

## Systems Reference Library

### **IBM 1410 Tape Sorting/Merging Programs: Sort/Merge 12**

This publication describes the functions and features of the IBM 1410 Sort/Merge 12 Program, a tape sorting and merging program using the Processing Overlap and Priority special features. It provides the programmer and operator with complete information for best use of the program. It presents substantial modifications and expansions to material in the previous Sort/Merge 12 publication, Form J28-0253. It also includes the 1410 Sorting times contained in Form C28-0293.

In addition to complete program specifications, the publication furnishes control card formats, detailed operating instructions, and information on the use of modification exits.

## PREFACE

This publication provides detailed information for programmers, systems analysts, and machine-room personnel on the use of the IBM 1410 Tape Sorting/Merging Program: Sort/Merge 12.

Sort/Merge 12 is an efficient tape sorting and merging program which is directed by user-supplied control cards. It makes use of the Overlap and Priority special features to permit overlap of the read/write and processing operations, and so provides most efficient use of computer time. The program can perform the following functions:

1. Sort and merge files composed of Form 1, Form 2, Form 3, or Form 4 data records (see "Record Formats").
2. Sort on one through ten control data fields; each field can contain from one through 9990 characters.
3. Merge two through five sequenced files.
4. Reblock and/or sequence check a sequenced file.
5. Label output tapes, as directed through control cards.
6. Provide automatic checkpoint and restart facilities.
7. Provide exit points to link Sort/Merge 12 to user-supplied routines to perform editing, summarizing, and other functions.

### Major Revision (July, 1963)

This publication supersedes the preliminary reference manual, IBM 1410 Tape Sorting/Merging Programs: Part II, Sort/Merge 12, Form J28-0253, with its associated Technical Newsletters (N28-1028 and N28-1020); and the Systems Reference Library publication, IBM 1410 Tape Sorting Programs, Sort/Merge 12: Sorting Times for the IBM 1410 with 7330, 729II, 729IV or 729V Tape Units, Form C28-0293, with its associated Technical Newsletter (N28-1056).

Copies of this and other IBM publications can be obtained through IBM Branch Offices.

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PREREQUISITE LITERATURE

The user should have a basic knowledge of tape sorting techniques and the IBM 1410 Input/Output Control System (IOCS) described in the following publications:

- Sorting Methods for IBM Data Processing Systems, Form F28-8001
- IBM 1410 Input/Output Control System for Card and Tape Systems, Form C28-0334

MINIMUM MACHINE REQUIREMENTS

- 20,000 positions of core storage
- Processing Overlap and Priority special features
- 4 IBM 729 II, 729 IV, 729 V, 729 VI, and/or 7330 Magnetic tape units
- 1 additional magnetic tape unit, and/or one IBM 1402 Card Read Punch, Model 2

Total Input/Output Unit Requirements

Five tape units and the card reader, if:

1. The program is read from tape and control cards are read from the card reader.

2. The program is read from the card reader and control cards are read from tape.

Four tape units and the card reader, if both the program and control cards are read in from the card reader.

- Five tape units, if all input is from tape.

Additional Machine Capacities

Sort/Merge 12 can advantageously use machine capacities greater than the specified minimum. With increased core storage, longer internal sequences are possible; more space is provided for user's routines, etc. Additional tape units permit higher orders of merge, more sequences, faster input and output for multi-reel files, etc.

Specific advantages to be gained through additional core storage and added tape units are discussed in the appropriate sections pertaining to functions and configurations.

## GENERAL CONSIDERATIONS

### ORGANIZATION OF SORT/MERGE 12

#### Assignment Phase

In the Assignment Phase, control card information is analyzed, and constants are computed which are passed on to Phases 1, 2, 3. Maximum efficiency of the running program depends on the work done in the Assignment Phase.

#### Running Program

Phase 1, Phase 2, and Phase 3 constitute the running program, defined as the generalized routines that perform the sorting or merging operations on the file's data records.

The general organization of Sort/Merge 12 is shown in Figure 1.

Phase 1 performs a series of internal sorts, producing sorted sequences on two, three, four or five output tapes, depending on the order of merge to be performed in Phase 2. These tapes serve as input to Phase 2.

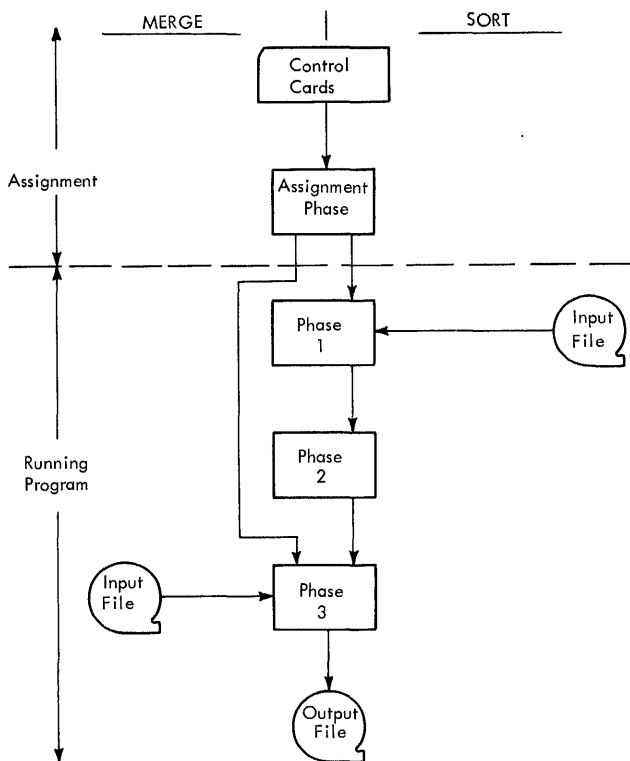


Figure 1. Organization of Sort/Merge 12

Phase 2 is automatically loaded into the machine after completion of Phase 1. Phase 2 performs merging operations on the sorted sequences of records produced by Phase 1, forming a number of sequences equal to or less than the order of merge used in Phase 2. If the output of Phase 1 consists of a number of sequences equal to or less than the order of merge to be performed in Phase 2, Phase 2 will be bypassed. The order of merge performed in Phase 2, may be two-, three-, four- or five-way; the number is dependent upon the quantity of tape units available for the application -- as Sort/Merge 12 is a balanced sort.

Phase 3 performs the final merging pass, and writes the completely sorted file out on tape. It can sequence check and reblock the file according to control card specifications. The order of merge employed in Phase 3 is equal to the number of sequences created either in the final pass of Phase 2, or in Phase 1 if Phase 2 has been bypassed. Phase 3 is not a complete physical entity in the Sort/Merge 12 program deck or on the Sort/Merge 12 system tape, as are Phase 1 and Phase 2. Phase 2 is reinitialized, according to control card specifications, to form most of Phase 3.

For merging applications, the running program is initialized so that only Phase 3 is operative; Phases 1 and 2 are loaded but not executed. The merge program is, therefore, a special form of Phase 3.

#### COLLATING SEQUENCE

The data records of a file are sequenced according to the collating sequence of the 64 characters of the Standard BCD Interchange Code (see Appendix A).

Note: A record mark ( $\neq$ , 0-2-8 punch) should appear only as the last character of any record.

Records can be placed in either an ascending or descending sequence: that is, with the character "blank" having the lowest or highest value, respectively.

#### CONTROL DATA FIELDS

A control data field consists of the contiguous characters in a data record used for comparison against corresponding groups in other data records for purposes of sorting and merging.

The only characters that are invalid for this purpose are the record mark and the group mark. Figure 2 gives the minimum and maximum parameters for control data fields. The fields can be in any order, separate or adjacent, but may not overlap (see Figure 3).

### Major and Minor Fields

The first control data field specified is the major field. All subsequent fields are minor fields whose relative rank is determined by the order in which they are specified in control card 2.

Major control fields are compared first; if they are unequal, the data records are sorted in the ascending or descending sequence specified in control card 1. If the major fields are equal, the first minor control fields are compared. If the first minor fields are unequal, the data records are sequenced; if equal, the next minor control fields are compared. This action continues until the records are sequenced, or until all control data fields are equal.

The input order is not necessarily maintained for those records in which all control data fields compare equal; in that case, the two records are sequenced in arbitrary order, determined by the program.

### USER-INSERTED ROUTINES

The user has the option of adding his own closed subroutines to Sort/Merge 12. These subroutines

	Minimum	Maximum
Number of Fields	1	10
Characters per Field	1	999
Total Number of Control Data Characters	1	9,990

Figure 2. Control Data Parameters

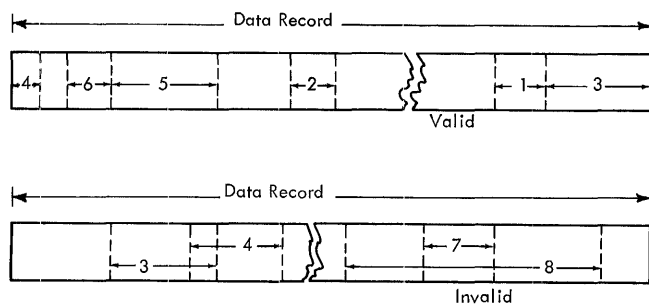


Figure 3. Control Data Field Configurations

may perform nonstandard sorting functions, or those not related to sorting, such as editing. Exits which provide linkage to the user's subroutines are supplied at logical points within Sort/Merge 12. The user must specify in control card 3 where his programming is to start. Space will be reserved for it from that specified location to the end of core storage. For full details on the exits available, linkages, programming considerations and suggested modifications, see "Modifications: User-Inserted Routines."

### CHECKPOINT AND RESTART

The term checkpoint refers to periodic recording on tape of the contents of core storage to provide convenient points for subsequently restarting the program.

Checkpoint records are automatically written for each pass of Phase 2 and for the Phase 3 pass. These checkpoint records are written on the output tape unit specified last on control card 1. For example, if five units are specified in columns 11-15 of control card 1, checkpoint records will always be written on the unit specified in column 15. In Phase 3, only checkpoint records will appear on this unit; no data records will be written on it.

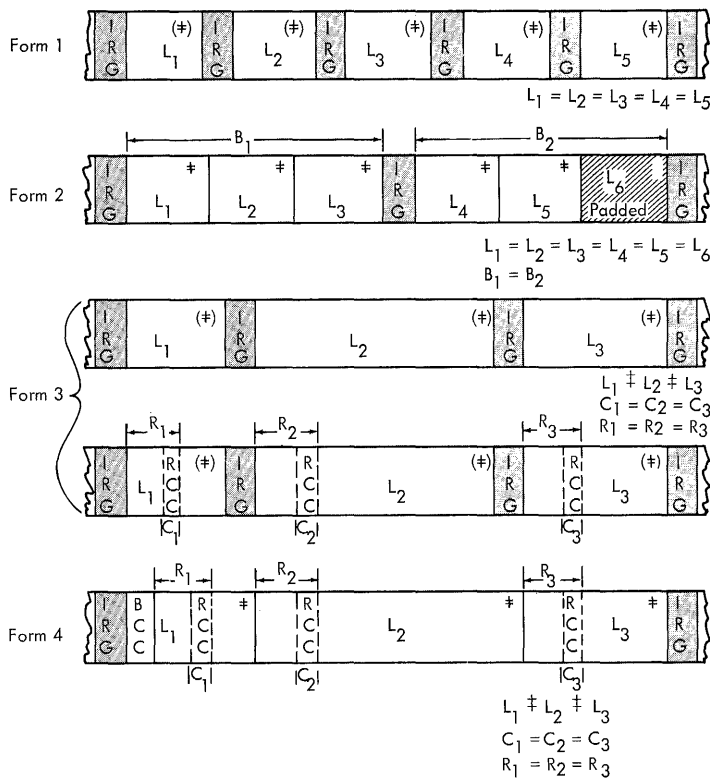
Sort/Merge 12 uses checkpoint records to reinitialize each pass of Phase 2 and for Phase 3. When it is necessary for the user to restart the program after a halt, the last recorded checkpoint is read into core storage, and the program is reinitialized to commence processing at the beginning of the pass during which the halt occurred.

### FILES AND RECORDS

The Sort/Merge 12 Input/Output Control System is based on the IOCS described in IBM 1410 Input/Output Control System for Card and Tape Systems, Form C28-0334. The following information is essentially an abstract from that publication, combined with other material pertinent to Sort/Merge 12.

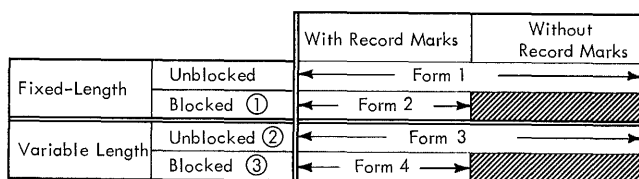
### Record Formats

The four classes of record formats that can be handled by Sort/Merge 12 are summarized in Figure 4. Figure 5 is a schematic representation of each format.



- Notes:
1. IRG = Inter-Record Gap  
RCC = Record Character Count  
BCC = Block Character Count
  2. Record Marks, (#), in Parentheses, are optional.

Figure 4. Record Formats



- ① With padding of short-length blocks.
- ② With or without Record Character Count fields.
- ③ With Record Character Counts and Block Character Count fields.

Figure 5. Record Format, Schematics

**Form 1:** If the input file consists of Form 1 records without record marks, a record mark is added at the end of each record by Sort/Merge 12 for internal processing. If Form 1 records are specified for output, the added record marks are deleted and the records are restored to their original length. If Form 2 records are specified for output, the added record marks are retained. If the input file consists of Form 1 records with

record marks, and Form 1 is specified for output, the record marks are retained throughout.

**Form 2:** If both input and output record format is Form 2, record marks are retained and short-length blocks are padded. For a merging application, if the input is Form 2 records, the output may not be Form 1 records.

**Form 3:** If the input file consists of Form 3 records without record marks and/or without record character count fields, record marks and record character counts (if necessary) are added for internal processing. If the output format is the same as the input format, the added record marks and the added record character count fields are deleted. If the output format is blocked records with a blocking factor greater than 1, the added record marks and record character count fields are retained.

**Form 4:** If both input and output format is Form 4, record marks and record character counts are retained for each record; and a proper block character count field is computed for each block. If Form 3 records are specified for output, the record marks and the record character count fields are retained. For a merging application, if the input is Form 4 records, the output cannot be Form 3 records.

### Block Character Count Field

The block character count field consists of the first four characters of each Form 4 block of records. This field is a count of the total number of characters in the block, including the four characters of the block character count field, itself.

The block character count field has AB zone bits over the units position.

### Record Character Count Field

The record character count field consists of two to four characters within a data record; and is a count of the total number of characters in the record, including those in the record character count field and the record mark, if any.

The record character count field must be in the same relative position in each record, and must be of the same length for each record (Figure 5).



## Header and Trailer Labels

### Header Labels

Sort/Merge 12 can check header labels on input files and can place header labels on output files (whether the input file was labeled or not). All labels on input files and those produced for output files must conform to the IBM 1410 Standard Header Label format. This format consists of the following 80-character card image record.

Card Column	Contents	Explanation
1-5	1HDRb	Header Flag
6-10	nnnnn	Tape Serial Number
11-15	nnnnn	File Serial Number
16-20	-nnnb	Reel Sequence Number
21-30	aaaaaaaa	File Name
31-35	yyddd	*Creation Date
36-40	-nnnb	**Retention Cycle
41-80	blank	(This field may be used in any way desired.)

\* yy specifies the year (00-99) and ddd the day of that year (001-366) on which the file was created.

\*\* nnn specifies the number of days the file is to be preserved after the creation date.

Files should be preserved until all output data created from them has been used successfully as new input. This insures that any record which requires the file as input can be reconstructed. Standard header labels provide for retention cycles of from 1 to 365 days. If files are to be protected indefinitely, the programmer can insert the digits 99 in the two high-order positions of the creation date.

The current date must be entered in control card 3.

Sort/Merge 12 is subject to a restriction. The header label retention-cycle-checking routines within the IOCS do not handle a cycle which extends beyond the end of the calendar year. When the creation date plus the retention cycle equals a value greater than 365, the console printer message, "TAPE cu SHOULD BE RETAINED UNTIL yyddd" occurs, followed by a halt. (This message and halt occur only when a tape is about to be used for output before completion of the retention cycle). Pressing the START key will permit the tape to be used. (See listing under "Halts and Messages.")

A tape mark following each header label can be specified by an entry in control card 1.

Standard input header labels are checked against data specified in the header label control card.

A separate header label control card must be included for each input file of a merging application if header labels are to be checked as specified in control card 1. If output tapes are to contain new header labels, the appropriate data should be contained in an output header label control card.

### Trailer Labels

Input trailer labels are checked only if input header label checking is specified in control card 1. Output trailer labels are written only if an output header label is specified in control card 1.

Since Format 2 of the standard trailer label is used, record counts and hash totals are not checked in input trailer labels; and record counts and hash totals are not written on the output trailer labels. Format 2 of the IBM Standard Trailer Label is shown in Figure 6.

### Read Error Procedure

The user can specify, in control card 1, what the IOCS read error procedure should be when unreadable information is detected in input records: a scan is optional; an unreadable block or record can be written out on a tape unit or the console I/O printer. (See control card 1, columns 56 and 57.)

### Blocking

Blocking is the process of combining two or more data records into a tape record, or block. A blocking factor is the number of data records contained within a tape record. Sort/Merge 12 accepts blocked or unblocked records. (See control card 1, columns 43-46.)

The sequenced records that constitute the final output can also be blocked. (See control card 1, columns 49-52.)

Card Columns	Contents	Explanation
1-5	1EOFb or 1EORb	Trailer Flag: End-of-File or End-of-Reel
6-10	nnnnn	Block Count
11-80	blank	(This field may be used in any way desired.)

Figure 6. Format 2 of Standard Trailer Label

## Blocking Factors

For a sorting application, Sort/Merge 12 internally blocks the records for maximum efficiency in processing. The sort blocking factor (B), computed by the program for this purpose, depends on the size of the records, the order of merge to be employed, the size of core storage being used, and the amount of storage reserved for user-inserted routines. Both B and Bi (the input blocking factors) must be divisors of the internal sort factor, G (see definition below). Maximum efficiency is assured if Bi is a factor of, or is equal to, the largest possible B. The output blocking factor (Bo) of Form 2 records must not exceed B. The maximum output block size for Form 4 records must not exceed the maximum sort block size. Internal blocking is not required for a merging application.

## Sort Block Length

The sort block length is either the product of the sort blocking factor and the number of characters contained in each data record (for fixed-length records) or the greatest possible block length (for variable-length records). The maximum sort block lengths in terms of characters is shown in Figure 7.

The entries in Figure 7 denote not only the maximum sort block lengths for given conditions, but also the maximum data record lengths when the sort blocking factor is one. The sort blocking factor employed for the sorting of fixed-length records is the largest value that results in a BL no greater than the corresponding entry in Figure 7 and that insures that B and Bi are both factors of G, the internal sort factor.

The following formula may be used to calculate the maximum sort block length permissible for a particular sorting application.

$$BL_{\max} = \frac{St - Pm - 2(M + 2)}{2(M + 1)}$$

Number of Core-Storage Positions	Order of Merge (m)			
	2-Way	3-Way	4-Way	5-Way
20,000	1132	711	468	298
40,000	4465	3211	2468	1965
60,000	7798	5711	4468	3632
80,000	9999	8211	6468	5298

Figure 7. Maximum Sort Block Lengths

- BL Maximum sort block length
- St Size of core storage minus the greater of any areas reserved for user programming in Phase 2 or Phase 3.
- Pm Size of the Sort/Merge 12 program itself (see below).
- M Order of merge to be performed.

The appropriate value of Pm for a particular sorting application is:

Order of Merge	Pm
1	12200
2	13200
3	14300
4	15300
5	16400

## The Internal Sort Factor

The number of data records (G) that are read into Phase 1 at one time and sorted internally must, for fixed-length records, be divisible by both the input blocking factor (Bi) and the sort blocking factor (B). This value, the internal sort factor (G), is the largest value, not exceeding 1024, that available core storage in Phase 1 will permit. The upper limit which Phase 1 core storage imposes on G is roughly defined in Figure 8.

As shown in Figure 8, the record lengths (L) that are handled by the Sort/Merge 12 program vary from 13 characters to 9999 characters.

## Maximum File Size

The maximum file size for a sorting application equals the greatest number of data records that may be contained on m-1 full reels of tape with a blocking factor of B (Figure 9).

$$G_{\max} = \frac{M_1 - 8600 - BL}{L + 9}$$

$M_1$  = The size of core storage minus space reserved in Phase 1 by the user for added programming  
 BL = Sort block length (the sort blocking factor times the data record length)  
 L = Data record length (13 ≤ L ≤ 9999)

Figure 8. Maximum Value of G

<u>m (Order of Merge)</u>	<u>Number of Full Reels That Can Be Sorted</u>
2	1
3	2
4	3
5	4

Figure 9. Maximum File Size Sorting Application

A message at the end of the Assignment Phase indicates the maximum file size for the values of B

and L, and the tape density specified for the application. A message also shows whether maximum file size has been exceeded.

#### Padding

Padding is the process of filling out a block of information with dummy data records. The user may specify that nines (9s) or blanks padding records be generated by Sort/Merge 12. Nines padding is more efficient for ascending sequences, and blanks padding for descending sequences. Padding is not generated for variable-length records.

## PHASES OF SORT/MERGE 12

### THE ASSIGNMENT PHASE

Some of the functions performed during the Assignment Phase have already been described in "Organization of Sort/Merge 12." A check for control card and logical errors is also made during this phase, and messages are written on the console I/O printer indicating the nature of such errors, when detected. For example, messages occur if the input blocking factor is greater than the sort blocking factor; if the minimum record length is less than 13; or if the maximum file size has been exceeded.

The constants computed in the Assignment Phase, such as sort blocking factor B and internal sort factor G, are used in Phase 1 and are automatically passed on, if necessary, to Phase 2 and Phase 3.

#### Move and Load Modes

An input file for Sort/Merge 12 may be read in either the Load mode or the Move mode. If the Move mode is specified (see control card 1, column 42), then word marks are set in core storage by the program in the high-order positions of certain data fields. These fields are; (1) all control data fields in each fixed- or variable-length record and, (2) the record character count field in each variable-length record.

If the Load mode is specified, the user must insure that word separator characters are properly located in the input data file. If the user wants word marks to be set in the fields listed above (as for the Move mode), or if the file is of fixed-length records whose number is less than G, he must add the following program change cards immediately preceding execute card 999S1200:

<u>Initial Loc</u>	<u>Length</u>	<u>Content</u>	<u>Seq No.</u>	<u>Program Block</u>
~02558	~00012	~N00000000000	997	S1200
~02739	~00012	~N00000000000	998	S1200

The symbolic entries corresponding to the above change cards are:

<u>Seq No.</u>	<u>Page/Line</u>	<u>Op Code</u>	<u>Operand</u>
442	3430	NOP DC	00000000000
460	3610	NOP DC	00000000000

Word separator characters in the input file must not cause word marks to be set by Sort/Merge 12 in

other than the high-order positions of control data fields or record character count fields.

### PHASE 1

Phase 1 employs an internal sort in which the input records are sorted into sequences of length G and written out on two, three, four or five output tapes, depending on the order of merge to be performed in Phase 2. These tapes become the input tapes for the first pass of Phase 2. The internal sort is accomplished by means of a modified binary search. The user may direct the Phase 1 running program to keep a count of the number of records read in, and/or a hash total, by making the appropriate entry in control card 1, column 67.

#### Tape Assignments

The input file can be contained on a maximum of 999 reels of magnetic tape which are mounted in rotation on the tape units specified in control card 1, columns 2-6 or columns 68-72. These tape units must all be on the channel specified in column 7. The tape units specified in columns 2-6 can serve a dual purpose:

1. The input file can be read in from these units.
2. These units are used as work tapes for the m-way merge performed in Phase 2 and Phase 3. The output of the first pass of Phase 2 is written on these units. The number of tape units specified in columns 2-6, must, therefore, be equivalent to the order of merge to be performed (two units for a two-way merge, three units for a three-way merge, etc.).

If columns 68-72 are left blank, the input file is read in from the units specified in columns 2-6; otherwise, the input file is read in from the units specified in columns 68-72. The user is free to designate in columns 68-72 the same units indicated in columns 2-6, plus others. On the other hand, the user may specify a completely different set of input units in columns 68-72. Tapes mounted on the units specified in columns 2-6 are always employed as work tapes in Phase 2 and Phase 3, whether the input tapes are specified in columns 2-6 or in columns 68-72.

#### Halts

If the number of reels of input to Phase 1 exceeds the specified number of tape drives (multi-reel input), a halt occurs each time the tape reel

mounted on the last specified tape unit reaches end of reel. This allows the machine operator to remove the tapes that have been processed and mount the next set of tape reels.

A halt option, provided in control card 1, column 47, enables the user to save the original Phase 1 input tapes. The input tapes can also be saved if the input units are specified in columns 68-72, and if these units are different from the units specified in columns 2-6.

## Output

The output of Phase 1 (sorted groups of G records) is written in rotation on the tape units specified in control card 1, columns 11-15. For example, if there are three output units specified for a three-way merge in Phase 2, the first, second, and third sequences of G records are written out on the first, second, and third tape units respectively. The fourth, fifth and sixth sequences of G records are also written out on the first, second and third tape units, and so on.

An automatic check is made before each sequence is written out, to determine whether this sequence follows the preceding sequence in order. If the sequence does follow, it is written on the same tape unit, thus adding to the length of the preceding sequence.

All blocks of B records that consist entirely of high-order padding records (9s for ascending sequences and blanks for descending sequences) are deleted before the last sequence of G records is written out from Phase 1.

For a sorting application, the number of tape units specified in columns 11-15 should be equivalent to the number of units designated in columns 2-6; i. e., to the order of merge to be performed. The tape units specified in columns 11-15 must be on the channel designated in control card 1, column 16. (Examples are illustrated in Figures 10 and 11.)

In each example, the pertinent card columns of control card 1 are shown with their contents, and the corresponding data flow is charted beneath. In Figure 10, columns 68-72 are blank; the input to the application comes from the tape units specified in columns 2-6. These units are on the channel specified in column 7. Columns 4-6 are blank, indicating that the only tape units to be used are those specified in columns 2 and 3. In Figure 11, three tape units are specified in columns 68-72; therefore, the input tapes are mounted on those units. The S-punch in column 1 of both examples indicates that the application is a sort.

## User-Inserted Routines

The user can reserve an area of core storage in Phase 1 for his own subroutines by entering the starting address of the area in control card 3, columns 8-12. The reserved area will extend from this address to the end of core storage. For example, on an IBM 1410 with 40,000 core-storage positions, if "35493" is entered in columns 8-12, locations 35493 through 39999 will be reserved in Phase 1 for user programming.

The inclusion of user routines limits the size of G. Exit points are provided in Phase 1 at which the user's subroutine(s) are entered. An explanation of modifications and a listing of all exit points are given under "Modification: User-Inserted Routines."

## PHASE 2

Phase 2 is automatically read in following the completion of Phase 1. Phase 2 consists of the number of merging passes required to produce the number of sequences equal to or less than the order of merge being performed in Phase 2. (This is indicated by "x" in Figures 10 and 11.) The output of Phase 1 is the input to Phase 2, and is contained on the tape units specified in control card 1, columns 11-15 (Figures 10 and 11).

Temporary header labels associated with the merging tapes in Phase 2 of a sorting application are retained on the output tapes if output header labels are not specified in control card 1, column 60.

## PHASE 3

The final merging pass is performed in Phase 3. A sequence check of the file will be made if specified by the user in control card 1, column 54.

The completely sequenced file is written in rotation on the set of tape units receiving the output of Phase 3. A total of m-1 units is available; the last one specified is reserved solely for the Phase 3 checkpoint record.

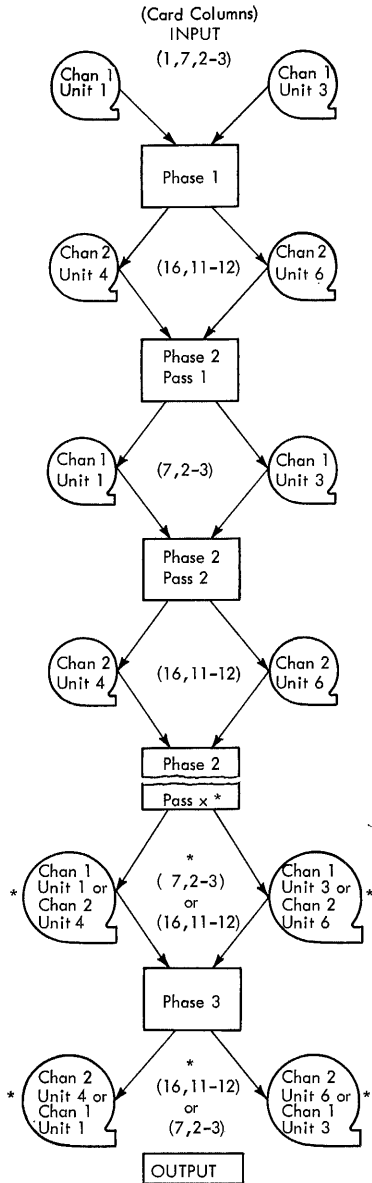
All blocks of B<sub>0</sub> records that consist entirely of the specified padding records (high order or low order) are deleted before the completely sequenced file is written out.

Padding is added if the first (for low order) or the last (for high order) output block contains less than B<sub>0</sub> records.

In the example that follows, the information in Figure 12, either supplied by the user or calculated by the Assignment Phase, as indicated, defines FILE A.

Control Card 1

Column	1	2	3	4	5	6	7	11	12	13	14	15	16	68	69	70	71	72
Contents	S	1	3				1	4	6				2					



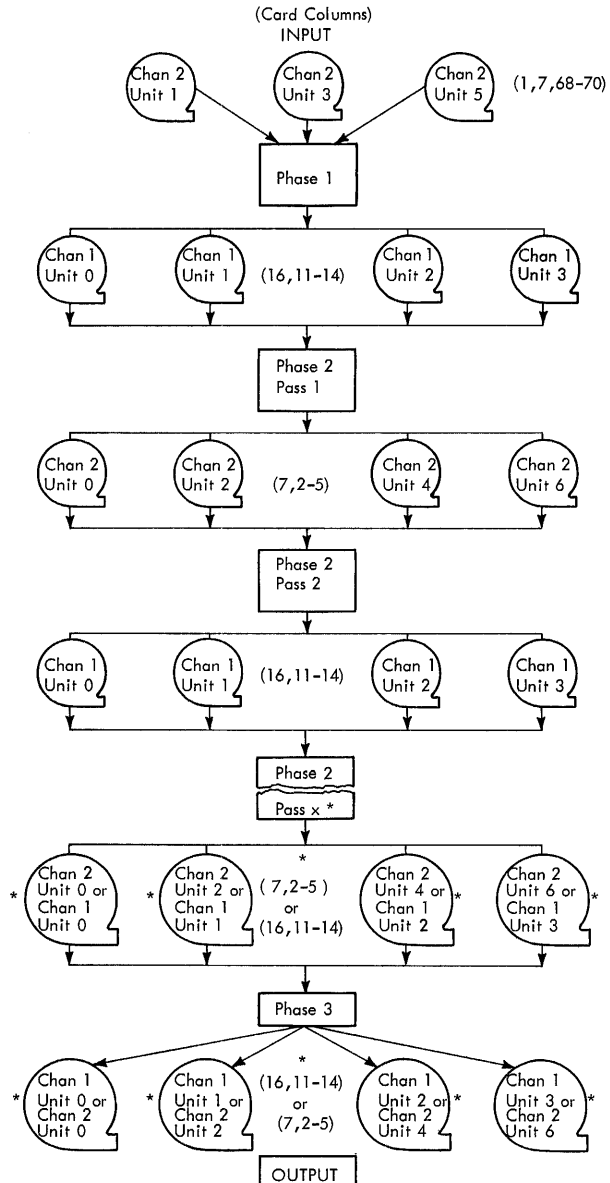
\* Depending on whether x is odd or even, respectively.

Figure 10

Figure 13 illustrates the Phase 1 input area after the last two input data records have been read into core storage. The 9s records are the padding records inserted by the sort program to make a total of eight records. The R records are the last two valid data records of the input file. Eight previous groups of G records have been read in and sorted by the Phase 1 running program.

As shown in Figure 14, the output of Phase 1 consists of eight ordered sequences of G records each, and one sequence of B records, blocked with a sort blocking factor of four. The first sequence

Column	1	2	3	4	5	6	7	11	12	13	14	15	16	68	69	70	71	72
Contents	S	0	2	4	6		1	0	1	2	3	2	2	1	3	5		



\* Depending on whether x is odd or even, respectively.

Figure 11

of eight records, G1, is written on tape 1. The second sequence of eight records, G2, follows G1 in sequence and is therefore also written on tape 1.

There is a sequence break between G2 and G3; i.e., the control field of the first record of G3 has a lower value than that of the last record of G2; G3 is therefore written on tape 2. This process continues until FILE A has been written on tape 1 and tape 2, as shown. The four records of G9 consist of the last two valid data records and two of the padding records discussed under Figure 13. The last block of B records, consisting of four padding records, has been deleted from the file.

FILE A		
Supplied by User	n (Number of Records)	66
	Record Format	Form 2
	Bi	2
	Bo	3
Computed by the Assignment Phase	m (Order of merge)	2
	B	4
	G	8

Figure 12. File A

R
R
99999
99999
99999
99999
99999
99999

Figure 13

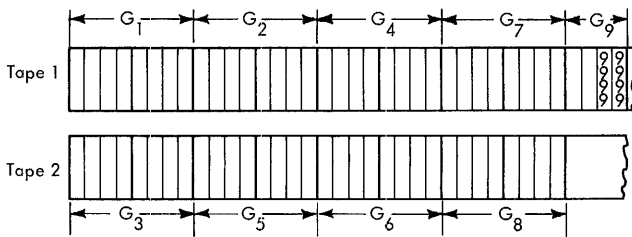


Figure 14

As illustrated in Figure 15, FILE A, completely sequenced, is written out on tape from Phase 3, blocked with an output blocking factor of three. The 64th, 65th and 66th records constitute the last block of the ordered file on tape; the last two records in core storage are not written out, because they are high-order padding records.

### User-Inserted Routines

The user can reserve an area of storage in Phase 2 and/or Phase 3 for his own subroutines by entering the starting address of the area in control card 3, columns 13-17. The reserved area will extend from this address to the end of core storage. An explanation of modifications and a listing of all exit points are given under "Modification: User-Inserted Routines."

### THE MERGE PROGRAM

The merge program is a modification of Phase 3. It can merge from two to five sequenced data files. The program can also be used with input from a single sequenced data file to accomplish reblocking,

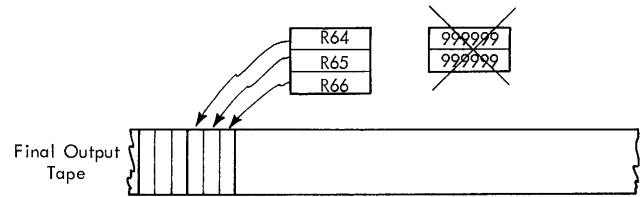


Figure 15

sequence checking, etc. Each input file is assigned to one tape unit, and may be a maximum of 99 reels of magnetic tape. The input tape units can be on either or both channels. All output tape units must be on the same channel.

### Input

Record formats for a merging application are the same as those previously specified for a sort. All input files in a merging application must have identical formats.

Note: If input header labels are to be checked, a separate input header label control card must be supplied for each file. See column 80 of "Header Label Control Card" (Figure 20).

### The Merge Running Program

The running program executes the m-way merge in one pass, as each input file has previously been sorted. A sequence check of all records is made if it has been specified by a zero-punch in control card 1, column 54. The input file can be reblocked, according to the specified value of Bo, column 54.

### Output

The sequenced output of the merge program is written on the tape units specified in control card 1, columns 2-6. These units must be on the channel punched in column 7. If more than one output unit is specified, each tape reel is automatically rewound and unloaded when filled; and the reel on the next specified tape unit is initialized to accept output. Tape label handling for the final output is specified in column 60.

If the output blocking factor is not evenly divisible into the file size, padding records will be added. If low-order padding is specified, the file size must be specified in control card 3, columns 1-7. (This is necessary for correct padding of the first output block.) If the file size is incorrect or if a record is dumped during the merge, high-order padding will always complete the last output block.

Figure 16 illustrates a merge application. Five input tape units are specified in columns 11-15; therefore, a five-way merge is to be performed. The contents of corresponding card columns 11, 16, 21-22, indicate that the first sequenced file is to be read in from unit 1 on channel 1, and is contained on two reels of magnetic tape. A similar analysis may be made for the remaining four sets of corresponding card columns. If an input file is contained on more than one reel of tape, each reel is automatically re-wound and unloaded when an end-of-reel condition is detected.

Two output tape units are specified in columns 2-3 and 7 (channel 1, units 2 and 4). As indicated in Figure 16, when the first reel of tape on unit 2 is filled, it is rewound and unloaded. Output is then written on the first reel of tape mounted on unit 4. When this reel is filled, the output is written on the second reel of tape mounted on unit 2, etc.

### User-Inserted Routines

The user can reserve an area of storage in the merge program for his own subroutines by entering the starting address of the area in control card 3, columns 13-17. The reserved area extends from this address to the end of core storage (see "Modification: User-Inserted Routines").

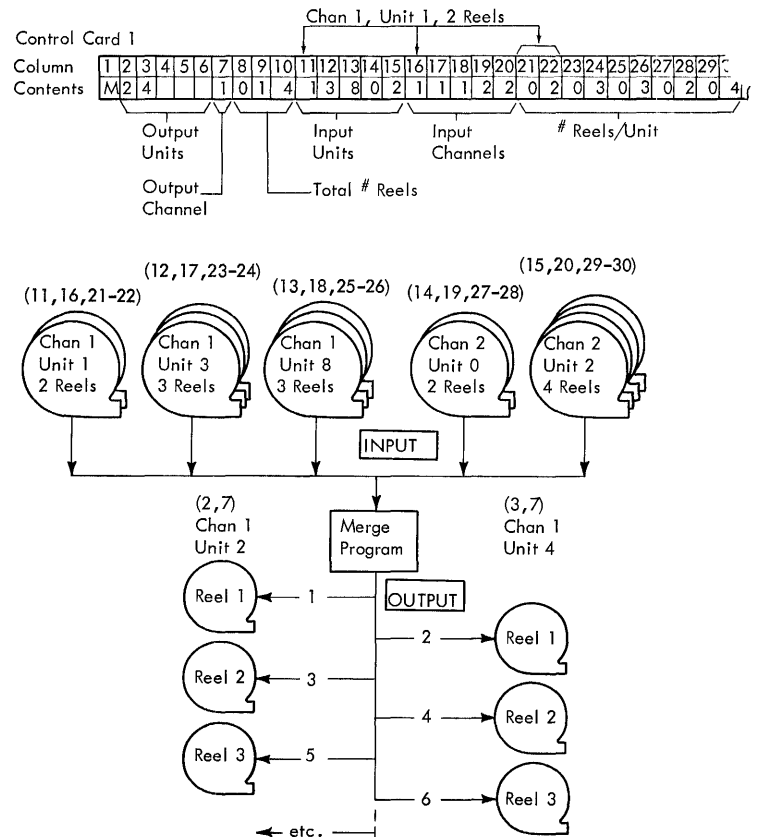


Figure 16



The four control cards accepted by Sort/Merge 12 are shown in Figures 17 through 20. Control cards 1 and 2 must be prepared for every application. Inclusion of control card 3 and the header label control card depends upon the nature of the input file and the application.

Appendix B, at the end of this publication, provides a quick reference to all four cards for programmers and machine operators.

Control Card 1

Control card 1 (Figure 17) contains specifications for most of the parameters required by the program, and indicators for the options chosen. The fields of this control card have been discussed in preceding sections and/or are described in Figure 17 in the description for each field.

Control Card 2

Control card 2 (Figure 18) contains the specifications for the control data fields to be used for the sorting or merging application. These fields are numbered from one through ten, in order of significance. Field 1 is the major control data field; Field 10 is

the most minor field. The order of precedence bears no relation to the physical locations of the fields (see Figure 3).

Control Card 3

Control card 3 (Figure 19) supplies optional information: the expected file size, the area or areas needed for user-supplied routines, the date, and the maximum record length for Form 3 records in a merge application. If control card 3 is included, control card 1 must have a zero in column 76.

Header Label Control Card

A header label control card (Figure 20) is required for the input file in a sort application, and for each input file in a merge operation, only if control card 1 has a "1" in column 58. A header label control card is required for an output file only if control card 1 has a "2" in column 60. The user specifies the nature of the file for which the card is punched in column 80, i. e., whether the card applies to the input file of a sorting application, an input file of a merge, or the output file for either.

Card Column	Contents	Sorting	Merging
1		SORT OR MERGE APPLICATION	
	S or M	Sorting; Input file on tape units specified in columns 2-6 or 68-72, on channel specified in column 7.	Merging; Input file on tape units specified in columns 11-15, on channels specified in columns 16-20.
2-6	23 nnnn	TAPE UNIT I	
		Each "n" can be from 0-9, or blank (Note 1).	
		PHASE 2 WORK; (INPUT) (FINAL OUTPUT) (Note 4)	OUTPUT
		The output of the first pass of Phase 2 is written on nnnn; these units are then used as work tapes throughout Phase 2. The number of units specified is therefore equal to the order of merge performed in Phase 2. Tape units nnnn also contain the input file, if columns 68-72 are blank. The number of units specified in columns 2-6 must be the same as that specified in columns 11-15, because Sort/Merge 12 is a balanced sort.	Tape units nnnn receive the merged output. The number of units specified should be equal to or less than the order of merge performed. If input consists of only one file (to be sequence checked, reblocked, etc.), the appropriate unit number is punched in column 2, and columns 3-6 are blank.
7	1 or 2	CHANNEL I	
		Channel for tape units specified in columns 2-6 and 68-72.	
8-10	nnn	NUMBER OF INPUT REELS	
		Total number of reels containing input file.	
		nnn can be from 001 to 999.	nnn can be from 001 to 495.

Figure 17. Control Card 1 (page 1)

Card Column	Contents	Sorting	Merging
<b>TAPE UNITS IIA - IIE</b>			
11-15	nnnn	Each "n" can be from 0-9, or blank (Note 1).  PHASE 1 OUTPUT; PHASE 2 WORK; (FINAL OUTPUT) (Note 4)  Tape units nnnn receive the output of Phase 1 and, therefore, the input to Phase 2. These units are subsequently used as work tapes in Phase 2. The number of units specified is therefore equal to the order of merge performed in Phase 2. The <u>number</u> of units specified in columns 11-15 must be the same as that specified in columns 2-6, because Sort/Merge 12 is a balanced sort.	INPUT  Tape units nnnn contain the input file. Each unit must be on the channel specified in the corresponding columns 16-20.
<b>CHANNEL IIA</b>			
16	1 or 2	Channel for <u>all</u> tape units specified in columns 11-15	Channel for unit specified in column 11
17	blank 1, or 2	Always blank	CHANNEL IIB Channel for unit specified in column 12
18	blank 1, or 2	Always blank	CHANNEL IIC Channel for unit specified in column 13
19	blank 1, or 2	Always blank	CHANNEL IID Channel for unit specified in column 14
20	blank 1, or 2	Always blank	CHANNEL IIE Channel for unit specified in column 15
21-22	nn	Always blank	NUMBER OF REELS (IIA) nn can be from 01-99; number of reels to be mounted on unit specified in columns 11 and 16 (Note 2).
23-24	nn	Always blank	NUMBER OF REELS (IIB) nn can be from 01 to 99, or blank; number of reels to be mounted on unit specified in columns 12 and 17 (Note 2).
25-26	nn	Always blank	NUMBER OF REELS (IIC) nn can be from 01 to 99, or blank; number of reels to be mounted on unit specified in columns 13 and 18 (Note 2).
27-28	nn	Always blank	NUMBER OF REELS (IID) nn can be from 01 to 99, or blank; number of reels to be mounted on unit specified in columns 14 and 19 (Note 2).
29-30	nn	Always blank	NUMBER OF REELS (IIE) nn can be from 01 to 99, or blank; number of reels to be mounted on unit specified in columns 15 and 20 (Note 2).
31		UNLOAD OPTION	
	blank	Tape reels are not to be unloaded at the end of each pass of Phase 2.	Always blank
	0	All tape reels are to be rewound and unloaded at the end of Phase 1 and at the end of each pass of Phase 2. (This option is useful for a large file mounted on 7330 tape units.)	

