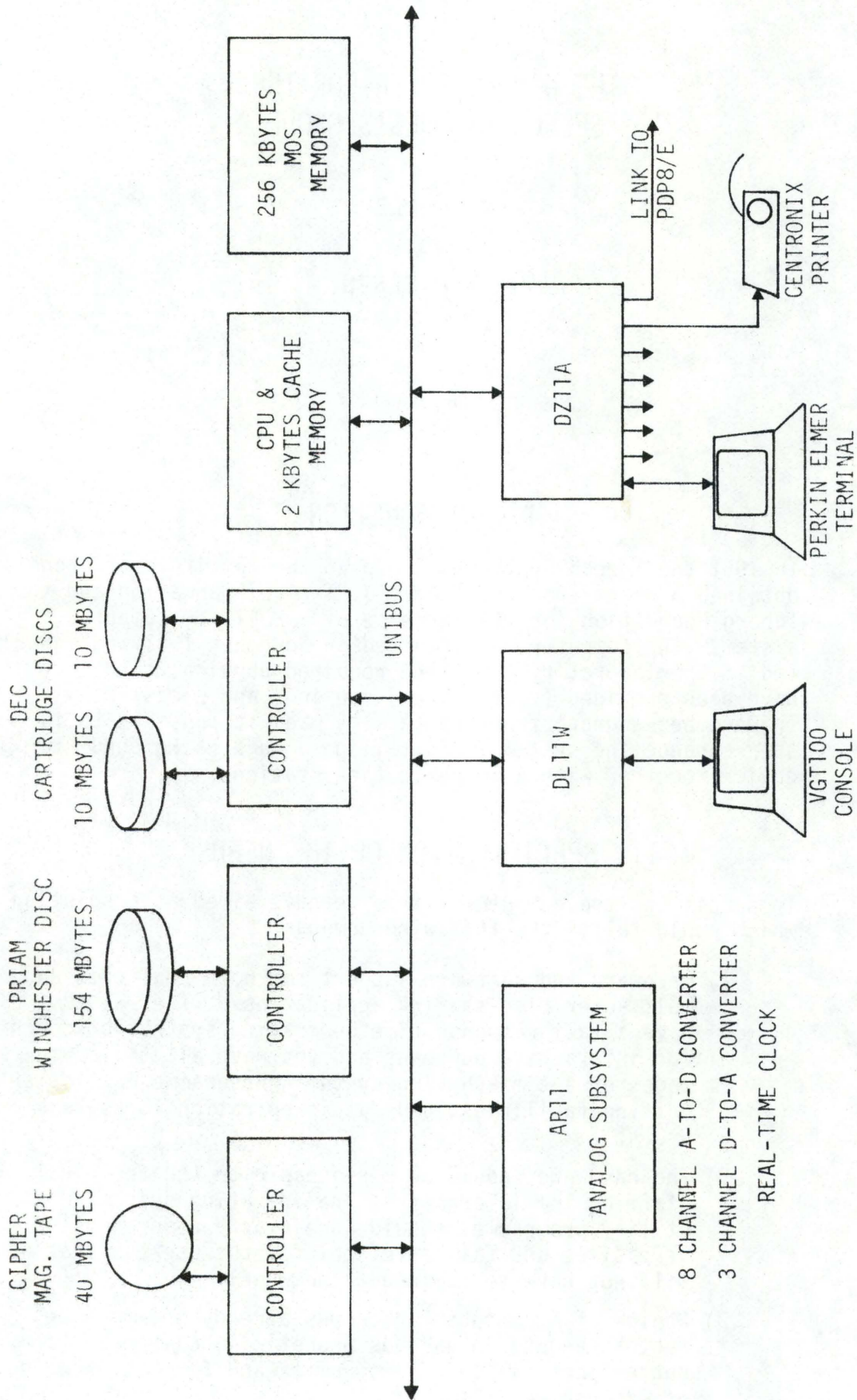
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Figure 1

The PDP11/60 computer configuration

III. THE COMPUTER CONFIGURATION

The PDP11/60 cpu contains the usual eight general purpose 16 bit registers, the arithmetic unit, microprogramme/sequencer, extended instruction set, and UNIBUS arbitration logic. Integral parts of the computer are the floating point instruction set and the 2 kbytes cache memory/memory management unit. The cache memory is a high speed bipolar memory that maintains a copy of the previously selected portions of main memory for faster access of instructions and data. The memory management unit performs two basic functions:

1) Relocation of virtual memory addresses to physical memory addresses.

2) Protection against unauthorized access.

Main memory is a 256 kbytes MOS device with associated ECC-logic (Error Checking and Correcting) capable of correcting single bit errors and reporting multiple errors.

As background storage devices two 10 Mbytes RLO2 disc drives (Digital Equipment Corporation) and one 154 Mbytes winchester disc drive (Priam) are used. For back-up and off line data storage a 40 Mbytes mag-tape station (Ciper nine track 1600/3200 bpi) is also connected.

Up to eight terminals can be connected to the DZ11A terminal multiplexer apart from the VGT100 console terminal (DEC) which is hooked up at the DL11W interface. For the time being the multiplexer handles one Perkin Elmer terminal, one Centronix printer, and a communication channel to the PDP8/E laboratory computer.

The AR11 constitutes an analog subsystem for signal processing and generation. It includes a sixteen channel 10 bits analog to digital converter, two 10 bits digital to analog converters, and a programmable real-time clock. The convertion time for the A-to-D converter is 33 microseconds, and 20 microseconds for the D-to-A converter.

IV. SOFTWARE

The computer was purchased with an RT11 operating system and a Fortran 4 c-licence included. Shortly after the installation, however, we had the UNIX version 7 operating system running on the computer[1], which has proved very useful for our purpose.

V. NOTE

1. We are greatly indebted to a group of students from DIKU, and especially Mr. Dennis Olsson, who installed the UNIX operating system on the PDP11/60.