ELLIOTT 900

Volume 2: PROGRAMMING INFORMATION

Part   7: MAGNETIC TAPE ROUTINES

Section 2: QMREAD, QMFIND

CONTENTS

Chapter 1: INTRODUCTION

1.1 Function

This program is a SIR coded subroutine which searches for a specified block on a Magnetic Tape file, and reads the block from tape into core store.

1.2 Form of Distribution

The routine is distributed on a SIR mnemonic tape, part of the MTBLOCK tape.

1.3 Method of Use

The program is assembled and entered as a SIR subroutine.

1.4 Configuration

The minimum configuration for running this program is a 903 central processor with 8192 words store, a magnetic tape controller and at least one magnetic tape handler.

Chapter 2: FUNCTIONS

2.1   Find and Read a Specified Block

Enter by: 11 QMT

8 QMFIND

0 FT

8 ERROR

where 0 FT points to the file table (see 2.4), and ERROR is the label of an error routine.   The A-register must hold the number of the block to be found, as a positive integer.

2.2   Go back n blocks and Read

Enter QMFIND as in   2.1 above.   The A-register must hold -n where n is the number of significant blocks to be passed, e.g. if A-register holds -1 the last block read or written will be read.   (Note that in this example the position of the tape will normally be the same as when the routine was entered.)

2.3   Read next Block in Sequence

Enter by: 11   QMT

8   QMREAD

0   FT

8   ERROR

where FT and ERROR have meanings as in   2.1.

2.4   Data Read

The specified block will be read into core store in the area specified in the file table (see Volume 2.7.1).   The first word of the block (containing the block number) will be stored at the location specified by the address in word 1; of the file table.   The total number of words read will be X, where word 2; file table holds +X.   If the actual block length W, was different to X, then:

(a) if W > X an error exit is made (see 2.6), and the last (W-X) words are not read into core store.

(b) if W < X then the block will be read correctly into the first W words, and the next X-W words will be undefined.

In all cases where the block is read successfully the second word of the block will hold either +W, or /0 W (i.e. W + bit 18, indicating a label block).

2.5   Exit

Normal exit is to the third location after entry, with the A-register positive.   If the A-register is negative on this exit, this indicates that the end of tape warning marker has been detected.

2.6   Error Exit

The error exit is to the second location after entry.   The contents of the A-register indicate the nature of the error according to the list given below.   If the appropriate bit is one then the giving meaning applies,

Bit 18   Indicates that the specified block cannot be found.

Bit 15   An instruction has been treated as "do nothing" by the controller, (may be due to pressing Manual while a block is being read or written).

Bit 14   File not opened for reading.

Bit 10   Zero character , i.e. false end of block; repeated hardware error.

Bit 7   Write permit ring not in.   Ignore if reading tape.

Bit 6   Long block.   The block to be read is longer than the maximum expected length (see 2.4).   If bits 2, 3, 4 and 10 are zero the first X words are read correctly.

Bit 4   Parity failure, repeated hardware error.

Bit 3   Missed transfer;   repeated hardware error.

Bit 2   Handler in Manual state or not available.   In this case bits 10 to 3 are undefined.

All other bits are undefined, and their values should be ignored.

If an error in reading the block is detected by hardware, or if a block that appears to be the correct one does not have a valid check character, the routine makes repeated attempts to find and read the correct block.   At least 20 attempts are made to read the specified block (the actual number is set by a constant).   If the error or errors still occur the error exit is eventually taken.   The error signified by the A-register on exit is that detected on the last attempt.   If the failure is due to lack of a check character Bit 18 is set.

Note that only the particular block specified to be found and read is checked for errors.   Errors or corrupted blocks in between the starting position of the search and the block to be found are ignored.

Chapter 3: METHOD USED

The standard version of the routine uses block transfers for reading from tape. It does not use interrupts from the magnetic tape controller, these are suppressed.

The find block routine checks whether the tape is to be moved forward or backwards. If the current position block number is greater than twice the block number to be found a rewind operation is used. Then or otherwise the tape is backspaced or moved forward by reading and ignoring blocks. Blocks to be ignored may be of any length and format except the EOF label format. If an EOF label is detected the error exit is taken with bit 18=1. Also if the block to be found is more than one block beyond the end of tape warning marker this error exit is taken.

Chapter 4: STORE USED

Approximately 330 locations.

Chapter 5: STORE LOCATIONS AFFECTED

QMREAD and QMFIND alter the following locations of interest to the user:

QMT

4; of the file table

The buffer store used for input

Workspace used internally by the magnetic tape software. No other locations of the file table are altered.

Chapter 6: TIME TAKEN

The time taken to read a single block(correctly on the first attempt)is approximately $18 + 0.33W$ milliseconds, where W is the number of words in the block.

If N is the block number to be found, and L is the number of the last block read or written then the time for the search routine is <u>very</u> approximately =

if $N>L$ then $(N-L) * (18+0.33W)/1000$ seconds
else if $N<L/2$ then $(L/150) * (W/66+0.75) + (N/1000) * (18+0.33W)$

if $N>L/2$ then $(L-N+2) * (18+0.33W)/1000$ seconds.

In these cases W is the average number of words in a block.