Figure 17. Control Card 1 (page 2)

Card Column	Contents	Sorting	Merging
32	RECORD FORMAT, INPUT FILE		
	blank	Form 1 records with record marks or Form 2 records.	
	0	Form 1 records without record marks.	
	1	Form 3 records with record marks, and with or without record character count fields (See columns 33-36).	
	2	Form 3 records without record marks, and with or without record character count fields (See columns 33-36).	
	3	Form 4 records.	
33-36	RECORD LENGTH: INPUT FILE		
	all blanks	Form 3 records <u>without</u> record character count field.	
	nnnn	Form 1 and Form 2 records; actual record length; nnnn can be from 0013-9999. Form 3 records with record character count fields and Form 4 records; relative address of the last character of the record character count field. For example, if the record character count field occupies the fifth and sixth character positions of each record, nnnn should be punched 0006. nnn can be from 0002 to 9994.	
37	RECORD CHARACTER-COUNT FIELD LENGTH: INPUT FILE		
	blank	Input file does not have a record character count field.	
	2, 3, or 4	Number of characters (field length) in the record character count field.	
38-41	MINIMUM RECORD LENGTH: INPUT FILE		
	all blanks	Form 1 or Form 2 records <u>or</u> Form 3 or Form 4 records whose minimum record length is not known. (In the latter case, efficiency of the application may be reduced.)	
	nnnn	File consists of Form 3 or Form 4 records; nnnn specifies the number of characters in the shortest record of the file. nnnn can be from 0013 to 9993.	
42	PARITY/MODE: INPUT FILE		
	Input file may be read in even or odd parity and in Move or Load mode:		
		<u>Parity</u>	<u>Mode</u>
	blank	Even	Move
	0	Even	Load
	1	Odd	Move
	2	Odd	Load
43-46	BLOCKING FACTOR OR LENGTH: INPUT FILE		
	0001	Form 1 records (blocking factor is 0001).	
	nnnn	Form 2 records; nnnn is equal to Bi.	
		Form 3 records; nnnn is equal to the maximum record length, L.	
		Form 4 records; nnnn is equal to the maximum input block length, Bi x L.	
		<u>Note:</u> Leading zeros are added to make this field equal to four characters.	
47	SAVING OR SWITCHING INPUT FILE:		
		Each input reel to be unloaded and/or processing to be halted after each end-of-reel (EOR) indication:	Always blank
		<u>Unload After EOR</u>	<u>Halt After EOR</u>
	blank	No	No
	0	No	Yes
	1	Yes	No
	2	Yes	Yes

Figure 17. Control Card 1 (page 3)

Card Column	Contents	Sorting	Merging
48		PARITY/MODE: OUTPUT FILE	
		Output file can be written in even or odd parity and in move or load mode, regardless of the parity and mode of the input file.	
		<u>Parity</u>	<u>Mode</u>
	blank	Even	Move
	0	Even	Load
	1	Odd	Move
	2	Odd	Load
49-52		BLOCKING FACTOR OR LENGTH: OUTPUT FILE	
	0001	Form 1 or Form 3 records	
	nnnn	Form 2 records; nnnn is equal to Bo	
		Form 4 records; nnnn is equal to BoL	
		For a merging application, the output file <u>must</u> consist of unblocked records if the input file is: (1) Form 1 without record marks, or (2) Form 3 without records marks, and/or without record character count fields.	
53		COLLATING SEQUENCE: ASCENDING/DESCENDING	
	blank	Sort or merge in an ascending sequence (blank is low)	
	1	Sort or merge in a descending sequence (blank is high)	
54		MERGE SEQUENCE CHECK	
	blank	Sequence check is not to be made in Phase 3 of a sort or in a merge.	
	0	Sequence check is to be made in Phase 3 of a sort, or in a merge.	
55		WORK TAPE DENSITY	
	blank	556 cpi	Always blank
	0	200 cpi	
	1	800 cpi	
56		UNREADABLE RECORD PROCEDURE: IOCS SCAN OPTION	
	blank	Scan option is <u>not</u> desired.	
	0	The scan option <u>is</u> desired; that is, the IOCS Error Routine will examine the block or record containing unreadable information and cause the locations of invalid characters (represented by asterisks) to be typed out on the console I/O printer. This gives the user the option of correcting the record or deleting it.	
57		UNREADABLE RECORD PROCEDURE: DUMP OPTION	
	blank	Block or record containing unreadable information is to be printed on the console I/O printer.	
	0, 1, ., or 9	Block or record containing unreadable characters is to be written on channel 1, tape unit 0, 1, . . . or 9.	
58		HEADER LABELS: INPUT TAPES	
	blank	Input tapes do <u>not</u> contain header labels.	
	0	Input tapes contain header labels that are <u>not</u> to be checked.	
	1	Input tapes contain header labels that are to be checked. Only standard labels (specified elsewhere in this publication) can be checked. If this option is chosen, an <u>input</u> header label control card is required. A separate card must be supplied for each input file of a merge.	
59		TAPE MARKS: INPUT TAPES	
	blank	Input tape header labels (if any) are not followed by tape marks.	
	1	Each input tape header label is followed by a tape mark.	

Figure 17. Control Card 1 (page 4)

Card Column	Contents	Sorting	Merging
60		HEADER LABELS: OUTPUT TAPES	
	blank	Output tapes are <u>not</u> to contain header labels.	
	1	Information in the <u>input</u> header label control card also defines <u>output</u> header labels. If this option is chosen, column <u>58</u> must be punched 1 (Note 3).	
61		TAPE MARKS: OUTPUT TAPES	
	blank	Output tape header labels (if any) are <u>not</u> to be followed by tape marks.	
	1	Each output tape header label is to be followed by a tape mark.	
62		TEMPORARY TAPE LABEL HANDLING: PHASES 1 and 2	
	blank	Phase 1 and Phase 2 output tapes are not to contain labels.	Always blank
	0	Phase 1 and Phase 2 output tapes are to contain labels.	
	1	Phase 1 and Phase 2 output tapes are to contain labels and tape marks.	
63		HALT OPTION: PHASE 3	
	blank	Program is <u>not</u> to halt prior to Phase 3.	Always blank
	0	Program is to halt prior to Phase 3.	
64		RETENTION CYCLE CHECK: PHASE 1 AND PHASE 2 OUTPUT LABELS	
	blank	Retention Cycles on Phase 1 and Phase 2 output labels are <u>not</u> to be checked.	Always blank
	0	Retention Cycles on Phase 1 and Phase 2 output labels are to be checked. This option requires that column 62 contain 0 or 1 and that control card 3 be included in the control card package.	
65		PADDING	
	blank	Padding records, when required to fill out short length blocks, to consist of blanks	
	9	Padding records to consist of 9s	
66		CORE STORAGE SIZE	
		Specifies the number of core-storage positions available:	
	2	20,000 positions	
	3	40,000 positions	
	4	60,000 positions	
	5	80,000 positions	

Figure 17. Control Card 1 (page 5)

67 RECORD COUNT/HASH TOTAL

Indicate whether record counts and/or hash totals are to be made.

	<u>Record Count</u>	<u>Hash Total</u>
blank	No	No
0	Yes	No
1	No	Yes
2	Yes	Yes

If the output file is to consist of Form 2 records, either 0 or 2 should be punched to insure that blocks created internally which consist entirely of the specified padding records are not written in the final output file.

68-72 OPTIONAL INPUT TAPE UNITS

all blanks	Input is from the units specified in columns 2-6.	Always blank
nnnn	Input is from the tape unit(s) specified. These must be on the channel specified in column 7.  (See also columns 2-6.)	

73-75 blank These columns must be blank

76 CONTROL CARD 3

blank	Control card 3 is <u>not</u> included.	Always blank
0	Control card 3 <u>is</u> included	

77-80 CTL1 CONTROL CARD 1 IDENTIFIER

Notes:

1. If fewer than five units are specified, their identifying numbers are written left-justified, with the remaining field positions left blank.
2. The total number of input reels; that is, the sum of columns 21-22, 23-24, 25-26, 27-28, and 29-30, must be equal to or less than 495.
3. Control card 3 must be supplied in the control card package, with the current date specified in columns 18-22.
4. The final output file is written on the units specified in columns 2-6 or in columns 11-15. The group of units used is dependent upon the number of passes required by Phase 2. If the number of passes required in Phase 2 is even, the final output file is written on the units specified in columns 2-6; if the number of passes required is odd, the output is written on the units specified in columns 11-15.

For the special case where no passes are required by Phase 2, the output is written on the units specified in columns 2-6.

Figure 17. Control Card 1 (page 6)

Card Columns	Contents	Sorting and Merging
1-2	nn	NUMBER OF CONTROL DATA FIELDS nn can be from 01 to 10
3-6	nnnn	TOTAL LENGTH OF CONTROL DATA FIELDS nnnn can be from 0001 to 9990
7-10	nnnn	FIELD 1 (MAJOR FIELD): LOCATION (Note 1)
11-13	nnn	FIELD 1: SIZE (Note 2)
14-17	nnnn	FIELD 2: LOCATION (Note 1)
18-20	nnn	FIELD 2: SIZE (Note 2)
21-24	nnnn	FIELD 3: LOCATION (Note 1)
25-27	nnn	FIELD 3: SIZE (Note 2)
28-31	nnnn	FIELD 4: LOCATION (Note 1)
32-34	nnn	FIELD 4: SIZE (Note 2)
35-38	nnnn	FIELD 5: LOCATION (Note 1)
39-41	nnn	FIELD 5: SIZE (Note 2)
42-45	nnnn	FIELD 6: LOCATION (Note 1)
46-48	nnn	FIELD 6: SIZE (Note 2)
49-52	nnnn	FIELD 7: LOCATION (Note 1)
53-55	nnn	FIELD 7: SIZE (Note 2)
56-59	nnnn	FIELD 8: LOCATION (Note 1)
60-62	nnn	FIELD 8: SIZE (Note 2)
63-66	nnnn	FIELD 9: LOCATION (Note 1)
67-69	nnn	FIELD 9: SIZE (Note 2)
70-73	nnnn	FIELD 10: (MOST MINOR FIELD): LOCATION (Note 1)
74-76	nnn	FIELD 10: SIZE (Note 2)
77-80	CTL2	CONTROL CARD 2 IDENTIFIER

Notes:

1. This is the location of the low-order (last) character of the field; for example: if this field consists of the 27th, 28th and 29th characters of each record, nnn should be punched 0029.
2. This specifies the number of characters in the appropriate control data field; nn can be from 001 to 999.

Figure 18. Control Card 2

Card Columns	Contents	Sorting	Merging
1-7	EXPECTED FILE SIZE		
	all blanks	Number of records in input file unknown.	High-order padding will complete last block of Form 2 output, <u>or</u> output is Form 1, 3 or 4.
	nnnnnn	Exact or approximate number of records in input file. nnnnnn can vary from 0000001 to 9999999.	Exact number of records in input files if Form 2, and low-order padding is specified.
8-12	USER AREA: PHASE 1		
	all blanks	User-supplied routines are not incorporated.	Always blank
	nnnn	Starting address of core-storage area to be reserved for user-supplied routines to be incorporated into Phase 1 (Note 1).	
13-17	USER AREA PHASE 2, PHASE 3, MERGE		
	all blanks	User-supplied routines are not incorporated.	
	nnnn	Starting address of core-storage area to be reserved for user-supplied routines to be incorporated into Phases 2 and/or 3 (Note 1).	Starting address of core-storage area to be reserved for user-supplied routines to be incorporated into the merge program (Note 1).
18-22	DATE		
	yyddd	yy specifies the year (00-99); ddd specifies the day (001-366). The date should be punched if the retention cycle is to be checked for Phase 2 or Phase 3 output tape labels of a sort, or on temporary tape labels that are retained. Date should also be punched, for both sorting and merging applications, if this information is to be retained on output header labels.	
	all blanks	This field is left blank if none of the above options has been chosen.	
23-26	MAXIMUM RECORD LENGTH: FORM 3 RECORDS		
	all blanks	Always blank	Merge is performed on Form 1, Form 2, or Form 4 records, or size of output area for Form 3 records is equal to the input block length (BiL) (Note 2).
	nnnn		Size of longest record where output consists of Form 3 unblocked records; nnnn can be from 0001 to 9999.
27-76	all blanks	This field is not used.	
77-80	CTL3	CONTROL CARD 3 IDENTIFIER	

Notes:

1. Core storage is reserved from this address to the last core-storage location of the machine (see control card 1, column 66).
2. For example, if the input block length is 9999 characters, the merge program will specify an output area of 9999 characters, even though the longest record of the file does not, for instance, exceed 250 characters. If 9999 core-storage locations are not available for this output area, the particular merge cannot be processed.

**Figure 19. Control Card 3**



1-3

nnn

TAPE LABEL HANDLING

nnn is determined by the appropriate table, below. "Yes" means that the item is to be checked or written; "No" that the option is not selected. In cases of conflict, YES has priority over NO.

Card Column	Contents	Header Labels				Trailer Labels
		File Serial Numbers	Reel Sequence Numbers	File Name	Creation Date	Block Character Count
1	0	Yes	Yes	Yes	Yes	Yes
	1	No	No	No	No	No
	2	No	No	Yes	No	Yes
2	0	Yes				
	1	No				
3	0		Do Not Update			
	1		Increment by 1*			

\*Optional for multi-reel input files.

Card Column	Contents	File Serial Numbers	Reel Sequence Numbers	File Name	Creation Date	Retention Cycle
1	0	No	No	No	No	Yes*
	1	No	No	No	No	No
2	0	Specified in Cols. 4-8				
	1	Replace by Tape Serial Number				
3	0		Do Not Update			
	1		Increment by 1**			

\*Current date must be supplied in control card 3 (columns 18-22).

\*\*Successively for each output reel.

4-8

FILE SERIAL NUMBER

nnn Specifies file serial to be checked if checking is specified in columns 1 or 2.

all blanks

Specifies file serial if "0" is punched in column 2.

If "1" is punched in column 2.

Figure 20. Header Label Control Card (page 1)

Card Columns	Contents	Input Files	Output Files
9	-	Hyphen, 11-punch (Note)	Hyphen, 11-punch (Note)
10-12	nnn	REEL SEQUENCE NUMBER nnn can be from 001 to 999	
13	blank	(Note)	(Note)
14-23	aaa...a	FILE NAME Any combination of the 64 valid 1410 characters (including blank) that identify the file.	
24-28	ddyyy	CREATION DATE  This field need not be punched if control card 3 is included in the control card package.	
29	-	Hyphen, 11-punch (Note)	Hyphen, 11-punch (Note)
30-32	nnn	Always blank	RETENTION CYCLE The number of days after the date specified in columns 24-28 (or in control card 3) that this file is to be preserved.
33	blank	(Note)	(Note)
34		Record Mark, 0-2-8 Punch, (This character must be punched)(Note)	
35-76	all blanks	This field is not used.	
77-79	HDR	HEADER LABEL CONTROL CARD IDENTIFIER	
80		APPLICATION/FILE IDENTIFIER	
	I or O	Letter I, 12-9 punch. This card is for the <u>input</u> file in a <u>sorting</u> application.	Letter O, 11-6 Punch. This card is for the <u>output</u> file in either a <u>sorting</u> or <u>merging</u> application.
	1, 2, 3, 4, 5	This card is for the <u>input</u> file in a <u>merging</u> application. The input file is to be mounted on the unit as specified in the following columns of control card 1:	
	Card 1	for Column	11
	2		12
	3		13
	4		14
	5		15

Note: For compatibility with format accepted by IOCS.

Figure 20. Header Label Control Card (page 2)

GENERAL

Sort/Merge 12 should not be modified to include an additional function if that function can be performed more economically outside of Sort/Merge 12, and only if the routines that perform the additional function can be feasibly incorporated through the techniques described in this section.

The incorporation of an added routine requires the following actions by the user:

1. Reservation of core storage
2. Preparation of linkages
3. Placement of activating overlays
4. Loading the added routine

Reservation of Core Storage

Reservation of core storage for an added routine is required only if the routine is to reside in core storage during the execution of the running program.

The amount of core storage to be reserved is specified by the user in control card 3. As described in the section on this control card, columns 8-12 are used to reserve an area during Phase 1, and columns 13-17 are used to reserve an area during Phase 2, Phase 3, or for a merge.

Preparation of Linkages

For most routines, linkages can be made by using one or more of the modification exits or exit control constants provided at key points in the sort/merge program and in the associated IOCS label-handling routines.

Except for PH3VAREXIT, each modification exit, in its inactive state, consists of a seven-character No Operation instruction: N000000. Each exit is "activated" by changing this instruction, by means of an overlay, to an unconditional branch instruction that branches to the first instruction to be executed in the added routine, (Yjiiiiib). This first instruction in the added routine should be Store B-Register (SBR) into the branch instruction in the added routine that will return control to the running program.

Each exit within the label handling routine is inactive if the six-character constant controlling that exit for the individual file has as its first character, Y. Each exit is activated by means of an overlay that changes Y to X. The five characters that follow the exit control constant must be the address of the first instruction to be executed

in the added routine, with a word mark over the 10,000s position. That is, an activated IOCS exit control constant would appear: Yjiiii.

Placement of Activating Overlays

As noted, the activation of an exit or exit control constant is made by including an overlay in the Sort/Merge 12 program deck.

To activate a Phase 1 exit, the overlay should directly precede the execute card for the particular program block that contains the exit or exit control constant.

Since every Phase 2 exit is also available to Phase 3 (Phase 3 is a special reinitialization of Phase 2), the placement of an exit activating overlay is dependent upon whether an exit is to be used only in Phase 2, only in Phase 3, or in both.

If a Phase 2 exit is to be used during Phase 2, the overlay should directly precede the particular program block that contains the exit or exit control constant. If, as is more usual, the exit is not to be activated until Phase 3 is run, the activating overlay should directly precede card 999S1273.

If a Phase 2 exit is to be used only in Phase 2, a deactivating overlay (one that returns the exit to its original inactive form) must directly precede card 999S1263.

To activate a Phase 3 exit, the overlay should directly precede the execute card of the block which contains the exit or exit control constant.

Loading the Added Routine

An added routine that is executed during Phase 1 of the running program and which starts at storage location 19000 or above, can be loaded into core storage by placing the cards that contain the routine into the Sort/Merge 12 program deck. The cards containing the added routine are placed in the appropriate program block directly preceding the appropriate exit activating overlay card. However, if the added routine starts below core-storage location 19000, Exit 1A (PATCHEXIT) must be used to load the routine.

An added routine that will be executed during Phase 2 or Phase 3 or during a merge, and which starts at storage location 20000 or above, can be loaded into core storage as described above. If the added routine starts below core-storage location 20000, Exit 2A (PATCHEXIT2) must be used to load the routine. The use of this exit permits the added routine to be loaded after the loading and execution

of certain initialization blocks which extend to location 20000.

### MODIFICATION EXITS AND EXIT CONTROL CONSTANTS

This section contains a tabulation of the modification exits and exit control constants. The list is divided into phases of the running program, and subdivided into modification exits and exit control constants. Each entry contains a description of the exit or exit control constant, number, label, sequence number, etc., to aid the user in both location and use.

#### Modification Exits

Each modification exit is identified by Exit Number, Label, Sequence Number, Block, High-Order Storage Location, and Index Registers Available.

The Exit Number consists of either a two-character or three-character identifier. The first character is a number that specifies the phase in which this exit appears. The second character is a letter indicating the logical order of the exit in relation to the other exits in the phase. The third character, if any, is either an F or a V placed in parenthesis, specifying that this exit is used for Fixed or Variable length operations, respectively.

The Label and the Sequence Number are derived from the symbolic listing of the program. This listing may be obtained by submitting an appropriately-completed Program Request Card through an IBM Systems Engineer to DP Program Information.

The Block is derived from the symbolic listing and from the identification field of the Sort/Merge 12 object program deck. In the symbolic listing, it appears at the top of each page; in the object cards it appears in columns 76-80. For both cases the first three characters are always S12, identifying this card or page as being for Sort/Merge 12. The next character is the block number; the last character specifies the applicable phase of the running program in which this block appears.

The High-Order Storage Location specifies the high-order core-storage position of the exit or exit control constant. This data also appears on the symbolic listing.

Index Registers Available specify the index registers that are not used by the running program, and which the user may use in his added routine.

Note: Each object program card of the Sort/Merge 12 program has the last eight columns reserved for identification (see Figure 21).

Card Column	73	74	75	76	77	78	79	80
Contents	Card Serial Number		S	1	2	b	p	(block) (phase)
Execute cards are always "999S12bp"								

Figure 21. Object Program Card Identification Fields

In the descriptions of modification exits, reference is also made to labels, sequence numbers, blocks, and core-storage locations. This information is also derived from the symbolic listing, though the last item (core-storage locations) can be used directly to find the areas or fields wanted in the object program.

#### Exit Control Constants

Each IOCS exit control constant is identified by a DTF exit number; Label, Sequence Number, Block, High-Order Storage Location, Return Label, Return Addresses, and Index Registers Available. The DTF exit numbers are described in the prerequisite IOCS manual.

Label, Sequence Number, Block, High-Order Storage Location, and Index Registers Available are essentially the same as for Modification Exits. The Return Label and Return Address specify the point to which the user's added routine must return. These are also in the symbolic listing.

#### Additional Information

Some of the following descriptions make reference to File A, File B, File C, File D, and File E. These are references to input files in a merging application as specified in control card 1, columns 11-15. Figure 22 shows the correspondence between the files specified in the control card and the names File A. . . . File E as a function of the order of merge.

Order of Merge	Control Card 1, Column -				
	11	12	13	14	15
1	File A				
2	File A	File E			
3	File A	File E	File D		
4	File A	File E	File D	File C	
5	File A	File E	File D	File C	File B

Figure 22. Input Files in a Merge Application

### Phase 1 Modification Exits

Exit 1A is used to load an added routine that is executed during Phase 1 and that begins below location 19000. PATCHEXIT, activated, should be an unconditional branch to the load program, J00281b. The cards containing the added routine should follow execute card 999S1261. The last card of the added routine must be followed by an execute card containing an unconditional branch to storage location 07645 (PATCHEXIT+7) J07645b.

Exit 1B is reached during Phase 1 just before each fixed-length or variable-length data record is entered into the internal sort. Index register 01 contains the storage location of the first position of the

data record. Phase 1 will already have performed the following operations on the data record:

1. If input is read in Move mode, word marks have been set in the high-order positions of each control data field and the record character count field (if any).
2. If input consists of either Form 1 records without record marks, or Form 3 records without record marks, a terminal record mark has been placed immediately following the record.
3. If input consists of Form 3 records without a record character count, a four-character record-character count has been computed and placed immediately before the record. If input consists of Form 3 records with record character count fields but without terminal record marks, the record mark is added, and a count of 1 is added to the record-character count field to reflect the added record mark.

Exit 1C is reached during Phase 1 each time the Phase 1 output area is filled, just before the sort block is written. The initial location of the output area is contained in PIOTPTBEG, Sequence Number 194, Block S1200, locations 00718 through 00722.

Exit 1D is reached during the Phase 1 padding routine for Form 1 and Form 2 records only, before the generation of each padding record needed for the final internal sort.

Exit 1E is reached only once; at the end of Phase 1 just before the Phase 1 output tapes are closed.

Exit Number	Label	Sequence Number	Block	High-Order Storage Location	Index Registers Available
1A	PATCHEXIT	1150	S1211	07638	07-14
1B	GETEXIT	0987	S1211	06391	07-14
1C	PUTEXIT	1047	S1211	06874	07-14
1D	PADINGEXIT	1863	S1281	04412	07-14
1E	ENDFZ1EXIT	1916	S1281	02303	07-14

Table A

DTF Exit	Exit Control Constant Label	Sequence Number	Block	High-Order Storage Location	Return Label	Return Storage Location	Index Registers Available
#1	IOCS21D1	750	S1211	05753	IOCSRENTY	05354	07-14
#2	IOCS21D2	752	S1211	05759	IOCSRENTY	05354	07-14
#3	IOCS21D3	754	S1211	05765	IOCSRENTY	05354	07-14
#4	IOCS21D4	756	S1211	05771	EXIT4	18414	07-14
#5	IOCS21D5	758	S1211	05777	IOCSRENTY	05354	07-14
#6	IOCS11D6	821	S1211	06048	IOCSRENTY	05354	07-14
#7	IOCS11D7	823	S1211	06054	IOCSRENTY	05354	07-14
#8	IOCS21D8	764	S1211	05795	EXIT8	07074	07-14

Table B

### Phase 1 Exit Control Constants

The IOCS label checking routine used in Phase 1 includes all eight DTF exits. (See Table B.) These exits are described in the prerequisite publication on the IOCS.

Two file schedulers are employed in Phase 1: the input file scheduler (beginning at Sequence Number 717, Block S1211, location 05598) and the output file scheduler (beginning at Sequence Number 773, Block S1211, location 05832).

DTF Exits 1 through 5 and DTF Exit 8 are used only for output files and DTF Exits 6 and 7 are used only for input files; therefore, Phase 1 contains a total of eight IOCS exit control constants which may be used for added routines.

Two exit control constants are used by the Phase 1 running program to activate Exit 4 and Exit 8. This does not make these control constants unavailable to modification routines; it simply affects the location to which a return must be made from an added routine that uses these exit control constants.

### Phase 1 Label Area

The Phase 1 label area begins at Sequence Number 675, Block S1211, location 05210.

DTF Exit #1 is reached during the Close operation for each Phase 1 output tape only if work tape labels have been specified (control card 1, column 62). When this exit is reached, an 80-character trailer containing 1EOFb in positions 1 through 5, and the block count in columns 6 through 10, has been assembled in the label area. Additional information can now be entered by the user's routine.

DTF Exit #2 is reached during the Close operation for each Phase 1 output tape, whether work tape labels have been specified or not.

If work tape labels have been specified, the standard Format 2 trailer label has been written before this exit is reached.

DTF Exit #3 is reached during the Open operation for each Phase 1 output tape only if work tape labels have been specified. When this exit is reached, the work tape header label has been read into the label area and the tape has been rewound. Activation of this exit causes the IOCS to bypass both output label checking and DTF Exit #4.

DTF Exit #4 is reached during the Open operation for each Phase 1 output tape only if work tape labels have been specified and Exit #3 has not been activated. When this exit is reached, the work tape retention cycle has been checked, if requested. Additional information can now be entered into positions 41 through 80 of the label by the user's routine.

DTF Exit #5 is reached during the Open operation for each Phase 1 output tape only if work tape labels are specified. When this exit is reached, the work tape label has been written.

DTF Exit #6 is reached during the Close operation for each Phase 1 input tape only if input header labels are specified. When this exit is reached, the trailer label has been read into the label area.

DTF Exit #7 is reached during the Open operation for each Phase 1 input tape whether or not input header labels are specified. When this exit is reached, the input header label, if any, has been read, and the standard label checking, if specified, has been performed.

DTF Exit #8 is reached only if the program is to write an end of reel. When this exit is reached, the sort is about to eliminate the tape which is at end of reel from the circle of work tapes for the duration of Phase 1, and then go to the Close operation for that tape.

### Phase 2 and Phase 3 Modification Exits

Unless otherwise noted, the exits shown in Table C are reached during each Phase 2 pass of a sort, Phase 3 of a sort, and during a merge.

Exit 2A is used to load an added routine that begins below location 20000, and is executed during Phase 2, Phase 3, or a merge. PATCHEXIT2, activated, should be an unconditional branch to the load program: Y00281b. If the added routine is to be executed during Phase 2, the cards containing it should follow execute card 999S1253. For Phase 3 or merge execution, the cards should follow execute card 999S1283. In either case, the last card of the added routine must be followed by an execute card containing an unconditional branch to storage location 07934 (PATCHEXIT2 + 7): Y07934b.

Exit 2B(F) through Exit 2F(F): for each Phase 3 or merge input file consisting of Form 1 or Form 2 records, one of these exits is reached just after a data record from that file has been moved to one of the output areas, unless that data record fills the output block. Index register 07 contains the storage address of the position following the last character of the data record in the output area. The exits to be used for each order of merge are indicated in Table C.

In the case of unblocked output, these exits are not reached, and exit number 2H(F) (OUTPTXTF3) should be used.

In the case of blocked output, OUTPTXTF3 must be used to process the final data record of each output block. If a sequence check has been

<u>Exit Number</u>	<u>Label</u>	<u>Sequence Number</u>	<u>Block</u>	<u>High-Order Storage Location</u>	<u>Orders of Merge</u>	<u>Index Registers Available</u>
2A	PATCHEXIT2	1310	S1212	07928		01-06, 11-14
2B(F)	INPTAEXIT	3347	S1262	11558	1-5	01 and 15
2B(V)	INPTAEXITV	1838	S1212	11533	1-5	01 and 15
2C(F)	INPTEEXIT	3385	S1262	12659	2-5	01 and 15
2C(V)	INPTEEXITV	1986	S1212	12634	2-5	01 and 15
2D(F)	INPTDEXIT	3423	S1262	13742	3-5	01 and 15
2D(V)	INPTDEXITV	2132	S1212	13717	3-5	01 and 15
2E(F)	INPTCEXIT	3460	S1262	14825	4-5	01 and 15
2E(V)	INPTCEXITV	2278	S1212	14800	4-5	01 and 15
2F(F)	INPTBEXIT	3495	S1262	15908	5	01 and 15
2F(V)	INPTBEXITV	2424	S1212	15883	5	01 and 15
2G	PRSETEXIT	4943	S1253	18253		01-06, 11-14
2H(F)*	OUTPTEXTF3	5453	S1283	11253		01 and 15
2H(V)*	PH3VAREXIT	5242	S1263	19501		01 and 15

\* This exit is reached only for a merge or Phase 3 of a sort.

Table C

specified, these five exits should not be used to edit control data field characters, as the data record just moved to the output area will be involved in the next sequence check. The use of these five exits during Phase 2 is of limited value, since OUTPTEXTF3 is not then available.

Exit 2B(V) through Exit 2F(F): for each Phase 2, Phase 3, or merge input file consisting of Form 4 records, one of these exits is reached after each data record has been moved to one of the output areas. Index register 07 contains the storage address of the position following the last character of the data record in the output area. The exits to be used for each order of merge are indicated in Table C.

Exit 2G is reached at the end of initialization for each pass of Phase 2, and for Phase 3, just before the header label is written on the checkpoint tape. This exit is not reached if Sort/Merge 12 is functioning as a merge.

Exits 2H(F) and 2H(V) are reached only during a merge or Phase 3 of a sort.

Exit 2H(F) is reached just before each output block of Form 2 records or each Form 1 output record is written. When this exit is reached, the complete tape record has been assembled in an output area and the write has not yet been issued. Index register 07 contains, for blocked records or unblocked records ending with record marks, the storage location of the group mark/word mark which terminates the output area. For Form 1 records not ending with record marks, index register 07 contains the storage address of the position just beyond the terminating group mark/word mark. Since, for Form 2 records, this exit must be used if Exits 2B(F), 2C(F), 2D(F) etc., are used, it is recommended that OUTPTEXTF3 alone be used to edit all data records.

An additional action must be taken if control data field characters are to be edited and a sequence check has been specified: before the last data record of the output block is processed, the data record, or at least that portion which includes all the control data fields, should be moved to a save area. The initial location of the save area, defined as if the entire data record is moved there, must then be placed into index register 08.

Exit 2H(V) is reached just before each output block of variable-length records is written. When this exit is reached, the complete block has been assembled in an output area and the write has not yet been issued. Index register 07 contains the block length. The beginning locations of the first data record in output areas #1 and #2 are at Sequence Numbers 1658 and 1659, Block S1212, Locations 10251 through 10255, and 10256 through 10260. Output area #1 is the first area used.

PH3VAREXIT, in its inactive state, consists of NJ00000b<sup>‡</sup>. It is activated by overlaying the last seven characters (beginning at location 19502) with an unconditional branch to the first instruction of the added routine to be executed.

Initialization of Phase 3 of a sort or merge moves PH3VAREXIT to actual location 11280. It is executed at this location during Phase 3 of a sort, or during a merge.

Return should be made from the added routine to location 11289.

#### Phase 2 and Phase 3 Exit Control Constants

The IOCS label checking routine used in Phases 2 and 3 of the sort, and by the merge, includes all eight DTF exits. These are described in the prerequisite publication on the IOCS. There is one

output file scheduler, beginning with Sequence Number 469, Block S1212, location 06442. The number of input file schedulers is equal to the order of merge. (All file schedulers are in Block S1212.)

The first input file scheduler (for File A) begins at Sequence Number 601, Block S1212, location 07130. The other input file schedulers (for Files B, C, D, and E) are generated from the File A scheduler, to have the following initial locations: (The File A scheduler is included below for ease of reference.)

	<u>Sequence Number</u>	<u>Storage Location</u>	<u>Orders of Merge</u>
File A	601	07130	1-5
File E	1870	11747	2-5
File D	2018	12844	3-5
File C	2164	13929	4-5
File B	2310	15010	5

Each input and output file scheduler has eight exit control constants -- one for each DTF exit. Since DTF exits 1 through 5 and exit 8 are executed only for output files, and DTF exits 6 and 7 only for input files, Phase 2 (and 3 and the merge) contains a maximum of sixteen usable exit control constants.

#### Phase 2 Label Area

The Phase 2 label area begins at Sequence Number 423, Block S1212, location 06024. (See Table D.)

DTF Exit 1 is reached during the Close operation for each final output tape (sort or merge) only if output tape labels have been specified. When this

exit is reached, an 80-character trailer label containing 1EOFb in positions 1 through 5, and the block count in columns 6 through 10, has been assembled in the label area. Additional information can now be entered by the user's routines.

This exit is also reached at the same point during the Close operation for each Phase 2 output work tape during each pass of Phase 2.

DTF Exit 2 is reached during the Close operation for each final output tape (sort or merge) whether or not output tape labels have been specified. When this exit is reached, if labels have been specified the Format 2 trailer label has already been written.

This exit is also reached at the same point for each Phase 2 output work tape during each pass of Phase 2.

DTF Exit 3 is reached during the Open operation for each final output tape (sort or merge) only if output tape labels have been specified. When this exit is reached, the output header label has been read into the label area and the tape has been re-wound. Activation of this exit causes the IOCS to bypass output label checking, as well as Exit 4.

This exit is also reached for each Phase 2 output work tape during each pass of Phase 2.

DTF Exit 4 is reached during the Open operation for each final output tape (sort or merge) only if output tape labels have been specified and Exit 3 has not been activated. When this exit is reached the output tape header label has been checked, if requested. Additional information can now be entered into positions 41 through 80 of the label by the user's routine.

DTF Exit	Exit Control		High-Order		Return Label	Return Storage Location	Index Registers Available	Orders of Merge
	Constant Label	Sequence Number	Block	Storage Location				
#1	IOCS11D1	577	S1212	07041	IOCSRENTY	06168	07-14	
#2	IOCS11D2	579	S1212	07047	IOCSRENTY	06168	07-14	
#3	IOCS11D3	581	S1212	07053	IOCSRENTY	06168	07-14	
#4	IOCS11D4	583	S1212	07059	EXIT4	09567	07-14	
#5	IOCS11D5	585	S1212	07065	IOCSRENTY	06168	07-14	
#6	IOCS12D6	722	S1212	07762	IOCSRENTY	06168	07-14	1-5
	IOCS13D6	1943	S1212	12379	IOCSRENTY	06168	07-14	2-5
	IOCS14D6	2091	S1212	13476	IOCSRENTY	06168	07-14	3-5
	IOCS15D6	2237	S1212	14559	IOCSRENTY	06168	07-14	4-5
	IOCS16D6	2383	S1212	15642	IOCSRENTY	06168	07-14	5
#7	IOCS12D7	724	S1212	07768	IOCSRENTY	06168	07-14	1-5
	IOCS13D7	1945	S1212	12385	IOCSRENTY	06168	07-14	2-5
	IOCS14D7	2093	S1212	13482	IOCSRENTY	06168	07-14	3-5
	IOCS15D7	2239	S1212	14565	IOCSRENTY	06168	07-14	4-5
	IOCS16D7	2385	S1212	15648	IOCSRENTY	06168	07-14	5
#8	IOCS11D8	591	S1212	07083	Phase 2-EOROUT	10570	07-14	

Phase 3-MRGCLOSE

Table D



This exit is also reached for each Phase 2 output work tape during each pass of Phase 2.

DTF Exit 5 is reached during the Open operation for each final output tape (sort or merge) only if output labels are specified. When this exit is reached, the label has been written.

This exit is also reached for each Phase 2 output work tape during each pass of Phase 2.

DTF Exit 6 is reached during the Close operation on each Phase 3 or merge input tape only if work tape or merge input tape labels are specified. When this exit is reached the trailer label has been read into the label area and checking, if specified, has been performed.

This exit is also reached for each Phase 2 input work tape during each pass of Phase 2.

For use during Phase 2, regardless of the order of merge, only IOCS12D6 should be overlaid, because this scheduler is used to initialize the other schedulers.

DTF Exit 7 is reached during the Open operation for each Phase 3 or merge input tape whether or not work tape or merge input tape header labels are specified. When this exit is reached, the header label, if any, has been read, and the standard label checking, if specified, has been performed.

This exit is also reached for each Phase 2 input work tape during each pass of Phase 2. For use during Phase 2, regardless of the order of merge, only IOCS12D7 should be overlaid, as this scheduler is used to initialize the other schedulers.

DTF Exit 8 is reached during Phase 3 or the merge only if the program is to write end of reel before going to the Close operation for that tape.

This exit is also reached for each write end of reel during any pass of Phase 2.

## USEFUL MODIFICATIONS

Brief descriptions of several useful modifications which can be incorporated into Sort/Merge 12 follow. These descriptions are intended: (1) to present the user with information on the function and use of the various exits available, and (2) to indicate the general logic of the suggested added routine, and to suggest the functions that the added routines should perform. All the modification routines must be entirely written by the user.

In many of the suggested routines, reference is made to a "Section," to indicate that the user must provide in his added routine separate subroutines to perform the functions described. Routines for unblocked output records are not described; these would be simpler than the corresponding routines for blocked records, and can be deduced therefrom.

## Shortening of Form 2 Data Records

Sort/Merge 12 Sections: Phase 3 of the Sort  
Exit used: OUTPTEXTF3

As described under OUTPTEXTF3, the exit (and therefore this modification) is reached each time an output area has been filled. The initial location of the output area can be derived from the contents of index register 07 (the location of the terminal group mark/word mark) and the user's knowledge of the output block length. The two index registers available, 01 and 15, can be initialized with this address and then updated for each successive record in the output block by the original data record length and the shortened data record length, respectively. Shortening can thus be accomplished entirely within the write out area, essentially by move instructions -- the A-address specifying the terminal position within the data record at its original length, and the B-address specifying the position within the shortened data record.

After shortening the last data record of each output block, a group mark/word mark must be placed immediately following the shortened block.

A nonlooping technique can also be used wherein separate move instructions are employed for each data record in the output block. In this technique, both the A- and B-addresses of the move instructions are tagged to index register 07 and are numerically the 100,000s complement of appropriate distances from the terminal group mark/word mark.

## Shortening of Form 4 Data Records

Sort/Merge 12 Sections: Phase 3 of the Sort  
The Merge

Exit used: PH3VAREXIT

As described under PH3VAREXIT, the exit (and therefore this modification,) is reached each time the output area has been filled. The first time the routine is reached, output area #1 will have been filled. To process the first data record in each output block, the two index registers available, 01 and 15, can be initialized with the beginning location of the first data record in the output area being used. The location of output area #1 is at Sequence Number 1658, Block S1212, locations 10251 through 10255; the location of output area #2 is at Sequence Number 1659, Block S1212, locations 10256 through 10260. For each successive data record in the output block, index register 01 can be updated by the original data record length and index register 15

by the shortened data record length. Thus, shortening can be accomplished entirely within the write-out area essentially by means of move instructions -- the A-address, tagged to index register 01, specifies the terminal position within the original data record; and the B-address, tagged to index register 15, specifies the position within the shortened data record.

In addition, the record character count in each data record must be reduced to reflect the shortened length. The block character count, located immediately before the first data record, must also be reduced. A group mark/word mark must be placed directly after the last data record in the shortened output block.

#### Lengthening of Form 2 Data Records

Sort/Merge 12 Sections: Phase 3 of the Sort  
The Merge

Exit used: OUTPTEXTF3

As described under OUTPTEXTF3, the exit (and therefore, this modification) is reached each time an output area has been filled. The following condition must be met in the added routine: the increased data record length times the output blocking factor, plus the original data record length, must not exceed the sort block length.

The first time the routine is entered, the B-address of two write instructions should be increased by the original data record length. These instructions are at Sequence Number 500, Block S1212, location 06652, and at Sequence Number 521, Block S1212, location 06765.

The first two times the routine is entered, the terminating group mark/word marks should be placed in the output area for the lengthened records. The required locations are computed as follows: the original location of the group mark/word mark, contained in index register 07, plus the increase in length per data record times the output blocking factor, plus the original record length.

Each time the modification is reached, the last data record of the output block should be the first to be lengthened. To process the last data record in the output block, index register 01 should be initialized to contain the first location of the last data record in the original output block (index register 07 contents less the original data record length) and index register 15 should be initialized to contain the first location of the last data record in the lengthened output block (index register 07 contents plus the output blocking factor times the increase in length per data record). Lengthening can thus be accomplished entirely within the write-out area primarily by means of left-to-right move instructions. Except for the move instructions that insert

additional fields, each A-address is tagged to index register 01, and specifies a position within the unlengthened data record; each B-address is tagged to index register 15, and specifies a position within the lengthened data record.

#### Lengthening of Form 4 Data Records

Sort/Merge 12 Sections: Phase 3 of the Sort  
The Merge

Exit used: PH3VAREXIT

As described under VAREXIT, the exit (and therefore this modification) is reached each time an output area has been filled. The following condition must be met in the added routine: the original maximum output block size, plus maximum output blocking times the increase in length per data record, must not exceed the maximum sort block length.

The first time the modification is reached, the B-address of two write instructions should be increased by the maximum data record length. These write instructions are at Sequence Number 500, Block S1212, location 06652; and at Sequence Number 521, Block S1212, location 06765.

Each time the modification is reached, the location of the group mark/word mark that will terminate the writing of the lengthened output block must first be determined. To accomplish this, the output area is scanned from left to right for record marks and for the group mark/word mark of the unlengthened output block. The first output area used is output area 1. The beginning location of the first area record in output areas 1 and 2 are at Sequence Number 1658, Block S1212, at locations 10251 through 10255; and at Sequence Number 1659, Block S1212, at locations 10256 through 10260. For each record mark found before the terminating group mark/word mark is reached, a count of one is added to the count of data records in the output block; and the increased length per data record is added to the block character count. The location for the terminating group mark/word mark of the lengthened output block is then the location of the group mark/word mark of the unlengthened output block, plus the original maximum data record length, plus the number of data records in the output block times the increase in length per data record. A terminating group mark/word mark should be placed in the location thus computed.

The last data record of the output block must be the first to be lengthened. Its location within the unlengthened output block can be found by reducing by one the record mark count previously made and then performing a number of scans equal to this reduced record mark count within the writeout area. The final record mark thus found terminates the

next-to-last record. The initial location of the last data record of the unlengthened output block is placed into index register 01. The record character count field within the data record is incremented by the increase in length per data record. To compute the beginning location of the last data record in the lengthened output block, the new length is subtracted from the location previously determined for the terminating group mark/word mark of the lengthened output block. This location is placed into index register 15.

The lengthening of the last data record can now be accomplished essentially by means of left-to-right move instructions. Except for the move instructions that insert additional fields, each A-address, tagged to index register 01, specifies a position within the unlengthened data record; each B-address, tagged to index register 15, specifies a position within the lengthened data record. When the lengthening of the last data record in the output block is complete, each preceding data record within the output block must be handled in the same way; that is, its initial location within the unlengthened output block is derived through scanning, its record character count field is incremented, its initial location within the lengthened output block is calculated by subtracting its new length from the initial location of the following data record and, finally, the lengthening is performed by the move instructions.

When the record mark count is reduced to zero, the first data record of the output block has yet to be lengthened. Its initial location within the unlengthened output block is the initial location of the writeout area being used. When the first data record has been lengthened, the final step is the transfer of the block character count field (which is already properly incremented, as described above) from its original location (preceding the unlengthened output block) to its new location (preceding the lengthened output block).

To eliminate the necessity for re-scanning the output area for each data record, the technique outlined above can be modified to create a table of initial locations during the first series of scans for each output block.

### Summarization of Form 2 Data Records

Sort/Merge 12 Sections: Phase 3 of the Sort  
The Merge

Exits used: OUTPTEXTF3 to enter Section C  
An overlay to the Branch High instruction at Sequence Number 5428, Block S1273, location 10691, with an unconditional branch to enter Section A.

Section A of this routine is reached by means of an unconditional branch overlay to a Branch High instruction that is in the sequence checking routines for merge or sort output; therefore, this added routine requires that sequence checking be specified (control card 1, column 54). Section A is reached directly after each sequence check comparison (or comparison series, for multiple control fields) has been made. The data record that will be next moved to an output area has just been compared with the data record just moved. The first instruction of Section A is either a Branch Low (for an ascending sort or merge), or a Branch High (for a descending sort or merge) to the out-of-sequence routine beginning at Sequence Number 5430, Block S1273, location 10705. This is followed by a Branch Equal to the instructions described below which perform the summarization.

If the routine does not Branch Equal, a switch (Output Area Filled) set ON in Section C, is tested. (This switch is ON if the record last moved to an output area filled the output area.) If the switch is OFF, a return is made to The Sort/Merge 12 running program by an unconditional branch to 0+X12. If the switch is ON, the contents of index register 12 are saved, and the address for a return to this summarization routine is placed into index register 12 before branching to Sequence Number 5455, Block S1283, location 11260, to signal the writing of the output block. Upon return, the contents of index register 12 are restored, and the Output Area Filled switch is set OFF. In addition, for the next sequence check, the contents of index register 07 (the initial location of the other output area) are placed into index register 08. A return is then made to the running program by an unconditional branch to 0+X12.

Section B of this routine is entered whenever the control words compare equal in the sequence check made just before entry to Section A. If the record in the output area is a padding record, a return is made to the running program by a Branch Equal to 0+X12. If the record is not a padding record, the data record in the output area is to be "summarized into" the data record in the input area. The length of the data record must first be subtracted from the contents of index register 07 to obtain the initial location of the data record in the output area. This setting of index register 07 will also cause the next move by the running program to the output area (the move of the data record now to be summarized into) to overlay (and thus delete) the data record already in the output area.

To store the initial locations of data records within each pair of Phase 3 or merge input areas, the running program uses individual index registers. The appropriate index register number needed in the summarization routine can be found at the tagged B-address of the sequence check comparison instruction, Sequence Number 1546, Block S1212, at locations 09606 and 09607. The summarization routine will vary according to the fields to be combined and the manner of their combination.

Following summarization, the data record length must be subtracted from index register 08 before the next sequence check, and a count of one must be subtracted from each of two data record counts: the first count (located at Sequence Number 2484, Block S1212, locations 00120 through 00126) is a count of Phase 3 output records; the second count (located at Sequence Number 2493, Block S1212, locations 00161 through 00166) is a count of Phase 1 input records. A return is made to the running program by unconditional branch to 0+X12.

Section C of this routine is reached through use of OUTPTEXTF3. As described in OUTPTEXTF3, this exit (and therefore Section C) is reached whenever an output area is full. In Section C the Output Area Full switch is first set ON, and a comparison is made between record counts.

