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IBM Systems Reference Library

Sort-7 Timing
Specifications and Operating Procedures
IBM 1401 and 1460 Data Processing Systems

Program Number 1401-LM-060

This reference publication contains the specifications and operating procedures for the Sort-7 Timing Program, Version 1. The first section discusses the machine requirements, program deck, control cards, and timing charts. The second section describes system preparation, messages, and halts.

Also included are 144 sort-timing comparison tables of the Sort-7 program run on IBM 1401 and 1460 Data Processing Systems. The parameters involved are explained.

The user should be familiar with Sort 7 Specifications and Operating Procedures for IBM 1401 and 1460, Form C24-3317-0. For a list of associated publications and their abstracts see the IBM 1401 and 1460 Bibliography, Form A24-1495.

Major Revision (February 1964)

This publication, C24-1456-1 is a major revision of and obsoletes Comparison of Sort 7 Timing for IBM 1401 and 1460 Data Processing Systems, Form C24-1456-0. In addition to the comparison timing tables contained in C24-1456-0, this publication contains the specifications and operating procedures for the Sort-7 Timing program.

Copies of this and other IBM publications can be obtained through IBM Branch Offices.
Address comments concerning the content of this publication to IBM Product Publications, Endicott, New York 13764.

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SPECIFICATIONS

The Sort-7 Timing program can be used to calculate timing estimates for:

- A 4-tape, 2-way balanced merge.
- A 6-tape, 3-way balanced merge.
- A 4-tape, multiphase merge.

The information punched in the control cards describes the object machine, the particular file to be sorted, and the type of merge to be performed. Timings can only be calculated for high-density tape files containing fixed-length records with one control data field per record. If timings are not required for specific file sizes (record volumes), the estimates calculated will be for a predetermined set of record volumes. The predetermined values are 1,000; 2,000; 5,000; 10,000; 25,000; 50,000; 75,000; and 100,000.

The Sort-7 Timing program prints out diagnostic messages and table(s) containing the estimate in minutes of the time required to sort the file. The estimates given do not include card-read time. These timings are for Sort 7 object decks only and do not represent timings utilizing the tape-loadable option.

The user should be familar with Sort 7 Specifications and Operating Procedures for IBM 1401 and 1460, Form C24-3317-0.

MACHINE REQUIREMENTS

The IBM 1401 system that is to be used must have at least:

- 16,000 positions of core storage.
- An IBM 1402 Card Read-Punch, Model 1
- An IBM 1403 Printer, Model 2, or an IBM 1404 Printer
- High-Low-Equal Compare feature
- Advanced-Programming feature
- Multiply-Divide feature.

The IBM 1460 system that is to be used must have at least:

- 16,000 positions of core storage.
- An IBM 1402 Card Read Punch, Model 3
- An IBM 1403 Printer, Model 2
- Indexing-and-Store-Address-Register feature
- Multiply-Divide feature.

An IBM 1401 or 1460 system with the required machine configuration can be used to produce Sort-7 Timing estimates for files to be sorted on any IBM 1401 or 1460.

DESCRIPTION OF THE PROGRAM DECK

The Sort-7 Timing program deck consists of 474 cards punched in the following format:

Column(s)	Contain
1-71	Sort-7 Timing program instructions and the necessary loading instructions.
72-75	Sequential number of the card within the program deck. The cards are numbered from 0001 to 0474.
76-77	60. This is the Sort-7 program number.
78-79	ST. This identifies the program as the Sort-7 Timing program.
80	The version number of the Sort-7 Timing program.

TAPE DENSITY

The Sort-7 Timing program calculates sort times for tape files written at a high-density rate. High density is 556 characters per inch on the 7330, 729-II, and 729-IV magnetic tape units, and 800 characters per inch on the 729-V and 729-VI magnetic tape units.

To perform a particular sort application in the time calculated by the Sort-7 Timing program, the user must be sure that his records are written at a high-density rate and that column 20 of control card 1 contains a 1 (7330, 729-II, 729-IV) or a 2 (729-V, 729-VI) to specify high density for the tapes to be used during phase 2.

CONTROL CARDS

Control cards supply the Sort-7 Timing program with a description of the Sort-7 program, the object machine, and the file(s) to be sorted. Two control cards are required for each sort application that is to be timed. More than one set of control cards can be placed in the program deck if additional estimates are desired.

Certain control card errors cause a halt or message during the running of the Sort-7 Timing program. Some errors are not detected. Because the program accepts these errors, the user should be certain that all control-card information is properly specified and that all cards are correctly punched.

Control Card 1

This card is identical to control card 1 used with the Sort-7 program. Refer to Sort 7 Specifications and Operating Procedures for IBM 1401 and 1460, Form C24-3317-0, when preparing this card.

In the following description an asterisk indicates the columns that are considered by the Sort-7 Timing program.

Column(s)	Indicate
1	First sort-input tape-unit number.
2	Second sort-input tape-unit number.
3	Third sort-input tape-unit number.
4	First sort work tape-unit number.
5	Second sort work tape-unit number.
6	Third sort work tape-unit number.
7-8	Total number of input reels (01-99) in the input file.
9-12*	Input record length. Punch the number of characters in the fixed-length input record. (Must always be punched.)
13-15*	Input blocking factor. a. Leave blank for input blocking factor equal to sort blocking factor. b. Punch 001 for fixed-length unblocked input records. c. Punch the number of input records per block.
16-18*	Output blocking factor. a. Leave blank for output blocking factor equal to sort blocking factor.
19	Unreadable block option.
20	The density of the tapes used during phase 2. High density is assumed in all cases.
21	Input-tape header label indicator.
22*	Output-tape header-label indicator. a. Leave blank if the output tapes are not to have header labels. b. Punch a 1 if the control portion of the input header label (positions 1-40) is to be used as the control portion of the 80-character output header label. c. Punch a 2 if a new 80-character header label is to be generated by the program. d. Punch a 3 if the control portion of the input header label (positions 1-40) is to be used as the control portion of the 120-character output header label. e. Punch a 4 if a new 120-character label is to be generated by the program.
23	Output tape-mark option.
24	Input-tape trailer-label indicator.
25*	Output-tape trailer-label indicator. a. Leave blank if the output tapes are not to have trailer labels. b. Punch a 1 or 2 if the standard output trailer label is to be generated by the program.
26	Padding indicator for fixed-length records.
27*	System core-storage capacity of the Sort-7 object machine. (Must always be punched.) a. Punch a 4 for 8,000 positions of core storage. b. Punch a 5 for 12,000 positions of core storage. c. Punch a 6 for 16,000 positions of core storage.
28-29	Total number of control-data fields. (The Sort-7 timing program assumes that there is one control-data field.)
30-32*	Total number of characters of control data. Punch the number of characters in the control-data field (001-999). (Must always be punched.)
33-36	Control-data field-1 location.
37-39	Control-data field-1 length.
40-46	Expected file size.
47-51*	Starting address of the phase-1 user area. User-written routines that are to be executed during phase 1 must be loaded into upper core storage. The address specified in these columns is the lowest core-storage address of the user programming area. Core-storage positions below this address are utilized by the Sort-7 program. The last two positions of core storage, for example, positions 7998 and 7999 in an 8,000-position 1401, are also used by the Sort-7 program and are not available for user-written routines.
52-56*	Starting address of the phase-2 user area. User-written routines that are to be executed during phase 2 must be loaded into upper core storage. The address specified in these columns is the lowest core-storage address of the user programming area. Core-storage positions below this address are utilized by the Sort-7 program. For a balanced merge, the last 25 positions of core storage, for example, positions 7975-7999 in an 8,000-position 1401, are also used by the Sort-7 program and are not available for the user-written routines. For a multiphase merge, the last 16 positions of core storage are not available for user-written routines.
57	Record-format indicator.
58-61	Low-order position of the record character count field.
62-65	The length in characters of the smallest variable-length record.
66-69	The length in characters of the largest input block of variable-length records.
70-73	The length in characters of the largest output block of variable-length records. NOTE: Leave columns 57-73 blank. The Sort-7 Timing program can only calculate timings for files of fixed-length records.
74	Record-mark padding indicator for fixed-length records only.
75	File order, either ascending or descending.
76-80	These columns are not used by Sort 7 or the Sort-7 Timing program.

Control Card 2

This card is used to specify the type of merge and the record volumes (file sizes) for which timings are to be calculated. The user can indicate that he wants timing estimates for a predetermined set of record volumes and/or specific record volumes.

The parameters of the file to be sorted are the same for all volumes of records described in this card.

The format of control card 2 is:

Column(s)	Indicate
1	Type of Merge. (Must always be punched.) a. Punch a 2 for a 2-way balanced merge. b. Punch a 3 for a 3-way balanced merge. c. Punch a 4 for a multiphase merge.
2-8	First volume of records for which a timing estimate is desired, or leave blank if timing estimates for the predetermined set of record volumes are desired. The predetermined values are 1,000; 2,000; 5,000; 10,000; 25,000; 50,000; 75,000; and 100,000.
9-15	Second volume of records for which a timing estimate is desired.
16-22	Third volume of records for which a timing estimate is desired.
23-29	Fourth volume of records for which a timing estimate is desired.
30-36	Fifth volume of records for which a timing estimate is desired.
37-43	Sixth volume of records for which a timing estimate is desired.
44-50	Seventh volume of records for which a timing estimate is desired.
51-57	Eighth volume of records for which a timing estimate is desired.
58-80	Blank.

SORT-7 TIMING PROGRAM OUTPUT

The program prints one line of timing information for each of the record volumes specified in control card 2. Times are given for 1401 and 1460 systems with 7330, 729-II, 729-IV, 729-V, and 729-VI (729-VI used with 1460 only) magnetic tape units.

The factors included in the tables are:

G—the number of records sorted internally at one time during phase 1.
B—the sort blocking factor.
P—the number of phase 2 merge passes.

The times that are printed have been rounded to the nearest minute. A 1 indicates that the time required to sort the file is one minute or less. An asterisk in the input-file column indicates that a file size greater than the maximum allowable file size was specified in control card 2.

