Digital Computer Laboratory
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

SUBJECT: The Availability of Floating Address Values Following CS Conversions

To: S&EC Group, H. Bonington

From: John M. Frankovich

Introduction

During the process of converting a program tape by the Comprehensive System a table is formed of the floating address tags occurring in the program. A modification has been made to CS so that the table is now left stored on group two of the buffer drum at the end of each conversion (or group of conversions). The availability of these values makes it possible for post-mortem and mistake diagnosis routines to translate addresses from numerical form back to floating address tag form.

Table Structure

The table of floating addresses consists of an entry table and a value table. The entry table is 25 registers long and begins at register 3547(octal) of buffer drum group two. The value table is 336 registers long and begins at register 3600(octal) of the same group.

The value table actually consists of a collection of sub-tables, one for each of the letters of the alphabet except l and o. Each of these sub-tables contains the values of all the floating address tags starting with a given letter and is as long as the maximum tag number associated with the given letter. For example, if the only "q" flads used are q5, q7 and q11, then the "q" sub-table is 11 registers long. All of the sub-tables for all the letters used are stored contiguously in sequence at the beginning of the value table and all unoccupied registers in the value table contain negative numbers (floating tag values are, of course, positive integers).

The value of a given tag is found by using the entry table. The sub-tables in the value table are stored in the following sequence: (blank) p,u,z,i,m,a,j,d,v,n,s,k,x,y,t,c,e,w,f,q,b,g,r,h. The value of a given tag, q34, for example, is found by adding the tag number, 34, to the contents of the q^{th} register, the 21st of the entry table. The result is the address of the register the value of q34 would occupy if

the value table were stored beginning at register 223(octal) of CM. If the value table is stored elsewhere then the proper increment must be added in order to get the correct location of the value.

The above procedure is the one used in CS to find the value of a given flad tag. The reverse procedure, that of finding the flad tag nearest in value to a given address, is the one to be followed in post-mortem and mistake diagnosis routines. The value table can be scanned to find the tag value differing the least from the given address. The alphanumeric form of the tag is then found by scanning the entry table to find the greatest entry strictly less than the address of this tag value (assuming the value table is stored at register 223(octal) of CM). The address of this entry then gives the letter of the tag, and the address of the tag value less the entry in the tag number. Also the original address less the tag value is the value of the original address relative to the tag.

Output Flads

Whenever an automatic output routine request occurs in a program tape, the request is tagged by a synthetic floating address tag. The location of the sub-table of values for these tags is specified by the contents of the initial register of the entry table in exactly the same manner as for the regular floating address tags. The tag number for each of these synthetic tags is determined by the sequence in which the output requests occur, i.e., the first request is the tag number one, the second two, etc. Programmers should take the presence of the synthetic flads into consideration when writing routines for the translation of numerical addresses to tag form.