If the Phase 3 output record count (Sequence Number 2484) compares low with the Phase 1 input record count (Sequence Number 2493), a return to the running program is made by a Branch Low to 0+X12. This bypasses the signalling of the write of the output block which would normally take place next. This bypass is required because the sequence check comparison has not yet been made between the last data record in the output area and the next data record to be moved.

If the Phase 3 output record count is equal to, or higher than, the Phase 1 input record count, the final output block has been filled and signalling of the write need not be bypassed; an unconditional branch is made to Sequence Number 5455, Block S1283, location 11260.

In a merge application, Section C consists simply of the instruction to set the Output Area Full switch ON. The write of final output block is signalled by overlaying Sequence Number 4220, Block S1282, location 09666, with a Branch Unequal to Section D, where OUTPTEXTF3 is NOPed. An unconditional branch is then made to Sequence Number 5466, Block S1283, location 11359.

## Summarization of Form 4 Data Records

Sort/Merge 12 Sections: Phase 3 of the Sort  
The Merge

Exits used: PH3VAREXIT to reach Section C  
An overlay to the Branch High instruction at Sequence Number 5428, Block S1273, location 10691, with an unconditional branch to enter Section A.

An overlay to the unconditional branch instruction at Sequence Number 1440, Block S1212, location 08787, with an unconditional branch to location 11220 (Sequence Number 1795, Block S1212).

An overlay to the address constant at Sequence Number 1457, Block S1212, locations 08927 through 08931, with the value "11220" (the location of Sequence Number 1795, Block S1212).

Section A of this routine is reached by means of an unconditional branch overlay to a Branch High instruction which is in the sequence checking routines for merge or sort output. This added routine, therefore, requires that sequence checking be specified (control card 1, column 54). Section A is reached directly after each sequence check comparison or comparison series for multiple control fields has been made. The data record that will be next moved to an output area has been compared with the data record just moved.

The first time that Section A is entered, the initial location of write-out area 1 must be moved into index register 01 from Sequence Number 1658, Block S1212, locations 10251 through 10255. The next instruction, which is also the first instruction for each subsequent time Section A is entered, is a Branch Low (for an ascending sort or merge) or a Branch High (for a descending sort or merge) to the out-of-sequence routine beginning at Sequence Number 5430, Block S1273, location 10705. This is followed by a Branch Equal to the instructions that perform the summarization.

If the routine does not Branch Equal, a switch (Output Area Filled), set ON in Section C, is tested. This switch is ON if the data record last moved to an output area filled the output block.

If the switch is OFF, the contents of index register 07 are moved into index register 01 and a return is made to the running program by means of an unconditional branch to 0+X12.

If the switch is ON, PH3VAREXIT must be deactivated and an unconditional branch made to CHANGEADR, Sequence Number 1811, Block S1212, .

location 11353. The closed subroutine at CHANGEADR signals the write for the output block. Upon return from this routine, PH3VAREXIT is reactivated (for entry to Section C), and the initial location of the other output area is moved into index registers 01 and 08, and a return is made to the running program by means of an unconditional branch to 0+X12.

Section B of this routine is entered whenever the control words compare equal in the sequence check made just before entry to Section A. The data record in the output area is now to be summarized into the data record in the input area. The initial location of the data record in the output area is in index register 01. The running program uses individual index registers to store the initial locations of the data records in each Phase 3 or merge input area. The appropriate index register numbers needed in the summarization routine can be found at the tagged B-address of the sequence check comparison instruction, Sequence Number 1546, Block S1212, at locations 09606 and 09607. The summarization routine will vary according to the fields to be combined, and the manner of their combination.

Following summarization, the record character count field of the data record within the output area must be subtracted from BLOCKLN, Sequence Number 1817, Block S1212, locations 11393 through 11397. In addition, the contents of index register 01 must be moved into index registers 07 and 08.

The setting of index register 07 causes the next move by the running program to the output area (the move of the data record just "summarized into") to overlay (and thus to delete) the data record already in the output area.

The setting of index register 08 is necessary for the following sequence check. Next, a count of one must be subtracted from two data record counts: the first count, Sequence Number 2484, Block S1212, at locations 00120 through 00126, is a count of Phase 3 output records; the second count, Sequence Number 2493, Block S1212, locations 00161 through 00166, is a count of Phase 1 input records. A return is then made to the running program by an unconditional branch to 0+X12.

Section C of this routine is reached through use of PH3VAREXIT. As described in PH3VAREXIT, this exit (and therefore Section C) is reached whenever an output block is full. In Section C, the Output Block Filled switch is set ON, the constant "29" is added to the contents of index register 12, and the constant 08962 is compared with contents of index register 12. If the comparison is unequal, a Branch Unequal is made to Sequence Number 1811, Block S1212, location 11353 to bypass signalling of

the write of the output block. This bypass is required because the sequence check comparison has not yet been made between the last data record in the output area and the next data record to be moved.

When the contents of index register 12 compare equal with 08962, the final output block has been filled and the signalling of the write need not be bypassed; an unconditional branch is made to Sequence Number 1805, Block S1212, location 11300.

#### Deletion of Form 2 Data Records

Sort/Merge 12 Sections: Phase 3 of the Sort  
The Merge

Exits used:

1. Overlays to as many of the following SBR instructions of the running program as are required by the order of merge (All are in Block S1262):

Sequence Number	High-Order Storage Location	Orders of Merge
3331	11468	1-5
3373	12569	2-5
3411	13652	3-5
3448	14735	4-5
3483	15815	5

Each overlay must be an unconditional branch to the first instruction of Section A of the added routine.

2. An overlay to the following WCP instruction of the running program:

Sequence Number	Block	High-Order Storage Location
5514	S1293	18281

The overlay must consist of (1) an unconditional branch to the first instruction of Section B of the added routine, and (2) a single character NOP instruction.

Section A of the added routine is entered each time a data record has been moved to an output area. When this section is entered, index register 07 contains the initial location of the data record. The first instruction of the routine should be a Store B-Register into the instruction which is to return control to the running program. The routine that determines whether or not the data record is to be deleted follows this instruction.

If the record is not to be deleted, the length of the data record must be added to the contents of index register 07 before returning to the running program. If the data record is to be deleted, index register 07 should be left unchanged. This

causes the next move by the running program to the output area to overlay (and delete) the unwanted data record. In addition, a count of one must be subtracted from two data record counts: the first count, Sequence Number 2484, Block S1212, locations 00120 through 00126, is a count of Phase 3 output records; the second count, Sequence Number 2493, Block S1212, locations 00160 through 00166, is a count of Phase 1 input records.

If an output file consisting of the deleted records is not being created, control is returned to the running program.

If an output file of deleted records is being created, the data record to be deleted must be moved to an output area within the added routine. (If this file is to consist of blocked records, index register 01 can be used for references to the required output area.) If the output area or block for this file is not yet full, control is returned to the running program.

When an output block of deleted records is complete, the following instructions must be performed to force completion and error checking of all current and pending I/O activity: (On a single channel system, only the first three instructions should be used.)

<u>Label</u>	<u>Opcod</u>	<u>Operand</u>
LABELA	ZA	LABELA, LABELA
	BOL1	LABELA
	BOPR1	LABELA
LABELB	ZA	LABELB, LABELB
	BOL2	LABELB
	BOPR2	LABELB

A nonoverlap write can then be performed. This operation must be followed by:

<u>Opcod</u>	<u>Operand</u>
BEX1 or BEX2	ERROR, 7
BEF1 or BEF2	ENDOFREEL
BA1 or BA2	RETURNSORT
B	RETURNSORT

The routines to handle error and end-of-reel conditions must be included in the added routine.

Section B of the added routine is entered by the overlay to the WCP instruction for the end-of-sort message. If the output file of deleted records is blocked, Section B must include instructions that pad and write the final output block; for unblocked output, the output record will always be written before Section B is entered. In either case, the output tape of deleted records should now be Closed by the added routine. The WCP instruction that was overlaid to provide entry to Section

B should be restored to its original contents, and control should be given to this instruction by an unconditional branch.

#### Deletion of Form 4 Data Records

Sort/Merge 12 Sections: Phase 3 of the Sort  
The Merge

Exits used:

- Overlays to as many of the following pairs of SBR instructions of the running program as are required by the order of merge (all are in Block S1212):

<u>Sequence Number</u>	<u>High-Order Storage Location</u>	<u>Orders of Merge</u>
1831	11490	1-5
1832	11497	
1979	12591	2-5
1980	12598	
2125	13674	3-5
2156	13681	
2271	14757	4-5
2272	14764	
2417	15840	5
2418	15847	

Each overlay consists of an SAR instruction (equal to the following overlaid instruction) and an unconditional branch to the added routine.

- An overlay to the following WCP instruction of the running program:

<u>Sequence Number</u>	<u>Block</u>	<u>High-Order Storage Location</u>
5514	S1293	18281

The overlay consists of (1) an unconditional branch to the first instruction of Section B of the added routine, and (2) a single character NOP instruction.

Section A of the added routine is entered each time a data record has been moved to an output area. When this section is entered, index register 07 contains the initial location of the data record. The first instruction of the added routine is Store B-Register into the instruction which is to return control to the running program, followed by the routine that determines whether or not the data record is to be deleted.

If the record is not to be deleted, the length of the data record must be added to the contents of index register 07 before returning to the running program.

If the data record is to be deleted, index register 07 should be left unchanged. This will cause the next move by the running program to the output area to overlay (and delete) the unwanted data record. In addition, a count of one must be subtracted from two data record counts: the first count, Sequence Number 2484, Block S1212, at locations 00120 through 00126, is a count of Phase 3 output records; the second count, Sequence Number 2493, Block S1212, at locations 00160 through 00166, is a count of Phase 1 input records. It is also necessary to subtract the length of the data record from BLOCKLN, Sequence Number 1817, Block S1212, locations 11393 through 11397.

If an output file consisting of the deleted records is not being created, control is returned to the running program.

If an output file of deleted records is being created, the data record to be deleted must be moved to an output area in the added routine. If this file is to consist of blocked records, index register 01 can be used for reference to the output area. If the output block for this file is not yet full, control is returned to the running program.

When an output block of deleted records is complete, the following instructions must be performed to force completion and error checking of all current and pending I/O activity. (On a single channel system, only the first three instructions should be used.)

<u>Label</u>	<u>Opcod</u>	<u>Operand</u>
LABELA	ZA	LABELA, LABELA
	BOL1	LABELA
	BOPR1	LABELA
LABELB	ZA	LABELB, LABELB
	BOL2	LABELB
	BOPR2	LABELB

A nonoverlap write can then be performed; this operation must be followed by:

<u>Opcod</u>	<u>Operand</u>
BEX1 or BEX2	ERROR, 7
BEF1 or BEF2	ENDOFREEL
BA1 or BA2	RETURNSORT
B	RETURNSORT

The routines to handle error and end-of-reel conditions must be included in the added routine.

Section B of the added routine is entered by the overlay to the WCP instruction for the End-of-Sort message. If the output file of deleted records is blocked, Section B must include the instructions that write the final output block. For unblocked

output, the output record will always be written before Section B is entered. In either case, the output tape of deleted records should now be closed by the added routine. The WCP instruction that was overlaid to provide entry to Section B should be restored to its original contents, and control should then be given to this instruction by an unconditional branch.

#### Creation of Phase 3 Output Header Labels from Phase 1 Input Header Labels

Exits used: DTF Exit 7 in Phase 1  
DTF Exit 3 in Phase 3

As described under DTF Exit 7 for Phase 1, this exit (and therefore Section A of the added routine) is reached after the reading and checking (if specified) of each Phase 1 input header label. Section A consists essentially of move instructions that save the Phase 1 input header label(s) in upper core storage. This save area must be included in both Section A of the added routine; and in Section B, described below. Since certain initialization blocks for Phases 2 and 3 extend to the top of 20,000 positions of core storage, the use of this technique requires that the system have at least 40,000 positions.

As described under DTF Exit 3 for Phase 3, this exit (and therefore Section B of the added routine) is reached during the Open operation for each final output tape immediately after the output header label has been read into the label area, and the tape rewound. Section B consists essentially of instructions that move the Phase 1 input header label(s) from the save area into the label area.

#### Processing and Creation of Format 1 Standard Trailer Labels

As supplied, Sort/Merge 12 processes only Format 2 of the standard input trailer label (i. e., only the block count is checked), and can create output trailer labels of only Format 2. The following is a description of a routine that processes Format 1 input trailer labels and creates Format 1 output trailer labels.

Exit used: GETEXIT in Phase 1  
DTF Exit 6 in Phase 1  
OUTPTXTF3 or PH3VAREXIT in Phase 3  
DTF Exit 1 in Phase 3

Section A. As described under GETEXIT for Phase 1, this exit (and therefore Section A of the added routine) is reached immediately before each fixed- or variable-length data record is entered

into the internal sort. In Section A of the added routine, a selected field of that data record is added to a hash total count for the current input reel. The field used should be the same one used in obtaining the hash totals in the input trailer label.

When Section A is entered, each control data field and the record character count field, (if any), will have a word mark in the first character position. (If it is necessary to precede the hash total Add instruction with a set word mark and/or clear word mark instruction, the Add instruction must be followed by a corresponding clear word mark and/or set word mark instruction.)

Section B. As described under DTF Exit 6 for Phase 1, this exit (and therefore Section B of the added routine) is reached during the Close operation for each Phase 1 input tape only if input header labels have been specified. When this exit is reached, the trailer label has been read into the label area. In Section B, the hash total of the trailer label is compared with the hash total taken in Section A, on records brought into the sort from the input reel being Closed. After this check is made, the input reel hash total, taken in Section A, is added to a cumulative hash total of Phase 1. The input reel hash total is then initialized to zeroes or blanks.

On an IBM 1410 with at least 40,000 positions of core storage, the Phase 1 cumulative hash total can be saved for comparison in Phase 3.

With 20,000 positions of core storage, an alternative method must be used, as certain initialization blocks for Phases 2 and 3 extend to the top 20,000 positions. The alternative method requires that the running program be instructed not to take hash totals. The Phase 1 hash total area used for phase-to-phase transfer is at Sequence Number 119, Block S1200, locations 00167 through 00183. If hash totals are not taken, this area is thus freed for use in the added routine.

Section B employs a seven-position save area for the input reel data record count. When Section B is entered, the save area should contain a total count of data records brought into Phase 1. This count should not include a count of the records from the input reel being Closed. The contents of the save area are then subtracted from the Phase 1 input data record count, Sequence Number 118, Block S1200, locations 00160 through 00166. The resultant value is equal to the number of data records brought into the sort from the input reel now being Closed. This value is compared with the data record count in the input trailer label. Following this check, the count at Sequence Number 118 must be restored by adding to it the contents

of the save area. Finally, the count at Sequence Number 118 is moved to the save area for use the next time Section B is entered.

Section C. As described in OUTPTXITF3 for fixed-length records and PH3VAREXIT for variable-length records, one of these exits (and therefore Section C of this routine) is reached whenever a Phase 3 output block is full. Each time Section C is entered, the hash count field from each data record in the output block is added to the hash total being taken for the individual output reel. (If it is necessary to precede the hash total Add instruction with a set word mark and/or clear word mark instruction, the Add instruction must be followed by a corresponding clear word mark and/or set word mark instruction.)

Section D. As described under DTF Exit 1 for Phase 3, this exit (and therefore Section D of the added routine) is entered during the Close operation for each final output tape only if output tape labels have been specified. When this exit is reached, an output trailer label of Format 2 has been assembled in the label area.

In Section D, the hash total, taken in Section C for the individual output reel is (1) moved to the label area, and (2) also added to a Section D cumulative hash total for Phase 3. For Form 1, Form 2, or Form 3 output records, the data record count for the individual output reel can be directly derived from the block count. For Form 4 output records, Section D must employ a seven-position save area which, at this point, must contain the total count of data records contained on all preceding output reels. The current total count of Phase 3 output data records is moved from Sequence Number 2493, Block S1212, locations 00120 through 00126, into the data record count positions in the label area. The contents of the save area are then subtracted from this current total count in the label area to produce the data record count for the current output reel.

If the assembled output trailer label begins with the characters 1EORb, the hash total computed in Section C must now be initialized to blanks or zeroes, and (for Form 4 output records) the current total count of Phase 3 output records must be moved into the save area.

If the assembled output trailer label begins with the characters 1EOFb, the cumulative hash total of Phase 3 should now be checked against the cumulative hash total of Phase 1.

For fixed-length records the user must consider the following: If the output blocking factor is not equal to the input blocking factor, padding records (added by the running program) may be included in the output file and, therefore, in the hash total of Phase 3.



The formulas and related information that follow provides a means of estimating total sorting time for fixed-length records. Sorting time for variable-length records can be approximated with the same formulas, by using a data record length slightly larger than the average data record length of the file to be sorted.

Symbols Used in the Timing Formulas

<u>Symbol</u>	<u>Explanation</u>
B	Sort blocking factor
Bi	Input blocking factor
Bo	Output blocking factor
C	Tape time per character, in milliseconds
CW	Length of the control data word (This is the sum of the lengths of the control data fields.)
F	Average number of control data comparisons required for each data record in each merging pass. F is a function of the order of merge, (m).
G	Number of data records internally sorted in each Phase 1 sorting cycle
J	A value used in calculating G. The full meaning and use of this symbol is provided with the calculation of G <sub>max</sub> .
K	A value used in estimating the time required for program loading, housekeeping, and rewinding tapes.
L	Data record length
M <sub>1</sub>	Number of core-storage locations available for use by the Phase 1 running program (M <sub>1</sub> is equal to the core-storage size of the 1410, minus the number of core-storage locations reserved in Phase 1 for user-inserted routines.)
M <sub>2</sub>	Number of core-storage locations available for use by the Phase 2 and Phase 3 running programs (M <sub>2</sub> is equal to the core-storage size of the 1410, minus the number of core-storage locations reserved in Phases 2 and 3 for user-inserted routines.)
m	Order of merge
N	Number of records to be sorted
P <sub>2</sub>	Number of Phase 2 merging passes
RP <sub>1</sub>	Size of the Phase 1 running program
RP <sub>2</sub>	Size of the Phase 2 running program

S	Number of sequences produced by Phase 1
T <sub>1</sub>	Phase 1 running time -- time, in milliseconds, required to read, process and write each data record in Phase 1.
T <sub>2</sub>	Phase 2 running time -- time, in milliseconds required to read, process, and write each data record in each Phase 2 pass.
T <sub>3</sub>	Phase 3 running time -- time, in milliseconds, required to read, process, and write each data record in Phase 3.

CALCULATION OF THE SORT BLOCKING FACTOR AND THE INTERNAL FACTOR

In order to determine the sort blocking factor (B) and the internal sort factor (G), the maximum values of B and G must first be calculated, as follows:

Maximum Sort Blocking Factor

$$B_{\max} = \text{Largest Integer} \leq \frac{M_2 - RP_2}{(2m + 2) L}, \text{ or}$$

$$B_{\max} = \text{Largest Integer} \leq \frac{9999}{L},$$

whichever is smaller.

RP<sub>2</sub> is shown in Figure 23.

Maximum Internal Sort Factor

The calculation of the maximum internal sort factor (G<sub>max</sub>) is an iterative process based on the following expression:

$$\frac{M_1 - RP_1 - (B_{\max} \times L) - J}{L + 5}$$

The value of J is determined as follows:

1. For sorting applications based on a single control data field, and for which output is to be in ascending sequence, J equals zero.

m	RP <sub>2</sub>
2	13220
3	14320
4	15320
5	16420

Figure 23. RP<sub>2</sub>: Phase 2 Running Program Size

2. For sorting applications based on a single control data field, and for which output is to be in descending sequence, J is equal either to the position of the low-order character of the control data field relative to the beginning of the data record, or to 13, whichever is greater.
3. For all sorting applications based on more than one control data field, J is equal to either the position of the low-order character of the rightmost control data field, relative to the beginning of the data record, or to 13, whichever is greater.

#### Iterative Process to Determine $G_{max}$

Calculate the first approximation of  $G_{max}$  ( $G_{max}'$ ), using the formula:

$G_{max}' =$  Largest Multiple of

$$B_{max} \leq \frac{M_1 - (RP_{1max}) - B_{max} \times L - J}{L + 5}$$

$$RP_{1max} = 10,442$$

If  $G_{max}'$  is greater than 1024, then  $G_{max}$  equals the largest multiple of  $B_{max}$  that is equal to or less than 1024, and the process is complete.

If  $G_{max}'$  is equal to or less than 1024, then find in Figure 24 the value of  $RP_1$  corresponding to the calculated value of  $G_{max}'$ . This table value of  $RP_1$  will be referred to as  $RP_1'$ .

If  $RP_1'$  is equal to  $RP_{1max}$  (see Figure 24), then  $G_{max}'$  is equal to  $G_{max}$ , and the process is complete, but if  $RP_1'$  is less than  $RP_{1max}$ , a second approximation of  $G_{max}$  must be made.

Calculate the second approximation of  $G_{max}$  ( $G_{max}''$ ), using the formula:

$G_{max}'' =$  Largest Multiple of

$$B_{max} \leq \frac{M_1 - RP_1' - (B_{max} \times L) - J}{L + 5}$$

Find in Figure 24 the value of  $RP_1$  corresponding to  $G_{max}''$ . This table value of  $RP_1$  will be referred to as  $RP_1''$ .

If  $RP_1''$  equals  $RP_1'$ , then  $G_{max}''$  equals  $G_{max}$ , and the process is complete. If, however,  $RP_1''$  is greater than  $RP_1'$ , a third approximation of  $G_{max}$  must be made.

Calculate the third approximation of  $G_{max}$  ( $G_{max}'''$ ), using the formula:

$G_{max}''' =$  Largest Multiple of

$$B_{max} \leq \frac{M_1 - RP_1''' - (B_{max} \times L) - J}{L + 5}$$

G	$RP_1$	$\log_2 G$
1	8007	0
2	8007	1
3-4	8122	2
5-8	8347	3
9-16	8412	4
17-32	8542	5
33-64	8802	6
65-128	8937	7
129-256	9207	8
257-512	9747	9
513-1024	10442*	10

\* $RP_{1max}$ .

Figure 24. Phase 1 Running Program Size

Find in Figure 24 the value of  $RP_1$  corresponding to  $G_{max}'''$ . This table value of  $RP_1$  will be referred to as  $RP_1'''$ .

If  $RP_1'''$  equals  $RP_1''$ , then  $G_{max}'''$  equals  $G_{max}$ , and the process is complete, but if  $RP_1'''$  is less than  $RP_1''$ , a fourth approximation of  $G_{max}$  must be made.

The iterative process is continued until one of the following occurs:

1.  $RP_1$  (n prime symbols) equals  $RP_1$  (n - 1 prime symbols); in this case  $G_{max}$  (n prime symbols) equals  $G_{max}$ .
2.  $RP_1$  (n prime symbols) equals  $RP_1$  (n - 2 prime symbols), and  $RP_1$  (n prime symbols) is less than  $RP_1$  (n - 1 prime symbols); in this case,  $G_{max}$  (n - 1 prime symbols) equals  $G_{max}$ .

#### Calculating B and G

The values of B and G can now be derived as follows:

1. If  $G_{max}$  is a multiple of  $B_i$ , then:  
 $B_{max}$  equals B, and  $G_{max}$  equals G.
2. If  $G_{max}$  is not a multiple of  $B_i$ , the value obtained for  $B_{max}$  must be successively reduced by 1, and used as B' in the following formula, until the calculated value of G' is a multiple of  $B_i$ :

G' = Highest Multiple of

$$B' \leq \frac{M_1 + RP_1 - B' L - J}{L + 5}$$

If the value of  $RP_1$  (Figure 24) corresponding to the first value of  $G'$  calculated is larger than the value of  $RP_1$  used in the calculation, then  $G'$  must be recalculated. The larger value of  $RP_1$  must be used in the above formula for the recalculation. If the value of  $G'$  resulting from the recalculation has corresponding to it an  $RP_1$  equal in value to the  $RP_1$  used in the formula, the calculation of  $G'$  for that particular  $B'$  is complete. In that case, the larger value of  $RP_1$  should be used in any subsequent calculations for smaller values of  $B$ .

If the value of  $RP_1$  corresponding to  $G'$  is smaller than the value of  $RP_1$  used in the formula, the value of  $G'$  first calculated must be decreased to the highest multiple of  $B'$  corresponding to the value of the smaller  $RP_1$ . It is then necessary to determine whether this resulting value of  $G'$  is a multiple of  $B_i$ .

When the calculated value of  $G'$  is a multiple of  $B_i$ ,  $G'$  equals  $G$ , and  $B'$  equals  $B$ .

#### USING B AND G IN TIMING FORMULAS

The values of  $B$  and  $G$ , as calculated above, are used in the following formulas to determine the total sorting time required for an application:

##### Phase 1

$$\text{Running Time } (T_1) = \frac{\text{(Phase 1 Process Time)}}{\text{(Phase 1 Tape Time)}}$$

$$\text{Process Time (milliseconds per data record)} = 0045 \left[ 550 + 3.125G + 2.5L + (\text{Log}_2 G - 1) \times \frac{660 + 140 \text{Log}_2 G}{G} \right] + \frac{160}{B_i} + \frac{225}{B} + \frac{2000 + 2CW}{B}$$

See Figure 24 for the values of  $\text{Log}_2 G$ .

$$\text{Tape Time (milliseconds per data record)} =$$

$$\left[ \frac{\text{Input Tape Start Time}}{B_i} + C_{\text{input tape}} L \right] + \left[ \frac{\text{Merge Tape Start Time}}{B} + C_{\text{merge tape}} L \right]$$

See Figure 25 for values of  $C$  and start times.

##### Phase 2

$$\text{Running Time } (T_2) = \frac{\text{(Phase 2 Process Time)}}{\text{(Phase 2 Tape Time), whichever is greater.}}$$

$$\text{Process Time (milliseconds per data record per pass)} =$$

$$.0045 \left[ 350 + 4.5L + F(47 + CW) + \frac{2000 + 2CW}{B} \right]$$

See Figure 26 for the value of  $F$ .

	C (milliseconds)	Start Time (milliseconds)
729 II 200 cpi	.067	10.8
556 cpi	.024	
729 IV 200 cpi	.044	7.3
556 cpi	.016	
7330 200 cpi	.139	20.1 on Read + 7C
556 cpi	.050	19.9 on Write + 7C

Figure 25. Tape Time

Tape Time (milliseconds per data record per pass);  
If one channel is used =

$$2 \left[ \frac{\text{Merge Tape Start Time}}{B} + C_{\text{merge tape}} L \right]$$

If both channels are used =

$$\left[ \frac{\text{Merge Tape Start Time}}{B} + C_{\text{merge tape}} L \right]$$

##### Phase 3

$$\text{Running Time } (T_3) = \frac{\text{(Phase 3 Process Time)}}{\text{(Phase 3 Tape Time), whichever is greater.}}$$

$$\text{Process Time (milliseconds per data record)} = .0045 \left[ 350 + 4.5L + F(47 + 2CW) + \frac{400}{B} \right]$$

$$+ \frac{400}{B_o} + (350 + 2CW)]$$

The last term,  $(350 + 2CW)$ , should be included only if a sequence check is specified.

Tape Time (milliseconds per data record);

If one channel is used =

$$\left[ \frac{\text{Merge Tape Start Time}}{B} + C_{\text{merge tape}} L \right] +$$

$$\left[ \frac{\text{Output Tape Start Time}}{B_o} + C_{\text{output tape}} L \right]$$

m	F
2	1.00
3	1.66
4	2.25
5	2.80

Figure 26. Average Number of Comparisons Per Data Record Per Pass

If both channels are used =

$$\left[ \frac{\text{Merge Tape Start Time}}{B} + C_{\text{merge tape}} L \right] \text{ or } \left[ \frac{\text{Output Tape Start Time}}{B_o} + C_{\text{output tape}} L \right],$$

whichever is greater.

### MERGING PASSES IN PHASE 2 (P<sub>2</sub>)

The necessary number of merging passes in Phase 2 is determined as follows:

1. Calculate S, using the following formula:

$$S = \frac{N}{G}$$

2. In Figure 27, under the merge order to be used, find the appropriate value of P<sub>2</sub> by locating the smallest value of S<sub>max</sub> equal to or greater than the value of S just computed.

### TOTAL SORTING TIME

Total Sorting Time = N/60,000 (T<sub>1</sub> + P<sub>2</sub>T<sub>2</sub> + T<sub>3</sub>) + T'. T' is an estimated time (in minutes) required for program loading, housekeeping, and tape rewinding. Its value is obtained as follows:

$$T' = P_2 (K) + 1$$

P <sub>2</sub>	Maximum Number of Sequences (S <sub>max</sub> ) for Merge Order of:			
	Two	Three	Four	Five
0	2	3	4	5
1	4	9	16	25
2	8	27	64	125
3	16	81	256	625
4	32	243	1024	3125
5	64	729	4096	15625
6	128	2187	16384	
7	256			
8	512			
9	1024			
10	2048			
11	4096			

Figure 27. Number of Phase 2 Merging Passes

For most sorting applications using IBM 729 II, 729 IV, 729 V or 729 VI Magnetic Tape Units, K is equal to 1. For applications of relatively low volume, set K equal to 1/2.

For most sorting applications using IBM 7330 Magnetic Tape Units, set K equal to 2. For low-volume applications using 7330 tape units, set K equal to 1.

### EQUAL ROUTINE TIMING FORMULAS

The preceding formulas are based on the use of a single control data field, of CW length. For a more accurate estimate of the process time involved in sorts in which multiple count data fields are specified, the formulas discussed below have been developed. The symbols used in these supplementary formulas are as follows:

Symbol	Explanation
e	The percentage of equals on the comparisons of the major control data field
E	The percentage of equals on the comparisons which involve all control data fields
c	The average number of control data fields compared
CW'	The average number of control data characters compared

Application of these supplementary formulas requires that the value of CW', as defined above, be used in place of CW in the basic formulas.

Phase 1 Equal Routine Process Time per data record, in milliseconds, to be added to the basic Phase 1 process time, equals:

1.  $c < 2 .0045 [(\text{Log}_2 G - 1)(97e + 74c - 74)]$
  2.  $c \geq 2 .0045 [(\text{Log}_2 G - 1)(97e + 138c - 202)]$
- See Figure 24 for the value of Log<sub>2</sub> G.

Phase 2 Equal Routine Process Time per data record, in milliseconds, to be added to the basic Phase 2 process time, equals:

1.  $c < 2 .0045 [(F + 1/B)(201e + 21E + 35c - 35)]$
  2.  $c \geq 2 .0045 [(F + 1/B)(201e + 21E + 164c - 293)]$
- See Figure 26 for the value of F.

Phase 3 Equal Routine Process Time per data record, in milliseconds, to be added to the basic Phase 3 process time, equals:

1.  $c < 2 .0045 [(F + 1)(201e + 21E + 35c - 35)]$
2.  $c \geq 2 .0045 [(F + 1)(201e + 21E + 164c - 293)]$

It is assumed that the sequence check option is specified.

The tables in the following pages provide a convenient means for estimating total sorting time for data records ranging from 20 to 2,000 characters, when using Sort/Merge 12 on an IBM 1410 equipped with IBM 7330, 729 II, 729 IV, or 729 V Magnetic Tape Units. Times for 729 VI tape units are not tabulated, but are computed as shown in this section.

### Symbols Used In The Timing Tables

CW

LNG

Total length of the control data fields; several values are presented for each data record length.

MRG

ORD

Merge order; values are given for each order of merge from 2 through 5.

NO.

CF

Number of control data fields; values are given for 1 and 5 control data fields.

B

Number of data records blocked to form a tape record during merge passes (sort blocking).

G

The number of data records that will be internally sorted in each Phase 1 internal sort.

PROCESS

TIME PH1,

PH2, PH3

Process time for Phase 1, each merge pass of Phase 2, and Phase 3, respectively, in milliseconds per data record.

TAPE

TIME 7330,

729 II,

729 IV,

729 V

Tape time for 7330, 729 II, 729 IV, and 729 V tape units, respectively, in milliseconds per data record.

MAXIMUM NUMBER OF  
RECORDS IN THOUSANDS

200CPI, 556CPI, 800 CPI

The maximum number of data records that can be sorted at the character densities associated with 7330, 729 II, 729 IV and 729 V tape units. (It is assumed that all sort tapes are full reels.)

### Basic Assumptions in Timing Table Computations

The following assumptions were made in deriving the values in the timing tables:

1. No storage space is reserved in any phase for added programming.
2. Input and output blocking are equal to sort blocking
3. The sequence check option is specified.
4. Where five control data fields are specified the lengths of the five fields are equal. In sequencing any two data records, the number of control data fields that must be compared to determine the correct sequence can be one, two, three, four, or five, with equal probabilities. Therefore, the average number of control data fields compared is three, and the average number of control data characters compared is  $.6CW$ . Moreover, for those comparisons involving all five control data fields (i. e., the first four control data fields are equal), in one-third of the cases the fifth control data fields are also equal. In the timing tables for those cases involving five control data fields, the values used for the calculation of Equal Routine Process Time in each phase are as follows:

$e = 0.8$ ,  $E = 0.067$ ,  $c = 3$ , and  $CW' = .6CW$

5. The input file is in random order. (If partial sequencing exists in the input file, the Phase 1 process time will be reduced.)

The timing formulas used to derive the values in the tables are functions of data record length and total length of the control data fields. For purposes of estimating sort times, these functions can be regarded as linear (that is, increasing at a constant rate for constantly increasing values of the two variables) and, therefore, the values for any specific application not found in the tables can be obtained from given values by interpolation or extrapolation.

### METHOD OF TIME ESTIMATION USING TIMING TABLES

The procedure for using the tables to calculate total sorting time for a particular application follows: (Applicable formulas are given in "Timing Formulas.")

1. Enter the tables with core-storage size, data record length, total length of the control data fields, and number of control data fields to obtain values of process time, tape time, and G.
2. Determine running time per record for each phase.
3. Determine the number of sequences, S, produced by Phase 1.

4. Determine the number of Phase 2 merge passes,  $P_2$ . For the merge order to be used, find the value of S in Figure 26 which is equal to or greater than the value calculated above.

5. Calculate total sorting time in minutes.

#### 729 VI MAGNETIC TAPE UNITS

For systems equipped with 729 VI Magnetic Tape Units, operating at 800 cpi, tape time, in milliseconds per data record, equals:

$$\frac{7.3}{B} \times .011 L.$$

#### Example

40,000 positions of core storage

$N = 100,000$

$L = 80$

Number of control data fields (CF) = 1.

Control data word length (CW LNG) = 10.

Order of merge = 4.

Input is in random sequence.

729 VI tape units (2 channels) are used.

Input blocking = Sort blocking = Output blocking.

Time per record, in milliseconds:

<u>Phase</u>	<u>Process</u>	<u>Tape</u>
1	11.46	1.52
2	4.18	1.52
3	5.66	1.52

Number of Phase 2 passes:

$$S = \frac{100,000}{300} = 334$$

From Figure 27, Phase 2 requires 4 passes.

Total time per record, in milliseconds:

$$\text{Time/rcd} = 11.46 + 2(1.52) + 4(4.18) + 5.66 = 36.88$$

Total sorting time, in minutes:

$$T = \frac{100,000 \times 36.88}{60,000} + T'$$

$$T = 61.5 + 4(1) + 1$$

$$T = 66.5 \text{ minutes}$$

#### 1410 ACCELERATOR FEATURE

For systems equipped with the 1410 Accelerator special feature, values for process time may be approximated by reducing the values by 17%.

20 CHARACTER DATA RECORD 20K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	56	336	10.90	2.40	3.92	1.36	0.67	0.45	0.53	243	559	718	
		5	56	336	21.18	4.03	7.14	1.36	0.67	0.45	0.53	243	559	718	
	3	1	35	350	11.12	2.66	4.13	1.58	0.79	0.53	0.65	454	961	1188	
		5	35	350	21.40	5.38	8.40	1.58	0.79	0.53	0.65	454	961	1188	
	4	1	23	391	11.72	2.95	4.33	1.88	0.95	0.64	0.81	624	1207	1437	
		5	23	391	22.00	6.64	9.56	1.88	0.95	0.64	0.81	624	1207	1437	
	5	1	14	392	11.78	3.34	4.58	2.45	1.25	0.84	1.11	718	1232	1405	
		5	14	392	22.06	7.96	10.68	2.45	1.25	0.84	1.11	718	1232	1405	
	10	2	1	56	336	11.26	2.44	4.01	1.36	0.67	0.45	0.53	243	559	718
			5	56	336	21.40	4.06	7.19	1.36	0.67	0.45	0.53	243	559	718
3		1	35	350	11.48	2.74	4.25	1.58	0.79	0.53	0.65	454	961	1188	
		5	35	350	21.61	5.42	8.48	1.58	0.79	0.53	0.65	454	961	1188	
4		1	23	391	12.08	3.05	4.48	1.88	0.95	0.64	0.81	624	1207	1437	
		5	23	391	22.21	6.70	9.65	1.88	0.95	0.64	0.81	624	1207	1437	
5		1	14	392	12.14	3.47	4.75	2.45	1.25	0.84	1.11	718	1232	1405	
		5	14	392	22.28	8.04	10.79	2.45	1.25	0.84	1.11	718	1232	1405	

30 CHARACTER DATA RECORD 20K MEMORY

CW LNG	MRG CRD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	37	259	9.95	2.68	4.16	2.05	1.01	0.68	0.80	162	371	477	
		5	37	259	20.24	4.33	7.37	2.05	1.01	0.68	0.80	162	371	477	
	3	1	23	276	10.22	3.00	4.38	2.38	1.19	0.80	0.98	302	637	787	
		5	23	276	20.50	5.74	8.66	2.38	1.19	0.80	0.98	302	637	787	
	4	1	15	270	10.18	3.36	4.62	2.86	1.44	0.97	1.23	414	796	946	
		5	15	270	20.46	7.09	9.84	2.86	1.44	0.97	1.23	414	796	946	
	5	1	9	279	10.38	3.91	4.92	3.76	1.92	1.29	1.71	473	804	913	
		5	9	279	20.66	8.59	11.03	3.76	1.92	1.29	1.71	473	804	913	
	10	2	1	37	259	10.31	2.73	4.25	2.05	1.01	0.68	0.80	162	371	477
			5	37	259	20.45	4.36	7.43	2.05	1.01	0.68	0.80	162	371	477
3		1	23	276	10.58	3.08	4.50	2.38	1.19	0.80	0.98	302	637	787	
		5	23	276	20.72	5.79	8.73	2.38	1.19	0.80	0.98	302	637	787	
4		1	15	270	10.54	3.47	4.77	2.86	1.44	0.97	1.23	414	796	946	
		5	15	270	20.67	7.15	9.93	2.86	1.44	0.97	1.23	414	796	946	
5		1	9	279	10.74	4.04	5.09	3.76	1.92	1.29	1.71	473	804	913	
		5	9	279	20.88	8.66	11.13	3.76	1.92	1.29	1.71	473	804	913	
20		2	1	37	259	11.03	2.82	4.43	2.05	1.01	0.68	0.80	162	371	477
			5	37	259	20.88	4.42	7.53	2.05	1.01	0.68	0.80	162	371	477
	3	1	23	276	11.30	3.23	4.74	2.38	1.19	0.80	0.98	302	637	787	
		5	23	276	21.15	5.88	8.88	2.38	1.19	0.80	0.98	302	637	787	
	4	1	15	270	11.26	3.68	5.06	2.86	1.44	0.97	1.23	414	796	946	
		5	15	270	21.11	7.27	10.11	2.86	1.44	0.97	1.23	414	796	946	
	5	1	9	279	11.46	4.30	5.43	3.76	1.92	1.29	1.71	473	804	913	
		5	9	279	21.31	8.82	11.34	3.76	1.92	1.29	1.71	473	804	913	

40 CHARACTER DATA RECORD 20K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	28	196	8.78	2.96	4.39	2.73	1.35	0.90	1.07	121	279	359	
		5	28	196	17.77	4.63	7.60	2.73	1.35	0.90	1.07	121	279	359	
	3	1	17	221	9.16	3.34	4.64	3.20	1.60	1.07	1.32	226	475	586	
		5	17	221	18.16	6.11	8.92	3.20	1.60	1.07	1.32	226	475	586	
	4	1	11	220	9.21	3.78	4.91	3.85	1.94	1.30	1.66	308	590	700	
		5	11	220	18.20	7.55	10.13	3.85	1.94	1.30	1.66	308	590	700	
	5	1	7	231	9.45	4.40	5.24	4.91	2.50	1.68	2.22	359	616	702	
		5	7	231	18.44	9.13	11.35	4.91	2.50	1.68	2.22	359	616	702	
	10	2	1	28	196	9.09	3.01	4.48	2.73	1.35	0.90	1.07	121	279	359
			5	28	196	17.96	4.66	7.66	2.73	1.35	0.90	1.07	121	279	359
3		1	17	221	9.48	3.42	4.76	3.20	1.60	1.07	1.32	226	475	586	
		5	17	221	18.35	6.15	8.99	3.20	1.60	1.07	1.32	226	475	586	
4		1	11	220	9.52	3.89	5.06	3.85	1.94	1.30	1.66	308	590	700	
		5	11	220	18.39	7.61	10.22	3.85	1.94	1.30	1.66	308	590	700	
5		1	7	231	9.76	4.53	5.41	4.91	2.50	1.68	2.22	359	616	702	
		5	7	231	18.63	9.21	11.45	4.91	2.50	1.68	2.22	359	616	702	
20		2	1	28	196	9.72	3.10	4.66	2.73	1.35	0.90	1.07	121	279	359
			5	28	196	18.34	4.71	7.77	2.73	1.35	0.90	1.07	121	279	359
	3	1	17	221	10.11	3.57	5.00	3.20	1.60	1.07	1.32	226	475	586	
		5	17	221	18.73	6.24	9.13	3.20	1.60	1.07	1.32	226	475	586	
	4	1	11	220	10.15	4.10	5.35	3.85	1.94	1.30	1.66	308	590	700	
		5	11	220	18.77	7.74	10.40	3.85	1.94	1.30	1.66	308	590	700	
	5	1	7	231	10.39	4.79	5.75	4.91	2.50	1.68	2.22	359	616	702	
		5	7	231	19.01	9.36	11.65	4.91	2.50	1.68	2.22	359	616	702	

50 CHARACTER DATA RECORD 20K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	22	176	8.63	3.26	4.63	3.42	1.69	1.13	1.34	97	222	285	
		5	22	176	17.63	4.94	7.84	3.42	1.69	1.13	1.34	97	222	285	
	3	1	14	182	8.76	3.66	4.89	3.95	1.97	1.32	1.62	181	384	475	
		5	14	182	17.75	6.44	9.17	3.95	1.97	1.32	1.62	181	384	475	
	4	1	9	180	8.80	4.17	5.18	4.76	2.40	1.61	2.05	248	477	567	
		5	9	180	17.79	7.96	10.41	4.76	2.40	1.61	2.05	248	477	567	
	5	1	5	190	9.09	5.11	5.65	6.57	3.36	2.26	3.01	276	460	519	
		5	5	190	18.09	9.94	11.75	6.57	3.36	2.26	3.01	276	460	519	
	10	2	1	22	176	8.94	3.30	4.72	3.42	1.69	1.13	1.34	97	222	285
			5	22	176	17.81	4.96	7.90	3.42	1.69	1.13	1.34	97	222	285
3		1	14	182	9.07	3.74	5.01	3.95	1.97	1.32	1.62	181	384	475	
		5	14	182	17.94	6.49	9.24	3.95	1.97	1.32	1.62	181	384	475	
4		1	9	180	9.11	4.28	5.33	4.76	2.40	1.61	2.05	248	477	567	
		5	9	180	17.98	8.03	10.50	4.76	2.40	1.61	2.05	248	477	567	
5		1	5	190	9.41	5.25	5.82	6.57	3.36	2.26	3.01	276	460	519	
		5	5	190	18.28	10.02	11.86	6.57	3.36	2.26	3.01	276	460	519	
20		2	1	22	176	9.57	3.40	4.90	3.42	1.69	1.13	1.34	97	222	285
			5	22	154	17.89	5.02	8.00	3.42	1.69	1.13	1.34	97	222	285
	3	1	14	182	9.70	3.89	5.25	3.95	1.97	1.32	1.62	181	384	475	
		5	14	182	18.32	6.58	9.38	3.95	1.97	1.32	1.62	181	384	475	
	4	1	9	180	9.74	4.49	5.62	4.76	2.40	1.61	2.05	248	477	567	
		5	9	180	18.36	8.16	10.67	4.76	2.40	1.61	2.05	248	477	567	
	5	1	5	190	10.04	5.52	6.16	6.57	3.36	2.26	3.01	276	460	519	
		5	5	190	18.65	10.18	12.06	6.57	3.36	2.26	3.01	276	460	519	
	40	2	1	22	176	10.83	3.58	5.26	3.42	1.69	1.13	1.34	97	222	285
			5	22	154	18.65	5.13	8.22	3.42	1.69	1.13	1.34	97	222	285
3		1	14	182	10.96	4.20	5.73	3.95	1.97	1.32	1.62	181	384	475	
		5	14	182	19.08	6.77	9.67	3.95	1.97	1.32	1.62	181	384	475	
4		1	9	180	11.00	4.91	6.21	4.76	2.40	1.61	2.05	248	477	567	
		5	9	180	19.12	8.41	11.02	4.76	2.40	1.61	2.05	248	477	567	
5		1	5	190	11.30	6.06	6.84	6.57	3.36	2.26	3.01	276	460	519	
		5	5	190	19.41	10.50	12.47	6.57	3.36	2.26	3.01	276	460	519	