The times calculated by the Sort-7 Timing program do not include the time required to load the Sort-7 program. For card-read time add 2 minutes.

OPERATING PROCEDURES

This section describes the procedure to be followed when running the Sort-7 Timing program.

PLACEMENT OF CONTROL CARDS

The Sort-7 Timing program can be loaded only from cards. Place the control cards in the program deck after the last card (number 474). More than one set of control cards can be inserted in the Sort-7 Timing program deck.

SYSTEM PREPARATION

Prepare the printer:

1. Insert forms.
2. Install an appropriately punched carriage tape.

Load the program:

1. Place the program deck including control cards in the card reader.
2. Press the check-reset, start-reset, and card-load keys.

The program will run to the end of the job without interruption unless an error occurs.

MESSAGES AND HALTS

Header and Parameter Messages

A header message and nine parameter messages precede the timing charts that are printed for each set of control cards. No halt occurs.

Header message: SORT-7 TIMING

Parameter messages:

(1) INPUT RECORD LENGTH XXXX
(2) INPUT BLOCKING FACTOR XXX
(3) OUTPUT BLOCKING FACTOR XXX
(4) WITH TAPE LABEL PROCESSING, or
WITHOUT TAPE LABEL PROCESSING
(5) CORE STORAGE { 8000 / 12000 / 16000
(6) CHARACTERS OF CONTROL DATA XXX
(7) USER STARTING ADDRESS — PHASE 1 XXXXX
(8) USER STARTING ADDRESS — PHASE 2 XXXXX
(9) 2-WAY BALANCED MERGE, or
3-WAY BALANCED MERGE, or
MULTIPHASE MERGE

Diagnostic Messages

Diagnostic messages are printed if the input parameters are incorrectly specified. No halt occurs. The program reads in the next set of control cards and continues processing.

A summary of the diagnostic messages and reasons is given in Figure 1.

Halts

If a halt occurs check the input data and return the program.

Diagnostic Message	Reason
ERROR 1	The machine size specified in column 27 of control card1 has been incorrectly specified. It must contain a 4 for 8,000 positions of core storage, a 5 for 12,000 positions of core storage, or a 6 for 16,000 positions of core storage.
ERROR 2	The order of merge, column 1 of control card 2, must be specified as a 2 for a 2-way balanced merge, a 3 for a 3-way balanced merge, or a 4 for a multiphase merge.
ERROR 3	The input record length, columns 9-12 of control card 1, has been specified above the maximum record length, 3999.
ERROR 4	The specified input record length, columns 9-12 of control card 1, is either less than 10 for blocked input or less than 13 for unblocked input.
ERROR 5	The specified control field length, columns 30-32 of control card 1 is incorrect. This message prints out when the length of the control field is greater than the input record length, greater than 999, or when the field contains invalid characters.
ERROR 6	The specified indicators, columns 22 and 25 of control card 1, contain characters other than b, 1, or 2.
ERROR 7	The starting address of the user area for phase 1, columns 47-51 of control card 1 was specified incorrectly. The address must be less than machine core size — 2 positions of core storage, or The starting address of the user area for phase 2, columns 52-56 of control card 1 was specified incorrectly. The address must be less than machine core size — 25 positions of core storage for a 2- or 3-way balanced merge, and it must be less than machine core size — 16 positions of core storage for a multiphase merge.
ERROR 8	The input blocking factor specified in columns 13-15 of control card 1 is greater than the maximum possible sort blocking factor. (BI must be less than 399.)
ERROR 9	The output blocking factor specified in columns 16-18 of control card 1 is greater than the maximum possible sort blocking factor. (BO must be less than 399.)
ERROR 10 B = XXX	The output blocking factor specified in columns 16-18 of control card 1 is not equal to or a submultiple of the sort blocking factor (B).

Figure 1. Diagnostic Messages and Reasons

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COMPARISON TIMING TABLES

This section contains 96 comparison tables for 2-way and 3-way balanced merges, and 48 tables for multiphase merging. The times have been rounded to the nearest full minute. The times do not include the time required to load the program. Card-read time is approximately 2 minutes.

In each case, estimates are given for sorts when label processing is specified and for sorts when label processing is not specified. The estimates given in all tables with tape label processing do not include the time required to process the labels.

The parameters involved are:

- Core-storage capacity — 8,000; 12,000; and 16,000 positions
- Input format — fixed-length records with one 10-character control data field
- Record size — 10, 20, 40, 80, 100, 200, 500, and 1,000 characters
- Input file size — 1,000; 2,000; 5,000; 10,000; 25,000; 50,000; 75,000; and 100,000 records
- The input and output blocking factors equal the sort blocking factor
- Magnetic tape units — 7330, 729-II, 729-IV, 729-V and 729-VI (729-VI used with 1460 only)
- Tape density — 556 characters per inch on 7330, 729-II and 729-IV tape units; 800 characters per inch on 729-V and 729-VI tape units.

The factors included in the tables are:

G—the number of records sorted internally at one time during phase 1.
B—the sort blocking factor.
P—the number of phase 2 merge passes.

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	135	135	3
2000	1	1	1	1	1	1	1	1	1			4
5000	4	3	3	3	2	2	2	2	2			6
10000	8	7	7	7	5	4	4	4	4			7
25000	22	19	18	18	14	11	10	11	10			8
50000	48	41	39	40	31	25	23	23	22			9
75000	78	67	64	64	51	40	37	38	35			10
100000	103	89	85	86	68	54	49	51	47			10

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 10; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	3	2	1	2	2	1	1	1	1	26	13	6
2000	6	4	3	3	5	3	2	3	2			7
5000	17	11	9	10	14	9	7	7	6			8
10000	37	24	20	21	32	19	15	16	13			9
25000	102	71	59	58	88	57	45	45	35			10
50000	222	139	116	125	193	110	87	96	77			11
75000	361	218	181	195	314	171	134	149	118			12
100000	481	286	237	255	419	223	175	193	153			12

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 100; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	67	67	4
2000	2	1	1	1	1	1	1	1	1			5
5000	5	4	4	4	4	3	2	2	2			7
10000	11	9	8	8	8	6	5	5	5			8
25000	31	24	22	23	22	16	14	15	13			9
50000	67	53	49	50	49	35	30	32	28			10
75000	109	86	79	81	80	57	49	51	45			11
100000	146	115	105	108	107	76	66	69	61			11

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 20; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	5	3	3	3	5	3	2	2	2	12	6	7
2000	12	8	6	7	11	7	5	5	4			8
5000	34	22	17	19	31	18	14	15	12			9
10000	76	48	38	41	68	40	30	33	25			10
25000	225	134	108	119	203	112	85	96	75			12
50000	486	272	218	239	437	223	170	191	146			13

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 200; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	66	33	4
2000	2	2	2	2	2	1	1	1	1			5
5000	7	5	5	5	6	4	3	3	3			7
10000	17	12	11	11	13	9	7	8	6			8
25000	46	34	29	31	37	24	20	21	18			9
50000	102	74	64	67	81	53	44	46	39			10
75000	166	122	107	114	133	89	74	81	68			11
100000	221	158	139	147	177	114	95	103	87			11

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 40; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	15	9	7	8	14	8	6	7	5	4	2	8
2000	34	21	16	18	31	18	14	15	11			9
5000	102	66	52	53	94	58	44	45	34			11
10000	222	128	101	113	204	110	83	95	72			12

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 500; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	2	1	1	1	2	1	1	1	1	32	16	5
2000	4	3	2	3	4	2	2	2	2			6
5000	14	9	8	8	12	7	6	6	5			8
10000	31	21	17	18	26	16	13	14	11			9
25000	85	56	47	50	72	44	35	38	30			10
50000	185	121	102	110	158	95	75	84	67			11
75000	300	189	158	171	258	146	116	128	103			12
100000	400	247	207	222	344	190	150	166	133			12

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 80; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	33	20	16	17	31	18	13	15	11	2	1	9
2000	74	45	35	38	68	39	29	32	24			10
5000	218	125	97	110	202	109	81	93	70			12
10000	472	252	195	219	437	217	161	184	137			13

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 1000; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	268	268	2
2000	1	1	1	1	1	1	1	1	1			3
5000	3	3	3	3	2	2	2	2	2			5
10000	7	7	6	6	5	4	4	4	3			6
25000	20	18	17	18	13	11	10	10	9			7
50000	45	40	38	38	29	23	22	22	21			8
75000	73	64	62	62	47	38	35	36	33			9
100000	98	86	82	83	63	51	47	47	45			9

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 10; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	2	1	1	1	2	1	1	1	1	52	26	5
2000	5	3	3	3	4	2	2	2	2			6
5000	14	9	8	8	12	7	6	6	5			7
10000	31	20	17	17	27	16	12	13	10			8
25000	86	56	47	48	74	44	35	36	29			9
50000	189	120	100	107	163	93	74	81	65			10
75000	310	188	158	167	268	145	115	124	100			11
100000	414	246	206	218	357	189	149	161	129			11

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 100; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	134	134	3
2000	1	1	1	1	1	1	1	1	1			4
5000	4	4	3	3	3	2	2	2	2			6
10000	10	8	7	8	7	5	5	5	4			7
25000	28	22	21	21	20	14	13	13	12			8
50000	61	48	45	45	43	31	27	28	25			9
75000	99	79	73	74	71	51	45	46	41			10
100000	132	105	97	98	95	68	60	61	55			10

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 20; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	4	3	2	2	4	2	2	2	1	26	13	6
2000	10	6	5	5	9	5	4	4	3			7
5000	28	17	14	15	25	14	11	12	9			8
10000	63	39	31	32	56	32	24	26	20			9
25000	173	103	84	90	155	85	65	72	56			10
50000	378	210	171	182	338	170	131	142	111			11

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 200; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	67	67	4
2000	2	2	1	1	2	1	1	1	1			5
5000	7	5	5	5	6	4	3	3	3			7
10000	16	11	10	10	12	8	7	7	6			8
25000	44	32	28	29	34	22	19	19	16			9
50000	96	69	61	62	76	49	41	42	36			10
75000	156	116	103	101	124	84	70	68	58			11
100000	208	150	133	139	165	107	89	95	81			11

