

status of the user, and so they must not be altered except by the Executive. Permitting references to the user bank from other banks allows reentrant Executive subroutines to service the user, under his control.

If the hardware detects the use of a privileged instruction in user mode, it stores the instruction in a special trap register and generates an interrupt. This interrupt initiates an Executive routine called the Dispatcher (see Section III) which interprets the contents of the trap register and responds appropriately. Many privileged instructions are defined by the system as subroutine calls, allowing a user program to link to Executive subroutines.

The final important hardware modification was the addition of character-manipulation instructions and of a special operating mode called "ring mode." One of the functions that an Executive routine must control is the transmission of characters to and from the remote Teletypes. This function is performed by the Teletype Service Routine (see Section V). Since this routine runs frequently, it is important that it be very fast. For this reason, instructions that address a single 6-bit byte were added. (These instructions, of course, are useful to any character-handling program.) Optionally, these instructions are self-incrementing, increasing the byte pointer by one each time the instruction is executed. Thus, four successive executions of the "deposit character and index" instruction which was initialized with the address of the first (left) byte of the word X would deposit characters in the left, middle, and right bytes of word X and the left byte of word $X+1$.

Ring mode was added to facilitate circular buffering. When oper-