

M E R G E   R O U T I N E

# 1.0 C O N T E N T S

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This document is preliminary in nature and is intended as a vehicle for meeting immediate needs with regard to system familiarization and orientation. UNIVAC® Division of Sperry Rand Corporation reserves the right to change and/or modify such information contained herein as may be required by subsequent system developments.

## 2.0 I N T R O D U C T I O N

The 1050 MERGE generator is designed to merge 2 to 12 ordered input files and to produce one output file of data sequentially ordered in accordance with the specified merge keys. A merge process is necessary if the data sorted by the 1050 SORT exceeded the maximum, which is determined by the amount of data which can be contained on one single reel of a collation phase tape.

The insertion method has been applied for merging.

Each merge program has to be written by the programmer as any other program. By implementing procedure calls the MERGE subroutines will be incorporated in the user program which has to communicate with the MERGE coding by means of the macro instructions. This supplies the user with the maximum flexibility in his own program. His program also has to perform the appropriate calls for the TAPE1 routine, or any other tape routine controlling tape input and output.

### 2.1 HARDWARE REQUIREMENTS

When using the Operating System and TAPE1, the following hardware requirements apply:

- UNISERVO Tape Units available

- Type: as allowed in TAPE1.

- Number of tape units: as required by TAPE1.

- All tape units must be of the same type.

- Memory Size

- Minimum: 8K

- Maximum: 32K

### 2.2 DATA

- Record Size

- This must be fixed (see TAPE1).

- Key

- The MERGE key consists of 1 to 10 fields occupying the same position in every record.

- Each field consists of 1 to 16 contiguous characters.

### 3.0 R O U T I N E C A L L S

The following calls have to be implemented.

3.1	<u>LABEL</u>	<u>OP'N</u>	<u>OPERANDS</u>
		*STD	

This is for standard label definitions.

3.2	<u>LABEL</u>	<u>OP'N</u>	<u>OPERANDS</u>
		SELCT	$p_1, p_2, p_3, \dots, p_n$

This causes the generation of the MERGE subroutines according to the specified parameters where

- $p_1$  = number of input files (2-12)
- $p_2$  = number of fields in the key (1-10)
- $p_3$  = type and sequence desired for field 1
- $p_n$  = type and sequence desired for field n-2 and may be
  - B for ascending binary
  - D for ascending decimal
  - DB for descending binary
  - DD for descending decimal

3.3	<u>LABEL</u>	<u>OP'N</u>	<u>OPERANDS</u>
		KEYn	$p_1, p_2$

This is for a key definition where

- $n$  = field number (1-10) for an n-field key
- $p_1$  = length of field (1-16) in characters
- $p_2$  = position number of rightmost character of the field in the record (relative to the number one)

3.4 These comprise appropriate TAPE1 and FILE1 calls and AREA directives.

## 4.0 M A C R O I N S T R U C T I O N S

### 4.1 INITIATING MACRO

LABEL	OP'N	OPERANDS
	INIT	

This macro initiates one input file, sets initial conditions in the MERGE routine, and selects one record. The INIT macro has to be performed for each file and therefore has to follow each OPEN1 macro.

#### ■ Entrance Condition

The absolute address of the first record is in the four least significant characters of AR1.

#### ■ Exit Conditions

- a) The absolute address of the selected record is in the four least significant characters of AR1.
- b) The binary file number of this record is in the least significant character of AR2.

The file number can be binary 1 to 12 and corresponds to the call sequence in the user's program.

If EOF (end of file) sentinel has been found when executing the OPEN1 macro ("no data tape"), a TERM call has to follow for this file instead of an INIT call and the next file has to be opened.

The number of input files can be decreased at object time by replacing the INIT call by a TERM call.

### 4.2 SELECT MACRO

LABEL	OP'N	OPERANDS
	MERGE	

The MERGE macro selects the next record. It has to be performed after the last selected record has been transferred to the output area, and the next record of that file has been accessed.

#### ■ Entrance Condition

The absolute address of the next record is in the four least significant characters of AR1.

#### ■ Exit Conditions

- a) The absolute address of the selected record is in the four least significant characters of AR1.
- b) The binary file number of this record is in the least significant character of AR2.

### 4.3 TERMINATING MACRO

LABEL	OP'N	OPERANDS
	TERM	

The TERM macro has to be executed for each input file after an EOF sentinel has been found or the file has been closed by CLOS1. The MERGE will terminate this file and then select a record of the remaining input files.

■ Entrance Condition

None.

■ Exit Conditions

- a) The absolute address of selected record is in the four least significant characters of AR1.
- b) The binary file number of this record is the least significant character of AR2.
- c) If this is the TERM call for the last input file, control is given to the instruction labeled ZEND in the user's program, where the output file has to be closed and the program completion stop has to be executed.

#### 4.4 NOTES

All macro instructions alter the contents of AR1, AR2, and index registers 1 and 2.

If equality of records is found, the record with the smallest file number will be selected.

The MERGE routine is restartable, therefore a multicycle merge can be performed.