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 40; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	12	7	6	6	11	6	5	5	4	10	5	7
2000	27	16	13	13	24	14	10	11	8			8
5000	74	44	35	36	68	38	28	30	23			9
10000	164	94	75	81	150	80	61	67	52			10
25000	487	254	201	216	446	213	160	176	133			12

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 500; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	66	33	4
2000	3	2	2	2	3	2	1	2	1			5
5000	12	8	7	7	10	6	5	5	4			7
10000	26	17	15	15	22	13	11	11	9			8
25000	72	48	41	42	61	37	29	31	25			9
50000	159	106	90	95	134	81	65	71	58			10
75000	260	165	140	148	220	125	100	108	88			11
100000	346	215	183	192	293	162	130	140	114			11

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 80; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	27	16	12	13	25	14	10	11	8	4	2	8
2000	60	35	27	29	55	31	23	24	18			9
5000	180	102	80	88	167	88	66	74	56			11
10000	392	205	160	175	362	175	131	145	109			12

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 1000; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	399	399	2
2000	1	1	1	1	1	1	1	1	1			3
5000	3	3	3	3	2	2	2	2	1			4
10000	7	6	6	6	4	4	3	3	3			5
25000	19	17	17	17	12	10	9	9	9			6
50000	43	38	36	37	27	22	21	21	20			7
75000	70	62	59	60	44	36	34	34	32			8
100000	93	82	79	80	59	48	45	45	43			8

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 10; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	2	1	1	1	1	1	1	1	1	78	39	4
2000	4	3	2	2	3	2	2	2	1			5
5000	14	9	7	8	12	7	5	6	5			7
10000	30	20	17	17	26	15	12	13	10			8
25000	84	55	46	47	72	42	34	35	28			9
50000	186	118	99	105	159	91	73	78	63			10
75000	278	170	143	151	239	130	103	111	90			10
100000	405	241	203	213	348	184	146	156	126			11

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 100; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	199	199	3
2000	1	1	1	1	1	1	1	1	1			4
5000	4	3	3	3	3	2	2	2	2			5
10000	9	7	7	7	6	5	4	4	4			6
25000	25	20	19	19	17	13	11	12	11			7
50000	55	45	41	42	39	28	25	26	23			8
75000	91	73	68	68	64	46	41	42	38			9
100000	121	97	90	91	86	62	55	56	50			9

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 20; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	4	2	2	2	3	2	1	1	1	38	19	5
2000	8	5	4	4	8	4	3	3	3			6
5000	27	17	14	14	24	14	11	11	9			8
10000	61	37	30	31	55	31	24	25	19			9
25000	169	101	82	88	150	82	64	70	55			10
50000	369	205	167	177	329	165	127	137	107			11

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 200; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	99	99	4
2000	2	2	1	1	2	1	1	1	1			5
5000	6	5	4	4	5	3	3	3	2			6
10000	14	10	9	9	11	7	6	6	5			7
25000	39	28	25	26	30	20	17	17	15			8
50000	86	62	55	56	67	44	37	37	32			9
75000	142	106	94	92	111	76	64	61	52			10
100000	189	137	122	127	148	97	81	86	74			10

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 40; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	11	7	5	6	10	6	4	5	3	14	7	7
2000	26	15	12	13	24	13	10	10	8			8
5000	72	43	34	35	66	36	27	29	22			9
10000	160	91	73	78	146	78	59	65	50			10
25000	437	227	180	192	400	190	143	155	118			11

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 500; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	98	49	4
2000	3	2	2	2	3	2	1	1	1			5
5000	10	7	6	6	8	5	4	4	3			6
10000	23	15	13	13	19	12	9	10	8			7
25000	64	42	36	37	53	32	26	27	22			8
50000	141	95	81	85	119	72	58	63	52			9
75000	233	149	127	133	196	112	90	97	79			10
100000	311	194	166	173	262	145	117	125	102			10

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 80; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	26	15	12	12	24	13	10	10	8	6	3	8
2000	57	33	26	27	53	29	22	23	17			9
5000	158	89	70	77	146	77	58	64	49			10
10000	347	181	142	153	320	154	115	126	95			11

2-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 1000; Control field — 10

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	158	158	3
2000	1	1	1	1	1	1	1	1	1			4
5000	3	3	3	3	2	2	2	2	1			5
10000	7	6	6	6	5	4	3	3	3			6
25000	22	19	18	18	14	11	10	11	10			8
50000	48	41	39	40	31	25	23	23	22			9
75000	71	62	59	60	46	37	34	35	32			9
100000	103	89	85	86	68	54	49	50	47			10

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 10; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	3	2	2	2	2	2	1	1	1	15	15	7
2000	6	4	4	4	6	3	3	3	2			8
5000	18	12	10	10	16	9	7	8	6			9
10000	40	26	21	22	34	21	16	17	14			10
25000	108	75	62	61	94	61	48	47	37			11
50000	235	147	122	132	205	118	91	101	81			12
75000	380	229	190	204	331	180	141	155	123			13
100000	507	299	248	267	442	234	183	201	159			13

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 100; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	79	79	4
2000	2	1	1	1	1	1	1	1	1			5
5000	4	4	3	3	3	2	2	2	2			6
10000	10	8	7	7	7	5	5	5	4			7
25000	30	24	22	23	22	16	14	14	13			9
50000	66	53	48	49	48	35	30	31	28			10
75000	100	79	72	74	73	52	45	47	41			10
100000	144	114	104	106	105	75	65	67	60			11

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 20; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	5	3	3	3	5	3	2	2	2	14	7	7
2000	12	8	6	6	11	6	5	5	4			8
5000	34	21	17	18	30	18	13	14	11			9
10000	74	46	37	39	67	39	29	32	24			10
25000	202	121	97	107	182	100	77	86	67			11
50000	439	246	198	215	395	201	153	171	132			12

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 200; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	39	39	5
2000	3	2	2	2	2	1	1	1	1			6
5000	8	6	5	5	6	4	4	4	3			8
10000	18	13	11	12	14	9	8	8	7			9
25000	49	36	31	32	39	26	21	22	19			10
50000	108	77	67	70	86	56	46	48	41			11
75000	161	119	104	105	129	87	72	72	61			11
100000	233	166	145	153	187	120	99	107	90			12

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 40; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	14	9	7	7	13	7	6	6	5	6	3	8
2000	32	19	15	16	29	16	12	13	10			9
5000	87	57	45	44	80	50	38	37	28			10
10000	190	109	86	95	175	94	71	80	61			11

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 500; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	2	1	1	1	2	1	1	1	1	19	19	6
2000	5	3	3	3	4	3	2	2	2			7
5000	15	10	8	9	13	8	6	7	5			9
10000	33	22	18	19	28	17	14	14	12			10
25000	90	60	50	52	77	47	37	39	31			11
50000	196	128	108	116	168	100	80	88	71			12
75000	293	185	155	166	251	142	113	124	100			12
100000	421	259	218	233	361	199	157	172	139			13

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 80; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	33	20	16	17	31	18	13	15	11	2	1	9
2000	74	45	35	38	68	39	29	32	24			10
5000	218	125	97	110	202	109	81	93	70			12
10000	472	252	195	219	437	217	161	184	137			13

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 1000; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	292	292	2
2000	1	1	1	1	1	1	1	1	1			3
5000	3	3	3	3	2	2	2	2	2			5
10000	7	7	6	6	5	4	4	4	3			6
25000	21	18	18	18	13	11	10	10	10			7
50000	45	40	38	38	29	23	22	22	21			8
75000	74	65	62	62	47	38	35	36	34			9
100000	98	86	83	83	63	51	47	48	45			9

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 10; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	2	2	1	1	2	1	1	1	1	29	29	6
2000	5	4	3	3	5	3	2	2	2			7
5000	15	10	8	9	13	8	6	6	5			8
10000	34	22	18	19	29	17	14	14	11			9
25000	94	60	50	52	81	47	37	39	31			10
50000	204	128	107	114	176	100	79	86	69			11
75000	332	200	167	177	287	155	122	132	106			12
100000	443	261	219	231	383	201	159	171	137			12

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 100; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	146	146	3
2000	1	1	1	1	1	1	1	1	1			4
5000	4	4	3	3	3	2	2	2	2			6
10000	10	8	7	8	7	5	5	5	4			7
25000	28	22	21	21	20	14	13	13	12			8
50000	60	48	45	45	43	31	27	28	25			9
75000	99	79	73	74	71	51	45	46	41			10
100000	132	105	97	98	94	68	60	61	55			10

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 20; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	5	3	2	3	4	3	2	2	2	14	14	7
2000	11	7	6	6	10	6	4	5	4			8
5000	31	19	15	16	28	16	12	13	10			9
10000	69	42	34	35	61	35	27	28	22			10
25000	188	111	90	97	168	92	71	78	61			11
50000	407	225	183	195	364	183	140	152	118			12

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 200; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	73	73	4
2000	2	2	1	1	2	1	1	1	1			5
5000	7	5	5	5	5	4	3	3	3			7
10000	16	11	10	10	12	8	7	7	6			8
25000	44	31	28	28	34	22	19	19	16			9
50000	95	69	61	62	75	49	41	42	36			10
75000	156	116	102	100	123	83	70	68	58			11
100000	207	150	132	138	164	106	89	95	81			11

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 40; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	12	7	6	6	11	6	5	5	4	10	5	7
2000	27	16	13	13	24	14	10	11	8			8
5000	74	44	35	36	68	38	28	30	23			9
10000	164	94	75	81	150	80	61	67	52			10
25000	487	254	201	216	446	213	160	176	133			12

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 500; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	2	1	1	1	1	1	1	1	1	36	36	5
2000	4	3	2	2	3	2	2	2	1			6
5000	13	9	7	7	11	7	5	5	4			8
10000	28	19	16	16	24	14	12	12	10			9
25000	78	52	44	45	66	40	32	33	27			10
50000	171	113	96	102	145	87	70	76	62			11
75000	278	175	149	157	236	133	107	115	94			12
100000	370	228	194	204	315	173	138	148	121			12