60 CHARACTER DATA RECORD 20K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	18	144	8.32	3.55	4.87	4.13	2.04	1.37	1.62	80	184	236	
		5	18	144	17.32	5.25	8.08	4.13	2.04	1.37	1.62	80	184	236	
	3	1	11	154	8.52	4.04	5.16	4.85	2.42	1.62	2.00	149	313	385	
		5	11	154	17.51	6.85	9.44	4.85	2.42	1.62	2.00	149	313	385	
	4	1	7	154	8.61	4.66	5.50	5.91	2.98	2.00	2.56	203	385	454	
		5	7	154	17.60	8.51	10.73	5.91	2.98	2.00	2.56	203	385	454	
	5	1	4	16C	8.88	5.77	6.03	8.09	4.14	2.78	3.72	226	373	420	
		5	4	16C	17.87	10.67	12.14	8.09	4.14	2.78	3.72	226	373	420	
	1C	2	1	18	144	8.63	3.60	4.96	4.13	2.04	1.37	1.62	80	184	236
			5	18	144	17.50	5.27	8.14	4.13	2.04	1.37	1.62	80	184	236
3		1	11	154	8.83	4.12	5.28	4.85	2.42	1.62	2.00	149	313	385	
		5	11	154	17.70	6.90	9.51	4.85	2.42	1.62	2.00	149	313	385	
4		1	7	154	8.92	4.77	5.65	5.91	2.98	2.00	2.56	203	385	454	
		5	7	154	17.79	8.57	10.81	5.91	2.98	2.00	2.56	203	385	454	
5		1	4	16C	9.19	5.91	6.20	8.09	4.14	2.78	3.72	226	373	420	
		5	4	16C	18.06	10.75	12.24	8.09	4.14	2.78	3.72	226	373	420	
2C		2	1	18	144	9.26	3.69	5.14	4.13	2.04	1.37	1.62	80	184	236
			5	18	144	17.88	5.33	8.24	4.13	2.04	1.37	1.62	80	184	236
	3	1	11	154	9.46	4.27	5.52	4.85	2.42	1.62	2.00	149	313	385	
		5	11	154	18.08	6.99	9.65	4.85	2.42	1.62	2.00	149	313	385	
	4	1	7	154	9.55	4.98	5.94	5.91	2.98	2.00	2.56	203	385	454	
		5	7	154	18.17	8.70	10.99	5.91	2.98	2.00	2.56	203	385	454	
	5	1	4	16C	9.82	6.18	6.54	8.09	4.14	2.78	3.72	226	373	420	
		5	4	16C	18.44	10.72	12.44	8.09	4.14	2.78	3.72	226	373	420	
	4C	2	1	18	144	10.52	3.88	5.50	4.13	2.04	1.37	1.62	80	184	236
			5	18	144	18.64	5.45	8.46	4.13	2.04	1.37	1.62	80	184	236
3		1	11	154	10.72	4.59	6.00	4.85	2.42	1.62	2.00	149	313	385	
		5	11	154	18.84	7.18	9.94	4.85	2.42	1.62	2.00	149	313	385	
4		1	7	154	10.81	5.41	6.53	5.91	2.98	2.00	2.56	203	385	454	
		5	7	154	18.93	8.96	11.34	5.91	2.98	2.00	2.56	203	385	454	
5		1	4	16C	11.08	6.73	7.23	8.09	4.14	2.78	3.72	226	373	420	
		5	4	16C	19.20	11.25	12.85	8.09	4.14	2.78	3.72	226	373	420	

70 CHARACTER DATA RECORD 20K MEMORY

CW LNG	MRG CRD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	16	128	7.79	3.81	5.09	4.77	2.35	1.58	1.86	69	159	205	
		5	16	128	15.50	5.52	8.31	4.77	2.35	1.58	1.86	69	159	205	
	3	1	10	130	8.32	4.32	5.40	5.53	2.76	1.85	2.27	129	274	339	
		5	10	130	17.31	7.15	9.67	5.53	2.76	1.85	2.27	129	274	339	
	4	1	6	138	8.54	5.08	5.75	6.89	3.48	2.34	2.99	174	330	389	
		5	6	138	17.54	8.96	11.01	6.89	3.48	2.34	2.99	174	330	389	
	5	1	4	14C	8.71	5.97	6.23	8.59	4.38	2.94	3.89	205	352	401	
		5	4	14C	17.71	10.87	12.34	8.59	4.38	2.94	3.89	205	352	401	
	1C	2	1	16	128	8.06	3.86	5.18	4.77	2.35	1.58	1.86	69	159	205
			5	16	128	15.67	5.55	8.36	4.77	2.35	1.58	1.86	69	159	205
3		1	10	130	8.63	4.40	5.52	5.53	2.76	1.85	2.27	129	274	339	
		5	10	130	17.50	7.20	9.75	5.53	2.76	1.85	2.27	129	274	339	
4		1	6	138	8.86	5.19	5.94	6.89	3.48	2.34	2.99	174	330	389	
		5	6	138	17.73	9.03	11.10	6.89	3.48	2.34	2.99	174	330	389	
5		1	4	14C	9.03	6.11	6.40	8.59	4.38	2.94	3.89	205	352	401	
		5	4	14C	17.90	10.96	12.44	8.59	4.38	2.94	3.89	205	352	401	
2C		2	1	16	128	8.60	3.96	5.36	4.77	2.35	1.58	1.86	69	159	205
			5	16	128	15.99	5.61	8.47	4.77	2.35	1.58	1.86	69	159	205
	3	1	10	130	9.26	4.56	5.76	5.53	2.76	1.85	2.27	129	274	339	
		5	10	130	17.88	7.29	9.89	5.53	2.76	1.85	2.27	129	274	339	
	4	1	6	138	9.49	5.40	6.23	6.89	3.48	2.34	2.99	174	330	389	
		5	6	138	18.11	9.16	11.28	6.89	3.48	2.34	2.99	174	330	389	
	5	1	4	14C	9.66	6.38	6.74	8.59	4.38	2.94	3.89	205	352	401	
		5	4	136	18.22	11.12	12.65	8.59	4.38	2.94	3.89	205	352	401	
	4C	2	1	16	128	9.68	4.15	5.72	4.77	2.35	1.58	1.86	69	159	205
			5	16	128	16.64	5.72	8.69	4.77	2.35	1.58	1.86	69	159	205
3		1	10	130	10.52	4.88	6.24	5.53	2.76	1.85	2.27	129	274	339	
		5	10	130	18.64	7.48	10.18	5.53	2.76	1.85	2.27	129	274	339	
4		1	6	138	10.75	5.84	6.81	6.89	3.48	2.34	2.99	174	330	389	
		5	6	132	18.78	9.42	11.63	6.89	3.48	2.34	2.99	174	330	389	
5		1	4	14C	10.92	6.93	7.43	8.59	4.38	2.94	3.89	205	352	401	
		5	4	136	18.98	11.45	13.06	8.59	4.38	2.94	3.89	205	352	401	

80 CHARACTER DATA RECCRD 20K MEMORY

CW LNG	MRC ORD	NO. CF	PROCESS TIME			TAPE TIME				MAXIMUM NUMBER OF					
			B	G	MILLISECNS/RECCRD	PH1	PH2	PH3	733C	729 II	729 IV	729 V	RECORDS IN THOUSANDS	200 CPI	556 CPI
5	2	1	14	112	7.70	4.10	5.33	5.45	2.69	1.80	2.13	60	139	179	
		5	14	112	15.42	5.82	8.54	5.45	2.69	1.80	2.13	60	139	179	
		1	8	12C	7.91	4.75	5.69	6.54	3.27	2.19	2.71	111	232	284	
	4	5	8	12C	15.62	7.62	9.97	6.54	3.27	2.19	2.71	111	232	284	
		1	5	125	8.1C	5.58	6.11	8.07	4.08	2.74	3.52	150	281	331	
		5	5	125	15.81	9.52	11.34	8.07	4.08	2.74	3.52	150	281	331	
	5	1	3	126	8.35	6.93	6.73	10.78	5.52	3.71	4.96	169	280	315	
		5	3	126	16.06	11.96	12.84	10.78	5.52	3.71	4.96	169	280	315	
	10	2	1	14	112	7.97	4.15	5.42	5.45	2.69	1.80	2.13	60	139	179
			5	14	112	15.58	5.85	8.60	5.45	2.69	1.80	2.13	60	139	179
			1	8	12C	8.18	4.83	5.81	6.54	3.27	2.19	2.71	111	232	284
		3	5	8	12C	15.78	7.67	10.04	6.54	3.27	2.19	2.71	111	232	284
			1	5	125	8.37	5.69	6.26	8.07	4.08	2.74	3.52	150	281	331
			5	5	125	15.98	9.59	11.42	8.07	4.08	2.74	3.52	150	281	331
4		1	3	126	8.62	7.07	6.9C	10.78	5.52	3.71	4.96	169	280	315	
		5	3	126	16.22	12.05	12.94	10.78	5.52	3.71	4.96	169	280	315	
20		2	1	14	112	8.51	4.24	5.60	5.45	2.69	1.80	2.13	60	139	179
			5	14	112	15.90	5.91	8.71	5.45	2.69	1.80	2.13	60	139	179
			1	8	12C	8.72	4.99	6.05	6.54	3.27	2.19	2.71	111	232	284
		3	5	8	12C	16.10	7.77	10.18	6.54	3.27	2.19	2.71	111	232	284
			1	5	125	8.91	5.91	6.55	8.07	4.08	2.74	3.52	150	281	331
			5	5	125	16.30	9.72	11.60	8.07	4.08	2.74	3.52	150	281	331
	4	1	3	126	9.16	7.35	7.25	10.78	5.52	3.71	4.96	169	280	315	
		5	3	126	16.55	12.22	13.15	10.78	5.52	3.71	4.96	169	280	315	
	40	2	1	14	112	9.59	4.44	5.96	5.45	2.69	1.80	2.13	60	139	179
			5	14	112	16.55	6.02	8.92	5.45	2.69	1.80	2.13	60	139	179
			1	8	12C	9.80	5.31	6.53	6.54	3.27	2.19	2.71	111	232	284
		3	5	8	12C	16.75	7.96	10.47	6.54	3.27	2.19	2.71	111	232	284
			1	5	125	9.99	6.35	7.14	8.07	4.08	2.74	3.52	150	281	331
			5	5	12C	16.88	9.98	11.95	8.07	4.08	2.74	3.52	150	281	331
4		1	3	126	10.24	7.92	7.93	10.78	5.52	3.71	4.96	169	280	315	
		5	3	126	17.19	12.56	13.56	10.78	5.52	3.71	4.96	169	280	315	

90 CHARACTER DATA RECCRC 20K MEMORY

CW LNG	MRC CRC	NO. CF	PRCCSS TIME			TAPE TIME				MAXIMUM NUMBER OF					
			B	G	MILLISECNS/RECCRD	PH1	PH2	PH3	733C	729 II	729 IV	729 V	RECORDS IN THOUSANDS	200 CPI	556 CPI
5	2	1	12	96	7.62	4.41	5.57	6.20	3.06	2.05	2.43	53	123	157	
		5	12	96	15.33	6.15	8.79	6.20	3.06	2.05	2.43	53	123	157	
		1	7	105	7.85	5.12	5.96	7.41	3.70	2.48	3.07	99	205	251	
	3	5	7	105	15.56	8.01	10.23	7.41	3.70	2.48	3.07	99	205	251	
		1	5	11C	8.01	5.78	6.31	8.57	4.32	2.90	3.69	138	265	315	
		5	5	11C	15.72	9.72	11.54	8.57	4.32	2.90	3.69	138	265	315	
	4	1	3	111	8.26	7.13	6.94	11.28	5.76	3.87	5.13	157	268	304	
		5	3	111	15.97	12.17	13.04	11.28	5.76	3.87	5.13	157	268	304	
	10	2	1	12	96	7.89	4.46	5.66	6.20	3.06	2.05	2.43	53	123	157
			5	12	96	15.50	6.18	8.84	6.20	3.06	2.05	2.43	53	123	157
			1	7	105	8.12	5.20	6.08	7.41	3.70	2.48	3.07	99	205	251
		3	5	7	105	15.72	8.06	10.31	7.41	3.70	2.48	3.07	99	205	251
			1	5	11C	8.28	5.89	6.46	8.57	4.32	2.90	3.69	138	265	315
			5	5	11C	15.89	9.79	11.63	8.57	4.32	2.90	3.69	138	265	315
4		1	3	111	8.53	7.27	7.11	11.28	5.76	3.87	5.13	157	268	304	
		5	3	111	16.13	12.25	13.15	11.28	5.76	3.87	5.13	157	268	304	
20		2	1	12	96	8.43	4.55	5.84	6.20	3.06	2.05	2.43	53	123	157
			5	12	96	15.82	6.24	8.95	6.20	3.06	2.05	2.43	53	123	157
			1	7	105	8.66	5.36	6.32	7.41	3.70	2.48	3.07	99	205	251
		3	5	7	105	16.04	8.16	10.45	7.41	3.70	2.48	3.07	99	205	251
			1	5	11C	8.82	6.11	6.75	8.57	4.32	2.90	3.69	138	265	315
			5	5	11C	16.21	9.92	11.80	8.57	4.32	2.90	3.69	138	265	315
	4	1	3	111	9.07	7.55	7.45	11.28	5.76	3.87	5.13	157	268	304	
		5	3	111	16.45	12.42	13.35	11.28	5.76	3.87	5.13	157	268	304	
	40	2	1	12	96	9.51	4.75	6.20	6.20	3.06	2.05	2.43	53	123	157
			5	12	96	16.47	6.35	9.17	6.20	3.06	2.05	2.43	53	123	157
			1	7	105	9.74	5.68	6.80	7.41	3.70	2.48	3.07	99	205	251
		3	5	7	105	16.69	8.35	10.74	7.41	3.70	2.48	3.07	99	205	251
			1	5	11C	9.90	6.56	7.34	8.57	4.32	2.90	3.69	138	265	315
			5	5	11C	16.86	10.18	12.15	8.57	4.32	2.90	3.69	138	265	315
4		1	3	111	10.15	8.12	8.13	11.28	5.76	3.87	5.13	157	268	304	
		5	3	111	17.10	12.76	13.76	11.28	5.76	3.87	5.13	157	268	304	

100 CHARACTER DATA RECORD 20K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	11	88	7.64	4.68	5.80	6.85	3.38	2.26	2.68	48	111	142	
		5	11	88	15.36	6.43	9.02	6.85	3.38	2.26	2.68	48	111	142	
	3	1	7	98	7.87	5.32	6.16	7.91	3.94	2.64	3.24	90	192	237	
		5	7	98	15.58	8.22	10.44	7.91	3.94	2.64	3.24	90	192	237	
	4	1	4	100	8.08	6.44	6.70	10.09	5.10	3.42	4.40	120	225	264	
		5	4	100	15.79	10.46	11.92	10.09	5.10	3.42	4.40	120	225	264	
	5	1	2	102	8.54	8.84	7.74	15.17	7.80	5.25	7.10	126	198	220	
		5	2	102	16.25	14.15	13.85	15.17	7.80	5.25	7.10	126	198	220	
	10	2	1	11	88	7.91	4.73	5.89	6.85	3.38	2.26	2.68	48	111	142
			5	11	88	15.52	6.46	9.07	6.85	3.38	2.26	2.68	48	111	142
3		1	7	98	8.14	5.40	6.28	7.91	3.94	2.64	3.24	90	192	237	
		5	7	98	15.74	8.26	10.51	7.91	3.94	2.64	3.24	90	192	237	
4		1	4	100	8.35	6.55	6.84	10.09	5.10	3.42	4.40	120	225	264	
		5	4	100	15.95	10.52	12.01	10.09	5.10	3.42	4.40	120	225	264	
5		1	2	102	8.81	8.99	7.91	15.17	7.80	5.25	7.10	126	198	220	
		5	2	102	16.41	14.23	13.95	15.17	7.80	5.25	7.10	126	198	220	
20		2	1	11	88	8.45	4.83	6.07	6.85	3.38	2.26	2.68	48	111	142
			5	11	88	15.84	6.52	9.18	6.85	3.38	2.26	2.68	48	111	142
	3	1	7	98	8.68	5.56	6.52	7.91	3.94	2.64	3.24	90	192	237	
		5	7	98	16.06	8.36	10.65	7.91	3.94	2.64	3.24	90	192	237	
	4	1	4	100	8.89	6.78	7.14	10.09	5.10	3.42	4.40	120	225	264	
		5	4	100	16.28	10.66	12.18	10.09	5.10	3.42	4.40	120	225	264	
	5	1	2	102	9.35	9.29	8.25	15.17	7.80	5.25	7.10	126	198	220	
		5	2	102	16.74	14.41	14.15	15.17	7.80	5.25	7.10	126	198	220	
	40	2	1	11	88	9.53	5.02	6.43	6.85	3.38	2.26	2.68	48	111	142
			5	11	88	16.49	6.64	9.40	6.85	3.38	2.26	2.68	48	111	142
3		1	7	98	9.76	5.89	7.00	7.91	3.94	2.64	3.24	90	192	237	
		5	7	98	16.71	8.56	10.94	7.91	3.94	2.64	3.24	90	192	237	
4		1	4	100	9.97	7.23	7.72	10.09	5.10	3.42	4.40	120	225	264	
		5	4	100	16.92	10.93	12.54	10.09	5.10	3.42	4.40	120	225	264	
5		1	2	102	10.43	9.88	8.94	15.17	7.80	5.25	7.10	126	198	220	
		5	2	102	17.38	14.77	14.56	15.17	7.80	5.25	7.10	126	198	220	

120 CHARACTER DATA RECORD 20K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	9	72	7.70	5.27	6.28	8.26	4.08	2.73	3.24	40	92	118	
		5	9	72	15.41	7.05	9.50	8.26	4.08	2.73	3.24	40	92	118	
	3	1	5	80	7.95	6.24	6.77	10.07	5.04	3.38	4.20	73	150	184	
		5	5	80	15.66	9.23	11.05	10.07	5.04	3.38	4.20	73	150	184	
	4	1	3	84	8.24	7.60	7.40	12.78	6.48	4.35	5.64	97	177	207	
		5	3	84	15.95	11.75	12.63	12.78	6.48	4.35	5.64	97	177	207	
	5	1	2	86	8.55	9.25	8.14	16.17	8.28	5.57	7.44	113	186	210	
		5	2	86	16.26	14.55	14.25	16.17	8.28	5.57	7.44	113	186	210	
	10	2	1	9	72	7.97	5.32	6.37	8.26	4.08	2.73	3.24	40	92	118
			5	9	72	15.57	7.08	9.55	8.26	4.08	2.73	3.24	40	92	118
3		1	5	80	8.22	6.32	6.89	10.07	5.04	3.38	4.20	73	150	184	
		5	5	80	15.83	9.28	11.12	10.07	5.04	3.38	4.20	73	150	184	
4		1	3	84	8.51	7.71	7.55	12.78	6.48	4.35	5.64	97	177	207	
		5	3	84	16.11	11.82	12.71	12.78	6.48	4.35	5.64	97	177	207	
5		1	2	86	8.82	9.39	8.31	16.17	8.28	5.57	7.44	113	186	210	
		5	2	86	16.42	14.64	14.35	16.17	8.28	5.57	7.44	113	186	210	
20		2	1	9	72	8.51	5.42	6.55	8.26	4.08	2.73	3.24	40	92	118
			5	9	72	15.89	7.14	9.66	8.26	4.08	2.73	3.24	40	92	118
	3	1	5	80	8.76	6.49	7.13	10.07	5.04	3.38	4.20	73	150	184	
		5	5	80	16.15	9.38	11.26	10.07	5.04	3.38	4.20	73	150	184	
	4	1	3	84	9.05	7.95	7.84	12.78	6.48	4.35	5.64	97	177	207	
		5	3	84	16.43	11.96	12.89	12.78	6.48	4.35	5.64	97	177	207	
	5	1	2	86	9.36	9.69	8.66	16.17	8.28	5.57	7.44	113	186	210	
		5	2	86	16.75	14.82	14.56	16.17	8.28	5.57	7.44	113	186	210	
	40	2	1	9	72	9.59	5.62	6.91	8.26	4.08	2.73	3.24	40	92	118
			5	9	72	16.54	7.26	9.87	8.26	4.08	2.73	3.24	40	92	118
3		1	5	80	9.84	6.83	7.61	10.07	5.04	3.38	4.20	73	150	184	
		5	5	80	16.80	9.58	11.55	10.07	5.04	3.38	4.20	73	150	184	
4		1	3	84	10.13	8.41	8.43	12.78	6.48	4.35	5.64	97	177	207	
		5	3	84	17.08	12.24	13.24	12.78	6.48	4.35	5.64	97	177	207	
5		1	2	86	10.44	10.29	9.34	16.17	8.28	5.57	7.44	113	186	210	
		5	2	86	17.40	15.17	14.97	16.17	8.28	5.57	7.44	113	186	210	

140 CHARACTER DATA RECCRC 20K MEMORY

CW LNG	MRG ORC	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	8	64	7.41	5.80	6.74	9.54	4.71	3.15	3.73	34	79	102	
			8	64	13.84	7.61	9.95	9.54	4.71	3.15	3.73	34	79	102	
		5	5	7C	8.05	6.64	7.18	11.07	5.52	3.70	4.54	64	137	169	
	4	1	3	72	15.76	9.63	11.45	11.07	5.52	3.70	4.54	64	137	169	
			3	72	8.31	8.00	7.81	13.78	6.96	4.67	5.98	87	165	194	
		5	3	72	16.02	12.15	13.03	13.78	6.96	4.67	5.98	87	165	194	
	5	1	2	74	8.62	9.65	8.55	17.17	8.76	5.89	7.78	102	176	200	
			2	74	16.33	14.96	14.66	17.17	8.76	5.89	7.78	102	176	200	
	10C	2	1	8	64	7.63	5.85	6.83	9.54	4.71	3.15	3.73	34	79	102
				8	64	13.97	7.64	10.01	9.54	4.71	3.15	3.73	34	79	102
5			5	7C	8.32	6.73	7.30	11.07	5.52	3.70	4.54	64	137	169	
3		1	5	7C	15.92	9.68	11.52	11.07	5.52	3.70	4.54	64	137	169	
			5	7C	8.58	8.12	7.95	13.78	6.96	4.67	5.98	87	165	194	
		5	3	72	16.18	12.22	13.12	13.78	6.96	4.67	5.98	87	165	194	
5		1	2	74	8.89	9.80	8.72	17.17	8.76	5.89	7.78	102	176	200	
			2	74	16.49	15.04	14.76	17.17	8.76	5.89	7.78	102	176	200	
20C		2	1	8	64	8.08	5.95	7.01	9.54	4.71	3.15	3.73	34	79	102
				8	64	14.24	7.70	10.11	9.54	4.71	3.15	3.73	34	79	102
	5		5	7C	8.86	6.90	7.53	11.07	5.52	3.70	4.54	64	137	169	
	3	1	5	7C	16.25	9.79	11.67	11.07	5.52	3.70	4.54	64	137	169	
			5	7C	9.12	8.35	8.25	13.78	6.96	4.67	5.98	87	165	194	
		5	3	72	16.50	12.36	13.29	13.78	6.96	4.67	5.98	87	165	194	
	5	1	2	74	9.43	10.10	9.06	17.17	8.76	5.89	7.78	102	176	200	
			2	74	16.82	15.22	14.96	17.17	8.76	5.89	7.78	102	176	200	
	40C	2	1	8	64	8.98	6.15	7.37	9.54	4.71	3.15	3.73	34	79	102
				8	64	14.78	7.82	10.33	9.54	4.71	3.15	3.73	34	79	102
5			5	7C	9.94	7.23	8.01	11.07	5.52	3.70	4.54	64	137	169	
3		1	5	7C	16.90	9.99	11.95	11.07	5.52	3.70	4.54	64	137	169	
			5	7C	10.20	8.82	8.83	13.78	6.96	4.67	5.98	87	165	194	
		5	3	72	17.15	12.64	13.65	13.78	6.96	4.67	5.98	87	165	194	
5		1	2	74	10.51	10.69	9.75	17.17	8.76	5.89	7.78	102	176	200	
			2	74	17.47	15.58	15.37	17.17	8.76	5.89	7.78	102	176	200	

160 CHARACTER DATA RECORD 20K MEMORY

CW LNG	MRG CRC	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	7	56	7.57	6.36	7.21	10.91	5.38	3.60	4.26	30	69	89	
			7	56	13.99	8.20	10.42	10.91	5.38	3.60	4.26	30	69	89	
		5	1	4	6C	7.80	7.50	7.76	13.09	6.54	4.38	5.42	55	116	142
	4	1	4	6C	14.23	10.57	12.04	13.09	6.54	4.38	5.42	55	116	142	
			2	64	8.28	9.91	8.81	18.17	9.24	6.21	8.12	70	124	144	
		5	2	64	14.71	14.33	14.04	18.17	9.24	6.21	8.12	70	124	144	
	5	1	1	66	9.61	14.58	10.75	28.35	14.64	9.86	13.52	71	106	116	
			1	66	17.32	20.69	16.86	28.35	14.64	9.86	13.52	71	106	116	
	10C	2	1	7	56	7.79	6.42	7.30	10.91	5.38	3.60	4.26	30	69	89
				7	56	14.13	8.23	10.47	10.91	5.38	3.60	4.26	30	69	89
5			1	4	6C	8.03	7.59	7.88	13.09	6.54	4.38	5.42	55	116	142
3		1	4	6C	14.36	10.62	12.11	13.09	6.54	4.38	5.42	55	116	142	
			4	64	8.51	10.04	8.96	18.17	9.24	6.21	8.12	70	124	144	
		5	2	64	14.85	14.41	14.12	18.17	9.24	6.21	8.12	70	124	144	
5		1	1	66	9.88	14.75	10.92	28.35	14.64	9.86	13.52	71	106	116	
			1	66	17.49	20.79	16.96	28.35	14.64	9.86	13.52	71	106	116	
20C		2	1	7	56	8.24	6.52	7.48	10.91	5.38	3.60	4.26	30	69	89
				7	56	14.40	8.29	10.58	10.91	5.38	3.60	4.26	30	69	89
	5		1	4	6C	8.48	7.76	8.12	13.09	6.54	4.38	5.42	55	116	142
	3	1	4	6C	14.63	10.73	12.25	13.09	6.54	4.38	5.42	55	116	142	
			4	64	8.96	10.29	9.25	18.17	9.24	6.21	8.12	70	124	144	
		5	2	64	15.12	14.56	14.30	18.17	9.24	6.21	8.12	70	124	144	
	5	1	1	66	10.42	15.09	11.27	28.35	14.64	9.86	13.52	71	106	116	
			1	65	17.80	20.99	17.17	28.35	14.64	9.86	13.52	71	106	116	
	40C	2	1	7	56	9.14	6.72	7.84	10.91	5.38	3.60	4.26	30	69	89
				7	56	14.94	8.42	10.80	10.91	5.38	3.60	4.26	30	69	89
5			1	4	6C	9.38	8.10	8.60	13.09	6.54	4.38	5.42	55	116	142
3		1	4	6C	15.17	10.93	12.54	13.09	6.54	4.38	5.42	55	116	142	
			2	64	9.86	10.78	9.84	18.17	9.24	6.21	8.12	70	124	144	
		5	2	64	15.66	14.85	14.65	18.17	9.24	6.21	8.12	70	124	144	
5		1	1	66	11.50	15.78	11.95	28.35	14.64	9.86	13.52	71	106	116	
			1	65	18.45	21.40	17.58	28.35	14.64	9.86	13.52	71	106	116	

180 CHARACTER DATA RECORD 20K MEMORY

CW LNG	MRG ORD	NO. CF	E	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	6	54	7.81	6.98	7.70	12.39	6.12	4.10	4.86	26	61	78	
					14.24	8.86	10.91	12.39	6.12	4.10	4.86	26	61	78	
		3	1	3	57	8.13	8.66	8.47	15.78	7.92	5.31	6.66	48	96	116
	14.56					11.86	12.74	15.78	7.92	5.31	6.66	48	96	116	
	4	1	2	58	8.44	10.32	9.22	19.17	9.72	6.53	8.46	64	118	138	
					14.86	14.74	14.44	19.17	9.72	6.53	8.46	64	118	138	
		5	1	59	9.31	14.98	11.16	29.35	15.12	10.18	13.86	66	102	113	
	15.74				21.09	17.27	29.35	15.12	10.18	13.86	66	102	113		
	10	2	1	6	54	8.04	7.04	7.79	12.39	6.12	4.10	4.86	26	61	78
						14.37	8.89	10.97	12.39	6.12	4.10	4.86	26	61	78
			3	1	3	57	8.36	8.75	8.59	15.78	7.92	5.31	6.66	48	96
		14.70					11.92	12.81	15.78	7.92	5.31	6.66	48	96	116
		4	1	2	58	8.66	10.44	9.36	19.17	9.72	6.53	8.46	64	118	138
						15.00	14.81	14.53	19.17	9.72	6.53	8.46	64	118	138
			5	1	59	9.54	15.15	11.33	29.35	15.12	10.18	13.86	66	102	113
15.88		21.19				17.37	29.35	15.12	10.18	13.86	66	102	113		
20		2	1	6	54	8.49	7.14	7.97	12.39	6.12	4.10	4.86	26	61	78
						14.64	8.95	11.07	12.39	6.12	4.10	4.86	26	61	78
			3	1	3	57	8.81	8.93	8.82	15.78	7.92	5.31	6.66	48	96
		14.97					12.03	12.96	15.78	7.92	5.31	6.66	48	96	116
		4	1	2	58	9.11	10.69	9.66	19.17	9.72	6.53	8.46	64	118	138
						15.27	14.96	14.70	19.17	9.72	6.53	8.46	64	118	138
			5	1	59	9.99	15.50	11.67	29.35	15.12	10.18	13.86	66	102	113
	16.15	21.40				17.57	29.35	15.12	10.18	13.86	66	102	113		
	40	2	1	6	54	9.39	7.35	8.33	12.39	6.12	4.10	4.86	26	61	78
						15.18	9.08	11.29	12.39	6.12	4.10	4.86	26	61	78
			3	1	3	57	9.71	9.29	9.30	15.78	7.92	5.31	6.66	48	96
		15.51					12.24	13.24	15.78	7.92	5.31	6.66	48	96	116
		4	1	2	58	10.01	11.19	10.24	19.17	9.72	6.53	8.46	64	118	138
						15.81	15.26	15.06	19.17	9.72	6.53	8.46	64	118	138
			5	1	59	10.89	16.18	12.36	29.35	15.12	10.18	13.86	66	102	113
16.69		21.81				17.58	29.35	15.12	10.18	13.86	66	102	113		

200 CHARACTER DATA RECORD 20K MEMORY

CW LNG	MRG ORD	NO. CF	E	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	5	45	7.99	7.69	8.22	14.07	6.96	4.66	5.56	24	54	69	
					14.42	9.62	11.44	14.07	6.96	4.66	5.56	24	54	69	
		3	1	3	51	8.29	9.07	8.87	16.78	8.40	5.63	7.00	44	90	110
	14.72					12.27	13.15	16.78	8.40	5.63	7.00	44	90	110	
	4	1	2	52	8.59	10.72	9.62	20.17	10.20	6.85	8.80	60	112	132	
					15.02	15.14	14.85	20.17	10.20	6.85	8.80	60	112	132	
		5	1	53	9.47	15.39	11.56	30.35	15.60	10.50	14.20	63	99	110	
	15.89				21.50	17.67	30.35	15.60	10.50	14.20	63	99	110		
	10	2	1	5	45	8.22	7.74	8.31	14.07	6.96	4.66	5.56	24	54	69
						14.55	9.65	11.49	14.07	6.96	4.66	5.56	24	54	69
			3	1	3	51	8.51	9.16	8.99	16.78	8.40	5.63	7.00	44	90
		14.85					12.32	13.22	16.78	8.40	5.63	7.00	44	90	110
		4	1	2	52	8.81	10.85	9.77	20.17	10.20	6.85	8.80	60	112	132
						15.15	15.22	14.93	20.17	10.20	6.85	8.80	60	112	132
			5	1	53	9.69	15.56	11.73	30.35	15.60	10.50	14.20	63	99	110
16.03		21.60				17.77	30.35	15.60	10.50	14.20	63	99	110		
20		2	1	5	45	8.67	7.85	8.49	14.07	6.96	4.66	5.56	24	54	69
						14.82	9.72	11.60	14.07	6.96	4.66	5.56	24	54	69
			3	1	3	51	8.96	9.33	9.23	16.78	8.40	5.63	7.00	44	90
		15.12					12.43	13.36	16.78	8.40	5.63	7.00	44	90	110
		4	1	2	52	9.26	11.10	10.06	20.17	10.20	6.85	8.80	60	112	132
						15.42	15.37	15.11	20.17	10.20	6.85	8.80	60	112	132
			5	1	53	10.14	15.90	12.08	30.35	15.60	10.50	14.20	63	99	110
	16.30	21.80				17.98	30.35	15.60	10.50	14.20	63	99	110		
	40	2	1	5	45	9.57	8.07	8.85	14.07	6.96	4.66	5.56	24	54	69
						15.36	9.85	11.81	14.07	6.96	4.66	5.56	24	54	69
			3	1	3	51	9.86	9.69	9.71	16.78	8.40	5.63	7.00	44	90
		15.66					12.65	13.65	16.78	8.40	5.63	7.00	44	90	110
		4	1	2	52	10.16	11.59	10.65	20.17	10.20	6.85	8.80	60	112	132
						15.96	15.66	15.46	20.17	10.20	6.85	8.80	60	112	132
			5	1	53	11.04	16.59	12.76	30.35	15.60	10.50	14.20	63	99	110
16.84		22.21				18.39	30.35	15.60	10.50	14.20	63	99	110		

220 CHARACTER DATA RECORD 20K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	5	4C	8.17	8.10	8.63	15.07	7.44	4.98	5.90	22	50	64	
		5	5	4C	14.59	10.02	11.84	15.07	7.44	4.98	5.90	22	50	64	
		1	3	45	8.45	9.47	9.28	17.78	8.88	5.95	7.34	40	85	105	
	4	5	3	45	14.87	12.67	13.55	17.78	8.88	5.95	7.34	40	85	105	
		1	2	46	8.75	11.13	10.03	21.17	10.68	7.17	9.14	56	107	127	
		5	2	46	15.17	15.55	15.25	21.17	10.68	7.17	9.14	56	107	127	
	5	1	1	48	9.64	15.79	11.97	31.35	16.08	10.82	14.54	59	96	107	
		5	1	48	16.06	21.90	18.08	31.35	16.08	10.82	14.54	59	96	107	
	10	2	1	5	4C	8.39	8.15	8.72	15.07	7.44	4.98	5.90	22	50	64
			5	5	4C	14.73	10.06	11.90	15.07	7.44	4.98	5.90	22	50	64
			1	3	45	8.67	9.56	9.40	17.78	8.88	5.95	7.34	40	85	105
		3	5	3	45	15.01	12.73	13.62	17.78	8.88	5.95	7.34	40	85	105
			1	2	46	8.97	11.25	10.17	21.17	10.68	7.17	9.14	56	107	127
			5	2	46	15.31	15.62	15.34	21.17	10.68	7.17	9.14	56	107	127
4		1	1	48	9.86	15.96	12.14	31.35	16.08	10.82	14.54	59	96	107	
		5	1	48	16.20	22.00	18.18	31.35	16.08	10.82	14.54	59	96	107	
20		2	1	5	4C	8.84	8.26	8.90	15.07	7.44	4.98	5.90	22	50	64
			5	5	4C	15.00	10.12	12.00	15.07	7.44	4.98	5.90	22	50	64
			1	3	45	9.12	9.74	9.63	17.78	8.88	5.95	7.34	40	85	105
		3	5	3	45	15.28	12.84	13.77	17.78	8.88	5.95	7.34	40	85	105
			1	2	46	9.42	11.50	10.47	21.17	10.68	7.17	9.14	56	107	127
			5	2	46	15.58	15.77	15.51	21.17	10.68	7.17	9.14	56	107	127
	4	1	1	48	10.31	16.31	12.48	31.35	16.08	10.82	14.54	59	96	107	
		5	1	48	16.47	22.21	18.38	31.35	16.08	10.82	14.54	59	96	107	
	40	2	1	5	4C	9.74	8.47	9.26	15.07	7.44	4.98	5.90	22	50	64
			5	5	4C	15.54	10.25	12.22	15.07	7.44	4.98	5.90	22	50	64
			1	3	45	10.02	10.10	10.11	17.78	8.88	5.95	7.34	40	85	105
		3	5	3	45	15.82	13.05	14.05	17.78	8.88	5.95	7.34	40	85	105
			1	2	46	10.32	12.00	11.05	21.17	10.68	7.17	9.14	56	107	127
			5	2	46	16.12	16.07	15.87	21.17	10.68	7.17	9.14	56	107	127
4		1	1	48	11.21	16.99	13.17	31.35	16.08	10.82	14.54	59	96	107	
		5	1	48	17.01	22.62	18.79	31.35	16.08	10.82	14.54	59	96	107	

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CW LNG	MRG CRD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
!	2	1	4	4C	8.48	8.95	9.21	17.09	8.46	5.66	6.78	19	44	56	
		5	4	4C	14.90	10.96	12.43	17.09	8.46	5.66	6.78	19	44	56	
		1	2	42	8.93	11.38	10.28	22.17	11.16	7.49	9.48	35	68	81	
	3	5	2	42	15.36	14.86	14.56	22.17	11.16	7.49	9.48	35	68	81	
		1	1	44	9.82	16.06	12.23	32.35	16.56	11.14	14.88	42	70	78	
		5	1	44	16.24	21.28	17.46	32.35	16.56	11.14	14.88	42	70	78	
	4	1	1	44	9.82	16.20	12.37	32.35	16.56	11.14	14.88	56	93	105	
		5	1	44	16.24	22.31	18.48	32.35	16.56	11.14	14.88	56	93	105	
	11	2	1	4	4C	8.70	9.01	9.30	17.09	8.46	5.66	6.78	19	44	56
			5	4	4C	15.04	11.00	12.48	17.09	8.46	5.66	6.78	19	44	56
			1	2	42	9.16	11.48	10.40	22.17	11.16	7.49	9.48	35	68	81
		3	5	2	42	15.49	14.91	14.63	22.17	11.16	7.49	9.48	35	68	81
			1	1	44	10.04	16.20	12.38	32.35	16.56	11.14	14.88	42	70	78
			5	1	44	16.38	21.37	17.54	32.35	16.56	11.14	14.88	42	70	78
4		1	1	44	10.04	16.37	12.54	32.35	16.56	11.14	14.88	56	93	105	
		5	1	44	16.38	22.41	18.58	32.35	16.56	11.14	14.88	56	93	105	
21		2	1	4	4C	9.15	9.12	9.48	17.09	8.46	5.66	6.78	19	44	56
			5	4	4C	15.31	11.06	12.59	17.09	8.46	5.66	6.78	19	44	56
			1	2	42	9.61	11.67	10.64	22.17	11.16	7.49	9.48	35	68	81
		3	5	2	42	15.76	15.03	14.77	22.17	11.16	7.49	9.48	35	68	81
			1	1	44	10.49	16.50	12.67	32.35	16.56	11.14	14.88	42	70	78
			5	1	44	16.65	21.54	17.72	32.35	16.56	11.14	14.88	42	70	78
	4	1	1	44	10.49	16.71	12.89	32.35	16.56	11.14	14.88	56	93	105	
		5	1	44	16.65	22.61	18.79	32.35	16.56	11.14	14.88	56	93	105	
	40	2	1	4	4C	10.05	9.35	9.84	17.09	8.46	5.66	6.78	19	44	56
			5	4	4C	15.85	11.20	12.80	17.09	8.46	5.66	6.78	19	44	56
			1	2	42	10.51	12.06	11.12	22.17	11.16	7.49	9.48	35	68	81
		3	5	2	42	16.30	15.26	15.06	22.17	11.16	7.49	9.48	35	68	81
			1	1	44	11.39	17.08	13.26	32.35	16.56	11.14	14.88	42	70	78
			5	1	44	17.19	21.90	18.07	32.35	16.56	11.14	14.88	42	70	78
4		1	1	44	11.39	17.40	13.57	32.35	16.56	11.14	14.88	56	93	105	
		5	1	44	17.19	23.02	19.20	32.35	16.56	11.14	14.88	56	93	105	

260 CHARACTER DATA RECCRC 20K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS		
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI
	2	1	4	36	8.66	9.36	9.62	18.09	8.94	5.98	7.12	18	42	53
	5	4	36	36	15.09	11.37	12.83	18.09	8.94	5.98	7.12	18	42	53
	3	1	2	4C	9.13	11.79	10.69	23.17	11.64	7.81	9.82	32	65	78
	5	2	4C	4C	15.56	15.26	14.96	23.17	11.64	7.81	9.82	32	65	78
	4	1	1	41	10.01	16.46	12.64	33.35	17.04	11.46	15.22	40	68	77
	5	1	1	41	16.44	21.69	17.86	33.35	17.04	11.46	15.22	40	68	77
	5	1	1	41	10.01	16.60	12.78	33.35	17.04	11.46	15.22	53	90	102
	5	1	1	41	16.44	22.71	18.89	33.35	17.04	11.46	15.22	53	90	102
10	2	1	4	36	8.89	9.41	9.71	18.09	8.94	5.98	7.12	18	42	53
	5	4	36	36	15.23	11.40	12.89	18.09	8.94	5.98	7.12	18	42	53
	3	1	2	4C	9.36	11.89	10.81	23.17	11.64	7.81	9.82	32	65	78
	5	2	4C	4C	15.70	15.32	15.03	23.17	11.64	7.81	9.82	32	65	78
	4	1	1	41	10.24	16.61	12.78	33.35	17.04	11.46	15.22	40	68	77
	5	1	1	41	16.57	21.77	17.95	33.35	17.04	11.46	15.22	40	68	77
	5	1	1	41	10.24	16.77	12.95	33.35	17.04	11.46	15.22	53	90	102
	5	1	1	41	16.57	22.81	18.99	33.35	17.04	11.46	15.22	53	90	102
20	2	1	4	36	9.34	9.53	9.89	18.09	8.94	5.98	7.12	18	42	53
	5	4	36	36	15.50	11.47	12.59	18.09	8.94	5.98	7.12	18	42	53
	3	1	2	4C	9.81	12.08	11.64	23.17	11.64	7.81	9.82	32	65	78
	5	2	4C	4C	15.97	15.44	15.18	23.17	11.64	7.81	9.82	32	65	78
	4	1	1	41	10.69	16.90	13.08	33.35	17.04	11.46	15.22	40	68	77
	5	1	1	41	16.84	21.95	18.12	33.35	17.04	11.46	15.22	40	68	77
	5	1	1	41	10.69	17.12	13.29	33.35	17.04	11.46	15.22	53	90	102
	5	1	1	41	16.84	23.02	19.19	33.35	17.04	11.46	15.22	53	90	102
4C	2	1	4	36	10.24	9.75	10.25	18.09	8.94	5.98	7.12	18	42	53
	5	4	36	36	16.04	11.60	13.21	18.09	8.94	5.98	7.12	18	42	53
	3	1	2	4C	10.71	12.47	11.52	23.17	11.64	7.81	9.82	32	65	78
	5	2	4C	4C	16.51	15.67	15.46	23.17	11.64	7.81	9.82	32	65	78
	4	1	1	41	11.59	17.49	13.66	33.35	17.04	11.46	15.22	40	68	77
	5	1	1	41	17.38	22.30	18.48	33.35	17.04	11.46	15.22	40	68	77
	5	1	1	41	11.59	17.80	13.98	33.35	17.04	11.46	15.22	53	90	102
	5	1	1	41	17.38	23.43	19.60	33.35	17.04	11.46	15.22	53	90	102

280 CHARACTER DATA RECORD 20K MEMORY

CW LNG	MRG CRD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
	5	2	1	4	36	8.89	9.76	10.02	19.09	9.42	6.30	7.46	17	39	51
	5	4	36	36	15.32	11.77	13.24	19.09	9.42	6.30	7.46	17	39	51	
	3	1	2	36	9.32	12.19	11.09	24.17	12.12	8.13	10.16	31	62	76	
	5	2	36	36	15.75	15.67	15.37	24.17	12.12	8.13	10.16	31	62	76	
	4	1	1	38	10.21	16.87	13.04	34.35	17.52	11.78	15.56	38	66	75	
	5	1	1	38	16.63	22.09	18.27	34.35	17.52	11.78	15.56	38	66	75	
	5	1	1	38	10.21	17.01	13.18	34.35	17.52	11.78	15.56	51	88	100	
	5	1	1	38	16.63	23.12	19.29	34.35	17.52	11.78	15.56	51	88	100	
1C	2	1	4	36	9.11	9.82	10.11	19.09	9.42	6.30	7.46	17	39	51	
	5	4	36	36	15.45	11.81	13.29	19.09	9.42	6.30	7.46	17	39	51	
	3	1	2	36	9.55	12.29	11.21	24.17	12.12	8.13	10.16	31	62	76	
	5	2	36	36	15.88	15.72	15.44	24.17	12.12	8.13	10.16	31	62	76	
	4	1	1	38	10.43	17.01	13.19	34.35	17.52	11.78	15.56	38	66	75	
	5	1	1	38	16.77	22.18	18.35	34.35	17.52	11.78	15.56	38	66	75	
	5	1	1	38	10.43	17.18	13.35	34.35	17.52	11.78	15.56	51	88	100	
	5	1	1	38	16.77	23.22	19.39	34.35	17.52	11.78	15.56	51	88	100	
2C	2	1	4	36	9.56	9.93	10.29	19.09	9.42	6.30	7.46	17	39	51	
	5	4	36	36	15.72	11.87	13.40	19.09	9.42	6.30	7.46	17	39	51	
	3	1	2	36	10.00	12.48	11.45	24.17	12.12	8.13	10.16	31	62	76	
	5	2	36	36	16.15	15.84	15.58	24.17	12.12	8.13	10.16	31	62	76	
	4	1	1	38	10.88	17.31	13.48	34.35	17.52	11.78	15.56	38	66	75	
	5	1	1	38	17.04	22.35	18.53	34.35	17.52	11.78	15.56	38	66	75	
	5	1	1	38	10.88	17.52	13.70	34.35	17.52	11.78	15.56	51	88	100	
	5	1	1	38	17.04	23.42	19.60	34.35	17.52	11.78	15.56	51	88	100	
4C	2	1	4	36	10.46	10.16	10.65	19.09	9.42	6.30	7.46	17	39	51	
	5	4	36	36	16.26	12.01	13.61	19.09	9.42	6.30	7.46	17	39	51	
	3	1	2	36	10.90	12.87	11.93	24.17	12.12	8.13	10.16	31	62	76	
	5	2	36	36	16.69	16.07	15.87	24.17	12.12	8.13	10.16	31	62	76	
	4	1	1	38	11.78	17.89	14.07	34.35	17.52	11.78	15.56	38	66	75	
	5	1	1	38	17.58	22.71	18.88	34.35	17.52	11.78	15.56	38	66	75	
	5	1	1	38	11.78	18.21	14.38	34.35	17.52	11.78	15.56	51	88	100	
	5	1	1	38	17.58	23.83	20.01	34.35	17.52	11.78	15.56	51	88	100	