## 5.0 ESTIMATED STORAGE REQUIREMENTS

The SELECT coding requires:

$$165 + 65f + 20n \text{ characters}$$

where  $f$  = number of input files

$n$  = number of fields in the key

INIT: 5 characters

MERGE: 10 characters

TERM: 5 characters

## 6.0 ESTIMATED EXECUTION TIMES

For a 1-field key (16 characters) and 3 input files,

INIT 2146.5 microseconds

MERGE 1930.5 microseconds

TERM 2205 microseconds

PROGRAM TWO-WAY MERGE

PROGRAMMER \_\_\_\_\_

DATE \_\_\_\_\_

PAGE \_\_\_\_\_ OF \_\_\_\_\_ PAGES

For BEGIN only.

SEQUENCE	PAGE	LINES	LABEL	OPERATION	OPERANDS	COMMENTS	PROGRAM-ID											
								1	3	4	5	6	7	11	13	18	19	30
001	0.1		S.M.P.L.	BEGIN	0200000													
	0.2			*S.T.D.		STANDARD LABEL DEFINITIONS												
	0.3			SELECT	2, 1, D	2 INPUT FILES, 1 KEY, DECIMAL ASCENDING												
	0.4			KEY	5, 1, 5													
	0.5			TAPE	2, STDBY, AR, 1, STDBY, TRF, 1, 2													
	0.6	A.		FILE	1, IN, 'FIRST', '000', A, 4, 1, 1, 1, INPA, INPA, 2, EOF, AB, 6, 2, 248													
	0.7	B.		FILE	1, IN, 'SECOND', '000', A, 4, 2, 2, 2, INPB, INPB, 2, EOF, AR, 6, 2, 248													
	0.8	C.		FILE	1, OUT, 'OUT', '000', A, 5, 3, 3, OUTC, OUTC, 2, TRF, 6, 2, 248													
	0.9		INPA	AREA	248													
	1.0		INPA2	AREA	248													
	1.1		INPB	AREA	248													
	1.2		INPB2	AREA	248													
	1.3		OUTC	AREA	248													
	1.4		OUTC2	AREA	248													
	1.5		IA	EQU	\$													
	1.6			ORIG	0													
	1.7		ITEMA	AREA	6, 3, 3	DUMMY AREA												
	1.8			ORIG	IA													
	1.9		START	OPEN	C	OPEN OUTPUT FILE												
	2.0			OPEN	A	OPEN FIRST INPUT FILE												



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002

**UNIVAC**  
DIVISION OF SPERRY RAND CORPORATION

**UNIVAC 1050 PAL ASSEMBLER CODING FORM**

PROGRAM-ID  
75 80  
SMPL

PROGRAM TWO-WAY MERGE PROGRAMMER \_\_\_\_\_ DATE \_\_\_\_\_ PAGE \_\_\_\_\_ OF \_\_\_\_\_ PAGES

For BEGIN only.

SEQUENCE PAGE	LINE 3	INSTR. 4	L 5	L 6	L 7	L 11	LABEL	OPERATION	OPERANDS				COMMENTS	PROGRAM-ID	
									13	18	19	30		40	45
002	01							SC	E.O.F.A	9,3,2			IS.E.T. C.O.N.N.E.C.T.O.R		
	02							INIT					INITIATE FIRST INPUT FILE		
	03	O.P.B						OPEN	1	B			OPEN SECOND INPUT FILE		
	04							INIT					INITIATE SECOND INPUT FILE		
	05	R.T.R.N.						BT	A.R.1	X.3			ADDR. OF SELECTED RECORD TO IR3		
	06							CC	3.1	1			FILE A SELECTED?		
	07							JE	FLA						
	08							PUT	1	I.T.E.M.A	C		RECORD FILE B TO OUTPUT AREA		
	09							GET	1	B			NEXT RECORD FROM FILE B		
	10							J	M.R.G						
	11	FLA						PUT	1	I.T.E.M.A	C				
	12							GET	1	A			NEXT RECORD FROM FILE A		
	13	M.R.G						MERGE					SELECT ONE RECORD		
	14							J	R.T.R.N						
	15	E.O.F.A						TERM					TERMINATE FILE A, SELECT RECORD		
	16							JC	O.P.B	00			JUMP ONLY IF NO DATA ON FILE A		
	17							J	R.T.R.N						
	18	E.O.F.B						TERM					TERMINATE FILE B, SELECT RECORD		
	19							J	R.T.R.N						
	20	Z.E.N.D.						CLOS	C	LOCK			ALL INPUT FILES TERMINATED		

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PROGRAM TWO WAY MERGE PROGRAMMER \_\_\_\_\_ DATE \_\_\_\_\_ PAGE \_\_\_\_\_ OF \_\_\_\_\_ PAGES

For BEGIN only.

SEQUENCE PAGE	LABEL	OPERATION	OPERANDS				COMMENTS	PROGRAM-ID			
			13	18	19	30			40	45	46
03	01	JR	0736				STOP SECTION OF EXECUTIVE				
	02	JD	077700				FINAL STOP				
	03	JR	0700				PROGRAM RELEASE				
	04	END	START								
	05										
	06										
	07										
	08										
	09										
	10										
	11										
	12										
	13										
	14										
	15										
	16										
	17										
	18										
	19										
	20										