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 80; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	27	16	12	13	25	14	10	11	8	4	2	8
2000	60	35	27	29	55	31	23	24	18			9
5000	180	102	80	88	167	88	66	74	56			11
10000	392	205	160	175	362	175	131	145	109			12

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 1000; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	399	399	2
2000	1	1	1	1	1	1	1	1	1			3
5000	3	3	3	3	2	2	2	2	1			4
10000	7	6	6	6	4	4	3	3	3			5
25000	19	17	17	17	12	10	9	9	9			6
50000	43	38	36	37	27	22	21	21	20			7
75000	70	62	59	60	44	36	34	34	32			8
100000	93	82	79	80	59	48	45	45	43			8

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 10; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	2	1	1	1	1	1	1	1	1	78	39	4
2000	4	3	2	2	3	2	2	2	1			5
5000	14	9	7	8	12	7	5	6	5			7
10000	30	20	17	17	26	15	12	13	10			8
25000	84	55	46	47	72	42	34	35	28			9
50000	186	118	99	105	159	91	73	78	63			10
75000	278	170	143	151	239	130	103	111	90			10
100000	405	241	203	213	348	184	146	156	126			11

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 100; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	199	199	3
2000	1	1	1	1	1	1	1	1	1			4
5000	4	3	3	3	3	2	2	2	2			5
10000	9	7	7	7	6	5	4	4	4			6
25000	25	20	19	19	17	13	11	12	11			7
50000	55	45	41	42	39	28	25	26	23			8
75000	91	73	68	68	64	46	41	42	38			9
100000	121	97	90	91	86	62	55	56	50			9

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 20; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	4	2	2	2	3	2	1	1	1	38	19	5
2000	8	5	4	4	8	4	3	3	3			6
5000	27	17	14	14	24	14	11	11	9			8
10000	61	37	30	31	55	31	24	25	19			9
25000	169	101	82	88	150	82	64	70	55			10
50000	369	205	167	177	329	165	127	137	107			11

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 200; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	99	99	4
2000	2	2	1	1	2	1	1	1	1			5
5000	6	5	4	4	5	3	3	3	2			6
10000	14	10	9	9	11	7	6	6	5			7
25000	39	28	25	26	30	20	17	17	15			8
50000	86	62	55	56	67	44	37	37	32			9
75000	142	106	94	92	111	76	64	61	52			10
100000	189	137	122	127	148	97	81	86	74			10

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 40; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	11	7	5	6	10	6	4	5	3	14	7	7
2000	26	15	12	13	24	13	10	10	8			8
5000	72	43	34	35	66	36	27	29	22			9
10000	160	91	73	78	146	78	59	65	50			10
25000	437	227	180	192	400	190	143	155	118			11

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 500; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	98	49	4
2000	3	2	2	2	3	2	1	1	1			5
5000	10	7	6	6	8	5	4	4	3			6
10000	23	15	13	13	19	12	9	10	8			7
25000	64	42	36	37	53	32	26	27	22			8
50000	141	95	81	85	119	72	58	63	52			9
75000	233	149	127	133	196	112	90	97	79			10
100000	311	194	166	173	262	145	117	125	102			10

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 80; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	26	15	12	12	24	13	10	10	8	6	3	8
2000	57	33	26	27	53	29	22	23	17			9
5000	158	89	70	77	146	77	58	64	49			10
10000	347	181	142	153	320	154	115	126	95			11

2-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 1000; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	202	101	2
2000	1	1	1	1	1	1	1	1	1			3
5000	3	2	2	2	2	1	1	1	1			3
10000	6	5	5	5	4	3	3	3	3			4
25000	17	16	15	15	11	9	9	9	8			5
50000	39	35	34	34	25	21	19	20	19			6
75000	59	53	50	51	38	31	29	30	28			6
100000	80	72	68	69	51	42	39	40	38			6

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 10; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	2	1	1	1	2	1	1	1	1	30	10	4
2000	4	3	2	2	3	2	2	2	1			4
5000	11	8	7	7	10	6	5	5	4			5
10000	27	18	15	16	23	15	11	12	10			6
25000	77	56	46	46	66	45	35	35	28			7
50000	154	102	85	93	132	80	63	71	57			7
75000	260	166	138	150	223	129	101	113	90			8
100000	347	217	181	196	298	168	132	147	117			8

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 100; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	100	50	3
2000	1	1	1	1	1	1	1	1	1			3
5000	4	3	3	3	2	2	2	2	2			4
10000	8	7	6	7	6	4	4	4	4			5
25000	24	20	18	19	17	13	11	12	11			6
50000	49	40	37	38	34	26	23	24	21			6
75000	82	67	62	64	58	44	38	40	36			7
100000	109	90	83	85	78	58	51	53	47			7

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 20; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	3	2	2	2	3	2	1	2	1	15	5	4
2000	8	5	4	5	7	5	3	4	3			5
5000	24	16	13	14	22	13	10	11	9			6
10000	49	32	26	28	43	27	20	22	17			6
25000	140	88	71	79	125	73	56	63	49			7
50000	316	186	150	165	282	152	116	131	101			8
75000	474	275	221	243	423	223	170	192	147			8
100000	704	402	323	355	628	326	248	280	214			9

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 200; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	50	25	3
2000	2	2	1	1	2	1	1	1	1			4
5000	6	5	4	4	5	3	3	3	2			5
10000	12	9	8	8	9	6	5	6	5			5
25000	35	26	23	24	27	19	16	17	14			6
50000	79	59	52	54	62	42	35	37	31			7
75000	119	91	81	86	93	66	55	60	51			7
100000	158	119	105	111	124	84	70	77	65			7

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 40; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	10	6	5	5	9	5	4	4	3	6	2	5
2000	23	14	11	12	21	12	9	10	8			6
5000	66	45	35	35	60	39	30	30	22			7
10000	132	80	63	70	120	68	51	59	45			7
25000	372	208	163	182	340	176	131	150	112			8

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 500; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	2	1	1	1	1	1	1	1	1	36	12	4
2000	3	2	2	2	3	2	1	2	1			4
5000	10	7	6	6	8	5	4	5	4			5
10000	23	16	13	14	19	12	10	11	9			6
25000	57	40	34	36	48	31	25	27	21			6
50000	130	90	76	83	110	70	55	62	50			7
75000	196	131	111	120	165	100	80	89	72			7
100000	293	191	161	174	247	145	115	128	103			8

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 80; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	22	14	11	12	21	12	9	10	8	3	1	6
2000	45	28	22	24	41	25	18	20	15			6
5000	129	77	60	68	119	67	50	58	43			7
10000	292	163	126	142	269	140	104	119	89			8

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 1000; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	402	201	1
2000	1	1	1	1	1	1	1	1	1			2
5000	3	3	3	3	2	1	1	1	1			3
10000	6	5	5	5	3	3	3	3	3			3
25000	17	15	15	15	10	9	8	8	8			4
50000	37	34	33	33	23	20	18	19	18			5
75000	57	52	50	50	35	30	28	28	27			5
100000	84	76	73	74	52	44	41	42	39			6

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 10; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	60	20	3
2000	4	2	2	2	3	2	1	2	1			4
5000	11	7	6	6	9	6	4	5	4			5
10000	21	15	12	13	18	11	9	9	8			5
25000	62	45	38	37	52	36	29	27	22			6
50000	142	94	79	85	120	72	58	63	51			7
75000	212	136	115	122	180	104	83	90	73			7
100000	284	179	152	161	241	136	108	117	95			7

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 100; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	200	100	2
2000	1	1	1	1	1	1	1	1	1			3
5000	3	3	2	3	2	2	1	2	1			3
10000	7	6	6	6	5	4	3	3	3			4
25000	21	18	17	17	14	11	10	10	9			5
50000	48	40	37	38	33	25	22	23	21			6
75000	72	60	56	57	50	38	34	35	31			6
100000	97	81	76	77	67	51	46	47	42			6

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 20; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	3	2	2	2	3	2	1	1	1	30	10	4
2000	6	4	3	3	6	3	3	3	2			4
5000	19	12	10	10	17	10	8	8	6			5
10000	44	28	23	24	39	23	18	19	15			6
25000	127	79	65	70	112	65	50	55	43			7
50000	255	150	122	131	225	120	93	101	79			7
75000	430	246	200	214	381	197	151	165	128			8
100000	574	324	263	282	508	258	198	216	168			8

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 200; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	100	50	3
2000	2	1	1	1	1	1	1	1	1			3
5000	5	4	3	3	4	3	2	2	2			4
10000	11	9	8	8	9	6	5	5	5			5
25000	33	25	22	23	25	17	14	15	13			6
50000	66	50	45	46	51	35	29	30	26			6
75000	112	87	78	77	86	61	52	51	44			7
100000	150	113	101	106	115	79	67	71	61			7

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 40; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	9	5	4	5	8	5	3	4	3	12	4	5
2000	18	11	9	9	16	9	7	7	6			5
5000	52	35	28	26	47	31	24	22	16			6
10000	119	71	56	62	108	60	46	51	39			7
25000	297	163	129	140	270	137	103	113	86			7
50000	671	356	281	303	611	296	221	244	184			8

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 500; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	1	1	1	1	1	1	1	1	1	50	25	3
2000	3	2	2	2	2	2	1	1	1			4
5000	9	6	5	5	7	5	4	4	3			5
10000	18	13	11	11	15	9	8	8	7			5
25000	52	36	31	32	43	27	22	23	19			6
50000	119	83	71	75	99	63	51	55	45			7
75000	179	120	103	109	149	90	72	78	64			7
100000	239	157	134	142	198	116	94	101	83			7

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 80; Control field — 10

INPUT FILE SIZE	1401				1460					G	B	P
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI			
1000	17	10	8	9	16	9	7	7	5	6	2	5
2000	40	24	19	20	37	21	16	17	13			6
5000	116	68	54	59	107	59	44	50	38			7
10000	232	127	100	108	214	108	81	90	67			7
25000	656	341	266	288	603	289	214	236	176			8