300 CHARACTER DATA RECORD 20K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	3	33	9.23	10.92	10.73	21.78	10.80	7.23	8.70	15	34	44	
		5	3	33	15.66	13.06	13.94	21.78	10.80	7.23	8.70	15	34	44	
	3	1	2	34	9.53	12.60	11.50	25.17	12.60	8.45	10.50	29	60	73	
		5	2	34	15.96	16.07	15.77	25.17	12.60	8.45	10.50	29	60	73	
	4	1	1	35	10.41	17.27	13.45	35.35	18.00	12.10	15.90	36	64	73	
		5	1	35	16.83	22.50	18.67	35.35	18.00	12.10	15.90	36	64	73	
	5	1	**	**	**	**	**	**	**	**	**	**	**	**	
		5	**	**	**	**	**	**	**	**	**	**	**	**	
	10	2	1	3	33	9.46	10.98	10.82	21.78	10.80	7.23	8.70	15	34	44
			5	3	33	15.79	13.10	14.00	21.78	10.80	7.23	8.70	15	34	44
3		1	2	34	9.76	12.70	11.62	25.17	12.60	8.45	10.50	29	60	73	
		5	2	34	16.09	16.13	15.84	25.17	12.60	8.45	10.50	29	60	73	
4		1	1	35	10.63	17.42	13.59	35.35	18.00	12.10	15.90	36	64	73	
		5	1	35	16.97	22.58	18.76	35.35	18.00	12.10	15.90	36	64	73	
5		1	**	**	**	**	**	**	**	**	**	**	**	**	
		5	**	**	**	**	**	**	**	**	**	**	**	**	
20		2	1	3	33	9.91	11.10	11.00	21.78	10.80	7.23	8.70	15	34	44
			5	3	33	16.06	13.17	14.10	21.78	10.80	7.23	8.70	15	34	44
	3	1	2	34	10.21	12.89	11.85	25.17	12.60	8.45	10.50	29	60	73	
		5	2	34	16.36	16.25	15.99	25.17	12.60	8.45	10.50	29	60	73	
	4	1	1	35	11.08	17.71	13.89	35.35	18.00	12.10	15.90	36	64	73	
		5	1	35	17.24	22.76	18.93	35.35	18.00	12.10	15.90	36	64	73	
	5	1	**	**	**	**	**	**	**	**	**	**	**	**	
		5	**	**	**	**	**	**	**	**	**	**	**	**	
	40	2	1	3	33	10.81	11.34	11.36	21.78	10.80	7.23	8.70	15	34	44
			5	3	33	16.60	13.32	14.32	21.78	10.80	7.23	8.70	15	34	44
3		1	2	34	11.11	13.28	12.33	25.17	12.60	8.45	10.50	29	60	73	
		5	2	34	16.90	16.48	16.27	25.17	12.60	8.45	10.50	29	60	73	
4		1	1	35	11.98	18.30	14.47	35.35	18.00	12.10	15.90	36	64	73	
		5	1	35	17.78	23.11	19.29	35.35	18.00	12.10	15.90	36	64	73	
5		1	**	**	**	**	**	**	**	**	**	**	**	**	
		5	**	**	**	**	**	**	**	**	**	**	**	**	

400 CHARACTER DATA RECORD 20K MEMORY

CW LNG	MRG CRD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	2	26	10.15	14.45	13.35	30.17	15.00	10.05	12.20	11	25	31	
		5	2	26	15.29	16.87	16.57	30.17	15.00	10.05	12.20	11	25	31	
	3	1	1	27	11.02	19.15	15.32	40.35	20.40	13.70	17.60	20	37	44	
		5	1	27	16.16	23.42	19.60	40.35	20.40	13.70	17.60	20	37	44	
	4	1	1	27	11.02	19.30	15.47	40.35	20.40	13.70	17.60	30	56	66	
		5	1	27	16.16	24.52	20.70	40.35	20.40	13.70	17.60	30	56	66	
	5	1	**	**	**	**	**	**	**	**	**	**	**	**	
		5	**	**	**	**	**	**	**	**	**	**	**	**	
	10	2	1	2	26	10.33	14.52	13.44	30.17	15.00	10.05	12.20	11	25	31
			5	2	26	15.40	16.91	16.62	30.17	15.00	10.05	12.20	11	25	31
3		1	1	27	11.20	19.27	15.44	40.35	20.40	13.70	17.60	20	37	44	
		5	1	27	16.27	23.49	19.67	40.35	20.40	13.70	17.60	20	37	44	
4		1	1	27	11.20	19.44	15.62	40.35	20.40	13.70	17.60	30	56	66	
		5	1	27	16.27	24.61	20.78	40.35	20.40	13.70	17.60	30	56	66	
5		1	**	**	**	**	**	**	**	**	**	**	**	**	
		5	**	**	**	**	**	**	**	**	**	**	**	**	
20		2	1	2	26	10.69	14.66	13.62	30.17	15.00	10.05	12.20	11	25	31
			5	2	26	15.62	16.99	16.73	30.17	15.00	10.05	12.20	11	25	31
	3	1	1	27	11.56	19.50	15.68	40.35	20.40	13.70	17.60	20	37	44	
		5	1	27	16.49	23.64	19.81	40.35	20.40	13.70	17.60	20	37	44	
	4	1	1	27	11.56	19.74	15.91	40.35	20.40	13.70	17.60	30	56	66	
		5	1	27	16.49	24.78	20.96	40.35	20.40	13.70	17.60	30	56	66	
	5	1	**	**	**	**	**	**	**	**	**	**	**	**	
		5	**	**	**	**	**	**	**	**	**	**	**	**	
	40	2	1	2	26	11.41	14.93	13.98	30.17	15.00	10.05	12.20	11	25	31
			5	2	26	16.05	17.15	16.94	30.17	15.00	10.05	12.20	11	25	31
3		1	1	27	12.28	19.98	16.16	40.35	20.40	13.70	17.60	20	37	44	
		5	1	27	16.92	23.92	20.10	40.35	20.40	13.70	17.60	20	37	44	
4		1	1	27	12.28	20.32	16.50	40.35	20.40	13.70	17.60	30	56	66	
		5	1	27	16.92	25.14	21.31	40.35	20.40	13.70	17.60	30	56	66	
5		1	**	**	**	**	**	**	**	**	**	**	**	**	
		5	**	**	**	**	**	**	**	**	**	**	**	**	



500 CHARACTER DATA RECORD 20K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS		
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI
5	2	1	2	2C	11.26	16.48	15.38	35.17	17.40	11.65	13.90	9	21	27
		5	2	2C	16.40	18.89	18.59	35.17	17.40	11.65	13.90	9	21	27
	3	1	1	21	12.13	21.17	17.35	45.35	22.80	15.30	19.30	16	33	40
		5	1	21	17.27	25.45	21.62	45.35	22.80	15.30	19.30	16	33	40
	4	1	**	**	**	**	**	**	**	**	**	**	**	**
5	1	**	**	**	**	**	**	**	**	**	**	**	**	
	5	**	**	**	**	**	**	**	**	**	**	**	**	
10	2	1	2	2C	11.44	16.55	15.47	35.17	17.40	11.65	13.90	9	21	27
		5	2	2C	16.51	18.93	18.65	35.17	17.40	11.65	13.90	9	21	27
	3	1	1	21	12.31	21.29	17.47	45.35	22.80	15.30	19.30	16	33	40
		5	1	21	17.38	25.52	21.69	45.35	22.80	15.30	19.30	16	33	40
	4	1	**	**	**	**	**	**	**	**	**	**	**	
5	1	**	**	**	**	**	**	**	**	**	**	**	**	
	5	**	**	**	**	**	**	**	**	**	**	**	**	
20	2	1	2	2C	11.80	16.68	15.65	35.17	17.40	11.65	13.90	9	21	27
		5	2	2C	16.73	19.01	18.75	35.17	17.40	11.65	13.90	9	21	27
	3	1	1	21	12.67	21.53	17.70	45.35	22.80	15.30	19.30	16	33	40
		5	1	21	17.59	25.66	21.84	45.35	22.80	15.30	19.30	16	33	40
	4	1	**	**	**	**	**	**	**	**	**	**	**	
5	1	**	**	**	**	**	**	**	**	**	**	**	**	
	5	**	**	**	**	**	**	**	**	**	**	**	**	
40	2	1	2	2C	12.52	16.95	16.01	35.17	17.40	11.65	13.90	9	21	27
		5	2	2C	17.16	19.17	18.97	35.17	17.40	11.65	13.90	9	21	27
	3	1	1	21	13.39	22.01	18.18	45.35	22.80	15.30	19.30	16	33	40
		5	1	21	18.03	25.95	22.12	45.35	22.80	15.30	19.30	16	33	40
	4	1	**	**	**	**	**	**	**	**	**	**	**	
5	1	**	**	**	**	**	**	**	**	**	**	**	**	
	5	**	**	**	**	**	**	**	**	**	**	**	**	

750 CHARACTER DATA RECORD 20K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS		
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI
5	2	1	1	14	14.52	26.06	22.24	57.85	28.80	19.30	23.55	6	13	16
		5	1	14	18.37	29.28	25.45	57.85	28.80	19.30	23.55	6	13	16
	3	1	**	**	**	**	**	**	**	**	**	**	**	
		5	**	**	**	**	**	**	**	**	**	**	**	
	4	1	**	**	**	**	**	**	**	**	**	**	**	
5	1	**	**	**	**	**	**	**	**	**	**	**	**	
	5	**	**	**	**	**	**	**	**	**	**	**	**	
10	2	1	1	14	14.65	26.15	22.33	57.85	28.80	19.30	23.55	6	13	16
		5	1	14	18.45	29.33	25.51	57.85	28.80	19.30	23.55	6	13	16
	3	1	**	**	**	**	**	**	**	**	**	**	**	
		5	**	**	**	**	**	**	**	**	**	**	**	
	4	1	**	**	**	**	**	**	**	**	**	**	**	
5	1	**	**	**	**	**	**	**	**	**	**	**	**	
	5	**	**	**	**	**	**	**	**	**	**	**	**	
20	2	1	1	14	14.92	26.33	22.51	57.85	28.80	19.30	23.55	6	13	16
		5	1	14	18.62	29.44	25.62	57.85	28.80	19.30	23.55	6	13	16
	3	1	**	**	**	**	**	**	**	**	**	**	**	
		5	**	**	**	**	**	**	**	**	**	**	**	
	4	1	**	**	**	**	**	**	**	**	**	**	**	
5	1	**	**	**	**	**	**	**	**	**	**	**	**	
	5	**	**	**	**	**	**	**	**	**	**	**	**	
40	2	1	1	14	15.46	26.69	22.87	57.85	28.80	19.30	23.55	6	13	16
		5	1	14	18.94	29.66	25.83	57.85	28.80	19.30	23.55	6	13	16
	3	1	**	**	**	**	**	**	**	**	**	**	**	
		5	**	**	**	**	**	**	**	**	**	**	**	
	4	1	**	**	**	**	**	**	**	**	**	**	**	
5		**	**	**	**	**	**	**	**	**	**	**		
5	1	**	**	**	**	**	**	**	**	**	**	**	**	
	5	**	**	**	**	**	**	**	**	**	**	**	**	

1000 CHARACTER DATA RECORD 20K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS		
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI
5	2	1	1	1C	17.43	31.13	27.30	70.35	34.80	23.30	27.80	4	10	13
		5	1	1C	21.29	34.34	30.52	70.35	34.80	23.30	27.80	4	10	13
	3	1	**	**										
		5	**	**										
		5	**	**										
10	2	1	1	1C	17.56	31.22	27.35	70.35	34.80	23.30	27.80	4	10	13
		5	1	1C	21.37	34.4C	30.57	70.35	34.80	23.30	27.80	4	10	13
	3	1	**	**										
		5	**	**										
		5	**	**										
20	2	1	1	10	17.83	31.40	27.57	70.35	34.80	23.30	27.80	4	10	13
		5	1	1C	21.53	34.5C	30.68	70.35	34.80	23.30	27.80	4	10	13
	3	1	**	**										
		5	**	**										
		5	**	**										
40	2	1	1	1C	18.37	31.76	27.93	70.35	34.80	23.30	27.80	4	10	13
		5	1	1C	21.85	34.72	30.89	70.35	34.80	23.30	27.80	4	10	13
	3	1	**	**										
		5	**	**										
		5	**	**										

1500 CHARACTER DATA RECCRC 20K MEMORY

CW LNG	MRG CRD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS		
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI
1	2	1	**	**										
		5	**	**										
		5	**	**										
	4	1	**	**										
		5	**	**										
10	2	1	**	**										
		5	**	**										
	3	1	**	**										
		5	**	**										
		5	**	**										
20	2	1	**	**										
		5	**	**										
	3	1	**	**										
		5	**	**										
		5	**	**										
40	2	1	**	**										
		5	**	**										
	3	1	**	**										
		5	**	**										
		5	**	**										

2000 CHARACTER DATA RECORD      20K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME			TAPE TIME				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					MILLISECONDS/RECORD			MILLISECONDS/RECORD							
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	**	**											
		5	**	**											
	3	1	**	**											
		5	**	**											
	4	1	**	**											
		5	**	**											
	5	1	**	**											
		5	**	**											
	10	2	1	**	**										
			5	**	**										
3		1	**	**											
		5	**	**											
4		1	**	**											
		5	**	**											
5		1	**	**											
		5	**	**											
20		2	1	**	**										
			5	**	**										
	3	1	**	**											
		5	**	**											
	4	1	**	**											
		5	**	**											
	5	1	**	**											
		5	**	**											
	40	2	1	**	**										
			5	**	**										
3		1	**	**											
		5	**	**											
4		1	**	**											
		5	**	**											
5		1	**	**											
		5	**	**											

20 CHARACTER DATA RECCRC 40K MEMORY

Ch LNG	MRG CRC	NC. CF	B	G	PRCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	223	892	19.11	2.28	3.87	1.09	0.53	0.35	0.39	267	701	973	
		5	223	892	30.68	3.89	7.09	1.09	0.53	0.35	0.39	267	701	973	
	3	1	16C	96C	20.07	2.46	4.05	1.13	0.55	0.37	0.41	527	1357	1859	
		5	16C	96C	31.63	5.14	8.32	1.13	0.55	0.37	0.41	527	1357	1859	
	4	1	123	984	20.41	2.63	4.21	1.17	0.57	0.38	0.43	780	1968	2662	
		5	123	984	31.98	6.26	9.43	1.17	0.57	0.38	0.43	780	1968	2662	
	5	1	98	98C	20.36	2.79	4.35	1.21	0.59	0.39	0.45	1025	2530	3381	
		5	98	98C	31.92	7.31	10.46	1.21	0.59	0.39	0.45	1025	2530	3381	
	10	2	1	223	892	19.51	2.32	3.96	1.09	0.53	0.35	0.39	267	701	973
			5	223	892	30.92	3.92	7.14	1.09	0.53	0.35	0.39	267	701	973
3		1	16C	96C	20.47	2.54	4.17	1.13	0.55	0.37	0.41	527	1357	1859	
		5	16C	96C	31.88	5.19	8.40	1.13	0.55	0.37	0.41	527	1357	1859	
4		1	123	984	20.81	2.73	4.35	1.17	0.57	0.38	0.43	780	1968	2662	
		5	123	984	32.22	6.32	9.52	1.17	0.57	0.38	0.43	780	1968	2662	
5		1	98	98C	20.76	2.92	4.53	1.21	0.59	0.39	0.45	1025	2530	3381	
		5	98	98C	32.17	7.38	10.57	1.21	0.59	0.39	0.45	1025	2530	3381	

30 CHARACTER DATA RECCRC 40K MEMORY

Ch LNG	MRG CRC	NC. CF	B	G	PRCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	148	592	15.01	2.50	4.08	1.64	0.79	0.53	0.58	177	467	648	
		5	148	592	26.58	4.12	7.30	1.64	0.79	0.53	0.58	177	467	648	
	3	1	107	749	17.22	2.69	4.26	1.69	0.82	0.55	0.61	351	905	1240	
		5	107	749	28.79	5.38	8.54	1.69	0.82	0.55	0.61	351	905	1240	
	4	1	82	738	17.07	2.87	4.42	1.75	0.85	0.57	0.64	520	1312	1775	
		5	82	738	28.64	6.51	9.65	1.75	0.85	0.57	0.64	520	1312	1775	
	5	1	65	78C	17.67	3.04	4.58	1.81	0.89	0.59	0.68	683	1685	2251	
		5	65	78C	29.23	7.57	10.68	1.81	0.89	0.59	0.68	683	1685	2251	
	10	2	1	148	592	15.42	2.55	4.17	1.64	0.79	0.53	0.58	177	467	648
			5	148	592	26.82	4.15	7.35	1.64	0.79	0.53	0.58	177	467	648
3		1	107	749	17.63	2.77	4.38	1.69	0.82	0.55	0.61	351	905	1240	
		5	107	749	29.03	5.42	8.61	1.69	0.82	0.55	0.61	351	905	1240	
4		1	82	738	17.48	2.97	4.57	1.75	0.85	0.57	0.64	520	1312	1775	
		5	82	738	28.88	6.57	9.74	1.75	0.85	0.57	0.64	520	1312	1775	
5		1	65	78C	18.07	3.17	4.75	1.81	0.89	0.59	0.68	683	1685	2251	
		5	65	78C	29.48	7.64	10.79	1.81	0.89	0.59	0.68	683	1685	2251	
20		2	1	148	592	16.23	2.64	4.35	1.64	0.79	0.53	0.58	177	467	648
			5	148	592	27.31	4.20	7.46	1.64	0.79	0.53	0.58	177	467	648
	3	1	107	749	18.44	2.92	4.62	1.69	0.82	0.55	0.61	351	905	1240	
		5	107	749	29.52	5.51	8.75	1.69	0.82	0.55	0.61	351	905	1240	
	4	1	82	738	18.29	3.18	4.86	1.75	0.85	0.57	0.64	520	1312	1775	
		5	82	738	29.37	6.69	9.91	1.75	0.85	0.57	0.64	520	1312	1775	
	5	1	65	78C	18.88	3.42	5.09	1.81	0.89	0.59	0.68	683	1685	2251	
		5	65	78C	29.96	7.79	10.99	1.81	0.89	0.59	0.68	683	1685	2251	

40 CHARACTER DATA RECCRC 40K MEMORY

CW LNG	MRG CRC	NC. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	111	555	14.61	2.72	4.29	2.18	1.06	0.71	0.78	133	350	486	
		5	111	555	26.18	4.34	7.51	2.18	1.06	0.71	0.78	133	350	486	
	3	1	8C	56C	14.69	2.92	4.48	2.25	1.09	0.73	0.81	263	678	929	
		5	8C	56C	26.25	5.61	8.75	2.25	1.09	0.73	0.81	263	678	929	
	4	1	61	549	14.54	3.11	4.64	2.33	1.14	0.76	0.86	390	982	1329	
		5	61	549	26.10	6.75	9.87	2.33	1.14	0.76	0.86	390	982	1329	
	5	1	49	588	15.09	3.29	4.8C	2.42	1.18	0.79	0.90	512	1265	1690	
		5	49	588	26.66	7.82	10.90	2.42	1.18	0.79	0.90	512	1265	1690	
	1C	2	1	111	555	15.01	2.77	4.38	2.18	1.06	0.71	0.78	133	350	486
			5	111	555	26.42	4.37	7.56	2.18	1.06	0.71	0.78	133	350	486
3		1	8C	56C	15.09	3.00	4.60	2.25	1.09	0.73	0.81	263	678	929	
		5	8C	56C	26.50	5.66	8.82	2.25	1.09	0.73	0.81	263	678	929	
4		1	61	549	14.94	3.21	4.79	2.33	1.14	0.76	0.86	390	982	1329	
		5	61	549	26.35	6.81	9.95	2.33	1.14	0.76	0.86	390	982	1329	
5		1	49	588	15.50	3.41	4.97	2.42	1.18	0.79	0.90	512	1265	1690	
		5	49	588	26.90	7.90	11.01	2.42	1.18	0.79	0.90	512	1265	1690	
2C		2	1	111	555	15.82	2.86	4.56	2.18	1.06	0.71	0.78	133	350	486
			5	111	555	26.91	4.43	7.67	2.18	1.06	0.71	0.78	133	350	486
	3	1	8C	56C	15.90	3.15	4.83	2.25	1.09	0.73	0.81	263	678	929	
		5	8C	56C	26.98	5.75	8.97	2.25	1.09	0.73	0.81	263	678	929	
	4	1	61	549	15.75	3.42	5.08	2.33	1.14	0.76	0.86	390	982	1329	
		5	61	549	26.83	6.94	10.13	2.33	1.14	0.76	0.86	390	982	1329	
	5	1	49	588	16.31	3.67	5.31	2.42	1.18	0.79	0.90	512	1265	1690	
		5	49	588	27.39	8.05	11.21	2.42	1.18	0.79	0.90	512	1265	1690	

50 CHARACTER DATA RECCRC 40K MEMORY

CW LNG	MRG CRC	NC. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	89	445	12.75	2.95	4.50	2.73	1.32	0.88	0.97	106	280	389	
		5	89	445	23.04	4.57	7.72	2.73	1.32	0.88	0.97	106	280	389	
	3	1	64	448	12.80	3.15	4.69	2.82	1.37	0.91	1.02	210	543	743	
		5	64	448	23.09	5.85	8.97	2.82	1.37	0.91	1.02	210	543	743	
	4	1	49	49C	13.40	3.35	4.86	2.92	1.42	0.95	1.07	312	786	1064	
		5	49	49C	23.68	7.00	10.08	2.92	1.42	0.95	1.07	312	786	1064	
	5	1	39	507	13.65	3.54	5.02	3.02	1.48	0.99	1.13	410	1011	1350	
		5	39	507	23.93	8.08	11.13	3.02	1.48	0.99	1.13	410	1011	1350	
	1C	2	1	89	445	13.11	2.99	4.59	2.73	1.32	0.88	0.97	106	280	389
			5	89	445	23.25	4.60	7.77	2.73	1.32	0.88	0.97	106	280	389
3		1	64	448	13.16	3.23	4.81	2.82	1.37	0.91	1.02	210	543	743	
		5	64	448	23.30	5.89	9.04	2.82	1.37	0.91	1.02	210	543	743	
4		1	49	49C	13.76	3.45	5.00	2.92	1.42	0.95	1.07	312	786	1064	
		5	49	49C	23.90	7.06	10.17	2.92	1.42	0.95	1.07	312	786	1064	
5		1	39	507	14.01	3.66	5.19	3.02	1.48	0.99	1.13	410	1011	1350	
		5	39	507	24.15	8.16	11.23	3.02	1.48	0.99	1.13	410	1011	1350	
2C		2	1	89	445	13.83	3.08	4.77	2.73	1.32	0.88	0.97	106	280	389
			5	89	445	23.68	4.65	7.88	2.73	1.32	0.88	0.97	106	280	389
	3	1	64	448	13.88	3.38	5.05	2.82	1.37	0.91	1.02	210	543	743	
		5	64	448	23.73	5.98	9.18	2.82	1.37	0.91	1.02	210	543	743	
	4	1	49	49C	14.48	3.66	5.30	2.92	1.42	0.95	1.07	312	786	1064	
		5	49	49C	24.33	7.18	10.35	2.92	1.42	0.95	1.07	312	786	1064	
	5	1	39	507	14.73	3.92	5.53	3.02	1.48	0.99	1.13	410	1011	1350	
		5	39	507	24.58	8.31	11.43	3.02	1.48	0.99	1.13	410	1011	1350	
	4C	2	1	89	445	15.27	3.26	5.13	2.73	1.32	0.88	0.97	106	280	389
			5	89	445	24.55	4.76	8.10	2.73	1.32	0.88	0.97	106	280	389
3		1	64	448	15.32	3.68	5.53	2.82	1.37	0.91	1.02	210	543	743	
		5	64	448	24.60	6.16	9.47	2.82	1.37	0.91	1.02	210	543	743	
4		1	49	49C	15.92	4.06	5.88	2.92	1.42	0.95	1.07	312	786	1064	
		5	49	49C	25.19	7.43	10.70	2.92	1.42	0.95	1.07	312	786	1064	
5		1	39	507	16.17	4.43	6.22	3.02	1.48	0.99	1.13	410	1011	1350	
		5	39	507	25.44	8.61	11.84	3.02	1.48	0.99	1.13	410	1011	1350	

60 CHARACTER DATA RECCRC 40K MEMORY

CW LNG	MRG CRC	NC. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	74	37C	11.82	3.17	4.72	3.27	1.59	1.06	1.17	88	233	324	
		5	74	37C	22.10	4.80	7.93	3.27	1.59	1.06	1.17	88	233	324	
	3	1	53	371	11.84	3.39	4.90	3.38	1.64	1.10	1.22	175	452	619	
		5	53	371	22.12	6.09	9.18	3.38	1.64	1.10	1.22	175	452	619	
	4	1	41	41C	12.40	3.59	5.07	3.50	1.70	1.14	1.28	260	656	887	
		5	41	41C	22.68	7.24	10.30	3.50	1.70	1.14	1.28	260	656	887	
	5	1	32	416	12.49	3.79	5.24	3.64	1.78	1.19	1.36	341	840	1121	
		5	32	416	22.78	8.34	11.35	3.64	1.78	1.19	1.36	341	840	1121	
	10	2	1	74	37C	12.18	3.21	4.81	3.27	1.59	1.06	1.17	88	233	324
			5	74	37C	22.32	4.83	7.98	3.27	1.59	1.06	1.17	88	233	324
3		1	53	371	12.20	3.46	5.02	3.38	1.64	1.10	1.22	175	452	619	
		5	53	371	22.34	6.13	9.25	3.38	1.64	1.10	1.22	175	452	619	
4		1	41	41C	12.76	3.69	5.22	3.50	1.70	1.14	1.28	260	656	887	
		5	41	41C	22.90	7.30	10.39	3.50	1.70	1.14	1.28	260	656	887	
5		1	32	416	12.85	3.92	5.41	3.64	1.78	1.19	1.36	341	840	1121	
		5	32	416	22.99	8.42	11.45	3.64	1.78	1.19	1.36	341	840	1121	
20		2	1	74	37C	12.90	3.31	4.99	3.27	1.59	1.06	1.17	88	233	324
			5	74	37C	22.75	4.88	8.09	3.27	1.59	1.06	1.17	88	233	324
	3	1	53	371	12.92	3.61	5.26	3.38	1.64	1.10	1.22	175	452	619	
		5	53	371	22.77	6.22	9.39	3.38	1.64	1.10	1.22	175	452	619	
	4	1	41	41C	13.48	3.89	5.51	3.50	1.70	1.14	1.28	260	656	887	
		5	41	41C	23.33	7.43	10.56	3.50	1.70	1.14	1.28	260	656	887	
	5	1	32	416	13.57	4.17	5.75	3.64	1.78	1.19	1.36	341	840	1121	
		5	32	416	23.42	8.57	11.66	3.64	1.78	1.19	1.36	341	840	1121	
	40	2	1	74	37C	14.34	3.49	5.35	3.27	1.59	1.06	1.17	88	233	324
			5	74	37C	23.61	4.99	8.31	3.27	1.59	1.06	1.17	88	233	324
3		1	53	371	14.36	3.92	5.74	3.38	1.64	1.10	1.22	175	452	619	
		5	53	371	23.64	6.40	9.68	3.38	1.64	1.10	1.22	175	452	619	
4		1	41	41C	14.92	4.30	6.10	3.50	1.70	1.14	1.28	260	656	887	
		5	41	41C	24.19	7.67	10.91	3.50	1.70	1.14	1.28	260	656	887	
5		1	32	416	15.01	4.68	6.44	3.64	1.78	1.19	1.36	341	840	1121	
		5	32	416	24.29	8.88	12.07	3.64	1.78	1.19	1.36	341	840	1121	

70 CHARACTER DATA RECCRC 40K MEMORY

CW LNG	MRG CRC	NC. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	63	315	11.17	3.39	4.93	3.82	1.85	1.24	1.36	76	200	277	
		5	63	315	21.45	5.03	8.14	3.82	1.85	1.24	1.36	76	200	277	
	3	1	45	36C	11.81	3.62	5.12	3.95	1.92	1.28	1.43	150	387	529	
		5	45	36C	22.09	6.32	9.39	3.95	1.92	1.28	1.43	150	387	529	
	4	1	35	35C	11.68	3.83	5.29	4.08	1.99	1.33	1.50	222	562	760	
		5	35	35C	21.96	7.49	10.52	4.08	1.99	1.33	1.50	222	562	760	
	5	1	28	364	11.89	4.03	5.46	4.23	2.07	1.38	1.58	293	723	966	
		5	28	364	22.17	8.59	11.57	4.23	2.07	1.38	1.58	293	723	966	
	10	2	1	63	315	11.53	3.44	5.02	3.82	1.85	1.24	1.36	76	200	277
			5	63	315	21.66	5.05	8.19	3.82	1.85	1.24	1.36	76	200	277
3		1	45	36C	12.17	3.69	5.24	3.95	1.92	1.28	1.43	150	387	529	
		5	45	36C	22.31	6.37	9.47	3.95	1.92	1.28	1.43	150	387	529	
4		1	35	35C	12.04	3.93	5.44	4.08	1.99	1.33	1.50	222	562	760	
		5	35	35C	22.18	7.55	10.60	4.08	1.99	1.33	1.50	222	562	760	
5		1	28	364	12.25	4.16	5.63	4.23	2.07	1.38	1.58	293	723	966	
		5	28	364	22.38	8.67	11.67	4.23	2.07	1.38	1.58	293	723	966	
20		2	1	63	315	12.25	3.53	5.20	3.82	1.85	1.24	1.36	76	200	277
			5	63	315	22.10	5.11	8.30	3.82	1.85	1.24	1.36	76	200	277
	3	1	45	36C	12.89	3.85	5.48	3.95	1.92	1.28	1.43	150	387	529	
		5	45	36C	22.74	6.46	9.61	3.95	1.92	1.28	1.43	150	387	529	
	4	1	35	35C	12.76	4.14	5.73	4.08	1.99	1.33	1.50	222	562	760	
		5	35	35C	22.61	7.68	10.78	4.08	1.99	1.33	1.50	222	562	760	
	5	1	28	364	12.97	4.42	5.97	4.23	2.07	1.38	1.58	293	723	966	
		5	28	364	22.82	8.82	11.88	4.23	2.07	1.38	1.58	293	723	966	
	40	2	1	63	315	13.69	3.71	5.56	3.82	1.85	1.24	1.36	76	200	277
			5	63	315	22.96	5.22	8.52	3.82	1.85	1.24	1.36	76	200	277
3		1	45	36C	14.33	4.15	5.96	3.95	1.92	1.28	1.43	150	387	529	
		5	45	36C	23.60	6.64	9.90	3.95	1.92	1.28	1.43	150	387	529	
4		1	35	35C	14.20	4.55	6.32	4.08	1.99	1.33	1.50	222	562	760	
		5	35	35C	23.47	7.92	11.13	4.08	1.99	1.33	1.50	222	562	760	
5		1	28	364	14.41	4.93	6.66	4.23	2.07	1.38	1.58	293	723	966	
		5	28	364	23.68	9.13	12.29	4.23	2.07	1.38	1.58	293	723	966	

80 CHARACTER DATA RECORD 40K MEMORY

CW LNG	MRG CRD	NC. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	55	275	10.73	3.62	5.14	4.37	2.12	1.41	1.56	66	175	242	
		5	55	275	21.01	5.25	8.35	4.37	2.12	1.41	1.56	66	175	242	
	3	1	40	280	10.81	3.85	5.33	4.51	2.19	1.46	1.63	131	339	464	
		5	40	280	21.09	6.56	9.61	4.51	2.19	1.46	1.63	131	339	464	
	4	1	30	300	11.10	4.07	5.51	4.68	2.28	1.52	1.72	194	490	662	
		5	30	300	21.38	7.74	10.74	4.68	2.28	1.52	1.72	194	490	662	
	5	1	24	312	11.28	4.29	5.68	4.85	2.37	1.58	1.81	256	630	841	
		5	24	312	21.56	8.86	11.79	4.85	2.37	1.58	1.81	256	630	841	
	10	2	1	55	275	11.09	3.66	5.23	4.37	2.12	1.41	1.56	66	175	242
			5	55	275	21.22	5.28	8.41	4.37	2.12	1.41	1.56	66	175	242
3		1	40	280	11.17	3.92	5.45	4.51	2.19	1.46	1.63	131	339	464	
		5	40	280	21.30	6.60	9.68	4.51	2.19	1.46	1.63	131	339	464	
4		1	30	300	11.46	4.18	5.66	4.68	2.28	1.52	1.72	194	490	662	
		5	30	300	21.60	7.81	10.82	4.68	2.28	1.52	1.72	194	490	662	
5		1	24	312	11.64	4.42	5.85	4.85	2.37	1.58	1.81	256	630	841	
		5	24	312	21.78	8.93	11.89	4.85	2.37	1.58	1.81	256	630	841	
20		2	1	55	275	11.81	3.75	5.41	4.37	2.12	1.41	1.56	66	175	242
			5	55	275	21.65	5.34	8.51	4.37	2.12	1.41	1.56	66	175	242
	3	1	40	280	11.89	4.07	5.69	4.51	2.19	1.46	1.63	131	339	464	
		5	40	280	21.74	6.69	9.82	4.51	2.19	1.46	1.63	131	339	464	
	4	1	30	300	12.18	4.38	5.95	4.68	2.28	1.52	1.72	194	490	662	
		5	30	300	22.03	7.93	11.00	4.68	2.28	1.52	1.72	194	490	662	
	5	1	24	312	12.36	4.67	6.20	4.85	2.37	1.58	1.81	256	630	841	
		5	24	312	22.21	9.09	12.10	4.85	2.37	1.58	1.81	256	630	841	
	40	2	1	55	275	13.25	3.94	5.77	4.37	2.12	1.41	1.56	66	175	242
			5	55	275	22.52	5.45	8.73	4.37	2.12	1.41	1.56	66	175	242
3		1	40	280	13.33	4.38	6.17	4.51	2.19	1.46	1.63	131	339	464	
		5	40	280	22.60	6.87	10.11	4.51	2.19	1.46	1.63	131	339	464	
4		1	30	300	13.62	4.79	6.54	4.68	2.28	1.52	1.72	194	490	662	
		5	30	300	22.89	8.18	11.35	4.68	2.28	1.52	1.72	194	490	662	
5		1	24	312	13.80	5.19	6.88	4.85	2.37	1.58	1.81	256	630	841	
		5	24	312	23.08	9.39	12.51	4.85	2.37	1.58	1.81	256	630	841	

90 CHARACTER DATA RECORD 40K MEMORY

CW LNG	MRG CRD	NC. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	49	245	9.99	3.84	5.35	4.92	2.38	1.59	1.75	59	155	215	
		5	49	245	18.99	5.48	8.56	4.92	2.38	1.59	1.75	59	155	215	
	3	1	35	280	10.93	4.08	5.55	5.08	2.47	1.65	1.84	117	301	412	
		5	35	280	21.21	6.80	9.82	5.08	2.47	1.65	1.84	117	301	412	
	4	1	27	270	10.80	4.31	5.73	5.25	2.56	1.71	1.93	173	436	590	
		5	27	270	21.08	7.99	10.95	5.25	2.56	1.71	1.93	173	436	590	
	5	1	21	294	11.15	4.55	5.91	5.47	2.67	1.79	2.04	227	558	744	
		5	21	294	21.44	9.12	12.02	5.47	2.67	1.79	2.04	227	558	744	
	10	2	1	49	245	10.31	3.88	5.44	4.92	2.38	1.59	1.75	59	155	215
			5	49	245	19.18	5.51	8.62	4.92	2.38	1.59	1.75	59	155	215
3		1	35	280	11.29	4.16	5.67	5.08	2.47	1.65	1.84	117	301	412	
		5	35	280	21.42	6.84	9.89	5.08	2.47	1.65	1.84	117	301	412	
4		1	27	270	11.16	4.41	5.87	5.25	2.56	1.71	1.93	173	436	590	
		5	27	270	21.30	8.05	11.04	5.25	2.56	1.71	1.93	173	436	590	
5		1	21	294	11.51	4.67	6.08	5.47	2.67	1.79	2.04	227	558	744	
		5	21	294	21.65	9.20	12.12	5.47	2.67	1.79	2.04	227	558	744	
20		2	1	49	245	10.94	3.98	5.62	4.92	2.38	1.59	1.75	59	155	215
			5	49	245	19.56	5.56	8.72	4.92	2.38	1.59	1.75	59	155	215
	3	1	35	280	12.01	4.31	5.91	5.08	2.47	1.65	1.84	117	301	412	
		5	35	280	21.85	6.93	10.04	5.08	2.47	1.65	1.84	117	301	412	
	4	1	27	270	11.88	4.62	6.17	5.25	2.56	1.71	1.93	173	436	590	
		5	27	270	21.73	8.17	11.22	5.25	2.56	1.71	1.93	173	436	590	
	5	1	21	294	12.23	4.93	6.42	5.47	2.67	1.79	2.04	227	558	744	
		5	21	294	22.08	9.35	12.32	5.47	2.67	1.79	2.04	227	558	744	
	40	2	1	49	245	12.20	4.16	5.98	4.92	2.38	1.59	1.75	59	155	215
			5	49	245	20.31	5.67	8.94	4.92	2.38	1.59	1.75	59	155	215
3		1	35	280	13.45	4.61	6.38	5.08	2.47	1.65	1.84	117	301	412	
		5	35	280	22.72	7.12	10.32	5.08	2.47	1.65	1.84	117	301	412	
4		1	27	270	13.32	5.03	6.75	5.25	2.56	1.71	1.93	173	436	590	
		5	27	270	22.59	8.42	11.57	5.25	2.56	1.71	1.93	173	436	590	
5		1	21	294	13.67	5.44	7.10	5.47	2.67	1.79	2.04	227	558	744	
		5	21	294	22.95	9.66	12.73	5.47	2.67	1.79	2.04	227	558	744	

100 CHARACTER DATA RECORD 40K MEMORY

Ck LNG	PRG CRC	NC. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS				
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI		
5	2	1	44	220	9.76	4.06	5.56	5.46	2.65	1.77	1.95	53	140	194		
		5	44	220	18.76	5.71	8.77	5.46	2.65	1.77	1.95	53	140	194		
		3	1	32	256	10.28	4.31	5.76	5.64	2.74	1.83	2.04	105	271	371	
	4	5	32	256	19.27	7.03	10.03	5.64	2.74	1.83	2.04	105	271	371		
		1	24	264	10.84	4.55	5.95	5.85	2.85	1.90	2.15	155	392	529		
		5	24	264	21.12	8.24	11.17	5.85	2.85	1.90	2.15	155	392	529		
	5	1	19	266	10.88	4.79	6.13	6.07	2.97	1.98	2.27	204	503	671		
		5	19	266	21.17	9.38	12.24	6.07	2.97	1.98	2.27	204	503	671		
		2	1	44	220	10.08	4.11	5.65	5.46	2.65	1.77	1.95	53	140	194	
	10C	2	5	44	220	18.95	5.73	8.83	5.46	2.65	1.77	1.95	53	140	194	
			3	1	32	256	10.59	4.38	5.88	5.64	2.74	1.83	2.04	105	271	371
			5	32	256	19.46	7.07	10.11	5.64	2.74	1.83	2.04	105	271	371	
		4	1	24	264	11.20	4.66	6.09	5.85	2.85	1.90	2.15	155	392	529	
			5	24	264	21.34	8.30	11.26	5.85	2.85	1.90	2.15	155	392	529	
			1	19	266	11.24	4.92	6.30	6.07	2.97	1.98	2.27	204	503	671	
5		5	19	266	21.38	9.46	12.34	6.07	2.97	1.98	2.27	204	503	671		
		2	1	44	220	10.71	4.20	5.83	5.46	2.65	1.77	1.95	53	140	194	
		5	44	220	19.33	5.79	8.94	5.46	2.65	1.77	1.95	53	140	194		
20C		3	1	32	256	11.22	4.54	6.12	5.64	2.74	1.83	2.04	105	271	371	
			5	32	256	19.84	7.16	10.25	5.64	2.74	1.83	2.04	105	271	371	
			1	24	264	11.92	4.86	6.39	5.85	2.85	1.90	2.15	155	392	529	
		5	5	24	264	21.77	8.42	11.43	5.85	2.85	1.90	2.15	155	392	529	
			1	19	266	11.96	5.18	6.64	6.07	2.97	1.98	2.27	204	503	671	
			5	19	266	21.81	9.61	12.54	6.07	2.97	1.98	2.27	204	503	671	
	40C	2	1	44	220	11.97	4.38	6.19	5.46	2.65	1.77	1.95	53	140	194	
			5	44	220	20.08	5.90	9.15	5.46	2.65	1.77	1.95	53	140	194	
			3	1	32	256	12.48	4.84	6.60	5.64	2.74	1.83	2.04	105	271	371
		5	5	32	256	20.60	7.35	10.54	5.64	2.74	1.83	2.04	105	271	371	
			1	24	264	13.36	5.28	6.97	5.85	2.85	1.90	2.15	155	392	529	
			5	24	264	22.63	8.67	11.79	5.85	2.85	1.90	2.15	155	392	529	
		5	1	19	266	13.40	5.69	7.32	6.07	2.97	1.98	2.27	204	503	671	
			5	19	266	22.68	9.92	12.95	6.07	2.97	1.98	2.27	204	503	671	

120 CHARACTER DATA RECORD 40K MEMORY

Ck LNG	PRG CRC	NC. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	37	185	9.51	4.51	5.98	6.55	3.17	2.12	2.33	44	116	162	
		5	37	185	18.51	6.16	9.19	6.55	3.17	2.12	2.33	44	116	162	
		3	1	26	208	9.85	4.78	6.19	6.78	3.30	2.20	2.46	87	225	308
	4	5	26	208	18.84	7.51	10.46	6.78	3.30	2.20	2.46	87	225	308	
		1	20	220	10.03	5.03	6.38	7.02	3.42	2.28	2.58	129	326	441	
		5	20	220	19.03	8.73	11.61	7.02	3.42	2.28	2.58	129	326	441	
	5	1	16	224	10.11	5.29	6.57	7.27	3.55	2.38	2.71	170	420	560	
		5	16	224	19.11	9.89	12.68	7.27	3.55	2.38	2.71	170	420	560	
		2	1	37	185	9.82	4.55	6.07	6.55	3.17	2.12	2.33	44	116	162
	10	3	5	37	185	18.69	6.18	9.25	6.55	3.17	2.12	2.33	44	116	162
			1	26	208	10.16	4.86	6.31	6.78	3.30	2.20	2.46	87	225	308
			5	26	208	19.03	7.55	10.54	6.78	3.30	2.20	2.46	87	225	308
		4	1	20	220	10.35	5.14	6.53	7.02	3.42	2.28	2.58	129	326	441
			5	20	220	19.22	8.79	11.69	7.02	3.42	2.28	2.58	129	326	441
			1	16	224	10.43	5.42	6.74	7.27	3.55	2.38	2.71	170	420	560
5		5	16	224	19.30	9.97	12.78	7.27	3.55	2.38	2.71	170	420	560	
		2	1	37	185	10.45	4.64	6.25	6.55	3.17	2.12	2.33	44	116	162
		5	37	185	19.07	6.24	9.36	6.55	3.17	2.12	2.33	44	116	162	
20		3	1	26	208	10.79	5.01	6.55	6.78	3.30	2.20	2.46	87	225	308
			5	26	208	19.41	7.65	10.68	6.78	3.30	2.20	2.46	87	225	308
			1	20	220	10.98	5.34	6.82	7.02	3.42	2.28	2.58	129	326	441
		5	5	20	220	19.60	8.92	11.87	7.02	3.42	2.28	2.58	129	326	441
			1	16	224	11.06	5.67	7.08	7.27	3.55	2.38	2.71	170	420	560
			5	16	224	19.67	10.12	12.98	7.27	3.55	2.38	2.71	170	420	560
	40	2	1	37	185	11.71	4.83	6.61	6.55	3.17	2.12	2.33	44	116	162
			5	37	185	19.83	6.35	9.57	6.55	3.17	2.12	2.33	44	116	162
			3	1	26	208	12.05	5.31	7.03	6.78	3.30	2.20	2.46	87	225
		4	5	26	208	20.17	7.83	10.97	6.78	3.30	2.20	2.46	87	225	308
			1	20	220	12.24	5.76	7.41	7.02	3.42	2.28	2.58	129	326	441
			5	20	220	20.35	9.17	12.22	7.02	3.42	2.28	2.58	129	326	441
		5	1	16	224	12.32	6.19	7.77	7.27	3.55	2.38	2.71	170	420	560
			5	16	224	20.43	10.43	13.39	7.27	3.55	2.38	2.71	170	420	560



