

INSTRUCTION ISSUE

Program instruction words are read one at a time from the IWS into the CIW register for execution. An instruction issues from the CIW register when the conditions in the functional units and operating registers are such that the functions required for execution may be performed to completion without conflicting with a previously issued instruction. Once an instruction has issued, it must be completed in a fixed time frame. No delays are allowed from issue to delivery of data to the destination operating registers.

Since each instruction word is divided into four 15-bit parcels, there may be as many as four instructions in the CIW register at one time. These instructions are executed in sequence (parcel 0 instruction first). The proper allowance must be made for the mixture of one- and two-parcel instruction formats. The five possible instruction arrangements are illustrated in Figure 4-1.

PROGRAM BRANCHING

When program execution reaches a branch instruction, the action taken depends upon whether the destination address is already in the IAS. If the destination address is in the IAS, the P register is altered to the new program address and the corresponding word is read from the IWS to the CIW register. The jump is then completed without an SCM reference for a new instruction word.

If the destination address is out of the IAS, two new words, located at the destination address and the destination address plus one, are requested from SCM to begin the new program sequence. Instruction execution continues upon receipt of the words from SCM.

DUPLICATE ENTRIES IN IWS

It is possible for a branch out of IWS to occur when the destination address corresponds to a program word that has already been requested from SCM as a result of the sequential two-word read ahead. If the word has not actually arrived at the IWS at the time of the branch test, the jump occurs and a duplicate of the first word in the new sequence is read from SCM. Execution of the new sequence begins as soon as the earlier word arrives at the IWS.