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 1000; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	602	301	1
2000	1	1	1	1	1	1	1	1	1			2
5000	3	3	3	3	2	1	1	1	1			2
10000	6	6	6	6	4	3	3	3	3			3
25000	18	17	16	16	11	9	9	9	9			4
50000	41	37	36	36	24	21	20	20	19			5
75000	61	56	54	55	37	32	30	30	29			5
100000	82	76	74	74	49	43	41	41	39			5

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 10; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	60	30	3
2000	3	2	2	2	3	2	1	1	1			4
5000	10	7	6	6	9	5	4	4	4			5
10000	21	14	12	12	17	11	9	9	7			5
25000	60	40	34	35	51	31	25	26	21			6
50000	137	91	77	82	116	70	56	60	49			7
75000	206	132	112	118	174	100	80	86	70			7
100000	276	173	147	155	233	130	104	112	91			7

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 100; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	300	150	2
2000	1	1	1	1	1	1	1	1	1			2
5000	3	3	3	3	2	2	2	2	1			3
10000	8	6	6	6	5	4	4	4	3			4
25000	22	18	17	18	15	11	10	10	10			5
50000	44	38	35	36	30	23	21	21	19			5
75000	74	62	59	59	50	38	35	35	32			6
100000	99	83	78	79	67	51	46	47	43			6

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 20; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	2	2	1	1	2	1	1	1	1	45	15	3
2000	6	4	3	3	5	3	2	3	2			4
5000	18	12	10	10	16	9	7	8	6			5
10000	37	23	19	20	32	19	15	15	12			5
25000	108	68	56	60	95	55	43	47	37			6
50000	246	144	118	125	217	115	89	96	76			7
75000	370	212	174	184	326	168	130	140	110			7
100000	555	312	255	270	490	247	190	205	160			8

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 200; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	150	75	2
2000	2	1	1	1	1	1	1	1	1			3
5000	5	4	3	3	4	3	2	2	2			4
10000	10	8	7	7	7	5	4	4	4			4
25000	29	22	20	20	22	15	13	13	11			5
50000	66	50	45	46	50	34	29	30	26			6
75000	99	79	71	69	75	54	47	45	39			6
100000	132	102	92	96	100	70	60	63	55			6

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 40; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	7	4	3	4	6	4	3	3	2	18	6	4
2000	17	10	8	9	15	9	7	7	5			5
5000	50	30	24	25	45	26	19	20	15			6
10000	100	60	48	52	91	51	39	42	33			6
25000	286	156	124	133	260	130	98	107	81			7
50000	647	340	270	288	588	282	211	229	174			8

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 500; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	74	37	3
2000	2	2	1	1	2	1	1	1	1			3
5000	7	5	4	5	6	4	3	3	3			4
10000	17	12	10	11	14	9	7	8	6			5
25000	51	35	30	31	42	26	21	22	18			6
50000	103	72	62	66	84	54	44	48	39			6
75000	175	117	101	106	144	87	71	76	63			7
100000	233	153	132	138	192	113	91	98	81			7

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 80; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	17	10	8	8	15	9	6	7	5	9	3	5
2000	33	20	16	16	30	17	13	13	10			5
5000	97	57	45	49	89	49	37	41	31			6
10000	223	121	95	103	205	103	77	84	64			7
25000	631	325	254	272	580	274	203	221	166			8

3-WAY BALANCED MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 1000; Control field — 10

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	119	119	2
2000	1	1	1	1	1	1	1	1	1			3
5000	3	3	2	2	2	1	1	1	1			4
10000	7	6	6	6	4	3	3	3	3			5
25000	17	15	14	14	10	9	8	8	8			5
50000	37	33	32	32	24	20	18	19	17			6
75000	57	50	48	49	36	30	28	28	26			6
100000	84	74	71	72	54	44	41	42	39			7

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 10; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	2	1	1	1	2	1	1	1	1	22	11	4
2000	5	3	3	3	4	2	2	2	2			5
5000	11	8	7	7	10	6	5	5	4			5
10000	26	18	15	16	23	14	11	12	10			6
25000	76	55	46	45	65	44	35	34	27			7
50000	171	112	94	102	146	88	69	77	62			8
75000	256	163	136	147	219	127	100	111	88			8
100000	342	215	179	194	293	166	130	145	115			8

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 100; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	118	59	2
2000	1	1	1	1	1	1	1	1	1			3
5000	4	3	3	3	2	2	2	2	2			4
10000	8	7	6	7	6	4	4	4	4			5
25000	21	18	16	17	15	11	10	10	9			5
50000	48	40	37	37	34	25	22	23	21			6
75000	73	60	56	57	51	38	34	35	32			6
100000	108	89	82	84	77	57	50	52	47			7

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 20; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	3	2	2	2	3	2	1	2	1	15	5	4
2000	8	5	4	5	7	5	3	4	3			5
5000	24	16	13	14	22	13	10	11	9			6
10000	49	32	26	28	43	27	20	22	17			6
25000	140	88	71	79	125	73	56	63	49			7
50000	316	186	150	165	282	152	116	131	101			8
75000	474	275	221	243	423	223	170	192	147			8
100000	704	402	323	355	628	326	248	280	214			9

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 200; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	58	29	3
2000	2	2	1	1	2	1	1	1	1			4
5000	6	4	4	4	5	3	3	3	2			5
10000	12	9	8	8	9	6	5	6	5			5
25000	34	26	23	23	26	18	15	16	14			6
50000	77	58	51	53	60	41	34	36	31			7
75000	116	89	79	84	91	64	54	58	50			7
100000	156	117	104	110	121	83	69	75	64			7

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 40; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	10	6	5	5	9	5	4	4	3	6	2	5
2000	23	14	11	12	21	12	9	10	8			6
5000	66	45	35	35	60	39	30	30	22			7
10000	132	80	63	70	120	68	51	59	45			7
25000	372	208	163	182	340	176	131	150	112			8

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 500; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	2	1	1	1	1	1	1	1	1	28	14	4
2000	3	2	2	2	3	2	1	1	1			4
5000	9	7	6	6	8	5	4	4	4			5
10000	22	15	13	14	18	12	9	10	8			6
25000	63	44	37	39	53	34	27	29	23			7
50000	127	88	74	80	106	68	54	60	49			7
75000	213	141	119	129	180	108	86	95	77			8
100000	284	185	156	168	240	140	112	123	100			8

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 80; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	22	14	11	12	21	12	9	10	8	3	1	6
2000	45	28	22	24	41	25	18	20	15			6
5000	129	77	60	68	119	67	50	58	43			7
10000	292	163	126	142	269	140	104	119	89			8

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 1000; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	219	219	2
2000	1	1	1	1	1	1	1	1	1			3
5000	3	2	2	2	2	1	1	1	1			3
10000	6	5	5	5	4	3	3	3	3			4
25000	17	15	15	15	11	9	8	8	8			5
50000	35	31	30	30	21	18	17	17	16			5
75000	58	52	50	50	36	30	28	28	27			6
100000	77	69	66	67	48	40	37	38	36			6

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 10; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	42	21	3
2000	3	2	2	2	3	2	1	2	1			4
5000	11	7	6	6	9	6	4	5	4			5
10000	21	14	12	13	18	11	9	9	7			5
25000	62	42	35	36	52	32	26	27	22			6
50000	141	93	79	84	119	72	57	62	51			7
75000	212	136	115	122	179	103	82	89	72			7
100000	317	198	167	177	269	150	120	129	105			8

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 100; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	218	109	2
2000	1	1	1	1	1	1	1	1	1			3
5000	3	3	3	3	2	2	1	2	1			3
10000	7	6	6	6	5	4	3	4	3			4
25000	21	18	17	17	14	11	10	10	9			5
50000	43	36	34	34	29	22	20	21	19			5
75000	72	60	56	57	50	38	34	35	31			6
100000	96	80	75	76	66	50	45	46	42			6

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 20; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	3	2	2	2	3	2	1	1	1	30	10	4
2000	6	4	3	3	6	3	3	3	2			4
5000	19	12	10	10	17	10	8	8	6			5
10000	44	28	23	24	39	23	18	19	15			6
25000	127	79	65	70	112	65	50	55	43			7
50000	255	150	122	131	225	120	93	101	79			7
75000	430	246	200	214	381	197	151	165	128			8
100000	574	324	263	282	508	258	198	216	168			8

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 200; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	108	54	3
2000	2	1	1	1	1	1	1	1	1			3
5000	5	4	3	3	4	3	2	2	2			4
10000	11	9	8	8	9	6	5	5	4			5
25000	29	22	20	20	22	15	13	13	11			5
50000	66	50	44	45	50	34	29	30	26			6
75000	99	78	70	69	76	54	46	45	39			6
100000	149	113	101	106	114	78	66	71	61			7

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 40; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	9	5	4	5	8	5	3	4	3	12	4	5
2000	18	11	9	9	16	9	7	7	6			5
5000	52	35	28	26	47	31	24	22	16			6
10000	119	71	56	62	108	60	46	51	39			7
25000	297	163	129	140	270	137	103	113	86			7
50000	671	356	281	303	611	296	221	244	184			8

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 500; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	54	27	3
2000	3	2	2	2	2	2	1	1	1			4
5000	9	6	5	5	7	5	4	4	3			5
10000	18	12	11	11	15	9	8	8	6			5
25000	52	36	30	31	43	27	22	23	19			6
50000	118	82	70	75	98	62	50	55	45			7
75000	177	118	101	107	147	89	72	77	64			7
100000	237	156	134	141	197	115	93	100	83			7

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 80; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	17	10	8	9	16	9	7	7	5	6	2	5
2000	40	24	19	20	37	21	16	17	13			6
5000	116	68	54	59	107	59	44	50	38			7
10000	232	127	100	108	214	108	81	90	67			7
25000	656	341	266	288	603	289	214	236	176			8