140 CHARACTER DATA RECORD 40K MEMORY

Ch LNG	MRG CRC	NC. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	31	155	9.33	4.96	6.40	7.66	3.71	2.48	2.73	38	100	138	
			5	31	155	18.33	6.62	9.62	7.66	3.71	2.48	2.73	38	100	138
		3	1	22	176	9.64	5.25	6.62	7.92	3.85	2.57	2.87	75	193	264
	5		22	176	18.64	7.99	10.90	7.92	3.85	2.57	2.87	75	193	264	
	4	1	17	187	9.82	5.52	6.82	8.20	4.00	2.67	3.02	111	279	377	
			5	17	187	18.81	9.23	12.04	8.20	4.00	2.67	3.02	111	279	377
		5	1	14	196	9.96	5.77	7.01	8.45	4.13	2.76	3.15	146	361	483
	5		14	196	18.96	10.39	13.11	8.45	4.13	2.76	3.15	146	361	483	
	1C	2	1	31	155	9.64	5.00	6.49	7.66	3.71	2.48	2.73	38	100	138
				5	31	155	18.52	6.65	9.67	7.66	3.71	2.48	2.73	38	100
			3	1	22	176	9.96	5.32	6.74	7.92	3.85	2.57	2.87	75	193
		5		22	176	18.83	8.03	10.97	7.92	3.85	2.57	2.87	75	193	264
4		1	17	187	10.13	5.02	6.97	8.20	4.00	2.67	3.02	111	279	377	
			5	17	187	19.00	9.29	12.13	8.20	4.00	2.67	3.02	111	279	377
		5	1	14	196	10.28	5.90	7.18	8.45	4.13	2.76	3.15	146	361	483
5			14	196	19.15	10.47	13.22	8.45	4.13	2.76	3.15	146	361	483	
2C		2	1	31	155	10.27	5.10	6.67	7.66	3.71	2.48	2.73	38	100	138
				5	31	155	18.89	6.70	9.78	7.66	3.71	2.48	2.73	38	100
			3	1	22	176	10.59	5.48	6.98	7.92	3.85	2.57	2.87	75	193
		5		22	176	19.21	8.13	11.11	7.92	3.85	2.57	2.87	75	193	264
	4	1	17	187	10.76	5.83	7.26	8.20	4.00	2.67	3.02	111	279	377	
			5	17	187	19.38	9.42	12.31	8.20	4.00	2.67	3.02	111	279	377
		5	1	14	196	10.91	6.16	7.52	8.45	4.13	2.76	3.15	146	361	483
	5		14	196	19.53	10.62	13.42	8.45	4.13	2.76	3.15	146	361	483	
	4C	2	1	31	155	11.53	5.28	7.03	7.66	3.71	2.48	2.73	38	100	138
				5	31	155	19.65	6.81	10.00	7.66	3.71	2.48	2.73	38	100
			3	1	22	176	11.85	5.78	7.46	7.92	3.85	2.57	2.87	75	193
		5		22	176	19.96	8.31	11.40	7.92	3.85	2.57	2.87	75	193	264
4		1	17	187	12.02	6.25	7.84	8.20	4.00	2.67	3.02	111	279	377	
			5	17	187	20.14	9.67	12.66	8.20	4.00	2.67	3.02	111	279	377
		5	1	14	196	12.17	6.68	8.20	8.45	4.13	2.76	3.15	146	361	483
5			14	196	20.28	10.93	13.83	8.45	4.13	2.76	3.15	146	361	483	

160 CHARACTER DATA RECORD 40K MEMORY

Ch LNG	MRG CRC	NC. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	27	135	9.29	5.41	6.82	8.75	4.24	2.83	3.12	33	87	121	
			5	27	135	18.29	7.07	10.04	8.75	4.24	2.83	3.12	33	87	121
		3	1	20	160	9.65	5.69	7.04	9.02	4.38	2.92	3.26	65	169	232
	5		20	160	18.65	8.44	11.32	9.02	4.38	2.92	3.26	65	169	232	
	4	1	15	165	9.75	6.00	7.25	9.36	4.56	3.05	3.44	97	245	331	
			5	15	165	18.75	9.72	12.48	9.36	4.56	3.05	3.44	97	245	331
		5	1	12	168	9.82	6.29	7.45	9.70	4.74	3.17	3.62	128	315	420
	5		12	168	18.82	10.92	13.56	9.70	4.74	3.17	3.62	128	315	420	
	1C	2	1	27	135	9.60	5.45	6.91	8.75	4.24	2.83	3.12	33	87	121
				5	27	135	18.47	7.10	10.09	8.75	4.24	2.83	3.12	33	87
			3	1	20	160	9.97	5.77	7.16	9.02	4.38	2.92	3.26	65	169
		5		20	160	18.84	8.49	11.39	9.02	4.38	2.92	3.26	65	169	232
4		1	15	165	10.07	6.10	7.40	9.36	4.56	3.05	3.44	97	245	331	
			5	15	165	18.94	9.78	12.56	9.36	4.56	3.05	3.44	97	245	331
		5	1	12	168	10.14	6.42	7.62	9.70	4.74	3.17	3.62	128	315	420
5			12	168	19.01	11.00	13.66	9.70	4.74	3.17	3.62	128	315	420	
2C		2	1	27	135	10.23	5.55	7.09	8.75	4.24	2.83	3.12	33	87	121
				5	27	135	18.85	7.16	10.20	8.75	4.24	2.83	3.12	33	87
			3	1	20	160	10.60	5.92	7.40	9.02	4.38	2.92	3.26	65	169
		5		20	160	19.22	8.58	11.53	9.02	4.38	2.92	3.26	65	169	232
	4	1	15	165	10.70	6.31	7.69	9.36	4.56	3.05	3.44	97	245	331	
			5	15	165	19.32	9.91	12.74	9.36	4.56	3.05	3.44	97	245	331
		5	1	12	168	10.77	6.68	7.97	9.70	4.74	3.17	3.62	128	315	420
	5		12	168	19.39	11.16	13.87	9.70	4.74	3.17	3.62	128	315	420	
	4C	2	1	27	135	11.49	5.73	7.45	8.75	4.24	2.83	3.12	33	87	121
				5	27	135	19.61	7.27	10.42	8.75	4.24	2.83	3.12	33	87
			3	1	20	160	11.86	6.23	7.88	9.02	4.38	2.92	3.26	65	169
		5		20	160	19.97	8.76	11.82	9.02	4.38	2.92	3.26	65	169	232
4		1	15	165	11.96	6.72	8.28	9.36	4.56	3.05	3.44	97	245	331	
			5	15	165	20.07	10.16	13.09	9.36	4.56	3.05	3.44	97	245	331
		5	1	12	168	12.03	7.20	8.65	9.70	4.74	3.17	3.62	128	315	420
5			12	168	20.14	11.47	14.28	9.70	4.74	3.17	3.62	128	315	420	

180 CHARACTER DATA RECORD 40K MEMORY

CW LAG	MRG ORD	NO. CF	B	G	PROCESS TIME			TAPE TIME				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					MILLISECONDS/RECORD	PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI
5	2	1	24	144	9.65	5.85	7.25	9.85	4.77	3.18	3.51	29	77	107	
		5	24	144	18.64	7.53	10.46	9.85	4.77	3.18	3.51	29	77	107	
		1	17	136	9.57	6.18	7.48	10.20	4.96	3.31	3.70	58	150	205	
	4	5	17	136	18.56	8.94	11.75	10.20	4.96	3.31	3.70	58	150	205	
		1	13	143	9.69	6.49	7.69	10.57	5.15	3.44	3.89	86	217	292	
		5	13	143	18.69	10.23	12.92	10.57	5.15	3.44	3.89	86	217	292	
	5	1	10	150	9.83	6.84	7.92	11.03	5.40	3.61	4.14	113	276	368	
		5	10	150	18.82	11.50	14.03	11.03	5.40	3.61	4.14	113	276	368	
	10	2	1	24	144	9.96	5.90	7.34	9.85	4.77	3.18	3.51	29	77	107
			5	24	144	18.83	7.56	10.52	9.85	4.77	3.18	3.51	29	77	107
			1	17	136	9.88	6.26	7.60	10.20	4.96	3.31	3.70	58	150	205
		3	5	17	136	18.75	8.99	11.83	10.20	4.96	3.31	3.70	58	150	205
			1	13	143	10.01	6.60	7.84	10.57	5.15	3.44	3.89	86	217	292
			5	13	143	18.88	10.30	13.01	10.57	5.15	3.44	3.89	86	217	292
4		1	10	150	10.14	6.97	8.09	11.03	5.40	3.61	4.14	113	276	368	
		5	10	150	19.01	11.58	14.13	11.03	5.40	3.61	4.14	113	276	368	
20		2	1	24	144	10.59	5.99	7.52	9.85	4.77	3.18	3.51	29	77	107
			5	24	144	19.21	7.61	10.62	9.85	4.77	3.18	3.51	29	77	107
			1	17	136	10.51	6.41	7.84	10.20	4.96	3.31	3.70	58	150	205
		3	5	17	136	19.13	9.08	11.97	10.20	4.96	3.31	3.70	58	150	205
			1	13	143	10.64	6.81	8.13	10.57	5.15	3.44	3.89	86	217	292
			5	13	143	19.26	10.42	13.18	10.57	5.15	3.44	3.89	86	217	292
	4	1	10	150	10.77	7.23	8.43	11.03	5.40	3.61	4.14	113	276	368	
		5	10	150	19.39	11.74	14.33	11.03	5.40	3.61	4.14	113	276	368	
	40	2	1	24	144	11.85	6.18	7.88	9.85	4.77	3.18	3.51	29	77	107
			5	24	144	19.96	7.72	10.84	9.85	4.77	3.18	3.51	29	77	107
			1	17	136	11.77	6.72	8.32	10.20	4.96	3.31	3.70	58	150	205
		3	5	17	136	19.89	9.27	12.26	10.20	4.96	3.31	3.70	58	150	205
			1	13	143	11.90	7.23	8.72	10.57	5.15	3.44	3.89	86	217	292
			5	13	143	20.01	10.67	13.53	10.57	5.15	3.44	3.89	86	217	292
4		1	10	150	12.03	7.76	9.12	11.03	5.40	3.61	4.14	113	276	368	
		5	10	150	20.15	12.05	14.74	11.03	5.40	3.61	4.14	113	276	368	

200 CHARACTER DATA RECORD 40K MEMORY

CW LAG	MRG ORD	NO. CF	B	G	PROCESS TIME			TAPE TIME				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					MILLISECONDS/RECORD	PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI
5	2	1	22	110	8.98	6.29	7.67	10.92	5.29	3.53	3.89	26	70	97	
		5	22	110	16.69	7.97	10.88	10.92	5.29	3.53	3.89	26	70	97	
		1	16	128	9.26	6.62	7.90	11.27	5.47	3.66	4.07	52	135	185	
	3	5	16	128	16.97	9.38	12.17	11.27	5.47	3.66	4.07	52	135	185	
		1	12	132	9.78	6.96	8.12	11.70	5.70	3.81	4.30	77	196	264	
		5	12	132	18.78	10.71	13.35	11.70	5.70	3.81	4.30	77	196	264	
	4	1	9	135	9.87	7.35	8.36	12.26	6.00	4.01	4.60	101	249	331	
		5	9	135	18.86	12.03	14.47	12.26	6.00	4.01	4.60	101	249	331	
	10	2	1	22	110	9.25	6.34	7.76	10.92	5.29	3.53	3.89	26	70	97
			5	22	110	16.86	8.00	10.93	10.92	5.29	3.53	3.89	26	70	97
			1	16	128	9.53	6.69	8.02	11.27	5.47	3.66	4.07	52	135	185
		3	5	16	128	17.13	9.43	12.24	11.27	5.47	3.66	4.07	52	135	185
			1	12	132	10.09	7.06	8.27	11.70	5.70	3.81	4.30	77	196	264
			5	12	132	18.96	10.77	13.43	11.70	5.70	3.81	4.30	77	196	264
4		1	9	135	10.18	7.48	8.53	12.26	6.00	4.01	4.60	101	249	331	
		5	9	135	19.05	12.11	14.57	12.26	6.00	4.01	4.60	101	249	331	
20		2	1	22	110	9.79	6.43	7.94	10.92	5.29	3.53	3.89	26	70	97
			5	22	110	17.18	8.06	11.04	10.92	5.29	3.53	3.89	26	70	97
			1	16	128	10.07	6.85	8.25	11.27	5.47	3.66	4.07	52	135	185
		3	5	16	128	17.45	9.52	12.39	11.27	5.47	3.66	4.07	52	135	185
			1	12	132	10.72	7.27	8.56	11.70	5.70	3.81	4.30	77	196	264
			5	12	132	19.34	10.90	13.61	11.70	5.70	3.81	4.30	77	196	264
	4	1	9	135	10.81	7.74	8.88	12.26	6.00	4.01	4.60	101	249	331	
		5	9	135	19.43	12.26	14.78	12.26	6.00	4.01	4.60	101	249	331	
	40	2	1	22	110	10.87	6.62	8.30	10.92	5.29	3.53	3.89	26	70	97
			5	22	110	17.83	8.17	11.26	10.92	5.29	3.53	3.89	26	70	97
			1	16	128	11.15	7.16	8.73	11.27	5.47	3.66	4.07	52	135	185
		3	5	16	128	18.10	9.71	12.67	11.27	5.47	3.66	4.07	52	135	185
			1	12	132	11.98	7.69	9.15	11.70	5.70	3.81	4.30	77	196	264
			5	12	132	20.10	11.15	13.96	11.70	5.70	3.81	4.30	77	196	264
4		1	9	135	12.07	8.27	9.56	12.26	6.00	4.01	4.60	101	249	331	
		5	9	135	20.19	12.58	15.19	12.26	6.00	4.01	4.60	101	249	331	

220 CHARACTER DATA RECCRC 40K MEMORY

CW LNC	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	2C	10C	9.08	6.74	8.09	12.02	5.82	3.88	4.28	24	63	88	
		5	2C	10C	16.79	8.43	11.30	12.02	5.82	3.88	4.28	24	63	88	
		3	1	14	112	9.28	7.10	8.33	12.45	6.05	4.04	4.51	47	122	168
	4	5	14	112	16.99	9.88	12.61	12.45	6.05	4.04	4.51	47	122	168	
		1	11	121	9.44	7.43	8.55	12.85	6.26	4.18	4.72	70	178	241	
		5	11	121	17.15	11.19	13.78	12.85	6.26	4.18	4.72	70	178	241	
	5	1	8	128	9.59	7.88	8.82	13.54	6.63	4.43	5.09	92	225	299	
		5	8	128	17.30	12.58	14.93	13.54	6.63	4.43	5.09	92	225	299	
	10C	2	1	2C	10C	9.35	6.79	8.18	12.02	5.82	3.88	4.28	24	63	88
			5	2C	10C	16.95	8.45	11.36	12.02	5.82	3.88	4.28	24	63	88
			3	1	14	112	9.55	7.18	8.45	12.45	6.05	4.04	4.51	47	122
		4	5	14	112	17.15	9.93	12.68	12.45	6.05	4.04	4.51	47	122	168
			1	11	121	9.71	7.53	8.70	12.85	6.26	4.18	4.72	70	178	241
			5	11	121	17.31	11.26	13.87	12.85	6.26	4.18	4.72	70	178	241
5		1	8	128	9.86	8.01	8.99	13.54	6.63	4.43	5.09	92	225	299	
		5	8	128	17.46	12.66	15.03	13.54	6.63	4.43	5.09	92	225	299	
20C		2	1	2C	10C	9.89	6.88	8.36	12.02	5.82	3.88	4.28	24	63	88
			5	2C	10C	17.28	8.51	11.46	12.02	5.82	3.88	4.28	24	63	88
			3	1	14	112	10.09	7.34	8.69	12.45	6.05	4.04	4.51	47	122
		4	5	14	112	17.48	10.03	12.82	12.45	6.05	4.04	4.51	47	122	168
			1	11	121	10.25	7.75	8.99	12.85	6.26	4.18	4.72	70	178	241
			5	11	121	17.63	11.38	14.04	12.85	6.26	4.18	4.72	70	178	241
	5	1	8	128	10.40	8.27	9.33	13.54	6.63	4.43	5.09	92	225	299	
		5	8	128	17.79	12.82	15.23	13.54	6.63	4.43	5.09	92	225	299	
	40C	2	1	2C	10C	10.97	7.07	8.72	12.02	5.82	3.88	4.28	24	63	88
			5	2C	10C	17.93	8.62	11.68	12.02	5.82	3.88	4.28	24	63	88
			3	1	14	112	11.17	7.65	9.17	12.45	6.05	4.04	4.51	47	122
		4	5	14	112	18.12	10.21	13.11	12.45	6.05	4.04	4.51	47	122	168
			1	11	121	11.33	8.17	9.58	12.85	6.26	4.18	4.72	70	178	241
			5	11	121	18.28	11.63	14.39	12.85	6.26	4.18	4.72	70	178	241
5		1	8	128	11.48	8.80	10.02	13.54	6.63	4.43	5.09	92	225	299	
		5	8	128	18.43	13.13	15.64	13.54	6.63	4.43	5.09	92	225	299	

240 CHARACTER DATA RECCRC 40K MEMORY

CW LNC	MRG CRC	NO. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	18	108	9.42	7.19	8.51	13.13	6.36	4.25	4.68	22	58	80	
		5	18	108	17.13	8.89	11.73	13.13	6.36	4.25	4.68	22	58	80	
		3	1	13	104	9.41	7.56	8.76	13.57	6.59	4.40	4.91	43	112	154
	4	5	13	104	17.12	10.35	13.03	13.57	6.59	4.40	4.91	43	112	154	
		1	1C	11C	9.53	7.92	8.99	14.03	6.84	4.57	5.16	64	163	220	
		5	1C	11C	17.24	11.69	14.22	14.03	6.84	4.57	5.16	64	163	220	
	5	1	8	112	9.60	8.28	9.22	14.54	7.11	4.75	5.43	85	210	280	
		5	8	112	17.31	12.99	15.33	14.54	7.11	4.75	5.43	85	210	280	
	10C	2	1	18	108	9.69	7.24	8.60	13.13	6.36	4.25	4.68	22	58	80
			5	18	108	17.30	8.92	11.78	13.13	6.36	4.25	4.68	22	58	80
			3	1	13	104	9.68	7.63	8.88	13.57	6.59	4.40	4.91	43	112
		4	5	13	104	17.28	10.40	13.11	13.57	6.59	4.40	4.91	43	112	154
			1	1C	11C	9.80	8.02	9.14	14.03	6.84	4.57	5.16	64	163	220
			5	1C	11C	17.40	11.76	14.30	14.03	6.84	4.57	5.16	64	163	220
5		1	8	112	9.87	8.42	9.39	14.54	7.11	4.75	5.43	85	210	280	
		5	8	112	17.47	13.06	15.43	14.54	7.11	4.75	5.43	85	210	280	
20C		2	1	18	108	10.23	7.34	8.78	13.13	6.36	4.25	4.68	22	58	80
			5	18	108	17.62	8.98	11.89	13.13	6.36	4.25	4.68	22	58	80
			3	1	13	104	10.22	7.79	9.12	13.57	6.59	4.40	4.91	43	112
		4	5	13	104	17.60	10.49	13.25	13.57	6.59	4.40	4.91	43	112	154
			1	1C	11C	10.34	8.23	9.43	14.03	6.84	4.57	5.16	64	163	220
			5	1C	11C	17.72	11.88	14.48	14.03	6.84	4.57	5.16	64	163	220
	5	1	8	112	10.41	8.68	9.74	14.54	7.11	4.75	5.43	85	210	280	
		5	8	112	17.79	13.22	15.64	14.54	7.11	4.75	5.43	85	210	280	
	40C	2	1	18	108	11.31	7.53	9.14	13.13	6.36	4.25	4.68	22	58	80
			5	18	108	18.27	9.09	12.10	13.13	6.36	4.25	4.68	22	58	80
			3	1	13	104	11.30	8.10	9.60	13.57	6.59	4.40	4.91	43	112
		4	5	13	104	18.25	10.68	13.54	13.57	6.59	4.40	4.91	43	112	154
			1	1C	11C	11.42	8.66	10.02	14.03	6.84	4.57	5.16	64	163	220
			5	1C	11C	18.37	12.14	14.83	14.03	6.84	4.57	5.16	64	163	220
5		1	8	112	11.49	9.21	10.42	14.54	7.11	4.75	5.43	85	210	280	
		5	8	112	18.44	13.54	16.05	14.54	7.11	4.75	5.43	85	210	280	

260 CHARACTER DATA RECORD 40K MEMORY

CW LNG	MRG ORD	NC. CF	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS					
			B	G	PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	17	85	9.35	7.63	8.93	14.20	6.88	4.59	5.06	20	53	74	
			5	17	85	17.06	9.33	12.14	14.20	6.88	4.59	5.06	20	53	74
	3	1	12	96	9.54	8.02	9.19	14.70	7.14	4.77	5.32	40	104	142	
			5	12	96	17.25	10.82	13.46	14.70	7.14	4.77	5.32	40	104	142
	4	1	9	108	9.74	8.42	9.44	15.26	7.44	4.97	5.62	59	150	202	
			5	9	108	17.46	12.22	14.66	15.26	7.44	4.97	5.62	59	150	202
	5	1	7	105	9.76	8.85	9.69	15.91	7.78	5.20	5.96	78	192	255	
			5	7	105	17.47	13.58	15.80	15.91	7.78	5.20	5.96	78	192	255
	10	2	1	17	85	9.62	7.68	9.02	14.20	6.88	4.59	5.06	20	53	74
				5	17	85	17.22	9.36	12.20	14.20	6.88	4.59	5.06	20	53
3		1	12	96	9.81	8.10	9.31	14.70	7.14	4.77	5.32	40	104	142	
			5	12	96	17.41	10.87	13.53	14.70	7.14	4.77	5.32	40	104	142
4		1	9	108	10.01	8.53	9.58	15.26	7.44	4.97	5.62	59	150	202	
			5	9	108	17.62	12.28	14.75	15.26	7.44	4.97	5.62	59	150	202
5		1	7	105	10.03	8.98	9.86	15.91	7.78	5.20	5.96	78	192	255	
			5	7	105	17.63	13.66	15.90	15.91	7.78	5.20	5.96	78	192	255
20		2	1	17	85	10.16	7.77	9.20	14.20	6.88	4.59	5.06	20	53	74
				5	17	85	17.55	9.42	12.31	14.20	6.88	4.59	5.06	20	53
	3	1	12	96	10.35	8.25	9.54	14.70	7.14	4.77	5.32	40	104	142	
			5	12	96	17.73	10.96	13.68	14.70	7.14	4.77	5.32	40	104	142
	4	1	9	108	10.55	8.74	9.88	15.26	7.44	4.97	5.62	59	150	202	
			5	9	108	17.94	12.41	14.92	15.26	7.44	4.97	5.62	59	150	202
	5	1	7	105	10.57	9.25	10.21	15.91	7.78	5.20	5.96	78	192	255	
			5	7	105	17.96	13.82	16.11	15.91	7.78	5.20	5.96	78	192	255
	40	2	1	17	85	11.24	7.96	9.56	14.20	6.88	4.59	5.06	20	53	74
				5	17	85	18.19	9.53	12.52	14.20	6.88	4.59	5.06	20	53
3		1	12	96	11.43	8.57	10.02	14.70	7.14	4.77	5.32	40	104	142	
			5	12	96	18.38	11.15	13.96	14.70	7.14	4.77	5.32	40	104	142
4		1	9	108	11.63	9.17	10.46	15.26	7.44	4.97	5.62	59	150	202	
			5	9	108	18.59	12.66	15.28	15.26	7.44	4.97	5.62	59	150	202
5		1	7	105	11.65	9.78	10.89	15.91	7.78	5.20	5.96	78	192	255	
			5	7	105	18.60	14.14	16.52	15.91	7.78	5.20	5.96	78	192	255

280 CHARACTER DATA RECORD 40K MEMORY

CW LNG	MRG ORD	NC. CF	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS					
			B	G	PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	15	90	9.65	8.10	9.36	15.36	7.44	4.97	5.48	19	49	69	
			5	15	90	17.36	9.82	12.58	15.36	7.44	4.97	5.48	19	49	69
	3	1	11	88	9.67	8.49	9.62	15.85	7.70	5.14	5.74	37	96	132	
			5	11	88	17.38	11.31	13.89	15.85	7.70	5.14	5.74	37	96	132
	4	1	8	96	9.83	8.95	9.89	16.54	8.07	5.39	6.11	55	138	186	
			5	8	96	17.54	12.77	15.12	16.54	8.07	5.39	6.11	55	138	186
	5	1	7	98	9.89	9.20	10.10	16.91	8.26	5.52	6.30	73	180	241	
			5	7	98	17.60	13.99	16.21	16.91	8.26	5.52	6.30	73	180	241
	10	2	1	15	90	9.92	8.15	9.45	15.36	7.44	4.97	5.48	19	49	69
				5	15	90	17.53	9.85	12.63	15.36	7.44	4.97	5.48	19	49
3		1	11	88	9.94	8.57	9.74	15.85	7.70	5.14	5.74	37	96	132	
			5	11	88	17.54	11.35	13.97	15.85	7.70	5.14	5.74	37	96	132
4		1	8	96	10.10	9.06	10.04	16.54	8.07	5.39	6.11	55	138	186	
			5	8	96	17.71	12.83	15.20	16.54	8.07	5.39	6.11	55	138	186
5		1	7	98	10.16	9.39	10.27	16.91	8.26	5.52	6.30	73	180	241	
			5	7	98	17.76	14.07	16.31	16.91	8.26	5.52	6.30	73	180	241
20		2	1	15	90	10.46	8.25	9.63	15.36	7.44	4.97	5.48	19	49	69
				5	15	90	17.85	9.91	12.74	15.36	7.44	4.97	5.48	19	49
	3	1	11	88	10.48	8.73	9.98	15.85	7.70	5.14	5.74	37	96	132	
			5	11	88	17.87	11.45	14.11	15.85	7.70	5.14	5.74	37	96	132
	4	1	8	96	10.64	9.27	10.33	16.54	8.07	5.39	6.11	55	138	186	
			5	8	96	18.03	12.96	15.38	16.54	8.07	5.39	6.11	55	138	186
	5	1	7	98	10.70	9.65	10.61	16.91	8.26	5.52	6.30	73	180	241	
			5	7	98	18.09	14.22	16.51	16.91	8.26	5.52	6.30	73	180	241
	40	2	1	15	90	11.54	8.44	9.99	15.36	7.44	4.97	5.48	19	49	69
				5	15	90	18.50	10.02	12.95	15.36	7.44	4.97	5.48	19	49
3		1	11	88	11.56	9.04	10.46	15.85	7.70	5.14	5.74	37	96	132	
			5	11	88	18.51	11.64	14.40	15.85	7.70	5.14	5.74	37	96	132
4		1	8	96	11.72	9.70	10.92	16.54	8.07	5.39	6.11	55	138	186	
			5	8	96	18.68	13.22	15.73	16.54	8.07	5.39	6.11	55	138	186
5		1	7	98	11.78	10.18	11.29	16.91	8.26	5.52	6.30	73	180	241	
			5	7	98	18.74	14.54	16.92	16.91	8.26	5.52	6.30	73	180	241

300 CHARACTER DATA RECCRC 40K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	14	84	9.81	8.55	9.78	16.45	7.97	5.32	5.87	17	46	64	
		5	14	84	17.52	10.27	13.00	16.45	7.97	5.32	5.87	17	46	64	
	3	1	10	9C	9.94	8.98	10.06	17.03	8.28	5.53	6.18	35	89	122	
		5	10	9C	17.65	11.81	14.33	17.03	8.28	5.53	6.18	35	89	122	
	4	1	8	88	9.95	9.36	10.30	17.54	8.55	5.71	6.45	51	130	176	
		5	8	88	17.66	13.18	15.52	17.54	8.55	5.71	6.45	51	130	176	
	5	1	6	9C	10.05	9.88	10.59	18.39	9.00	6.02	6.90	67	166	220	
		5	6	9C	17.76	14.64	16.70	18.39	9.00	6.02	6.90	67	166	220	
	10	2	1	14	84	10.08	8.60	9.87	16.45	7.97	5.32	5.87	17	46	64
			5	14	84	17.68	10.30	13.05	16.45	7.97	5.32	5.87	17	46	64
		3	1	10	9C	10.21	9.06	10.18	17.03	8.28	5.53	6.18	35	89	122
			5	10	9C	17.81	11.86	14.40	17.03	8.28	5.53	6.18	35	89	122
		4	1	8	88	10.22	9.46	10.44	17.54	8.55	5.71	6.45	51	130	176
			5	8	88	17.83	13.24	15.61	17.54	8.55	5.71	6.45	51	130	176
		5	1	6	9C	10.32	10.01	10.76	18.39	9.00	6.02	6.90	67	166	220
5			6	9C	17.92	14.72	16.80	18.39	9.00	6.02	6.90	67	166	220	
20		2	1	14	84	10.62	8.70	10.05	16.45	7.97	5.32	5.87	17	46	64
			5	14	84	18.01	10.36	13.16	16.45	7.97	5.32	5.87	17	46	64
		3	1	10	9C	10.75	9.22	10.41	17.03	8.28	5.53	6.18	35	89	122
			5	10	9C	18.13	11.95	14.55	17.03	8.28	5.53	6.18	35	89	122
		4	1	8	88	10.76	9.68	10.74	17.54	8.55	5.71	6.45	51	130	176
			5	8	88	18.15	13.37	15.78	17.54	8.55	5.71	6.45	51	130	176
		5	1	6	9C	10.86	10.28	11.10	18.39	9.00	6.02	6.90	67	166	220
	5		6	9C	18.25	14.88	17.00	18.39	9.00	6.02	6.90	67	166	220	
	40	2	1	14	84	11.70	8.89	10.41	16.45	7.97	5.32	5.87	17	46	64
			5	14	84	18.65	10.48	13.38	16.45	7.97	5.32	5.87	17	46	64
		3	1	10	9C	11.83	9.53	10.89	17.03	8.28	5.53	6.18	35	89	122
			5	10	9C	18.78	12.14	14.83	17.03	8.28	5.53	6.18	35	89	122
		4	1	8	88	11.84	10.11	11.32	17.54	8.55	5.71	6.45	51	130	176
			5	8	88	18.80	13.62	16.14	17.54	8.55	5.71	6.45	51	130	176
		5	1	6	9C	11.94	10.81	11.79	18.39	9.00	6.02	6.90	67	166	220
5			6	9C	18.90	15.21	17.41	18.39	9.00	6.02	6.90	67	166	220	

400 CHARACTER DATA RECCRC 40K MEMORY

CW LNG	MRG CRD	NO. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	11	66	10.74	10.75	11.88	21.85	10.58	7.06	7.78	13	35	48	
		5	11	66	18.45	12.51	15.09	21.85	10.58	7.06	7.78	13	35	48	
	3	1	8	64	10.33	11.23	12.17	22.54	10.95	7.31	8.15	26	67	92	
		5	8	64	16.76	14.10	16.45	22.54	10.95	7.31	8.15	26	67	92	
	4	1	6	66	10.87	11.76	12.47	23.39	11.40	7.62	8.60	38	98	132	
		5	6	66	18.58	15.64	17.70	23.39	11.40	7.62	8.60	38	98	132	
	5	1	4	72	11.09	12.65	12.91	25.09	12.30	8.22	9.50	50	121	160	
		5	4	72	18.80	17.56	19.02	25.09	12.30	8.22	9.50	50	121	160	
	10	2	1	11	66	11.01	10.80	11.97	21.85	10.58	7.06	7.78	13	35	48
			5	11	66	18.61	12.54	15.15	21.85	10.58	7.06	7.78	13	35	48
		3	1	8	64	10.56	11.31	12.29	22.54	10.95	7.31	8.15	26	67	92
			5	8	64	16.90	14.15	16.52	22.54	10.95	7.31	8.15	26	67	92
		4	1	6	66	11.14	11.87	12.62	23.39	11.40	7.62	8.60	38	98	132
			5	6	66	18.74	15.71	17.78	23.39	11.40	7.62	8.60	38	98	132
		5	1	4	72	11.36	12.79	13.08	25.09	12.30	8.22	9.50	50	121	160
5			4	72	18.96	17.64	19.12	25.09	12.30	8.22	9.50	50	121	160	
20		2	1	11	66	11.55	10.90	12.15	21.85	10.58	7.06	7.78	13	35	48
			5	11	66	18.93	12.60	15.26	21.85	10.58	7.06	7.78	13	35	48
		3	1	8	64	11.01	11.47	12.53	22.54	10.95	7.31	8.15	26	67	92
			5	8	64	17.17	14.25	16.66	22.54	10.95	7.31	8.15	26	67	92
		4	1	6	66	11.68	12.09	12.91	23.39	11.40	7.62	8.60	38	98	132
			5	6	66	19.07	15.84	17.96	23.39	11.40	7.62	8.60	38	98	132
		5	1	4	72	11.90	13.07	13.43	25.09	12.30	8.22	9.50	50	121	160
	5		4	72	19.29	17.80	19.33	25.09	12.30	8.22	9.50	50	121	160	
	40	2	1	11	66	12.63	11.10	12.51	21.85	10.58	7.06	7.78	13	35	48
			5	11	66	19.58	12.71	15.47	21.85	10.58	7.06	7.78	13	35	48
		3	1	8	64	11.91	11.79	13.01	22.54	10.95	7.31	8.15	26	67	92
			5	8	64	17.71	14.44	16.95	22.54	10.95	7.31	8.15	26	67	92
		4	1	6	66	12.76	12.52	13.50	23.39	11.40	7.62	8.60	38	98	132
			5	6	66	19.71	16.10	18.31	23.39	11.40	7.62	8.60	38	98	132
		5	1	4	72	12.98	13.62	14.11	25.09	12.30	8.22	9.50	50	121	160
5			4	72	19.93	18.13	19.74	25.09	12.30	8.22	9.50	50	121	160	

500 CHARACTER DATA RECORD 40K MEMORY

CW LNG	MRG ORC	NC. CF	R	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS		
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI
					5	2	1	8	48	11.27	13.09	14.03	27.54	13.35
		5	8	48	17.70	14.90	17.24	27.54	13.35	8.91	9.85	10	27	38
		1	6	54	11.41	13.63	14.35	28.39	13.80	9.22	10.30	21	53	73
		5	6	54	17.84	16.57	18.62	28.39	13.80	9.22	10.30	21	53	73
	4	1	4	56	11.58	14.54	14.80	30.09	14.70	9.82	11.20	30	76	101
		5	4	56	18.00	18.56	20.02	30.09	14.70	9.82	11.20	30	76	101
		1	3	57	11.73	15.43	15.24	31.78	15.60	10.43	12.10	40	96	126
		5	3	57	18.16	20.47	21.35	31.78	15.60	10.43	12.10	40	96	126
1C	2	1	8	48	11.49	13.14	14.12	27.54	13.35	8.91	9.85	10	27	38
		5	8	48	17.83	14.93	17.30	27.54	13.35	8.91	9.85	10	27	38
		1	6	54	11.64	13.72	14.47	28.39	13.80	9.22	10.30	21	53	73
		5	6	54	17.97	16.62	18.69	28.39	13.80	9.22	10.30	21	53	73
	4	1	4	56	11.80	14.65	14.94	30.09	14.70	9.82	11.20	30	76	101
		5	4	56	18.14	18.62	20.11	30.09	14.70	9.82	11.20	30	76	101
		1	3	57	11.96	15.57	15.41	31.78	15.60	10.43	12.10	40	96	126
		5	3	57	18.30	20.55	21.45	31.78	15.60	10.43	12.10	40	96	126
2C	2	1	8	48	11.94	13.24	14.30	27.54	13.35	8.91	9.85	10	27	38
		5	8	48	18.10	14.99	17.40	27.54	13.35	8.91	9.85	10	27	38
		1	6	54	12.09	13.88	14.70	28.39	13.80	9.22	10.30	21	53	73
		5	6	54	18.24	16.72	18.84	28.39	13.80	9.22	10.30	21	53	73
	4	1	4	56	12.25	14.88	15.24	30.09	14.70	9.82	11.20	30	76	101
		5	4	56	18.41	18.76	20.28	30.09	14.70	9.82	11.20	30	76	101
		1	3	57	12.41	15.86	15.75	31.78	15.60	10.43	12.10	40	96	126
		5	3	57	18.57	20.72	21.65	31.78	15.60	10.43	12.10	40	96	126
4C	2	1	8	48	12.84	13.44	14.66	27.54	13.35	8.91	9.85	10	27	38
		5	8	48	18.64	15.11	17.62	27.54	13.35	8.91	9.85	10	27	38
		1	6	54	12.99	14.21	15.18	28.39	13.80	9.22	10.30	21	53	73
		5	6	54	18.78	16.91	19.12	28.39	13.80	9.22	10.30	21	53	73
	4	1	4	56	13.15	15.33	15.82	30.09	14.70	9.82	11.20	30	76	101
		5	4	56	18.95	19.03	20.64	30.09	14.70	9.82	11.20	30	76	101
		1	3	57	13.31	16.42	16.44	31.78	15.60	10.43	12.10	40	96	126
		5	3	57	19.11	21.06	22.06	31.78	15.60	10.43	12.10	40	96	126

750 CHARACTER DATA RECORD 40K MEMORY

CW LNG	MRG ORC	NC. CF	R	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS		
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI
					5	2	1	5	35	14.08	18.83	19.36	41.57	20.16
		5	5	35	20.51	20.76	22.57	41.57	20.16	13.46	14.91	7	18	25
		1	4	36	14.18	19.45	19.71	42.59	20.70	13.82	15.45	14	35	49
		5	4	36	20.60	22.52	23.98	42.59	20.70	13.82	15.45	14	35	49
	4	1	3	36	14.32	20.35	20.16	44.28	21.60	14.43	16.35	20	51	69
		5	3	36	20.75	24.51	25.38	44.28	21.60	14.43	16.35	20	51	69
		1	2	38	14.63	22.00	20.90	47.67	23.40	15.65	18.15	26	64	84
		5	2	38	21.05	27.31	27.01	47.67	23.40	15.65	18.15	26	64	84
1C	2	1	5	35	14.31	18.88	19.45	41.57	20.16	13.46	14.91	7	18	25
		5	5	35	20.64	20.79	22.63	41.57	20.16	13.46	14.91	7	18	25
		1	4	36	14.40	19.54	19.83	42.59	20.70	13.82	15.45	14	35	49
		5	4	36	20.74	22.57	24.06	42.59	20.70	13.82	15.45	14	35	49
	4	1	3	36	14.55	20.47	20.31	44.28	21.60	14.43	16.35	20	51	69
		5	3	36	20.88	24.58	25.47	44.28	21.60	14.43	16.35	20	51	69
		1	2	38	14.85	22.15	21.07	47.67	23.40	15.65	18.15	26	64	84
		5	2	38	21.19	27.40	27.11	47.67	23.40	15.65	18.15	26	64	84
2C	2	1	5	35	14.76	18.99	19.63	41.57	20.16	13.46	14.91	7	18	25
		5	5	35	20.91	20.85	22.74	41.57	20.16	13.46	14.91	7	18	25
		1	4	36	14.85	19.71	20.07	42.59	20.70	13.82	15.45	14	35	49
		5	4	36	21.01	22.67	24.20	42.59	20.70	13.82	15.45	14	35	49
	4	1	3	36	15.00	20.70	20.60	44.28	21.60	14.43	16.35	20	51	69
		5	3	36	21.15	24.72	25.65	44.28	21.60	14.43	16.35	20	51	69
		1	2	38	15.30	22.45	21.41	47.67	23.40	15.65	18.15	26	64	84
		5	2	38	21.46	27.57	27.32	47.67	23.40	15.65	18.15	26	64	84
4C	2	1	5	35	15.66	19.21	19.99	41.57	20.16	13.46	14.91	7	18	25
		5	5	35	21.45	20.98	22.95	41.57	20.16	13.46	14.91	7	18	25
		1	4	36	15.75	20.05	20.55	42.59	20.70	13.82	15.45	14	35	49
		5	4	36	21.55	22.88	24.49	42.59	20.70	13.82	15.45	14	35	49
	4	1	3	36	15.90	21.17	21.18	44.28	21.60	14.43	16.35	20	51	69
		5	3	36	21.69	25.00	26.00	44.28	21.60	14.43	16.35	20	51	69
		1	2	38	16.20	23.04	22.10	47.67	23.40	15.65	18.15	26	64	84
		5	2	38	22.00	27.93	27.73	47.67	23.40	15.65	18.15	26	64	84

1000 CHARACTER DATA RECCRC 40K MEMORY

CW LNG	MRC ORC	NO. CF	E	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS				
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI		
5	2	1	4	24	24	16.46	24.34	24.60	55.09	26.70	17.82	19.70	5	13	19	
					24	21.60	26.35	27.82	55.09	26.70	17.82	19.70	5	13	19	
					27	16.62	25.27	25.07	56.78	27.60	18.43	20.60	10	26	36	
	3	1	3	27	27	21.76	28.47	29.35	56.78	27.60	18.43	20.60	10	26	36	
					28	16.91	26.92	25.82	60.17	29.40	19.65	22.40	15	38	50	
					28	22.05	31.34	31.05	60.17	29.40	19.65	22.40	15	38	50	
	4	1	2	28	30	17.79	31.59	27.76	70.35	34.80	23.30	27.80	19	43	55	
					30	22.93	37.70	33.87	70.35	34.80	23.30	27.80	19	43	55	
					30	17.97	31.76	27.93	70.35	34.80	23.30	27.80	19	43	55	
	1C	2	1	4	24	24	16.64	24.40	24.69	55.09	26.70	17.82	19.70	5	13	19
						24	21.71	26.39	27.87	55.09	26.70	17.82	19.70	5	13	19
						27	16.80	25.36	25.19	56.78	27.60	18.43	20.60	10	26	36
		3	1	3	27	27	21.87	28.52	29.42	56.78	27.60	18.43	20.60	10	26	36
						28	17.09	27.05	25.97	60.17	29.40	19.65	22.40	15	38	50
						28	22.16	31.42	31.13	60.17	29.40	19.65	22.40	15	38	50
4		1	2	28	30	17.97	31.76	27.93	70.35	34.80	23.30	27.80	19	43	55	
					30	23.04	37.80	33.97	70.35	34.80	23.30	27.80	19	43	55	
					30	17.97	31.76	27.93	70.35	34.80	23.30	27.80	19	43	55	
2C		2	1	4	24	24	17.00	24.51	24.87	55.09	26.70	17.82	19.70	5	13	19
						24	21.93	26.45	27.98	55.09	26.70	17.82	19.70	5	13	19
						27	17.16	25.53	25.43	56.78	27.60	18.43	20.60	10	26	36
		3	1	3	27	27	22.08	28.63	29.56	56.78	27.60	18.43	20.60	10	26	36
						28	17.45	27.30	26.26	60.17	29.40	19.65	22.40	15	38	50
						28	22.38	31.57	31.31	60.17	29.40	19.65	22.40	15	38	50
	4	1	2	28	30	18.33	32.10	28.28	70.35	34.80	23.30	27.80	19	43	55	
					30	23.26	38.00	34.18	70.35	34.80	23.30	27.80	19	43	55	
					30	17.97	31.76	27.93	70.35	34.80	23.30	27.80	19	43	55	
	4C	2	1	4	24	24	17.72	24.74	25.23	55.09	26.70	17.82	19.70	5	13	19
						24	22.36	26.59	28.19	55.09	26.70	17.82	19.70	5	13	19
						27	17.88	25.89	25.91	56.78	27.60	18.43	20.60	10	26	36
		3	1	3	27	27	22.52	28.85	29.85	56.78	27.60	18.43	20.60	10	26	36
						28	18.17	27.79	26.85	60.17	29.40	19.65	22.40	15	38	50
						28	22.81	31.86	31.66	60.17	29.40	19.65	22.40	15	38	50
4		1	2	28	30	19.05	32.79	28.96	70.35	34.80	23.30	27.80	19	43	55	
					30	23.69	38.41	34.59	70.35	34.80	23.30	27.80	19	43	55	
					30	19.05	32.79	28.96	70.35	34.80	23.30	27.80	19	43	55	

1500 CHARACTER DATA RECCRC 40K MEMORY

CW LNG	MRC CRC	NO. CF	E	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS				
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI		
5	2	1	2	18	18	22.52	36.73	35.63	85.17	41.40	27.65	30.90	3	8	12	
					18	27.66	39.14	38.84	85.17	41.40	27.65	30.90	3	8	12	
					18	22.52	36.90	35.80	85.17	41.40	27.65	30.90	7	17	24	
	3	1	2	18	18	27.66	40.37	40.07	85.17	41.40	27.65	30.90	7	17	24	
					19	23.38	41.57	37.75	95.35	46.80	31.30	36.30	10	24	31	
					19	28.52	46.80	42.97	95.35	46.80	31.30	36.30	10	24	31	
	4	1	1	19	19	23.38	41.71	37.89	95.35	46.80	31.30	36.30	13	32	42	
					19	28.52	47.82	44.00	95.35	46.80	31.30	36.30	13	32	42	
					19	23.38	41.71	37.89	95.35	46.80	31.30	36.30	13	32	42	
	1C	2	1	2	18	18	22.70	36.80	35.72	85.17	41.40	27.65	30.90	3	8	12
						18	27.77	39.18	38.90	85.17	41.40	27.65	30.90	3	8	12
						18	22.70	37.00	35.92	85.17	41.40	27.65	30.90	7	17	24
		3	1	2	18	18	27.77	40.43	40.14	85.17	41.40	27.65	30.90	7	17	24
						19	23.56	41.72	37.89	95.35	46.80	31.30	36.30	10	24	31
						19	28.63	46.88	43.06	95.35	46.80	31.30	36.30	10	24	31
4		1	1	19	19	23.56	41.88	38.06	95.35	46.80	31.30	36.30	13	32	42	
					19	28.63	47.92	44.10	95.35	46.80	31.30	36.30	13	32	42	
					19	23.56	41.88	38.06	95.35	46.80	31.30	36.30	13	32	42	
2C		2	1	2	18	18	23.06	36.93	35.90	85.17	41.40	27.65	30.90	3	8	12
						18	27.98	39.26	39.00	85.17	41.40	27.65	30.90	3	8	12
						18	23.06	37.19	36.15	85.17	41.40	27.65	30.90	7	17	24
		3	1	2	18	18	27.98	40.55	40.29	85.17	41.40	27.65	30.90	7	17	24
						19	23.92	42.01	38.19	95.35	46.80	31.30	36.30	10	24	31
						19	28.85	47.06	43.23	95.35	46.80	31.30	36.30	10	24	31
	4	1	1	19	19	23.92	42.23	38.40	95.35	46.80	31.30	36.30	13	32	42	
					19	28.85	48.13	44.30	95.35	46.80	31.30	36.30	13	32	42	
					19	23.92	42.23	38.40	95.35	46.80	31.30	36.30	13	32	42	
	4C	2	1	2	18	18	23.78	37.20	36.26	85.17	41.40	27.65	30.90	3	8	12
						18	28.42	39.42	39.22	85.17	41.40	27.65	30.90	3	8	12
						18	23.78	37.58	36.63	85.17	41.40	27.65	30.90	7	17	24
		3	1	2	18	18	28.42	40.78	40.57	85.17	41.40	27.65	30.90	7	17	24
						19	24.64	42.60	38.77	95.35	46.80	31.30	36.30	10	24	31
						19	29.28	47.41	43.59	95.35	46.80	31.30	36.30	10	24	31
4		1	1	19	19	24.64	42.91	39.09	95.35	46.80	31.30	36.30	13	32	42	
					19	29.28	48.54	44.71	95.35	46.80	31.30	36.30	13	32	42	
					19	24.64	42.91	39.09	95.35	46.80	31.30	36.30	13	32	42	

