

1401 Subroutine #10
E. Melichar
July 30, 1962

DISK OPERATION AND ERROR SUBROUTINE WITH MINIMUM SEEK FEATURE

Full Track, Move Mode, Arm 0

The Disk Operation and Error Subroutine with Minimum Seek Feature, Full Track, Move Mode, Arm 0 performs all disk and disk check operations. It is efficient both in speed of operation and in use of core memory. As each disk operation is executed, the Subroutine stores the disk address. When re-entered for another disk operation, it performs a Seek operation only if it is necessary.

FUNCTION

In using the Subroutine, the programmer must establish a 1,000-digit field into which data from the Ramac will be read or from which data will be read onto the Ramac. This field must be both immediately preceded and immediately followed in core by a Group Mark Word Mark. The first Group Mark Word Mark must be immediately preceded in core by an 8-digit disk address, the low order position of which must be labeled RA. This label corresponds to practice of the programming group of the Bank.

The programmer must establish two 5-digit DCW fields in his program labeled LOWTK and HIGHTK, respectively. LOWTK must contain the lowest valid Ramac address and HIGHTK must contain the highest valid Ramac address used by the program in a Write Disk operation. If the Ramac address specified prior to a Write Disk operation falls outside these limits, the computer will execute a programmed halt in the Subroutine.

To perform a disk operation, one of the three branch instructions listed below is given. The computer will branch to the Subroutine, execute the specified operation, and return to the main routine in the next sequential instruction following the branch instruction used to enter the Subroutine. The branch instructions with which the Subroutine may be entered, and the disk operations performed by each, are as follows:

B SEEKFT	Seek Disk if necessary
B READFT	Seek Disk if necessary and Read Disk Full Track
B WRITEFT	Seek Disk if necessary, Write Disk Full Track, and Write Disk Check

After executing each of the above operations the Subroutine performs a check for disk errors by testing the Access Inoperable Indicator after a Seek Disk operation and the Any Disk-Unit Error Condition indicator after a Write Disk, Read Disk, or Write Disk Check operation. If either indicator is on at any of these tests, the appropriate operation or operations are reexecuted up to 8 times. If the error condition is not corrected after 8 tries, the computer executes a programmed halt in the Subroutine.

CORE SPACE REQUIREMENTS

The complete Subroutine, excluding LOWTK and HIGHTK, occupies 207 digits of core memory. Since it replaces disk operation instructions and indicator tests in the main program with much shorter branch instructions, it effects considerable savings in core memory in most programs. In addition, since the Subroutine utilizes the original disk operation instructions in reseeking, re-reading, and rewriting after a disk error condition; it uses no additional core over what would have been used by an error routine only.

If, as is likely, an individual program does not require the Subroutine to perform all three alternative operations listed above, core memory can be conserved by making one or more of the easy modifications listed below.

MODIFICATIONS

If a disk error condition is not corrected, the computer will execute the Halt instruction on line 150 of the Subroutine. This instruction can be modified to a Branch, Halt and Branch, or a Halt with specific indications in the A- and B- address registers.

To conserve core memory, the Subroutine can be shortened by removing cards containing the instructions for each of the alternative operations that are not used in a specific program. The following table lists the cards that can be removed for each Branch operation that is not used, and the number of digits by which the program will be shortened in each case:

<u>Operation not used</u>	<u>Remove cards</u>	<u>Shortened by</u>
B SEEKFT	010, 020, 030	16 digits
B READFT	160, 170, 180, 190; 200, 210	32 digits
B WRITFT	100, 110, 210, 220, 230, 240, 250, 260, 270, 280, 290, 300, 310, 320	84 digits

PG	LIN	CT	LABEL	OP	A OPERAND	B OPERAND	D	LOC	ERROR NOTES	COMMENTS
					NO CONTROL CARD					
010	4		SEEKFT	SBR	RETADD&003					DISK SUBROUTINE
020	7			C	RA -002	RASTOR				
030	5			B	RETADD		S			
040	8		SEEKDK	MCW	%F0	RA -007	R			FULL TRACK
050	5			B	TESTX9		N			MOVE MODE
060	1			NOP						SUBROUTINE #10
070	4		BSEEKX	B	ZEROCT					
080	1			NOP						
090	4		BREADX	B	READDK					
100	4			B	WRITEK					
110	8		DKOHEK	MCW	%F3	RA -007	W			
120	8		TESTX9	B	HALTXX	COUNTX	9			
130	7			A	ONEXXX	COUNTX				
140	4			B	SEEKDK					
150	1		HALTXX	H						DISK ERROR HALT
160	4		READFT	SBR	RETADD&003					
170	4			CW	BSEEKX					
180	7			C	RA -002	RASTOR				
190	5			B	SEEKDK		/			
200	8		READDK	MCW	%F2	RA -007	R			
210	4			B	TSTYYY					
220	4		WRITFT	SBR	RETADD&003					
230	7			CW	BREADX	BSEEKX				
240	7			C	RA -002	RASTOR				
250	5			B	SEEKDK		/			
260	7		WRITEK	C	RA -001	HIGHTK				
270	5			B	HALTXX		T			
280	7			C	RA -001	LOWTK				
290	5			B	HALTXX		U			
300	8			MCW	%F2	RA -007	W			
310	5			B	DKCHEK		Y			
320	8			MCW	%F3	RA -007	W			
330	5		TSTYYY	B	TESTX9		Y			
340	7		ZEROCT	MCW	ONEXXX	COUNTX				
350	7			SW	BSEEKX	BREADX				
360	7			MCW	RA -002	RASTOR				
370	4		RETADD	B	0000					
380	1		COUNTX	DCW	*					
390	1		ONEXXX	DCW	*			1		
400	4		RASTOR	DCW	*				0539	

PRECAUTION

For computers with the indexing feature and with less than 16,000 digits of core storage, the Subroutine should be assembled between locations 1 and 999.