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 1000; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	638	319	1
2000	1	1	1	1	1	1	1	1	1			2
5000	3	3	3	3	2	1	1	1	1			2
10000	6	6	6	6	4	3	3	3	3			3
25000	18	17	17	17	11	10	9	9	9			4
50000	37	34	34	34	22	19	18	19	18			4
75000	62	57	55	55	37	32	30	31	29			5
100000	82	75	73	74	49	43	41	41	39			5

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 10; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	62	31	3
2000	3	2	2	2	3	2	1	1	1			4
5000	9	6	5	5	7	4	4	4	3			4
10000	20	14	12	12	17	11	8	9	7			5
25000	60	40	34	35	50	31	25	25	21			6
50000	137	91	77	81	116	69	56	60	49			7
75000	206	131	112	117	174	99	80	85	70			7
100000	275	173	147	154	232	130	104	111	91			7

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 100; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	318	159	2
2000	1	1	1	1	1	1	1	1	1			2
5000	3	3	3	3	2	2	2	2	1			3
10000	8	7	6	6	5	4	4	4	3			4
25000	19	17	16	16	13	10	9	9	9			4
50000	44	37	35	35	29	23	21	21	19			5
75000	67	57	53	54	44	35	31	32	29			5
100000	99	84	79	79	67	51	46	47	43			6

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 20; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	2	2	1	1	2	1	1	1	1	45	15	3
2000	6	4	3	3	5	3	2	3	2			4
5000	18	12	10	10	16	9	7	8	6			5
10000	37	23	19	20	32	19	15	15	12			5
25000	108	68	56	60	95	55	43	47	37			6
50000	246	144	118	125	217	115	89	96	76			7
75000	370	212	174	184	326	168	130	140	110			7
100000	555	312	255	270	490	247	190	205	160			8

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 200; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	158	79	2
2000	2	1	1	1	1	1	1	1	1			3
5000	5	4	3	3	4	3	2	2	2			4
10000	10	8	7	7	7	5	4	4	4			4
25000	28	22	20	20	21	15	13	13	11			5
50000	66	50	45	46	50	34	29	30	26			6
75000	98	78	70	68	74	54	46	44	39			6
100000	132	102	92	96	100	70	60	63	55			6

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 40; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	7	4	3	4	6	4	3	3	2	18	6	4
2000	17	10	8	9	15	9	7	7	5			5
5000	50	30	24	25	45	26	19	20	15			6
10000	100	60	48	52	91	51	39	42	33			6
25000	286	156	124	133	260	130	98	107	81			7
50000	647	340	270	288	588	282	211	229	174			8

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 500; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	78	39	3
2000	2	2	1	2	2	1	1	1	1			3
5000	7	5	4	5	6	4	3	3	3			4
10000	17	12	10	11	14	9	7	8	6			5
25000	51	35	30	31	42	26	21	22	18			6
50000	102	72	62	66	84	54	44	47	39			6
75000	174	117	101	106	144	87	70	75	62			7
100000	232	153	131	138	192	112	91	97	80			7

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 80; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	17	10	8	8	15	9	6	7	5	9	3	5
2000	33	20	16	16	30	17	13	13	10			5
5000	97	57	45	49	89	49	37	41	31			6
10000	223	121	95	103	205	103	77	84	64			7
25000	631	325	254	272	580	274	203	221	166			8

3-WAY BALANCED MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 1000; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	119	119	2
2000	1	1	1	1	1	1	1	1	1			3
5000	3	2	2	2	2	1	1	1	1			5
10000	6	5	5	5	4	3	3	3	3			6
25000	16	14	13	14	10	9	8	8	7			7
50000	35	31	29	29	23	18	17	17	16			8
75000	55	48	45	46	36	29	26	27	25			9
100000	76	66	62	64	51	40	37	38	35			10

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 10; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	2	1	1	1	2	1	1	1	1	22	11	5
2000	4	3	2	3	4	2	2	2	2			6
5000	12	8	7	7	11	7	5	6	4			7
10000	28	19	15	16	25	15	12	13	10			9
25000	78	55	45	45	68	45	35	35	27			10
50000	169	108	89	97	147	87	68	76	60			11
75000	265	165	135	147	232	132	102	114	89			12
100000	356	219	180	196	311	174	134	150	118			12

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 100; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	118	59	2
2000	1	1	1	1	1	1	1	1	1			3
5000	3	3	3	3	2	2	2	2	1			5
10000	8	6	6	6	6	4	4	4	3			6
25000	21	17	16	16	15	11	10	10	9			7
50000	46	37	34	35	33	24	21	22	20			8
75000	73	59	54	55	53	39	34	35	31			9
100000	102	82	74	76	75	54	47	49	43			10

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 20; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	4	3	2	2	4	2	2	2	1	10	5	6
2000	9	6	5	5	8	5	4	4	4			7
5000	26	17	13	15	24	14	11	12	9			9
10000	58	37	29	32	52	31	24	26	20			10
25000	159	97	78	86	143	82	62	71	54			11
50000	346	202	160	177	313	169	127	145	109			13

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 200; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	58	29	3
2000	2	1	1	1	1	1	1	1	1			4
5000	6	4	4	4	4	3	2	3	2			6
10000	12	9	8	8	10	6	5	6	5			7
25000	34	25	22	23	27	18	15	16	13			8
50000	76	55	48	50	61	40	33	35	29			10
75000	116	87	76	81	93	64	53	58	48			10
100000	161	117	102	109	129	86	70	77	64			11

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 40; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	12	7	6	6	11	6	5	5	4	4	2	8
2000	25	16	12	13	23	14	10	11	8			9
5000	69	46	36	37	64	41	31	31	23			10
10000	151	90	70	79	139	78	58	67	51			11

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 500; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	2	1	1	1	1	1	1	1	1	28	14	4
2000	4	2	2	2	3	2	2	2	1			6
5000	10	7	6	6	9	5	4	5	4			7
10000	22	15	13	13	19	12	9	10	8			8
25000	64	43	35	38	55	34	27	29	23			10
50000	135	91	76	83	116	72	57	64	51			11
75000	210	136	113	123	181	107	84	93	74			11
100000	293	186	154	167	252	145	114	126	100			12

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 80; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	25	15	12	13	23	14	10	11	8	2	1	9
2000	54	33	26	28	51	30	22	24	18			10
5000	149	88	68	77	138	77	57	66	49			11
10000	325	181	138	156	302	158	116	134	98			13

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 1000; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	219	219	1
2000	1	1	1	1	1	1	1	1	1			2
5000	3	2	2	2	2	1	1	1	1			4
10000	6	5	5	5	4	3	3	3	3			5
25000	16	14	13	13	10	8	8	8	7			6
50000	34	30	29	29	21	18	16	17	16			7
75000	54	47	45	45	34	28	26	26	25			8
100000	74	65	62	62	47	38	35	36	34			9

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 10; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	2	1	1	1	1	1	1	1	1	42	21	4
2000	4	2	2	2	3	2	2	2	1			5
5000	11	7	6	6	9	6	4	5	4			6
10000	24	16	13	14	21	12	10	10	8			8
25000	66	44	36	38	57	35	27	29	23			9
50000	145	94	78	84	125	74	58	64	51			10
75000	228	143	119	127	197	112	88	96	76			11
100000	314	192	159	170	272	149	117	127	101			11

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 100; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	218	109	1
2000	1	1	1	1	1	1	1	1	1			2
5000	3	3	2	3	2	2	1	2	1			4
10000	7	6	5	6	5	4	3	3	3			5
25000	20	16	15	15	14	10	9	9	9			6
50000	43	35	33	33	30	22	20	20	18			7
75000	69	56	52	53	49	36	32	33	29			8
100000	95	77	71	73	68	50	44	45	40			9

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 20; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	3	2	2	2	3	2	1	1	1	20	10	5
2000	8	5	4	4	7	4	3	3	2			6
5000	22	14	11	12	20	12	9	9	7			8
10000	48	30	24	25	43	25	19	20	16			9
25000	133	82	66	72	119	68	52	58	45			10
50000	289	166	133	144	259	136	103	114	88			11

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 200; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	108	54	2
2000	2	1	1	1	1	1	1	1	1			3
5000	5	4	3	3	4	3	2	2	2			5
10000	11	8	7	7	8	6	5	5	4			6
25000	30	22	20	20	23	16	13	13	11			7
50000	67	49	43	44	53	35	29	30	26			9
75000	103	79	70	69	81	57	47	47	39			9
100000	146	108	95	99	116	77	64	69	58			10

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 40; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	9	6	4	5	8	5	4	4	3	8	4	6
2000	21	13	10	11	20	11	8	9	7			8
5000	57	38	30	29	53	34	26	24	18			9
10000	126	75	59	64	115	64	48	54	41			10
25000	357	194	151	164	328	165	122	136	101			12

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 500; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	54	27	3
2000	3	2	2	2	2	2	1	1	1			4
5000	9	6	5	5	7	5	4	4	3			6
10000	19	13	11	11	16	10	8	8	7			7
25000	55	37	31	32	46	28	22	24	19			9
50000	119	81	68	73	102	63	50	55	44			10
75000	182	119	100	107	154	91	73	79	64			10
100000	254	162	137	145	216	124	98	107	86			11

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 80; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	21	12	10	10	19	11	8	9	6	4	2	8
2000	45	27	21	22	41	23	17	14	14			9
5000	123	72	56	62	114	63	47	53	40			10
10000	269	145	113	123	248	125	93	103	77			11

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 1000; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	638	319	1
2000	1	1	1	1	1	1	1	1	1			1
5000	3	3	3	3	2	2	1	1	1			2
10000	6	6	6	6	4	3	3	3	3			3
25000	17	16	15	15	11	9	9	9	8			5
50000	37	34	33	33	23	19	18	18	18			6
75000	58	53	51	51	35	30	28	29	27			6
100000	80	72	70	70	49	41	39	39	37			7

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 10; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	62	31	3
2000	3	2	2	2	3	2	1	1	1			4
5000	10	6	5	6	8	5	4	4	3			6
10000	22	14	12	12	19	11	9	9	7			7
25000	61	40	33	35	52	31	25	26	21			8
50000	139	89	74	79	120	70	55	60	48			10
75000	212	133	111	117	182	103	81	87	70			10
100000	295	181	151	159	254	140	110	118	94			11