2000 CHARACTER DATA RECORD 40K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	2	12	27.75	46.85	45.75	110.17	53.40	35.65	39.40	2	6	9	
		5	2	12	31.61	49.27	48.97	110.17	53.40	35.65	39.40	2	6	9	
	3	1	1	14	28.58	51.55	47.72	120.35	58.80	39.30	44.80	5	12	16	
		5	1	14	32.43	55.82	52.00	120.35	58.80	39.30	44.80	5	12	16	
	4	1	1	14	28.58	51.70	47.87	120.35	58.80	39.30	44.80	7	19	25	
		5	1	14	32.43	56.92	53.10	120.35	58.80	39.30	44.80	7	19	25	
	5	1	**	**											
		5	**	**											
	10	2	1	2	12	27.88	46.92	45.84	110.17	53.40	35.65	39.40	2	6	9
			5	2	12	31.69	49.31	49.02	110.17	53.40	35.65	39.40	2	6	9
3		1	1	14	28.71	51.67	47.84	120.35	58.80	39.30	44.80	5	12	16	
		5	1	14	32.52	55.89	52.07	120.35	58.80	39.30	44.80	5	12	16	
4		1	1	14	28.71	51.84	48.02	120.35	58.80	39.30	44.80	7	19	25	
		5	1	14	32.52	57.01	53.18	120.35	58.80	39.30	44.80	7	19	25	
5		1	**	**											
		5	**	**											
20		2	1	2	12	28.15	47.06	46.02	110.17	53.40	35.65	39.40	2	6	9
			5	2	12	31.85	49.39	49.13	110.17	53.40	35.65	39.40	2	6	9
	3	1	1	14	28.98	51.90	48.08	120.35	58.80	39.30	44.80	5	12	16	
		5	1	14	32.68	56.04	52.21	120.35	58.80	39.30	44.80	5	12	16	
	4	1	1	14	28.98	52.14	48.31	120.35	58.80	39.30	44.80	7	19	25	
		5	1	14	32.68	57.18	53.36	120.35	58.80	39.30	44.80	7	19	25	
	5	1	**	**											
		5	**	**											
	40	2	1	2	12	28.69	47.33	46.38	110.17	53.40	35.65	39.40	2	6	9
			5	2	12	32.17	49.55	49.34	110.17	53.40	35.65	39.40	2	6	9
3		1	1	14	29.52	52.38	48.56	120.35	58.80	39.30	44.80	5	12	16	
		5	1	14	33.00	56.32	52.50	120.35	58.80	39.30	44.80	5	12	16	
4		1	1	14	29.52	52.72	48.90	120.35	58.80	39.30	44.80	7	19	25	
		5	1	14	33.00	57.54	53.71	120.35	58.80	39.30	44.80	7	19	25	
5		1	**	**											
		5	**	**											



20 CHARACTER DATA RECCRD 60K MEMORY

CW LNG	MRG CRD	NO. CF	B	G	PROCESS TIME MILLISECCNDS/RECCRD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	389	778	17.50	2.26	3.87	1.05	0.51	0.34	0.37	270	728	1024	
		5	389	778	29.07	3.87	7.08	1.05	0.51	0.34	0.37	270	728	1024	
	3	1	285	855	18.59	2.44	4.04	1.07	0.52	0.35	0.38	537	1429	1997	
		5	285	855	30.15	5.11	8.31	1.07	0.52	0.35	0.38	537	1429	1997	
	4	1	223	892	19.11	2.60	4.19	1.09	0.53	0.35	0.39	801	2105	2919	
		5	223	892	30.68	6.22	9.42	1.09	0.53	0.35	0.39	801	2105	2919	
	5	1	181	905	19.29	2.75	4.34	1.11	0.54	0.36	0.40	1060	2752	3788	
		5	181	905	30.86	7.26	10.45	1.11	0.54	0.36	0.40	1060	2752	3788	
	10	2	1	389	778	17.91	2.30	3.96	1.05	0.51	0.34	0.37	270	728	1024
			5	389	778	29.31	3.90	7.13	1.05	0.51	0.34	0.37	270	728	1024
3		1	285	855	18.99	2.51	4.16	1.07	0.52	0.35	0.38	537	1429	1997	
		5	285	855	30.40	5.16	8.39	1.07	0.52	0.35	0.38	537	1429	1997	
4		1	223	892	19.51	2.70	4.34	1.09	0.53	0.35	0.39	801	2105	2919	
		5	223	892	30.92	6.28	9.51	1.09	0.53	0.35	0.39	801	2105	2919	
5		1	181	905	19.70	2.87	4.51	1.11	0.54	0.36	0.40	1060	2752	3788	
		5	181	905	31.10	7.33	10.55	1.11	0.54	0.36	0.40	1060	2752	3788	

30 CHARACTER DATA RECCRD 60K MEMORY

CW LNG	MRG CRD	NO. CF	B	G	PROCESS TIME MILLISECCNDS/RECCRD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	259	777	17.61	2.47	4.07	1.58	0.76	0.51	0.55	180	485	683	
		5	259	777	29.17	4.09	7.29	1.58	0.76	0.51	0.55	180	485	683	
	3	1	190	950	20.04	2.66	4.25	1.61	0.78	0.52	0.57	358	953	1331	
		5	190	950	31.61	5.33	8.52	1.61	0.78	0.52	0.57	358	953	1331	
	4	1	148	888	19.17	2.82	4.40	1.64	0.79	0.53	0.58	533	1402	1945	
		5	148	888	30.74	6.45	9.63	1.64	0.79	0.53	0.58	533	1402	1945	
	5	1	121	968	20.30	2.98	4.55	1.67	0.81	0.54	0.60	706	1835	2526	
		5	121	968	31.86	7.49	10.66	1.67	0.81	0.54	0.60	706	1835	2526	
	10	2	1	259	777	18.01	2.52	4.16	1.58	0.76	0.51	0.55	180	485	683
			5	259	777	29.41	4.11	7.34	1.58	0.76	0.51	0.55	180	485	683
3		1	190	950	20.44	2.73	4.37	1.61	0.78	0.52	0.57	358	953	1331	
		5	190	950	31.85	5.38	8.59	1.61	0.78	0.52	0.57	358	953	1331	
4		1	148	888	19.57	2.92	4.55	1.64	0.79	0.53	0.58	533	1402	1945	
		5	148	888	30.98	6.51	9.72	1.64	0.79	0.53	0.58	533	1402	1945	
5		1	121	968	20.70	3.10	4.72	1.67	0.81	0.54	0.60	706	1835	2526	
		5	121	968	32.11	7.57	10.76	1.67	0.81	0.54	0.60	706	1835	2526	
20		2	1	259	777	18.82	2.61	4.34	1.58	0.76	0.51	0.55	180	485	683
			5	259	777	29.90	4.17	7.45	1.58	0.76	0.51	0.55	180	485	683
	3	1	190	950	21.25	2.88	4.61	1.61	0.78	0.52	0.57	358	953	1331	
		5	190	950	32.33	5.47	8.74	1.61	0.78	0.52	0.57	358	953	1331	
	4	1	148	888	20.38	3.13	4.84	1.64	0.79	0.53	0.58	533	1402	1945	
		5	148	888	31.47	6.53	9.89	1.64	0.79	0.53	0.58	533	1402	1945	
	5	1	121	968	21.51	3.35	5.06	1.67	0.81	0.54	0.60	706	1835	2526	
		5	121	968	32.59	7.72	10.97	1.67	0.81	0.54	0.60	706	1835	2526	

40 CHARACTER DATA RECORD 60K MEMORY

CW LNG	MRG CRD	NO. CF	E	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	194	776	17.71	2.69	4.28	2.10	1.02	0.68	0.74	135	364	512	
		5	194	776	29.27	4.30	7.49	2.10	1.02	0.68	0.74	135	364	512	
	3	1	142	852	18.78	2.97	4.46	2.14	1.04	0.69	0.76	268	714	998	
		5	142	852	30.34	5.55	8.73	2.14	1.04	0.69	0.76	268	714	998	
	4	1	111	999	20.85	3.04	4.61	2.18	1.06	0.71	0.78	400	1052	1458	
		5	111	999	32.41	6.67	9.84	2.18	1.06	0.71	0.78	400	1052	1458	
	5	1	9C	99C	20.72	3.20	4.76	2.23	1.08	0.72	0.80	529	1375	1892	
		5	9C	99C	32.29	7.72	10.87	2.23	1.08	0.72	0.80	529	1375	1892	
	1C	2	1	194	776	18.11	2.73	4.37	2.10	1.02	0.68	0.74	135	364	512
			5	194	776	29.52	4.33	7.55	2.10	1.02	0.68	0.74	135	364	512
		3	1	142	852	19.18	2.95	4.58	2.14	1.04	0.69	0.76	268	714	998
			5	142	852	30.59	5.60	8.80	2.14	1.04	0.69	0.76	268	714	998
4		1	111	999	21.25	3.15	4.76	2.18	1.06	0.71	0.78	400	1052	1458	
		5	111	999	32.66	6.74	9.93	2.18	1.06	0.71	0.78	400	1052	1458	
5		1	9C	99C	21.13	3.33	4.93	2.23	1.08	0.72	0.80	529	1375	1892	
		5	9C	99C	32.53	7.80	10.97	2.23	1.08	0.72	0.80	529	1375	1892	
2C		2	1	194	776	18.92	2.82	4.55	2.10	1.02	0.68	0.74	135	364	512
			5	194	776	30.00	4.39	7.66	2.10	1.02	0.68	0.74	135	364	512
		3	1	142	852	19.99	3.10	4.82	2.14	1.04	0.69	0.76	268	714	998
			5	142	852	31.07	5.69	8.95	2.14	1.04	0.69	0.76	268	714	998
	4	1	111	999	22.06	3.35	5.05	2.18	1.06	0.71	0.78	400	1052	1458	
		5	111	999	33.14	6.86	10.10	2.18	1.06	0.71	0.78	400	1052	1458	
	5	1	9C	99C	21.94	3.58	5.28	2.23	1.08	0.72	0.80	529	1375	1892	
		5	9C	99C	33.02	7.95	11.18	2.23	1.08	0.72	0.80	529	1375	1892	

50 CHARACTER DATA RECORD 60K MEMORY

CW LNG	MRG CRD	NO. CF	E	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	155	62C	15.63	2.90	4.49	2.63	1.27	0.85	0.92	108	291	409	
		5	155	62C	27.20	4.52	7.70	2.63	1.27	0.85	0.92	108	291	409	
	3	1	114	684	16.53	3.09	4.66	2.68	1.29	0.86	0.94	215	571	799	
		5	114	684	28.10	5.78	8.94	2.68	1.29	0.86	0.94	215	571	799	
	4	1	89	8C1	18.18	3.27	4.83	2.73	1.32	0.88	0.97	320	841	1167	
		5	89	8C1	29.75	6.90	10.05	2.73	1.32	0.88	0.97	320	841	1167	
	5	1	72	792	18.06	3.43	4.98	2.78	1.35	0.90	1.00	423	1100	1514	
		5	72	792	29.63	7.95	11.08	2.78	1.35	0.90	1.00	423	1100	1514	
	1C	2	1	155	62C	16.03	2.95	4.58	2.63	1.27	0.85	0.92	108	291	409
			5	155	62C	27.44	4.55	7.76	2.63	1.27	0.85	0.92	108	291	409
		3	1	114	684	16.94	3.17	4.78	2.68	1.29	0.86	0.94	215	571	799
			5	114	684	28.34	5.82	9.01	2.68	1.29	0.86	0.94	215	571	799
4		1	89	8C1	18.59	3.37	4.97	2.73	1.32	0.88	0.97	320	841	1167	
		5	89	8C1	29.99	6.96	10.14	2.73	1.32	0.88	0.97	320	841	1167	
5		1	72	792	18.46	3.56	5.15	2.78	1.35	0.90	1.00	423	1100	1514	
		5	72	792	29.87	8.03	11.19	2.78	1.35	0.90	1.00	423	1100	1514	
2C		2	1	155	62C	16.84	3.04	4.76	2.63	1.27	0.85	0.92	108	291	409
			5	155	62C	27.93	4.60	7.86	2.63	1.27	0.85	0.92	108	291	409
		3	1	114	684	17.75	3.32	5.02	2.68	1.29	0.86	0.94	215	571	799
			5	114	684	28.83	5.91	9.16	2.68	1.29	0.86	0.94	215	571	799
	4	1	89	8C1	19.40	3.57	5.26	2.73	1.32	0.88	0.97	320	841	1167	
		5	89	8C1	30.48	7.08	10.31	2.73	1.32	0.88	0.97	320	841	1167	
	5	1	72	792	19.27	3.81	5.49	2.78	1.35	0.90	1.00	423	1100	1514	
		5	72	792	30.35	8.18	11.39	2.78	1.35	0.90	1.00	423	1100	1514	
	4C	2	1	155	62C	18.46	3.22	5.12	2.63	1.27	0.85	0.92	108	291	409
			5	155	62C	28.90	4.71	8.08	2.63	1.27	0.85	0.92	108	291	409
		3	1	114	684	19.37	3.62	5.50	2.68	1.29	0.86	0.94	215	571	799
			5	114	684	29.80	6.09	9.44	2.68	1.29	0.86	0.94	215	571	799
4		1	89	8C1	21.02	3.58	5.85	2.73	1.32	0.88	0.97	320	841	1167	
		5	89	8C1	31.45	7.33	10.66	2.73	1.32	0.88	0.97	320	841	1167	
5		1	72	792	20.89	4.32	6.17	2.78	1.35	0.90	1.00	423	1100	1514	
		5	72	792	31.33	8.49	11.80	2.78	1.35	0.90	1.00	423	1100	1514	

60 CHARACTER DATA RECCRD 60K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	129	516	14.29	3.12	4.69	3.16	1.52	1.02	1.10	90	242	341	
		5	129	516	25.85	4.74	7.91	3.16	1.52	1.02	1.10	90	242	341	
	3	1	95	665	16.38	3.31	4.87	3.21	1.55	1.04	1.13	179	476	665	
		5	95	665	27.95	6.00	9.15	3.21	1.55	1.04	1.13	179	476	665	
	4	1	74	666	16.40	3.49	5.04	3.27	1.59	1.06	1.17	266	701	972	
		5	74	666	27.97	7.13	10.26	3.27	1.59	1.06	1.17	266	701	972	
	5	1	60	660	16.32	3.66	5.19	3.34	1.62	1.08	1.20	353	916	1261	
		5	60	660	27.89	8.19	11.30	3.34	1.62	1.08	1.20	353	916	1261	
	10	2	1	129	516	14.69	3.16	4.78	3.16	1.52	1.02	1.10	90	242	341
			5	129	516	26.09	4.76	7.96	3.16	1.52	1.02	1.10	90	242	341
3		1	95	665	16.79	3.39	4.99	3.21	1.55	1.04	1.13	179	476	665	
		5	95	665	28.19	6.04	9.22	3.21	1.55	1.04	1.13	179	476	665	
4		1	74	666	16.81	3.59	5.18	3.27	1.59	1.06	1.17	266	701	972	
		5	74	666	28.21	7.19	10.35	3.27	1.59	1.06	1.17	266	701	972	
5		1	60	660	16.73	3.79	5.36	3.34	1.62	1.08	1.20	353	916	1261	
		5	60	660	28.13	8.26	11.40	3.34	1.62	1.08	1.20	353	916	1261	
20		2	1	129	516	15.50	3.25	4.96	3.16	1.52	1.02	1.10	90	242	341
			5	129	516	26.58	4.82	8.07	3.16	1.52	1.02	1.10	90	242	341
	3	1	95	665	17.60	3.54	5.23	3.21	1.55	1.04	1.13	179	476	665	
		5	95	665	28.68	6.13	9.36	3.21	1.55	1.04	1.13	179	476	665	
	4	1	74	666	17.62	3.79	5.47	3.27	1.59	1.06	1.17	266	701	972	
		5	74	666	28.70	7.31	10.52	3.27	1.59	1.06	1.17	266	701	972	
	5	1	60	660	17.54	4.04	5.70	3.34	1.62	1.08	1.20	353	916	1261	
		5	60	660	28.62	8.41	11.60	3.34	1.62	1.08	1.20	353	916	1261	
	40	2	1	129	516	17.12	3.43	5.32	3.16	1.52	1.02	1.10	90	242	341
			5	129	516	27.55	4.93	8.29	3.16	1.52	1.02	1.10	90	242	341
3		1	95	665	19.22	3.84	5.71	3.21	1.55	1.04	1.13	179	476	665	
		5	95	665	29.65	6.31	9.65	3.21	1.55	1.04	1.13	179	476	665	
4		1	74	666	19.24	4.20	6.06	3.27	1.59	1.06	1.17	266	701	972	
		5	74	666	29.67	7.56	10.87	3.27	1.59	1.06	1.17	266	701	972	
5		1	60	660	19.16	4.55	6.39	3.34	1.62	1.08	1.20	353	916	1261	
		5	60	660	29.59	8.72	12.01	3.34	1.62	1.08	1.20	353	916	1261	

70 CHARACTER DATA RECCRD 60K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	111	555	14.95	3.33	4.90	3.68	1.78	1.19	1.29	77	208	292	
		5	111	555	26.51	4.95	8.12	3.68	1.78	1.19	1.29	77	208	292	
	3	1	81	567	15.12	3.53	5.08	3.75	1.81	1.21	1.32	153	408	570	
		5	81	567	26.69	6.22	9.36	3.75	1.81	1.21	1.32	153	408	570	
	4	1	63	567	15.13	3.71	5.25	3.82	1.85	1.24	1.36	228	600	832	
		5	63	567	26.69	7.36	10.47	3.82	1.85	1.24	1.36	228	600	832	
	5	1	51	612	15.77	3.89	5.40	3.90	1.89	1.26	1.40	302	785	1080	
		5	51	612	27.33	8.42	11.51	3.90	1.89	1.26	1.40	302	785	1080	
	10	2	1	111	555	15.35	3.38	4.99	3.68	1.78	1.19	1.29	77	208	292
			5	111	555	26.76	4.98	8.17	3.68	1.78	1.19	1.29	77	208	292
3		1	81	567	15.93	3.61	5.20	3.75	1.81	1.21	1.32	153	408	570	
		5	81	567	26.93	6.26	9.43	3.75	1.81	1.21	1.32	153	408	570	
4		1	63	567	15.93	3.82	5.39	3.82	1.85	1.24	1.36	228	600	832	
		5	63	567	26.94	7.42	10.56	3.82	1.85	1.24	1.36	228	600	832	
5		1	51	612	16.17	4.01	5.57	3.90	1.89	1.26	1.40	302	785	1080	
		5	51	612	27.58	8.50	11.61	3.90	1.89	1.26	1.40	302	785	1080	
20		2	1	111	555	16.16	3.47	5.17	3.68	1.78	1.19	1.29	77	208	292
			5	111	555	27.24	5.03	8.28	3.68	1.78	1.19	1.29	77	208	292
	3	1	81	567	16.34	3.76	5.44	3.75	1.81	1.21	1.32	153	408	570	
		5	81	567	27.42	6.35	9.57	3.75	1.81	1.21	1.32	153	408	570	
	4	1	63	567	16.34	4.02	5.69	3.82	1.85	1.24	1.36	228	600	832	
		5	63	567	27.42	7.54	10.73	3.82	1.85	1.24	1.36	228	600	832	
	5	1	51	612	16.98	4.27	5.91	3.90	1.89	1.26	1.40	302	785	1080	
		5	51	612	28.06	8.65	11.82	3.90	1.89	1.26	1.40	302	785	1080	
	40	2	1	111	555	17.78	3.65	5.53	3.68	1.78	1.19	1.29	77	208	292
			5	111	555	28.21	5.14	8.49	3.68	1.78	1.19	1.29	77	208	292
3		1	81	567	17.96	4.06	5.92	3.75	1.81	1.21	1.32	153	408	570	
		5	81	567	28.39	6.53	9.86	3.75	1.81	1.21	1.32	153	408	570	
4		1	63	567	17.96	4.43	6.27	3.82	1.85	1.24	1.36	228	600	832	
		5	63	567	28.40	7.78	11.09	3.82	1.85	1.24	1.36	228	600	832	
5		1	51	612	18.60	4.78	6.60	3.90	1.89	1.26	1.40	302	785	1080	
		5	51	612	29.03	8.95	12.23	3.90	1.89	1.26	1.40	302	785	1080	

80 CHARACTER DATA RECORD 60K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	97	485	13.65	3.54	5.11	4.21	2.03	1.36	1.47	67	182	256	
		5	97	485	23.93	5.17	8.32	4.21	2.03	1.36	1.47	67	182	256	
	3	1	71	497	13.83	3.75	5.29	4.29	2.07	1.38	1.51	134	357	499	
		5	71	497	24.11	6.44	9.57	4.29	2.07	1.38	1.51	134	357	499	
	4	1	55	495	13.80	3.54	5.46	4.37	2.12	1.41	1.56	200	525	728	
		5	55	495	24.09	7.58	10.68	4.37	2.12	1.41	1.56	200	525	728	
	5	1	45	54C	14.87	4.11	5.61	4.45	2.16	1.44	1.60	264	687	946	
		5	45	54C	26.44	8.65	11.72	4.45	2.16	1.44	1.60	264	687	946	
	10	2	1	97	485	14.01	3.59	5.20	4.21	2.03	1.36	1.47	67	182	256
			5	97	485	24.15	5.20	8.38	4.21	2.03	1.36	1.47	67	182	256
3		1	71	497	14.19	3.82	5.41	4.29	2.07	1.38	1.51	134	357	499	
		5	71	497	24.32	6.48	9.64	4.29	2.07	1.38	1.51	134	357	499	
4		1	55	495	14.16	4.04	5.60	4.37	2.12	1.41	1.56	200	525	728	
		5	55	495	24.30	7.64	10.77	4.37	2.12	1.41	1.56	200	525	728	
5		1	45	54C	15.28	4.24	5.78	4.45	2.16	1.44	1.60	264	687	946	
		5	45	540	26.68	8.73	11.82	4.45	2.16	1.44	1.60	264	687	946	
20		2	1	97	485	14.73	3.68	5.38	4.21	2.03	1.36	1.47	67	182	256
			5	97	485	24.58	5.25	8.49	4.21	2.03	1.36	1.47	67	182	256
	3	1	71	497	14.91	3.57	5.65	4.29	2.07	1.38	1.51	134	357	499	
		5	71	497	24.76	6.57	9.78	4.29	2.07	1.38	1.51	134	357	499	
	4	1	55	495	14.88	4.24	5.90	4.37	2.12	1.41	1.56	200	525	728	
		5	55	495	24.73	7.77	10.94	4.37	2.12	1.41	1.56	200	525	728	
	5	1	45	54C	16.09	4.50	6.13	4.45	2.16	1.44	1.60	264	687	946	
		5	45	54C	27.17	8.88	12.03	4.45	2.16	1.44	1.60	264	687	946	
	40	2	1	97	485	16.17	3.86	5.74	4.21	2.03	1.36	1.47	67	182	256
			5	97	485	25.44	5.36	8.70	4.21	2.03	1.36	1.47	67	182	256
3		1	71	497	16.35	4.28	6.13	4.29	2.07	1.38	1.51	134	357	499	
		5	71	497	25.62	6.76	10.07	4.29	2.07	1.38	1.51	134	357	499	
4		1	55	495	16.32	4.65	6.48	4.37	2.12	1.41	1.56	200	525	728	
		5	55	495	25.60	8.01	11.30	4.37	2.12	1.41	1.56	200	525	728	
5		1	45	54C	17.71	5.00	6.81	4.45	2.16	1.44	1.60	264	687	946	
		5	45	54C	28.14	9.18	12.44	4.45	2.16	1.44	1.60	264	687	946	

90 CHARACTER DATA RECORD 60K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	86	43C	12.99	3.76	5.32	4.74	2.29	1.52	1.66	60	161	227	
		5	86	43C	23.28	5.39	8.53	4.74	2.29	1.52	1.66	60	161	227	
	3	1	63	441	13.16	3.97	5.50	4.82	2.33	1.56	1.70	119	317	443	
		5	63	441	23.44	6.66	9.78	4.82	2.33	1.56	1.70	119	317	443	
	4	1	49	441	13.16	4.16	5.67	4.92	2.38	1.59	1.75	177	467	647	
		5	49	441	23.45	7.81	10.89	4.92	2.38	1.59	1.75	177	467	647	
	5	1	4C	48C	13.72	4.34	5.83	5.01	2.43	1.62	1.80	235	611	841	
		5	4C	48C	24.00	8.88	11.93	5.01	2.43	1.62	1.80	235	611	841	
	10	2	1	86	43C	13.35	3.80	5.41	4.74	2.29	1.52	1.66	60	161	227
			5	86	43C	23.49	5.41	8.58	4.74	2.29	1.52	1.66	60	161	227
3		1	63	441	13.52	4.04	5.62	4.82	2.33	1.56	1.70	119	317	443	
		5	63	441	23.65	6.71	9.85	4.82	2.33	1.56	1.70	119	317	443	
4		1	49	441	13.52	4.26	5.81	4.92	2.38	1.59	1.75	177	467	647	
		5	49	441	23.66	7.87	10.98	4.92	2.38	1.59	1.75	177	467	647	
5		1	4C	48C	14.08	4.47	6.00	5.01	2.43	1.62	1.80	235	611	841	
		5	4C	48C	24.22	8.96	12.04	5.01	2.43	1.62	1.80	235	611	841	
20		2	1	86	43C	14.07	3.90	5.59	4.74	2.29	1.52	1.66	60	161	227
			5	86	43C	23.92	5.47	8.69	4.74	2.29	1.52	1.66	60	161	227
	3	1	63	441	14.24	4.19	5.86	4.82	2.33	1.56	1.70	119	317	443	
		5	63	441	24.09	6.80	9.99	4.82	2.33	1.56	1.70	119	317	443	
	4	1	49	441	14.24	4.47	6.11	4.92	2.38	1.59	1.75	177	467	647	
		5	49	441	24.09	7.99	11.16	4.92	2.38	1.59	1.75	177	467	647	
	5	1	4C	48C	14.80	4.72	6.34	5.01	2.43	1.62	1.80	235	611	841	
		5	4C	480	24.65	9.11	12.24	5.01	2.43	1.62	1.80	235	611	841	
	40	2	1	86	430	15.51	4.08	5.95	4.74	2.29	1.52	1.66	60	161	227
			5	86	430	24.79	5.58	8.91	4.74	2.29	1.52	1.66	60	161	227
3		1	63	441	15.68	4.49	6.34	4.82	2.33	1.56	1.70	119	317	443	
		5	63	441	24.95	6.98	10.28	4.82	2.33	1.56	1.70	119	317	443	
4		1	49	441	15.68	4.87	6.69	4.92	2.38	1.59	1.75	177	467	647	
		5	49	441	24.96	8.24	11.51	4.92	2.38	1.59	1.75	177	467	647	
5		1	4C	48C	16.24	5.23	7.02	5.01	2.43	1.62	1.80	235	611	841	
		5	4C	480	25.51	9.42	12.65	5.01	2.43	1.62	1.80	235	611	841	

100 CHARACTER DATA RECORD 60K MEMORY

CW LNG	MRG ORC	NO. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	77	385	12.48	3.97	5.52	5.26	2.54	1.69	1.84	54	145	204	
		5	77	385	22.76	5.60	8.74	5.26	2.54	1.69	1.84	54	145	204	
	3	1	57	399	12.68	4.18	5.71	5.36	2.59	1.73	1.89	107	285	399	
		5	57	399	22.96	6.88	9.98	5.36	2.59	1.73	1.89	107	285	399	
	4	1	44	396	12.65	4.38	5.88	5.46	2.65	1.77	1.95	160	420	582	
		5	44	396	22.93	8.04	11.10	5.46	2.65	1.77	1.95	160	420	582	
	5	1	36	432	13.16	4.57	6.04	5.57	2.70	1.80	2.00	211	550	757	
		5	36	432	23.44	9.11	12.15	5.57	2.70	1.80	2.00	211	550	757	
	1C	2	1	77	385	12.84	4.02	5.61	5.26	2.54	1.69	1.84	54	145	204
			5	77	385	22.98	5.63	8.79	5.26	2.54	1.69	1.84	54	145	204
		3	1	57	399	13.04	4.26	5.83	5.36	2.59	1.73	1.89	107	285	399
			5	57	399	23.18	6.93	10.06	5.36	2.59	1.73	1.89	107	285	399
		4	1	44	396	13.01	4.48	6.03	5.46	2.65	1.77	1.95	160	420	582
			5	44	396	23.15	8.10	11.19	5.46	2.65	1.77	1.95	160	420	582
		5	1	36	432	13.52	4.70	6.21	5.57	2.70	1.80	2.00	211	550	757
5			36	432	23.66	9.19	12.25	5.57	2.70	1.80	2.00	211	550	757	
2C		2	1	77	385	13.56	4.11	5.79	5.26	2.54	1.69	1.84	54	145	204
			5	77	385	23.41	5.68	8.90	5.26	2.54	1.69	1.84	54	145	204
		3	1	57	399	13.76	4.41	6.07	5.36	2.59	1.73	1.89	107	285	399
			5	57	399	23.61	7.02	10.20	5.36	2.59	1.73	1.89	107	285	399
		4	1	44	396	13.73	4.69	6.32	5.46	2.65	1.77	1.95	160	420	582
			5	44	396	23.58	8.22	11.37	5.46	2.65	1.77	1.95	160	420	582
		5	1	36	432	14.24	4.95	6.55	5.57	2.70	1.80	2.00	211	550	757
	5		36	432	24.09	9.34	12.45	5.57	2.70	1.80	2.00	211	550	757	
	4C	2	1	77	385	15.00	4.29	6.15	5.26	2.54	1.69	1.84	54	145	204
			5	77	385	24.27	5.79	9.12	5.26	2.54	1.69	1.84	54	145	204
		3	1	57	399	15.20	4.71	6.55	5.36	2.59	1.73	1.89	107	285	399
			5	57	399	24.48	7.20	10.49	5.36	2.59	1.73	1.89	107	285	399
		4	1	44	396	15.17	5.10	6.90	5.46	2.65	1.77	1.95	160	420	582
			5	44	396	24.44	8.47	11.72	5.46	2.65	1.77	1.95	160	420	582
		5	1	36	432	15.68	5.46	7.24	5.57	2.70	1.80	2.00	211	550	757
5			36	432	24.96	9.65	12.86	5.57	2.70	1.80	2.00	211	550	757	

120 CHARACTER DATA RECCRD 60K MEMORY

CW LNG	MRG CRC	NO. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	64	32C	11.80	4.40	5.94	6.32	3.05	2.03	2.21	45	121	170	
		5	64	32C	22.08	6.04	9.15	6.32	3.05	2.03	2.21	45	121	170	
	3	1	47	329	11.93	4.62	6.13	6.43	3.11	2.08	2.27	89	238	332	
		5	47	329	22.22	7.33	10.40	6.43	3.11	2.08	2.27	89	238	332	
	4	1	37	333	12.00	4.83	6.30	6.55	3.17	2.12	2.33	133	350	486	
		5	37	333	22.28	8.49	11.52	6.55	3.17	2.12	2.33	133	350	486	
	5	1	30	36C	12.39	5.02	6.46	6.68	3.24	2.16	2.40	176	458	630	
		5	30	36C	22.67	9.58	12.57	6.68	3.24	2.16	2.40	176	458	630	
	1C	2	1	64	32C	12.16	4.45	6.03	6.32	3.05	2.03	2.21	45	121	170
			5	64	32C	22.30	6.06	9.21	6.32	3.05	2.03	2.21	45	121	170
		3	1	47	329	12.29	4.70	6.25	6.43	3.11	2.08	2.27	89	238	332
			5	47	329	22.43	7.37	10.47	6.43	3.11	2.08	2.27	89	238	332
		4	1	37	333	12.36	4.93	6.45	6.55	3.17	2.12	2.33	133	350	486
			5	37	333	22.50	8.55	11.61	6.55	3.17	2.12	2.33	133	350	486
		5	1	30	36C	12.75	5.15	6.63	6.68	3.24	2.16	2.40	176	458	630
5			30	36C	22.89	9.66	12.67	6.68	3.24	2.16	2.40	176	458	630	
2C		2	1	64	32C	12.88	4.54	6.21	6.32	3.05	2.03	2.21	45	121	170
			5	64	32C	22.73	6.12	9.31	6.32	3.05	2.03	2.21	45	121	170
		3	1	47	329	13.01	4.85	6.49	6.43	3.11	2.08	2.27	89	238	332
			5	47	329	22.86	7.46	10.62	6.43	3.11	2.08	2.27	89	238	332
		4	1	37	333	13.08	5.13	6.74	6.55	3.17	2.12	2.33	133	350	486
			5	37	333	22.93	8.67	11.79	6.55	3.17	2.12	2.33	133	350	486
		5	1	30	36C	13.47	5.41	6.98	6.68	3.24	2.16	2.40	176	458	630
	5		30	36C	23.32	9.81	12.88	6.68	3.24	2.16	2.40	176	458	630	
	4C	2	1	64	32C	14.32	4.72	6.57	6.32	3.05	2.03	2.21	45	121	170
			5	64	32C	23.59	6.23	9.53	6.32	3.05	2.03	2.21	45	121	170
		3	1	47	329	14.45	5.15	6.97	6.43	3.11	2.08	2.27	89	238	332
			5	47	329	23.73	7.64	10.91	6.43	3.11	2.08	2.27	89	238	332
		4	1	37	333	14.52	5.54	7.32	6.55	3.17	2.12	2.33	133	350	486
			5	37	333	23.79	8.92	12.14	6.55	3.17	2.12	2.33	133	350	486
		5	1	30	36C	14.91	5.92	7.66	6.68	3.24	2.16	2.40	176	458	630
5			30	36C	24.18	10.11	13.29	6.68	3.24	2.16	2.40	176	458	630	

14C CHARACTER DATA RECCRD 60K MEMORY

CW LNG	MRG CRC	NO. CF	B	C	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	55	275	11.40	4.83	6.35	7.37	3.56	2.37	2.58	38	103	146	
		5	55	275	21.68	6.47	9.57	7.37	3.56	2.37	2.58	38	103	146	
	3	1	4C	28C	11.48	5.06	6.55	7.51	3.63	2.42	2.65	76	204	284	
		5	4C	28C	21.76	7.77	10.82	7.51	3.63	2.42	2.65	76	204	284	
	4	1	31	31C	11.91	5.28	6.72	7.66	3.71	2.48	2.73	114	300	415	
		5	31	31C	22.19	8.95	11.95	7.66	3.71	2.48	2.73	114	300	415	
	5	1	25	30C	11.79	5.49	6.89	7.81	3.79	2.53	2.81	151	391	538	
		5	25	30C	22.07	10.06	13.00	7.81	3.79	2.53	2.81	151	391	538	
	1C	2	1	55	275	11.76	4.88	6.44	7.37	3.56	2.37	2.58	38	103	146
			5	55	275	21.90	6.50	9.62	7.37	3.56	2.37	2.58	38	103	146
3		1	4C	28C	11.84	5.14	6.67	7.51	3.63	2.42	2.65	76	204	284	
		5	4C	28C	21.98	7.82	10.89	7.51	3.63	2.42	2.65	76	204	284	
4		1	31	31C	12.27	5.38	6.87	7.66	3.71	2.48	2.73	114	300	415	
		5	31	31C	22.41	9.01	12.04	7.66	3.71	2.48	2.73	114	300	415	
5		1	25	30C	12.15	5.62	7.06	7.81	3.79	2.53	2.81	151	391	538	
		5	25	30C	22.28	10.13	13.10	7.81	3.79	2.53	2.81	151	391	538	
2C		2	1	55	275	12.48	4.97	6.62	7.37	3.56	2.37	2.58	38	103	146
			5	55	275	22.33	6.55	9.73	7.37	3.56	2.37	2.58	38	103	146
	3	1	4C	28C	12.56	5.29	6.90	7.51	3.63	2.42	2.65	76	204	284	
		5	4C	28C	22.41	7.91	11.04	7.51	3.63	2.42	2.65	76	204	284	
	4	1	31	31C	12.99	5.59	7.16	7.66	3.71	2.48	2.73	114	300	415	
		5	31	31C	22.84	9.13	12.21	7.66	3.71	2.48	2.73	114	300	415	
	5	1	25	30C	12.87	5.87	7.41	7.81	3.79	2.53	2.81	151	391	538	
		5	25	30C	22.72	10.29	13.31	7.81	3.79	2.53	2.81	151	391	538	
	4C	2	1	55	275	13.92	5.15	6.98	7.37	3.56	2.37	2.58	38	103	146
			5	55	275	23.19	6.66	9.94	7.37	3.56	2.37	2.58	38	103	146
3		1	4C	28C	14.00	5.59	7.38	7.51	3.63	2.42	2.65	76	204	284	
		5	4C	28C	23.28	8.09	11.32	7.51	3.63	2.42	2.65	76	204	284	
4		1	31	31C	14.43	6.0C	7.75	7.66	3.71	2.48	2.73	114	300	415	
		5	31	31C	23.71	9.38	12.56	7.66	3.71	2.48	2.73	114	300	415	
5		1	25	30C	14.31	6.38	8.09	7.81	3.79	2.53	2.81	151	391	538	
		5	25	30C	23.58	10.59	13.72	7.81	3.79	2.53	2.81	151	391	538	

16C CHARACTER DATA RECCRD 60K MEMORY

CW LNG	MRG CRC	NO. CF	B	C	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	48	24C	10.71	5.26	6.77	8.42	4.06	2.71	2.94	33	90	128	
		5	48	24C	19.71	6.90	9.98	8.42	4.06	2.71	2.94	33	90	128	
	3	1	35	245	10.80	5.50	6.96	8.58	4.15	2.77	3.03	67	178	249	
		5	35	245	19.79	8.21	11.24	8.58	4.15	2.77	3.03	67	178	249	
	4	1	27	27C	11.59	5.73	7.15	8.75	4.24	2.83	3.12	100	262	363	
		5	27	27C	21.87	9.40	12.37	8.75	4.24	2.83	3.12	100	262	363	
	5	1	22	264	11.52	5.94	7.32	8.92	4.33	2.89	3.21	132	343	471	
		5	22	264	21.80	10.52	13.42	8.92	4.33	2.89	3.21	132	343	471	
	1C	2	1	48	24C	11.03	5.31	6.86	8.42	4.06	2.71	2.94	33	90	128
			5	48	24C	19.90	6.93	10.04	8.42	4.06	2.71	2.94	33	90	128
3		1	35	245	11.11	5.58	7.08	8.58	4.15	2.77	3.03	67	178	249	
		5	35	245	19.98	8.26	11.31	8.58	4.15	2.77	3.03	67	178	249	
4		1	27	27C	11.95	5.83	7.29	8.75	4.24	2.83	3.12	100	262	363	
		5	27	27C	22.09	9.47	12.46	8.75	4.24	2.83	3.12	100	262	363	
5		1	22	264	11.88	6.07	7.49	8.92	4.33	2.89	3.21	132	343	471	
		5	22	264	22.02	10.59	13.53	8.92	4.33	2.89	3.21	132	343	471	
2C		2	1	48	24C	11.66	5.40	7.04	8.42	4.06	2.71	2.94	33	90	128
			5	48	24C	20.28	6.98	10.14	8.42	4.06	2.71	2.94	33	90	128
	3	1	35	245	11.74	5.73	7.32	8.58	4.15	2.77	3.03	67	178	249	
		5	35	245	20.36	8.35	11.45	8.58	4.15	2.77	3.03	67	178	249	
	4	1	27	27C	12.67	6.04	7.58	8.75	4.24	2.83	3.12	100	262	363	
		5	27	27C	22.52	9.59	12.63	8.75	4.24	2.83	3.12	100	262	363	
	5	1	22	264	12.60	6.33	7.83	8.92	4.33	2.89	3.21	132	343	471	
		5	22	264	22.45	10.75	13.73	8.92	4.33	2.89	3.21	132	343	471	
	4C	2	1	48	24C	12.92	5.58	7.40	8.42	4.06	2.71	2.94	33	90	128
			5	48	24C	21.03	7.09	10.36	8.42	4.06	2.71	2.94	33	90	128
3		1	35	245	13.00	6.03	7.80	8.58	4.15	2.77	3.03	67	178	249	
		5	35	245	21.11	8.53	11.74	8.58	4.15	2.77	3.03	67	178	249	
4		1	27	27C	14.11	6.45	8.17	8.75	4.24	2.83	3.12	100	262	363	
		5	27	27C	23.38	9.84	12.98	8.75	4.24	2.83	3.12	100	262	363	
5		1	22	264	14.04	6.84	8.51	8.92	4.33	2.89	3.21	132	343	471	
		5	22	264	23.31	11.06	14.14	8.92	4.33	2.89	3.21	132	343	471	

180 CHARACTER DATA RECCRD 60K MEMORY

CW LNC	MRG CRC	NC. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	43	215	10.59	5.69	7.18	9.47	4.57	3.05	3.31	30	80	113	
		5	43	215	19.59	7.33	10.40	9.47	4.57	3.05	3.31	30	80	113	
	3	1	31	217	10.64	5.94	7.38	9.66	4.67	3.12	3.41	59	158	221	
		5	31	217	19.63	8.66	11.66	9.66	4.67	3.12	3.41	59	158	221	
	4	1	24	240	10.97	6.17	7.57	9.85	4.77	3.18	3.51	88	233	323	
		5	24	240	19.97	9.86	12.79	9.85	4.77	3.18	3.51	88	233	323	
	5	1	20	240	10.99	6.39	7.74	10.02	4.86	3.24	3.60	117	305	420	
		5	20	240	19.98	10.97	13.85	10.02	4.86	3.24	3.60	117	305	420	
	10	2	1	43	215	10.91	5.73	7.27	9.47	4.57	3.05	3.31	30	80	113
			5	43	215	19.78	7.36	10.45	9.47	4.57	3.05	3.31	30	80	113
3		1	31	217	10.95	6.01	7.50	9.66	4.67	3.12	3.41	59	158	221	
		5	31	217	19.82	8.70	11.73	9.66	4.67	3.12	3.41	59	158	221	
4		1	24	240	11.29	6.28	7.71	9.85	4.77	3.18	3.51	88	233	323	
		5	24	240	20.16	9.92	12.88	9.85	4.77	3.18	3.51	88	233	323	
5		1	20	240	11.30	6.52	7.91	10.02	4.86	3.24	3.60	117	305	420	
		5	20	240	20.17	11.05	13.95	10.02	4.86	3.24	3.60	117	305	420	
20		2	1	43	215	11.54	5.82	7.45	9.47	4.57	3.05	3.31	30	80	113
			5	43	215	20.16	7.41	10.56	9.47	4.57	3.05	3.31	30	80	113
	3	1	31	217	11.58	6.17	7.74	9.66	4.67	3.12	3.41	59	158	221	
		5	31	217	20.20	8.79	11.87	9.66	4.67	3.12	3.41	59	158	221	
	4	1	24	240	11.92	6.48	8.01	9.85	4.77	3.18	3.51	88	233	323	
		5	24	240	20.54	10.04	13.05	9.85	4.77	3.18	3.51	88	233	323	
	5	1	20	240	11.93	6.78	8.25	10.02	4.86	3.24	3.60	117	305	420	
		5	20	240	20.55	11.20	14.15	10.02	4.86	3.24	3.60	117	305	420	
	40	2	1	43	215	12.80	6.01	7.81	9.47	4.57	3.05	3.31	30	80	113
			5	43	215	20.91	7.53	10.77	9.47	4.57	3.05	3.31	30	80	113
3		1	31	217	12.84	6.47	8.22	9.66	4.67	3.12	3.41	59	158	221	
		5	31	217	20.96	8.98	12.16	9.66	4.67	3.12	3.41	59	158	221	
4		1	24	240	13.18	6.90	8.59	9.85	4.77	3.18	3.51	88	233	323	
		5	24	240	21.29	10.29	13.41	9.85	4.77	3.18	3.51	88	233	323	
5		1	20	240	13.19	7.29	8.94	10.02	4.86	3.24	3.60	117	305	420	
		5	20	240	21.31	11.51	14.56	10.02	4.86	3.24	3.60	117	305	420	