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 100; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	318	159	1
2000	1	1	1	1	1	1	1	1	1			2
5000	3	3	3	3	2	2	2	2	1			3
10000	7	6	6	6	5	4	3	3	3			4
25000	20	17	16	16	14	10	9	9	9			6
50000	43	36	34	34	30	23	20	21	19			7
75000	67	56	52	53	46	35	31	32	29			7
100000	94	78	72	73	65	49	43	44	40			8

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 20; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	3	2	2	2	3	2	1	1	1	30	15	4
2000	7	4	3	4	6	3	3	3	2			5
5000	20	12	10	10	18	10	8	8	6			7
10000	44	27	22	23	39	23	17	18	14			8
25000	127	78	63	67	114	64	49	54	42			10
50000	270	156	126	134	242	127	97	105	81			11

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 200; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	158	79	2
2000	2	1	1	1	1	1	1	1	1			3
5000	5	3	3	3	3	2	2	2	2			4
10000	10	8	7	7	8	5	4	5	4			5
25000	29	22	19	20	23	15	13	13	11			7
50000	64	47	42	43	50	33	28	28	24			8
75000	101	77	69	67	79	55	46	45	38			9
100000	137	103	91	95	106	72	61	64	55			9

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 40; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	9	5	4	4	8	4	3	4	3	12	6	6
2000	19	11	9	9	17	10	7	8	6			7
5000	52	31	25	26	48	27	20	21	16			8
10000	120	70	55	60	110	61	46	50	38			10
25000	321	175	138	148	293	148	110	120	91			11

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 500; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	78	39	3
2000	3	2	2	2	2	1	1	1	1			4
5000	8	5	5	5	6	4	3	3	3			5
10000	17	12	10	10	15	9	7	7	6			6
25000	51	34	29	30	43	26	21	22	18			8
50000	109	75	64	67	92	57	46	50	41			9
75000	177	115	97	103	149	88	70	75	61			10
100000	238	153	130	136	200	115	92	99	80			10

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 80; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	18	11	8	9	17	9	7	7	6	6	3	7
2000	41	24	19	19	38	21	16	16	12			8
5000	118	68	53	58	109	59	44	49	37			10
10000	250	135	105	114	231	117	86	95	71			11

MULTIPHASE MERGE WITH TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 1000; Control field — 10

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	129	129	2
2000	1	1	1	1	1	1	1	1	1			3
5000	3	2	2	2	2	1	1	1	1			5
10000	6	5	5	5	4	3	3	3	3			6
25000	16	14	14	14	11	9	8	8	8			7
50000	35	31	29	30	23	19	17	18	16			8
75000	56	49	46	47	36	29	27	27	25			9
100000	76	67	63	64	50	40	37	38	35			9

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 10; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	2	1	1	1	2	1	1	1	1	24	12	5
2000	4	3	2	3	4	2	2	2	2			6
5000	12	8	7	7	10	6	5	5	4			7
10000	27	18	15	16	23	14	11	12	9			8
25000	76	54	45	44	67	44	35	34	27			10
50000	162	105	87	94	141	84	66	73	58			11
75000	260	162	133	144	228	129	100	112	87			12
100000	351	215	177	192	306	170	132	147	115			12

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 100; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	64	64	3
2000	1	1	1	1	1	1	1	1	1			4
5000	4	3	3	3	3	2	2	2	2			6
10000	8	6	6	6	6	4	4	4	3			7
25000	22	18	16	17	16	12	10	11	9			8
50000	48	38	35	36	35	25	22	23	20			9
75000	76	60	55	56	55	40	35	36	32			10
100000	105	83	75	78	77	55	48	50	44			11

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 20; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	4	3	2	2	4	2	2	2	1	12	6	6
2000	9	6	4	5	8	5	4	4	3			7
5000	24	16	12	13	22	13	10	11	8			8
10000	56	35	28	30	51	30	23	25	19			10
25000	149	92	74	81	134	78	59	67	51			11
50000	323	188	150	165	291	156	118	133	101			12

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 200; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	64	32	3
2000	2	1	1	1	1	1	1	1	1			4
5000	5	4	3	4	4	3	2	3	2			6
10000	12	9	8	8	9	6	5	6	5			7
25000	33	24	21	22	26	18	14	15	13			8
50000	72	53	46	48	58	38	31	33	28			9
75000	114	86	75	80	91	63	52	57	48			10
100000	159	115	100	107	127	84	69	75	63			11

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 40; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	12	7	6	6	11	6	5	5	4	4	2	8
2000	25	16	12	13	23	14	10	11	8			9
5000	69	46	36	37	64	41	31	31	23			10
10000	151	90	70	79	139	78	58	67	51			11

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 500; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	32	16	4
2000	3	2	2	2	3	2	1	1	1			5
5000	10	7	6	6	8	5	4	4	4			7
10000	22	15	12	13	19	12	9	10	8			8
25000	60	40	34	36	51	32	25	27	21			9
50000	132	89	74	80	114	70	55	62	49			11
75000	206	133	111	120	177	104	82	91	72			11
100000	286	181	150	162	246	141	110	122	97			12

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 80; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	25	15	12	13	23	14	10	11	8	2	1	9
2000	54	33	26	28	51	30	22	24	18			10
5000	149	88	68	77	138	77	57	66	49			11
10000	325	181	138	156	302	158	116	134	98			13

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 8K; Record length — 1000; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	229	229	1
2000	1	1	1	1	1	1	1	1	1			2
5000	3	2	2	2	2	1	1	1	1			4
10000	6	5	5	5	4	3	3	3	3			5
25000	16	14	13	13	10	8	8	8	7			6
50000	34	30	29	29	21	18	16	17	16			7
75000	54	47	45	45	34	28	26	26	25			8
100000	74	65	62	62	47	38	35	36	34			9

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 10; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	2	1	1	1	1	1	1	1	1	44	22	4
2000	4	2	2	2	3	2	2	2	1			5
5000	10	7	6	6	9	5	4	5	4			6
10000	23	15	13	13	19	12	9	10	8			7
25000	66	43	36	37	57	34	27	28	22			9
50000	144	93	78	83	124	74	58	63	51			10
75000	227	142	118	126	196	111	87	95	75			11
100000	313	190	159	168	270	148	116	126	100			11

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 100; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	228	114	1
2000	1	1	1	1	1	1	1	1	1			2
5000	3	3	2	3	2	2	1	2	1			4
10000	7	6	5	6	5	4	3	3	3			5
25000	20	16	15	15	14	10	9	9	9			6
50000	43	35	33	33	30	22	20	20	18			7
75000	69	56	52	53	48	36	32	32	29			8
100000	95	77	71	72	67	49	44	45	40			9

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 20; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	3	2	2	2	3	2	1	1	1	22	11	5
2000	8	5	4	4	7	4	3	3	2			6
5000	21	13	10	11	18	11	8	9	7			7
10000	48	30	24	25	43	25	19	20	15			9
25000	131	81	65	70	118	67	51	57	44			10
50000	286	163	132	141	256	134	102	112	86			11

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 200; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	114	57	2
2000	2	1	1	1	1	1	1	1	1			3
5000	5	4	3	3	4	3	2	2	2			5
10000	11	8	7	7	8	6	5	5	4			6
25000	30	22	19	20	23	15	13	13	11			7
50000	67	49	43	44	53	35	29	30	25			9
75000	103	78	69	68	80	56	47	46	39			9
100000	146	107	94	99	115	76	64	68	58			10

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 40; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	9	6	4	5	8	5	4	4	3	8	4	6
2000	21	13	10	11	20	11	8	9	7			8
5000	57	38	30	29	53	34	26	24	18			9
10000	126	75	59	64	115	64	48	54	41			10
25000	357	194	151	164	328	165	122	136	101			12

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 500; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	56	28	3
2000	3	2	2	2	2	2	1	1	1			4
5000	9	6	5	5	7	5	4	4	3			6
10000	19	13	11	11	16	10	8	8	7			7
25000	54	36	30	32	46	28	22	23	19			9
50000	119	80	68	72	101	63	50	54	44			10
75000	181	118	100	106	154	91	72	78	63			10
100000	253	162	136	144	215	123	98	106	85			11

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 80; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	21	12	10	10	19	11	8	9	6	4	2	8
2000	45	27	21	22	41	23	17	19	14			9
5000	123	72	56	62	114	63	47	53	40			10
10000	269	145	113	123	248	125	93	103	77			11

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 12K; Record length — 1000; Control field — 10

641105MUP

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	329	329	1
2000	1	1	1	1	1	1	1	1	1			2
5000	3	2	2	2	2	1	1	1	1			3
10000	6	5	5	5	4	3	3	3	3			4
25000	16	14	14	14	10	8	8	8	7			6
50000	35	31	30	30	22	18	17	17	16			7
75000	53	48	46	46	33	28	26	26	25			7
100000	75	66	64	64	47	39	36	36	34			8

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 10; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	64	32	3
2000	3	2	2	2	3	2	1	1	1			4
5000	10	6	5	6	8	5	4	4	3			6
10000	22	14	12	12	19	11	9	9	7			7
25000	61	40	33	34	52	31	25	26	21			8
50000	134	87	73	77	115	68	54	58	47			9
75000	211	132	110	117	181	102	81	87	70			10
100000	294	180	150	158	254	140	110	118	94			11

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 100; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	328	164	1
2000	1	1	1	1	1	1	1	1	1			2
5000	3	3	3	3	2	2	2	2	1			3
10000	7	6	6	6	5	4	3	3	3			4
25000	20	17	16	16	14	10	9	9	9			6
50000	43	36	34	34	30	23	20	20	19			7
75000	67	56	52	53	46	35	31	32	29			7
100000	94	78	72	73	65	49	43	44	40			8

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 20; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	3	2	2	2	3	2	1	1	1	32	16	4
2000	7	4	3	3	6	3	3	3	2			5
5000	20	12	10	10	18	10	8	8	6			7
10000	44	27	22	23	39	22	17	18	14			8
25000	121	74	60	65	108	61	47	52	40			9
50000	268	154	124	132	240	126	96	104	80			11

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 200; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	164	82	2
2000	2	1	1	1	1	1	1	1	1			3
5000	5	3	3	3	3	2	2	2	2			4
10000	10	8	7	7	8	5	4	4	4			5
25000	29	22	19	20	22	15	13	13	11			7
50000	64	47	42	43	50	33	28	28	24			8
75000	101	77	68	67	78	55	46	45	38			9
100000	137	102	91	95	106	72	60	64	55			9

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 40; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	9	5	4	4	8	4	3	4	3	12	6	6
2000	19	11	9	9	17	10	7	8	6			7
5000	52	31	25	26	48	27	20	21	16			8
10000	120	70	55	60	110	61	46	50	38			10
25000	321	175	138	148	293	148	110	120	91			11

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 500; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	1	1	1	1	1	1	1	1	1	82	41	3
2000	3	2	2	2	2	1	1	1	1			4
5000	8	5	5	5	6	4	3	3	3			5
10000	17	12	10	10	14	9	7	7	6			6
25000	51	34	29	30	43	26	21	22	17			8
50000	109	75	63	67	91	57	46	50	40			9
75000	176	114	97	102	148	87	70	75	61			10
100000	237	152	129	136	200	115	92	98	80			10

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 80; Control field — 10

INPUT FILE SIZE	1401				1460							
	7330	729-II	729-IV	729-V	7330	729-II	729-IV	729-V	729-VI	G	B	P
1000	18	11	8	9	17	9	7	7	6	6	3	7
2000	41	24	19	19	38	21	16	16	12			8
5000	118	68	53	58	109	59	44	49	37			10
10000	250	135	105	114	231	117	86	95	71			11

MULTIPHASE MERGE WITHOUT TAPE LABEL PROCESSING
Core storage capacity — 16K; Record length — 1000; Control field — 10

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IBM **Technical Newsletter**

File No. 1401/1460 - 33

Re: Form No. C24-1456-1

This Newsletter No. N21-5002-0

Date: December 10, 1965

Previous Newsletter Nos. N24-0281

Replacement pages for Sort 7 Timing Specifications and Operating Procedures for IBM 1401 and 1460, Form C24-1456-1.

To bring your publication up to date, please replace page 5 with the corresponding page of this Newsletter. Changes are indicated by a vertical line at the left of the affected text.

Please insert this page to indicate that your publication now includes the modified page issued with this Technical Newsletter.

Form	Page	Date
N21-5002	5	December 10, 1965

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The Sort-7 Timing program can be used to calculate timing estimates for:

- A 4-tape, 2-way balanced merge.
- A 6-tape, 3-way balanced merge.
- A 4-tape, multiphase merge.

The information punched in the control cards describes the object machine, the particular file to be sorted, and the type of merge to be performed. Timings can only be calculated for high-density tape files containing fixed-length records with one control data field per record. No timing estimates can be obtained for sorts of two or more control fields because the time added by such a condition is essentially based on the randomness of each control field. One control field is compared at a time, proceeding from the high-order control field through the low-order control field. However, the program goes to the next control field only if the preceding field was equal. Whether or not this is the case depends solely upon the data.

If timings are not required for specific file sizes (record volumes), the estimates calculated will be for a predetermined set of record volumes. The predetermined values are 1,000; 2,000; 5,000; 10,000; 25,000; 50,000; 75,000; and 100,000.

The Sort-7 Timing program prints out diagnostic messages and table(s) containing the estimate in minutes of the time required to sort the file. The estimates given do not include card-read time. These timings are for Sort 7 object decks only and do not represent timings utilizing the tape-loadable option.

The user should be familar with Sort 7 Specifications and Operating Procedures for IBM 1401 and 1460, Form C24-3317-0.

MACHINE REQUIREMENTS

The IBM 1401 system that is to be used must have at least:

- 16,000 positions of core storage.
- An IBM 1402 Card Read-Punch, Model 1
- An IBM 1403 Printer, Model 2, or an IBM 1404 Printer
- High-Low-Equal Compare feature
- Advanced-Programming feature
- Multiply-Divide feature.

The IBM 1460 system that is to be used must have at least:

- 16,000 positions of core storage.
- An IBM 1402 Card Read Punch, Model 3
- An IBM 1403 Printer, Model 2
- Indexing-and-Store-Address-Register feature
- Multiply-Divide feature.

An IBM 1401 or 1460 system with the required machine configuration can be used to produce Sort-7 Timing estimates for files to be sorted on any IBM 1401 or 1460.

DESCRIPTION OF THE PROGRAM DECK

The Sort-7 Timing program deck consists of 474 cards punched in the following format:

Column(s)	Contain
1-71	Sort-7 Timing program instructions and the necessary loading instructions.
72-75	Sequential number of the card within the program deck. The cards are numbered from 0001 to 0474.
76-77	60. This is the Sort-7 program number.
78-79	ST. This identifies the program as the Sort-7 Timing program.
80	The version number of the Sort-7 Timing program.

TAPE DENSITY

The Sort-7 Timing program calculates sort times for tape files written at a high-density rate. High density is 556 characters per inch on the 7330, 729-II, and 729-IV magnetic tape units, and 800 characters per inch on the 729-V and 729-VI magnetic tape units.

To perform a particular sort application in the time calculated by the Sort-7 Timing program, the user must be sure that his records are written at a high-density rate and that column 20 of control card 1 contains a 1 (7330, 729-II, 729-IV) or a 2 (729-V, 729-VI) to specify high density for the tapes to be used during phase 2.

CONTROL CARDS

Control cards supply the Sort-7 Timing program with a description of the Sort-7 program, the object machine, and the file(s) to be sorted. Two control cards are required for each sort application that is to be timed. More than one set of control cards can be placed in the program deck if additional estimates are desired.

Certain control card errors cause a halt or message during the running of the Sort-7 Timing program. Some errors are not detected. Because the program accepts these errors, the user should be certain that all control-card information is properly specified and that all cards are correctly punched.

Control Card 1

This card is identical to control card 1 used with the Sort-7 program. Refer to Sort 7 Specifications and Operating Procedures for IBM 1401 and 1460, Form C24-3317-0, when preparing this card.

In the following description an asterisk indicates the columns that are considered by the Sort-7 Timing program.

Column(s)	Indicate
1	First sort-input tape-unit number.
2	Second sort-input tape-unit number.
3	Third sort-input tape-unit number.
4	First sort work tape-unit number.
5	Second sort work tape-unit number.
6	Third sort work tape-unit number.
7-8	Total number of input reels (01-99) in the input file.
9-12*	Input record length. Punch the number of characters in the fixed-length input record. (Must always be punched.)
13-15*	Input blocking factor. a. Leave blank for input blocking factor equal to sort blocking factor. b. Punch 001 for fixed-length unblocked input records. c. Punch the number of input records per block.
16-18*	Output blocking factor. a. Leave blank for output blocking factor equal to sort blocking factor.
19	Unreadable block option.
20	The density of the tapes used during phase 2. High density is assumed in all cases.
21	Input-tape header label indicator.
22*	Output-tape header-label indicator. a. Leave blank if the output tapes are not to have header labels. b. Punch a 1 if the control portion of the input header label (positions 1-40) is to be used as the control portion of the 80-character output header label. c. Punch a 2 if a new 80-character header label is to be generated by the program. d. Punch a 3 if the control portion of the input header label (positions 1-40) is to be used as the control portion of the 120-character output header label. e. Punch a 4 if a new 120-character label is to be generated by the program.
23	Output tape-mark option.
24	Input-tape trailer-label indicator.
25*	Output-tape trailer-label indicator. a. Leave blank if the output tapes are not to have trailer labels. b. Punch a 1 or 2 if the standard output trailer label is to be generated by the program.
26	Padding indicator for fixed-length records.
27*	System core-storage capacity of the Sort-7 object machine. (Must always be punched.) a. Punch a 4 for 8,000 positions of core storage. b. Punch a 5 for 12,000 positions of core storage. c. Punch a 6 for 16,000 positions of core storage.
28-29	Total number of control-data fields. (The Sort-7 timing program assumes that there is one control-data field.)
30-32*	Total number of characters of control data. Punch the number of characters in the control-data field (001-999). (Must always be punched.)
33-36	Control-data field-1 location.
37-39	Control-data field-1 length.
40-46	Expected file size.
47-51*	Starting address of the phase-1 user area. User-written routines that are to be executed during phase 1 must be loaded into upper core storage. The address specified in these columns is the lowest core-storage address of the user programming area. Core-storage positions below this address are utilized by the Sort-7 program. The last two positions of core storage, for example, positions 7998 and 7999 in an 8,000-position 1401, are also used by the Sort-7 program and are not available for user-written routines.
52-56*	Starting address of the phase-2 user area. User-written routines that are to be executed during phase 2 must be loaded into upper core storage. The address specified in these columns is the lowest core-storage address of the user programming area. Core-storage positions below this address are utilized by the Sort-7 program. For a balanced merge, the last 25 positions of core storage, for example, positions 7975-7999 in an 8,000-position 1401, are also used by the Sort-7 program and are not available for the user-written routines. For a multiphase merge, the last 16 positions of core storage are not available for user-written routines.
57	Record-format indicator.
58-61	Low-order position of the record character count field.
62-65	The length in characters of the smallest variable-length record.
66-69	The length in characters of the largest input block of variable-length records.
70-73	The length in characters of the largest output block of variable-length records. NOTE: Leave columns 57-73 blank. The Sort-7 Timing program can only calculate timings for files of fixed-length records.
74	Record-mark padding indicator for fixed-length records only.
75	File order, either ascending or descending.
76-80	These columns are not used by Sort 7 or the Sort-7 Timing program.

Control Card 2

This card is used to specify the type of merge and the record volumes (file sizes) for which timings are to be calculated. The user can indicate that he wants timing estimates for a predetermined set of record volumes and/or specific record volumes.

The parameters of the file to be sorted are the same for all volumes of records described in this card.