200 CHARACTER DATA RECCRD 60K MEMORY

CW LNC	MRG CRC	NC. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	38	190	10.48	6.12	7.60	10.54	5.08	3.39	3.68	27	72	102	
		5	38	190	19.47	7.77	10.81	10.54	5.08	3.39	3.68	27	72	102	
	3	1	28	196	10.56	6.37	7.80	10.73	5.19	3.46	3.79	53	142	199	
		5	28	196	19.57	9.10	12.08	10.73	5.19	3.46	3.79	53	142	199	
	4	1	22	220	10.93	6.61	7.99	10.92	5.29	3.53	3.89	80	210	291	
		5	22	220	19.92	10.30	13.21	10.92	5.29	3.53	3.89	80	210	291	
	5	1	18	216	10.89	6.85	8.16	11.13	5.40	3.61	4.00	105	275	378	
		5	18	216	19.88	11.44	14.27	11.13	5.40	3.61	4.00	105	275	378	
	10	2	1	38	190	10.79	6.17	7.69	10.54	5.08	3.39	3.68	27	72	102
			5	38	190	19.66	7.80	10.87	10.54	5.08	3.39	3.68	27	72	102
3		1	28	196	10.89	6.45	7.92	10.73	5.19	3.46	3.79	53	142	199	
		5	28	196	19.76	9.15	12.15	10.73	5.19	3.46	3.79	53	142	199	
4		1	22	220	11.24	6.72	8.13	10.92	5.29	3.53	3.89	80	210	291	
		5	22	220	20.11	10.36	13.30	10.92	5.29	3.53	3.89	80	210	291	
5		1	18	216	11.20	6.97	8.33	11.13	5.40	3.61	4.00	105	275	378	
		5	18	216	20.07	11.51	14.37	11.13	5.40	3.61	4.00	105	275	378	
20		2	1	38	190	11.42	6.26	7.87	10.54	5.08	3.39	3.68	27	72	102
			5	38	190	20.04	7.85	10.97	10.54	5.08	3.39	3.68	27	72	102
	3	1	28	196	11.52	6.60	8.16	10.73	5.19	3.46	3.79	53	142	199	
		5	28	196	20.14	9.24	12.29	10.73	5.19	3.46	3.79	53	142	199	
	4	1	22	220	11.87	6.92	8.42	10.92	5.29	3.53	3.89	80	210	291	
		5	22	220	20.49	10.49	13.47	10.92	5.29	3.53	3.89	80	210	291	
	5	1	18	216	11.83	7.23	8.68	11.13	5.40	3.61	4.00	105	275	378	
		5	18	216	20.45	11.67	14.58	11.13	5.40	3.61	4.00	105	275	378	
	40	2	1	38	190	12.68	6.44	8.23	10.54	5.08	3.39	3.68	27	72	102
			5	38	190	20.80	7.96	11.19	10.54	5.08	3.39	3.68	27	72	102
3		1	28	196	12.78	6.51	8.64	10.73	5.19	3.46	3.79	53	142	199	
		5	28	196	20.90	9.42	12.58	10.73	5.19	3.46	3.79	53	142	199	
4		1	22	220	13.13	7.34	9.01	10.92	5.29	3.53	3.89	80	210	291	
		5	22	220	21.25	10.74	13.82	10.92	5.29	3.53	3.89	80	210	291	
5		1	18	216	13.09	7.75	9.36	11.13	5.40	3.61	4.00	105	275	378	
		5	18	216	21.21	11.98	14.99	11.13	5.40	3.61	4.00	105	275	378	

220 CHARACTER DATA RECCRC 60K MEMORY

CW LNG	PRG CRC	NC. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	35	175	10.50	6.54	8.01	11.58	5.59	3.73	4.05	24	66	93	
		5	35	175	19.50	8.20	11.22	11.58	5.59	3.73	4.05	24	66	93	
	3	1	25	20C	10.86	6.82	8.22	11.81	5.71	3.81	4.17	48	129	180	
		5	25	20C	19.86	9.55	12.50	11.81	5.71	3.81	4.17	48	129	180	
	4	1	2C	20C	10.88	7.06	8.41	12.02	5.82	3.88	4.28	72	191	264	
		5	2C	20C	19.88	10.76	13.63	12.02	5.82	3.88	4.28	72	191	264	
	5	1	16	208	11.01	7.31	8.59	12.27	5.95	3.98	4.41	96	249	342	
		5	16	208	20.01	11.91	14.70	12.27	5.95	3.98	4.41	96	249	342	
	10	2	1	35	175	10.81	6.59	8.10	11.58	5.59	3.73	4.05	24	66	93
			5	35	175	19.68	8.23	11.28	11.58	5.59	3.73	4.05	24	66	93
3		1	25	20C	11.18	6.89	8.34	11.81	5.71	3.81	4.17	48	129	180	
		5	25	20C	20.05	9.60	12.57	11.81	5.71	3.81	4.17	48	129	180	
4		1	2C	200	11.20	7.16	8.55	12.02	5.82	3.88	4.28	72	191	264	
		5	2C	200	20.07	10.82	13.72	12.02	5.82	3.88	4.28	72	191	264	
5		1	16	208	11.33	7.44	8.76	12.27	5.95	3.98	4.41	96	249	342	
		5	16	208	20.20	11.99	14.80	12.27	5.95	3.98	4.41	96	249	342	
20		2	1	35	175	11.44	6.68	8.28	11.58	5.59	3.73	4.05	24	66	93
			5	35	175	20.06	8.28	11.39	11.58	5.59	3.73	4.05	24	66	93
	3	1	25	20C	11.81	7.05	8.58	11.81	5.71	3.81	4.17	48	129	180	
		5	25	20C	20.43	9.69	12.71	11.81	5.71	3.81	4.17	48	129	180	
	4	1	2C	20C	11.83	7.37	8.85	12.02	5.82	3.88	4.28	72	191	264	
		5	2C	20C	20.45	10.94	13.89	12.02	5.82	3.88	4.28	72	191	264	
	5	1	16	208	11.96	7.70	9.11	12.27	5.95	3.98	4.41	96	249	342	
		5	16	208	20.58	12.15	15.01	12.27	5.95	3.98	4.41	96	249	342	
	40	2	1	35	175	12.70	6.87	8.64	11.58	5.59	3.73	4.05	24	66	93
			5	35	175	20.82	8.39	11.60	11.58	5.59	3.73	4.05	24	66	93
3		1	25	20C	13.07	7.35	9.06	11.81	5.71	3.81	4.17	48	129	180	
		5	25	20C	21.18	9.87	13.00	11.81	5.71	3.81	4.17	48	129	180	
4		1	2C	20C	13.09	7.78	9.43	12.02	5.82	3.88	4.28	72	191	264	
		5	2C	20C	21.20	11.19	14.25	12.02	5.82	3.88	4.28	72	191	264	
5		1	16	208	13.22	8.22	9.79	12.27	5.95	3.98	4.41	96	249	342	
		5	16	208	21.33	12.46	15.42	12.27	5.95	3.98	4.41	96	249	342	

240 CHARACTER DATA RECCRC 60K MEMORY

CW LNG	PRG CRC	NC. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	32	16C	10.52	6.97	8.42	12.64	6.10	4.07	4.42	22	60	85	
		5	32	16C	19.52	8.63	11.64	12.64	6.10	4.07	4.42	22	60	85	
	3	1	23	184	10.87	7.25	8.64	12.88	6.23	4.16	4.55	44	118	165	
		5	23	184	19.87	9.99	12.91	12.88	6.23	4.16	4.55	44	118	165	
	4	1	18	18C	10.84	7.51	8.83	13.13	6.36	4.25	4.68	66	174	242	
		5	18	18C	19.84	11.22	14.06	13.13	6.36	4.25	4.68	66	174	242	
	5	1	15	18C	10.86	7.76	9.01	13.36	6.48	4.33	4.80	88	229	315	
		5	15	18C	19.86	12.36	15.12	13.36	6.48	4.33	4.80	88	229	315	
	10	2	1	32	160	10.84	7.02	8.51	12.64	6.10	4.07	4.42	22	60	85
			5	32	160	19.71	8.66	11.69	12.64	6.10	4.07	4.42	22	60	85
3		1	23	184	11.19	7.33	8.76	12.88	6.23	4.16	4.55	44	118	165	
		5	23	184	20.06	10.04	12.98	12.88	6.23	4.16	4.55	44	118	165	
4		1	18	18C	11.15	7.62	8.98	13.13	6.36	4.25	4.68	66	174	242	
		5	18	18C	20.02	11.28	14.14	13.13	6.36	4.25	4.68	66	174	242	
5		1	15	18C	11.17	7.89	9.18	13.36	6.48	4.33	4.80	88	229	315	
		5	15	18C	20.04	12.44	15.22	13.36	6.48	4.33	4.80	88	229	315	
20		2	1	32	160	11.47	7.11	8.69	12.64	6.10	4.07	4.42	22	60	85
			5	32	160	20.09	8.72	11.80	12.64	6.10	4.07	4.42	22	60	85
	3	1	23	184	11.82	7.48	9.00	12.88	6.23	4.16	4.55	44	118	165	
		5	23	184	20.44	10.13	13.13	12.88	6.23	4.16	4.55	44	118	165	
	4	1	18	18C	11.78	7.83	9.27	13.13	6.36	4.25	4.68	66	174	242	
		5	18	18C	20.40	11.41	14.32	13.13	6.36	4.25	4.68	66	174	242	
	5	1	15	18C	11.80	8.14	9.53	13.36	6.48	4.33	4.80	88	229	315	
		5	15	180	20.42	12.60	15.43	13.36	6.48	4.33	4.80	88	229	315	
	40	2	1	32	160	12.73	7.30	9.05	12.64	6.10	4.07	4.42	22	60	85
			5	32	160	20.84	8.83	12.02	12.64	6.10	4.07	4.42	22	60	85
3		1	23	184	13.08	7.79	9.48	12.88	6.23	4.16	4.55	44	118	165	
		5	23	184	21.19	10.31	13.42	12.88	6.23	4.16	4.55	44	118	165	
4		1	18	18C	13.04	8.24	9.86	13.13	6.36	4.25	4.68	66	174	242	
		5	18	18C	21.16	11.66	14.67	13.13	6.36	4.25	4.68	66	174	242	
5		1	15	18C	13.06	8.66	10.21	13.36	6.48	4.33	4.80	88	229	315	
		5	15	180	21.18	12.91	15.84	13.36	6.48	4.33	4.80	88	229	315	



260 CHARACTER DATA RECORD 60K MEMORY

CK LNG	MRG CRC	NC. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	29	145	10.55	7.41	8.84	13.7C	6.61	4.41	4.79	20	55	78	
		5	29	145	19.54	9.07	12.06	13.7C	6.61	4.41	4.79	20	55	78	
		1	21	168	10.89	7.70	9.06	13.97	6.75	4.51	4.93	41	109	153	
	3	5	21	168	19.88	10.44	13.33	13.97	6.75	4.51	4.93	41	109	153	
		1	17	17C	10.93	7.95	9.25	14.20	6.88	4.59	5.06	61	161	224	
		5	17	17C	19.93	11.66	14.47	14.2C	6.88	4.59	5.06	61	161	224	
	4	1	13	169	10.95	8.25	9.46	14.57	7.07	4.72	5.25	81	210	288	
		5	13	169	19.25	12.88	15.56	14.57	7.07	4.72	5.25	81	210	288	
		5	13	169	20.14	12.96	15.67	14.57	7.07	4.72	5.25	81	210	288	
	10C	2	1	29	145	10.86	7.45	8.93	13.7C	6.61	4.41	4.79	20	55	78
			5	29	145	19.73	9.1C	12.11	13.7C	6.61	4.41	4.79	20	55	78
			1	21	168	11.20	7.77	9.18	13.97	6.75	4.51	4.93	41	109	153
		3	5	21	168	20.07	10.49	13.4C	13.97	6.75	4.51	4.93	41	109	153
			1	17	17C	11.25	8.05	9.40	14.20	6.88	4.59	5.06	61	161	224
			5	17	17C	20.12	11.72	14.56	14.20	6.88	4.59	5.06	61	161	224
4		1	13	169	11.26	8.38	9.63	14.57	7.07	4.72	5.25	81	210	288	
		5	13	169	20.14	12.96	15.67	14.57	7.07	4.72	5.25	81	210	288	
		5	13	169	20.14	12.96	15.67	14.57	7.07	4.72	5.25	81	210	288	
2C		2	1	29	145	11.49	7.55	9.11	13.7C	6.61	4.41	4.79	20	55	78
			5	29	145	20.11	9.16	12.22	13.7C	6.61	4.41	4.79	20	55	78
			1	21	168	11.83	7.93	9.42	13.97	6.75	4.51	4.93	41	109	153
		3	5	21	168	20.45	10.58	13.55	13.97	6.75	4.51	4.93	41	109	153
			1	17	17C	11.88	8.26	9.69	14.2C	6.88	4.59	5.06	61	161	224
			5	17	17C	20.50	11.85	14.74	14.2C	6.88	4.59	5.06	61	161	224
	4	1	13	169	11.89	8.64	9.97	14.57	7.07	4.72	5.25	81	210	288	
		5	13	169	20.51	13.11	15.87	14.57	7.07	4.72	5.25	81	210	288	
		5	13	169	20.51	13.11	15.87	14.57	7.07	4.72	5.25	81	210	288	
	4C	2	1	29	145	12.75	7.73	9.47	13.7C	6.61	4.41	4.79	20	55	78
			5	29	145	20.87	9.27	12.43	13.7C	6.61	4.41	4.79	20	55	78
			1	21	168	13.09	8.23	9.9C	13.97	6.75	4.51	4.93	41	109	153
		3	5	21	168	21.20	10.76	13.84	13.97	6.75	4.51	4.93	41	109	153
			1	17	17C	13.14	8.68	10.27	14.20	6.88	4.59	5.06	61	161	224
			5	17	17C	21.25	12.1C	15.09	14.2C	6.88	4.59	5.06	61	161	224
4		1	13	169	13.15	9.16	10.65	14.57	7.07	4.72	5.25	81	210	288	
		5	13	169	21.27	13.42	16.28	14.57	7.07	4.72	5.25	81	210	288	
		5	13	169	21.27	13.42	16.28	14.57	7.07	4.72	5.25	81	210	288	

28C CHARACTER DATA RECORD 60K MEMORY

CK LNG	MRG CRC	NC. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	27	135	10.64	7.84	9.25	14.75	7.12	4.75	5.16	19	51	73	
		5	27	135	19.64	9.5C	12.47	14.75	7.12	4.75	5.16	19	51	73	
		1	2C	14C	10.73	8.12	9.47	15.02	7.26	4.84	5.30	38	102	142	
	3	5	2C	14C	19.73	10.87	13.75	15.02	7.26	4.84	5.30	38	102	142	
		1	15	15C	10.90	8.43	9.68	15.36	7.44	4.97	5.48	57	149	207	
		5	15	15C	19.89	12.15	14.91	15.36	7.44	4.97	5.48	57	149	207	
	4	1	12	156	11.01	8.72	9.88	15.7C	7.62	5.09	5.66	75	195	267	
		5	12	156	20.0C	13.35	15.99	15.7C	7.62	5.09	5.66	75	195	267	
		5	12	156	20.0C	13.35	15.99	15.7C	7.62	5.09	5.66	75	195	267	
	10C	2	1	27	135	10.95	7.88	9.34	14.75	7.12	4.75	5.16	19	51	73
			5	27	135	19.82	9.53	12.52	14.75	7.12	4.75	5.16	19	51	73
			1	2C	14C	11.05	8.20	9.59	15.02	7.26	4.84	5.30	38	102	142
		3	5	2C	14C	19.92	10.92	13.82	15.02	7.26	4.84	5.30	38	102	142
			1	15	15C	11.21	8.53	9.83	15.36	7.44	4.97	5.48	57	149	207
			5	15	15C	20.08	12.21	14.99	15.36	7.44	4.97	5.48	57	149	207
4		1	12	156	11.32	8.85	10.05	15.7C	7.62	5.09	5.66	75	195	267	
		5	12	156	20.19	13.43	16.09	15.7C	7.62	5.09	5.66	75	195	267	
		5	12	156	20.19	13.43	16.09	15.7C	7.62	5.09	5.66	75	195	267	
2C		2	1	27	135	11.58	7.98	9.52	14.75	7.12	4.75	5.16	19	51	73
			5	27	135	20.20	9.59	12.63	14.75	7.12	4.75	5.16	19	51	73
			1	2C	14C	11.68	8.35	9.83	15.02	7.26	4.84	5.30	38	102	142
		3	5	2C	14C	20.29	11.01	13.96	15.02	7.26	4.84	5.30	38	102	142
			1	15	15C	11.84	8.74	10.12	15.36	7.44	4.97	5.48	57	149	207
			5	15	15C	20.46	12.34	15.17	15.36	7.44	4.97	5.48	57	149	207
	4	1	12	156	11.95	9.11	10.40	15.7C	7.62	5.09	5.66	75	195	267	
		5	12	156	20.57	13.59	16.30	15.7C	7.62	5.09	5.66	75	195	267	
		5	12	156	20.57	13.59	16.30	15.7C	7.62	5.09	5.66	75	195	267	
	4C	2	1	27	135	12.84	8.16	9.88	14.75	7.12	4.75	5.16	19	51	73
			5	27	135	20.96	9.7C	12.85	14.75	7.12	4.75	5.16	19	51	73
			1	2C	14C	12.94	8.66	10.31	15.02	7.26	4.84	5.30	38	102	142
		3	5	2C	14C	21.05	11.19	14.25	15.02	7.26	4.84	5.30	38	102	142
			1	15	15C	13.10	9.15	10.71	15.36	7.44	4.97	5.48	57	149	207
			5	15	15C	21.22	12.59	15.52	15.36	7.44	4.97	5.48	57	149	207
4		1	12	156	13.21	9.63	11.08	15.7C	7.62	5.09	5.66	75	195	267	
		5	12	156	21.33	13.90	16.71	15.7C	7.62	5.09	5.66	75	195	267	
		5	12	156	21.33	13.90	16.71	15.7C	7.62	5.09	5.66	75	195	267	

3CC CHARACTER DATA RECCRC 60K MEMORY

CK LNG	MRG CRC	NC. CF			PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS		
			B	G	PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI
5	2	1	25	125	10.30	8.27	9.67	15.81	7.63	5.09	5.53	18	48	68
		5	25	125	18.01	9.94	12.89	15.81	7.63	5.09	5.53	18	48	68
	3	1	19	133	10.86	8.55	9.89	16.07	7.77	5.18	5.67	35	95	133
		5	19	133	19.86	11.30	14.16	16.07	7.77	5.18	5.67	35	95	133
		5	19	133	20.05	11.35	14.23	16.07	7.77	5.18	5.67	35	95	133
	4	1	14	14C	10.99	8.87	10.10	16.45	7.97	5.32	5.87	53	139	193
		5	14	14C	19.99	12.60	15.33	16.45	7.97	5.32	5.87	53	139	193
	5	1	12	144	11.07	9.12	10.29	16.7C	8.10	5.41	6.00	70	183	252
		5	12	144	20.06	13.76	16.40	16.7C	8.10	5.41	6.00	70	183	252
	1C	2	1	25	125	10.57	8.32	9.76	15.81	7.63	5.09	5.53	18	48
5			25	125	18.17	9.97	12.94	15.81	7.63	5.09	5.53	18	48	68
3		1	19	133	11.18	8.63	10.0C	16.07	7.77	5.18	5.67	35	95	133
		5	19	133	20.05	11.35	14.23	16.07	7.77	5.18	5.67	35	95	133
		5	19	133	20.43	11.44	14.38	16.07	7.77	5.18	5.67	35	95	133
4		1	14	14C	11.31	8.98	10.25	16.45	7.97	5.32	5.87	53	139	193
		5	14	14C	20.18	12.67	15.42	16.45	7.97	5.32	5.87	53	139	193
5		1	12	144	11.38	9.25	10.46	16.7C	8.10	5.41	6.00	70	183	252
		5	12	144	20.25	13.83	16.50	16.7C	8.10	5.41	6.00	70	183	252
2C		2	1	25	125	11.11	8.41	9.94	15.81	7.63	5.09	5.53	18	48
	5		25	125	18.50	10.02	13.05	15.81	7.63	5.09	5.53	18	48	68
	3	1	19	133	11.81	8.78	10.24	16.07	7.77	5.18	5.67	35	95	133
		5	19	133	20.43	11.44	14.38	16.07	7.77	5.18	5.67	35	95	133
		5	19	133	20.43	11.44	14.38	16.07	7.77	5.18	5.67	35	95	133
	4	1	14	14C	11.94	9.19	10.54	16.45	7.97	5.32	5.87	53	139	193
		5	14	14C	20.56	12.79	15.59	16.45	7.97	5.32	5.87	53	139	193
	5	1	12	144	12.01	9.51	10.8C	16.7C	8.10	5.41	6.00	70	183	252
		5	12	144	20.63	13.99	16.70	16.7C	8.10	5.41	6.00	70	183	252
	4C	2	1	25	125	12.19	8.6C	10.3C	15.81	7.63	5.09	5.53	18	48
5			25	125	19.15	10.14	13.26	15.81	7.63	5.09	5.53	18	48	68
3		1	19	133	13.07	9.09	10.72	16.07	7.77	5.18	5.67	35	95	133
		5	19	133	21.18	11.63	14.66	16.07	7.77	5.18	5.67	35	95	133
		5	19	133	21.18	11.63	14.66	16.07	7.77	5.18	5.67	35	95	133
4		1	14	14C	13.20	9.60	11.13	16.45	7.97	5.32	5.87	53	139	193
		5	14	14C	21.31	13.04	15.94	16.45	7.97	5.32	5.87	53	139	193
5		1	12	144	13.27	10.03	11.49	16.7C	8.10	5.41	6.00	70	183	252
		5	12	144	21.39	14.30	17.11	16.7C	8.10	5.41	6.00	70	183	252

4CC CHARACTER DATA RECCRC 60K MEMORY

CK LNG	MRG CRC	NC. CF			PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS		
			B	C	PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI
5	2	1	19	95	11.04	10.41	11.74	21.07	10.17	6.78	7.37	13	36	51
		5	19	95	18.76	12.1C	14.96	21.07	10.17	6.78	7.37	13	36	51
	3	1	14	112	11.30	10.75	11.98	21.45	10.37	6.92	7.57	26	71	99
		5	14	112	19.02	13.53	16.25	21.45	10.37	6.92	7.57	26	71	99
		5	14	112	19.02	13.53	16.25	21.45	10.37	6.92	7.57	26	71	99
	4	1	11	11C	11.31	11.07	12.20	21.85	10.58	7.06	7.78	40	105	145
		5	11	11C	19.02	14.84	17.42	21.85	10.58	7.06	7.78	40	105	145
	5	1	9	117	11.44	11.4C	12.41	22.26	10.80	7.21	8.00	52	137	189
		5	9	117	19.15	16.08	18.52	22.26	10.80	7.21	8.00	52	137	189
	1C	2	1	19	95	11.31	10.45	11.83	21.07	10.17	6.78	7.37	13	36
5			19	95	18.92	12.13	15.01	21.07	10.17	6.78	7.37	13	36	51
3		1	14	112	11.57	10.82	12.10	21.45	10.37	6.92	7.57	26	71	99
		5	14	112	19.18	13.58	16.33	21.45	10.37	6.92	7.57	26	71	99
		5	14	112	19.18	13.58	16.33	21.45	10.37	6.92	7.57	26	71	99
4		1	11	11C	11.58	11.18	12.35	21.85	10.58	7.06	7.78	40	105	145
		5	11	11C	19.18	14.9C	17.51	21.85	10.58	7.06	7.78	40	105	145
5		1	9	117	11.71	11.53	12.58	22.26	10.80	7.21	8.00	52	137	189
		5	9	117	19.31	16.16	18.62	22.26	10.80	7.21	8.00	52	137	189
2C		2	1	19	95	11.85	10.55	12.01	21.07	10.17	6.78	7.37	13	36
	5		19	95	19.24	12.18	15.12	21.07	10.17	6.78	7.37	13	36	51
	3	1	14	112	12.11	10.98	12.34	21.45	10.37	6.92	7.57	26	71	99
		5	14	112	19.50	13.67	16.47	21.45	10.37	6.92	7.57	26	71	99
		5	14	112	19.50	13.67	16.47	21.45	10.37	6.92	7.57	26	71	99
	4	1	11	11C	12.12	11.39	12.64	21.85	10.58	7.06	7.78	40	105	145
		5	11	11C	19.51	15.03	17.69	21.85	10.58	7.06	7.78	40	105	145
	5	1	9	117	12.25	11.79	12.93	22.26	10.80	7.21	8.00	52	137	189
		5	9	117	19.64	16.31	18.83	22.26	10.80	7.21	8.00	52	137	189
	4C	2	1	19	95	12.93	10.74	12.37	21.07	10.17	6.78	7.37	13	36
5			19	95	19.89	12.30	15.33	21.07	10.17	6.78	7.37	13	36	51
3		1	14	112	13.19	11.29	12.82	21.45	10.37	6.92	7.57	26	71	99
		5	14	112	20.15	13.86	16.76	21.45	10.37	6.92	7.57	26	71	99
		5	14	112	20.15	13.86	16.76	21.45	10.37	6.92	7.57	26	71	99
4		1	11	11C	13.20	11.81	13.22	21.85	10.58	7.06	7.78	40	105	145
		5	11	11C	20.16	15.28	18.04	21.85	10.58	7.06	7.78	40	105	145
5		1	9	117	13.33	12.32	13.61	22.26	10.80	7.21	8.00	52	137	189
		5	9	117	20.29	16.63	19.24	22.26	10.80	7.21	8.00	52	137	189

500 CHARACTER DATA RECCRD 60K MEMORY

CW LNG	MRC CRC	NC. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS		
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI
					5	2	1	15	75	11.93	12.56	13.82	26.36	12.72
		5	15	75	19.64	14.27	17.03	26.36	12.72	8.49	9.22	10	29	40
	3	1	11	88	12.14	12.95	14.07	26.85	12.98	8.66	9.48	21	57	79
		5	11	88	19.86	15.76	18.35	26.85	12.98	8.66	9.48	21	57	79
	4	1	8	88	12.20	13.41	14.35	27.54	13.35	8.91	9.85	31	83	115
		5	8	88	19.91	17.23	19.57	27.54	13.35	8.91	9.85	31	83	115
	5	1	7	91	12.27	13.71	14.55	27.91	13.54	9.04	10.04	42	109	150
		5	7	91	19.98	18.44	20.66	27.91	13.54	9.04	10.04	42	109	150
1C	2	1	15	75	12.20	12.61	13.91	26.36	12.72	8.49	9.22	10	29	40
		5	15	75	19.81	14.30	17.09	26.36	12.72	8.49	9.22	10	29	40
	3	1	11	88	12.41	13.03	14.19	26.85	12.98	8.66	9.48	21	57	79
		5	11	88	20.02	15.81	18.42	26.85	12.98	8.66	9.48	21	57	79
	4	1	8	88	12.47	13.51	14.49	27.54	13.35	8.91	9.85	31	83	115
		5	8	88	20.08	17.29	19.66	27.54	13.35	8.91	9.85	31	83	115
	5	1	7	91	12.54	13.84	14.72	27.91	13.54	9.04	10.04	42	109	150
		5	7	91	20.15	18.52	20.76	27.91	13.54	9.04	10.04	42	109	150
2C	2	1	15	75	12.74	12.70	14.09	26.36	12.72	8.49	9.22	10	29	40
		5	15	75	20.13	14.36	17.19	26.36	12.72	8.49	9.22	10	29	40
	3	1	11	88	12.95	13.18	14.43	26.85	12.98	8.66	9.48	21	57	79
		5	11	88	20.34	15.90	18.56	26.85	12.98	8.66	9.48	21	57	79
	4	1	8	88	13.01	13.73	14.79	27.54	13.35	8.91	9.85	31	83	115
		5	8	88	20.40	17.42	19.83	27.54	13.35	8.91	9.85	31	83	115
	5	1	7	91	13.08	14.11	15.07	27.91	13.54	9.04	10.04	42	109	150
		5	7	91	20.47	18.68	20.97	27.91	13.54	9.04	10.04	42	109	150
4C	2	1	15	75	13.82	12.90	14.45	26.36	12.72	8.49	9.22	10	29	40
		5	15	75	20.78	14.48	17.41	26.36	12.72	8.49	9.22	10	29	40
	3	1	11	88	14.03	13.50	14.91	26.85	12.98	8.66	9.48	21	57	79
		5	11	88	20.99	16.09	18.85	26.85	12.98	8.66	9.48	21	57	79
	4	1	8	88	14.09	14.16	15.37	27.54	13.35	8.91	9.85	31	83	115
		5	8	88	21.05	17.67	20.19	27.54	13.35	8.91	9.85	31	83	115
	5	1	7	91	14.16	14.64	15.75	27.91	13.54	9.04	10.04	42	109	150
		5	7	91	21.12	19.00	21.38	27.91	13.54	9.04	10.04	42	109	150

750 CHARACTER DATA RECCRD 60K MEMORY

CW LNG	MRC CRC	NC. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS		
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI
					5	2	1	1C	5C	14.06	17.92	19.00	39.53	19.08
		5	1C	5C	20.49	19.69	22.21	39.53	19.08	12.73	13.83	7	19	27
	3	1	7	56	14.21	18.48	19.32	40.41	19.54	13.04	14.29	14	37	52
		5	7	56	20.63	21.38	23.60	40.41	19.54	13.04	14.29	14	37	52
	4	1	5	6C	14.35	19.15	19.68	41.57	20.16	13.46	14.91	21	55	76
		5	5	6C	20.78	23.09	24.90	41.57	20.16	13.46	14.91	21	55	76
	5	1	4	6C	14.44	19.74	20.00	42.59	20.70	13.82	15.45	28	71	98
		5	4	6C	20.87	24.64	26.11	42.59	20.70	13.82	15.45	28	71	98
1C	2	1	1C	5C	14.29	17.97	19.09	39.53	19.08	12.73	13.83	7	19	27
		5	1C	5C	20.62	19.72	22.27	39.53	19.08	12.73	13.83	7	19	27
	3	1	7	56	14.43	18.56	19.44	40.41	19.54	13.04	14.29	14	37	52
		5	7	56	20.77	21.43	23.67	40.41	19.54	13.04	14.29	14	37	52
	4	1	5	6C	14.58	19.26	19.83	41.57	20.16	13.46	14.91	21	55	76
		5	5	6C	20.91	23.15	24.99	41.57	20.16	13.46	14.91	21	55	76
	5	1	4	6C	14.66	19.88	20.17	42.59	20.70	13.82	15.45	28	71	98
		5	4	6C	21.00	24.73	26.21	42.59	20.70	13.82	15.45	28	71	98
2C	2	1	1C	5C	14.74	18.07	19.27	39.53	19.08	12.73	13.83	7	19	27
		5	1C	5C	20.89	19.78	22.38	39.53	19.08	12.73	13.83	7	19	27
	3	1	7	56	14.88	18.72	19.68	40.41	19.54	13.04	14.29	14	37	52
		5	7	56	21.04	21.52	23.81	40.41	19.54	13.04	14.29	14	37	52
	4	1	5	6C	15.03	19.48	20.12	41.57	20.16	13.46	14.91	21	55	76
		5	5	6C	21.18	23.29	25.17	41.57	20.16	13.46	14.91	21	55	76
	5	1	4	6C	15.11	20.15	20.51	42.59	20.70	13.82	15.45	28	71	98
		5	4	6C	21.27	24.89	26.42	42.59	20.70	13.82	15.45	28	71	98
4C	2	1	1C	5C	15.64	18.27	19.63	39.53	19.08	12.73	13.83	7	19	27
		5	1C	5C	21.43	19.90	22.59	39.53	19.08	12.73	13.83	7	19	27
	3	1	7	56	15.78	19.05	20.16	40.41	19.54	13.04	14.29	14	37	52
		5	7	56	21.58	21.72	24.10	40.41	19.54	13.04	14.29	14	37	52
	4	1	5	6C	15.93	19.92	20.70	41.57	20.16	13.46	14.91	21	55	76
		5	5	6C	21.72	23.55	25.52	41.57	20.16	13.46	14.91	21	55	76
	5	1	4	6C	16.01	20.70	21.20	42.59	20.70	13.82	15.45	28	71	98
		5	4	6C	21.81	25.22	26.83	42.59	20.70	13.82	15.45	28	71	98

1000 CHARACTER DATA RECCRC 60K MEMORY

CK LNG	MRC CRC	NC. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	7	42	16.86	23.37	24.22	52.91	25.54	17.04	18.54	5	14	20	
					23.29	25.21	27.43	52.91	25.54	17.04	18.54	5	14	20	
	3	1	5	45	16.99	24.06	24.59	54.07	26.16	17.46	19.16	10	28	39	
					23.42	27.05	28.87	54.07	26.16	17.46	19.16	10	28	39	
	4	1	4	44	17.07	24.66	24.92	55.09	26.70	17.82	19.70	15	41	57	
					23.49	28.68	30.15	55.09	26.70	17.82	19.70	15	41	57	
	5	1	3	45	17.22	25.56	25.36	56.78	27.60	18.43	20.60	21	53	73	
					23.65	30.59	31.47	56.78	27.60	18.43	20.60	21	53	73	
	10	2	1	7	42	17.09	23.43	24.31	52.91	25.54	17.04	18.54	5	14	20
						23.42	25.24	27.48	52.91	25.54	17.04	18.54	5	14	20
3		1	5	45	17.22	24.14	24.71	54.07	26.16	17.46	19.16	10	28	39	
					23.55	27.10	28.94	54.07	26.16	17.46	19.16	10	28	39	
4		1	4	44	17.29	24.78	25.07	55.09	26.70	17.82	19.70	15	41	57	
					23.63	28.75	30.23	55.09	26.70	17.82	19.70	15	41	57	
5		1	3	45	17.45	25.70	25.53	56.78	27.60	18.43	20.60	21	53	73	
					23.78	30.68	31.57	56.78	27.60	18.43	20.60	21	53	73	
20		2	1	7	42	17.54	23.53	24.49	52.91	25.54	17.04	18.54	5	14	20
						23.69	25.30	27.59	52.91	25.54	17.04	18.54	5	14	20
	3	1	5	45	17.67	24.21	24.95	54.07	26.16	17.46	19.16	10	28	39	
					23.82	27.20	29.08	54.07	26.16	17.46	19.16	10	28	39	
	4	1	4	44	17.74	25.00	25.36	55.09	26.70	17.82	19.70	15	41	57	
					23.90	28.88	30.41	55.09	26.70	17.82	19.70	15	41	57	
	5	1	3	45	17.90	25.98	25.88	56.78	27.60	18.43	20.60	21	53	73	
					24.05	30.85	31.78	56.78	27.60	18.43	20.60	21	53	73	
	40	2	1	7	42	18.44	23.73	24.85	52.91	25.54	17.04	18.54	5	14	20
						24.23	25.43	27.81	52.91	25.54	17.04	18.54	5	14	20
3		1	5	45	18.57	24.65	25.43	54.07	26.16	17.46	19.16	10	28	39	
					24.36	27.40	29.37	54.07	26.16	17.46	19.16	10	28	39	
4		1	4	44	18.64	25.45	25.95	55.09	26.70	17.82	19.70	15	41	57	
					24.44	29.15	30.76	55.09	26.70	17.82	19.70	15	41	57	
5		1	3	45	18.80	26.55	26.56	56.78	27.60	18.43	20.60	21	53	73	
					24.59	31.19	32.19	56.78	27.60	18.43	20.60	21	53	73	

1500 CHARACTER DATA RECCRC 60K MEMORY

CK LNG	MRC CRC	NC. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	5	25	22.00	34.02	34.55	79.07	38.16	25.46	27.66	3	9	13	
					27.14	35.94	37.76	79.07	38.16	25.46	27.66	3	9	13	
	3	1	3	30	22.26	35.39	35.20	81.78	39.60	26.43	29.10	7	18	25	
					27.40	38.59	39.47	81.78	39.60	26.43	29.10	7	18	25	
	4	1	2	32	22.57	37.05	35.95	85.17	41.40	27.65	30.90	10	26	36	
					27.71	41.47	41.17	85.17	41.40	27.65	30.90	10	26	36	
	5	1	2	32	22.57	37.19	36.09	85.17	41.40	27.65	30.90	14	35	49	
					27.71	42.50	42.20	85.17	41.40	27.65	30.90	14	35	49	
	10	2	1	5	25	22.18	34.07	34.64	79.07	38.16	25.46	27.66	3	9	13
						27.25	35.98	37.82	79.07	38.16	25.46	27.66	3	9	13
3		1	3	30	22.44	35.48	35.32	81.78	39.60	26.43	29.10	7	18	25	
					27.51	38.65	39.54	81.78	39.60	26.43	29.10	7	18	25	
4		1	2	32	22.75	37.17	36.09	85.17	41.40	27.65	30.90	10	26	36	
					27.82	41.54	41.26	85.17	41.40	27.65	30.90	10	26	36	
5		1	2	32	22.75	37.34	36.26	85.17	41.40	27.65	30.90	14	35	49	
					27.82	42.58	42.30	85.17	41.40	27.65	30.90	14	35	49	
20		2	1	5	25	22.54	34.18	34.82	79.07	38.16	25.46	27.66	3	9	13
						27.47	36.04	37.92	79.07	38.16	25.46	27.66	3	9	13
	3	1	3	30	22.80	35.66	35.55	81.78	39.60	26.43	29.10	7	18	25	
					27.73	38.76	39.69	81.78	39.60	26.43	29.10	7	18	25	
	4	1	2	32	23.11	37.42	36.39	85.17	41.40	27.65	30.90	10	26	36	
					28.03	41.69	41.43	85.17	41.40	27.65	30.90	10	26	36	
	5	1	2	32	23.11	37.64	36.60	85.17	41.40	27.65	30.90	14	35	49	
					28.03	42.76	42.50	85.17	41.40	27.65	30.90	14	35	49	
	40	2	1	5	25	23.26	34.39	35.18	79.07	38.16	25.46	27.66	3	9	13
						27.90	36.17	38.14	79.07	38.16	25.46	27.66	3	9	13
3		1	3	30	23.52	36.02	36.03	81.78	39.60	26.43	29.10	7	18	25	
					28.16	38.97	39.97	81.78	39.60	26.43	29.10	7	18	25	
4		1	2	32	23.83	37.92	36.97	85.17	41.40	27.65	30.90	10	26	36	
					28.46	41.99	41.79	85.17	41.40	27.65	30.90	10	26	36	
5		1	2	32	23.83	38.23	37.29	85.17	41.40	27.65	30.90	14	35	49	
					28.46	43.12	42.91	85.17	41.40	27.65	30.90	14	35	49	

2000 CHARACTER DATA RECORD 60K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	3	21	27.85	45.35	45.15	106.78	51.60	34.43	37.60	2	7	10	
		5	3	21	32.99	47.49	48.37	106.78	51.60	34.43	37.60	2	7	10	
	3	1	2	22	28.14	47.02	45.92	110.17	53.40	35.65	39.40	5	13	19	
		5	2	22	33.28	50.50	50.20	110.17	53.40	35.65	39.40	5	13	19	
	4	1	2	22	28.14	47.17	46.07	110.17	53.40	35.65	39.40	7	20	28	
		5	2	22	33.28	51.59	51.30	110.17	53.40	35.65	39.40	7	20	28	
	5	1	1	24	29.01	51.84	48.01	120.35	58.80	39.30	44.80	10	25	33	
		5	1	24	34.15	57.95	54.12	120.35	58.80	39.30	44.80	10	25	33	
	10	2	1	3	21	28.03	45.41	45.24	106.78	51.60	34.43	37.60	2	7	10
			5	3	21	33.10	47.53	48.42	106.78	51.60	34.43	37.60	2	7	10
3		1	2	22	28.32	47.12	46.04	110.17	53.40	35.65	39.40	5	13	19	
		5	2	22	33.39	50.55	50.27	110.17	53.40	35.65	39.40	5	13	19	
4		1	2	22	28.32	47.30	46.22	110.17	53.40	35.65	39.40	7	20	28	
		5	2	22	33.39	51.67	51.38	110.17	53.40	35.65	39.40	7	20	28	
5		1	1	24	29.19	52.01	48.18	120.35	58.80	39.30	44.80	10	25	33	
		5	1	24	34.26	58.05	54.22	120.35	58.80	39.30	44.80	10	25	33	
20		2	1	3	21	28.39	45.53	45.42	106.78	51.60	34.43	37.60	2	7	10
			5	3	21	33.31	47.60	48.53	106.78	51.60	34.43	37.60	2	7	10
	3	1	2	22	28.68	47.31	46.28	110.17	53.40	35.65	39.40	5	13	19	
		5	2	22	33.60	50.67	50.41	110.17	53.40	35.65	39.40	5	13	19	
	4	1	2	22	28.68	47.55	46.51	110.17	53.40	35.65	39.40	7	20	28	
		5	2	22	33.60	51.82	51.56	110.17	53.40	35.65	39.40	7	20	28	
	5	1	1	24	29.55	52.35	48.53	120.35	58.80	39.30	44.80	10	25	33	
		5	1	24	34.47	58.25	54.43	120.35	58.80	39.30	44.80	10	25	33	
	40	2	1	3	21	29.11	45.77	45.78	106.78	51.60	34.43	37.60	2	7	10
			5	3	21	33.75	47.74	48.74	106.78	51.60	34.43	37.60	2	7	10
3		1	2	22	29.40	47.70	46.76	110.17	53.40	35.65	39.40	5	13	19	
		5	2	22	34.04	50.90	50.70	110.17	53.40	35.65	39.40	5	13	19	
4		1	2	22	29.40	48.04	47.10	110.17	53.40	35.65	39.40	7	20	28	
		5	2	22	34.04	52.11	51.91	110.17	53.40	35.65	39.40	7	20	28	
5		1	1	24	30.27	53.04	49.21	120.35	58.80	39.30	44.80	10	25	33	
		5	1	24	34.91	58.66	54.84	120.35	58.80	39.30	44.80	10	25	33	

20 CHARACTER DATA RECCRC 80K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	499	998	20.59	2.25	3.86	1.04	0.50	0.33	0.36	271	736	1041	
		5	499	998	32.16	3.87	7.08	1.04	0.50	0.33	0.36	271	736	1041	
	3	1	41C	82C	18.09	2.43	4.03	1.05	0.51	0.34	0.37	542	1460	2057	
		5	41C	82C	29.66	5.10	8.31	1.05	0.51	0.34	0.37	542	1460	2057	
	4	1	323	969	20.19	2.59	4.19	1.06	0.51	0.34	0.37	809	2162	3030	
		5	323	969	31.76	6.21	9.41	1.06	0.51	0.34	0.37	809	2162	3030	
	5	1	264	792	17.70	2.73	4.33	1.08	0.52	0.35	0.38	1073	2844	3965	
		5	264	792	29.27	7.24	10.44	1.08	0.52	0.35	0.38	1073	2844	3965	
	1C	2	1	499	998	21.00	2.30	3.95	1.04	0.50	0.33	0.36	271	736	1041
			5	499	998	32.40	3.89	7.13	1.04	0.50	0.33	0.36	271	736	1041
3		1	41C	82C	18.50	2.50	4.15	1.05	0.51	0.34	0.37	542	1460	2057	
		5	41C	82C	29.90	5.14	8.38	1.05	0.51	0.34	0.37	542	1460	2057	
4		1	323	969	20.59	2.69	4.33	1.06	0.51	0.34	0.37	809	2162	3030	
		5	323	969	32.00	6.27	9.50	1.06	0.51	0.34	0.37	809	2162	3030	
5		1	264	792	18.11	2.86	4.50	1.08	0.52	0.35	0.38	1073	2844	3965	
		5	264	792	29.51	7.31	10.54	1.08	0.52	0.35	0.38	1073	2844	3965	

3C CHARACTER DATA RECCRC 80K MEMORY

CW LNG	MRG CRC	NO. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	333	999	20.72	2.47	4.07	1.56	0.75	0.50	0.54	181	491	694	
		5	333	999	32.29	4.08	7.28	1.56	0.75	0.50	0.54	181	491	694	
	3	1	273	819	18.19	2.64	4.24	1.57	0.76	0.51	0.55	361	973	1371	
		5	273	819	29.76	5.32	8.52	1.57	0.76	0.51	0.55	361	973	1371	
	4	1	215	86C	18.77	2.80	4.40	1.59	0.77	0.51	0.56	539	1441	2020	
		5	215	86C	30.34	6.43	9.62	1.59	0.77	0.51	0.56	539	1441	2020	
	5	1	176	88C	19.06	2.95	4.54	1.62	0.78	0.52	0.57	715	1896	2643	
		5	176	88C	30.62	7.46	10.65	1.62	0.78	0.52	0.57	715	1896	2643	
	1C	2	1	333	999	21.13	2.51	4.16	1.56	0.75	0.50	0.54	181	491	694
			5	333	999	32.53	4.11	7.34	1.56	0.75	0.50	0.54	181	491	694
3		1	273	819	18.60	2.72	4.36	1.57	0.76	0.51	0.55	361	973	1371	
		5	273	819	30.00	5.36	8.59	1.57	0.76	0.51	0.55	361	973	1371	
4		1	215	86C	19.18	2.90	4.54	1.59	0.77	0.51	0.56	539	1441	2020	
		5	215	86C	30.58	6.49	9.71	1.59	0.77	0.51	0.56	539	1441	2020	
5		1	176	88C	19.46	3.08	4.71	1.62	0.78	0.52	0.57	715	1896	2643	
		5	176	88C	30.87	7.54	10.75	1.62	0.78	0.52	0.57	715	1896	2643	
2C		2	1	333	999	21.94	2.60	4.34	1.56	0.75	0.50	0.54	181	491	694
			5	333	999	33.02	4.16	7.45	1.56	0.75	0.50	0.54	181	491	694
	3	1	273	819	19.41	2.87	4.60	1.57	0.76	0.51	0.55	361	973	1371	
		5	273	819	30.49	5.45	8.73	1.57	0.76	0.51	0.55	361	973	1371	
	4	1	215	86C	19.99	3.11	4.84	1.59	0.77	0.51	0.56	539	1441	2020	
		5	215	86C	31.07	6.61	9.88	1.59	0.77	0.51	0.56	539	1441	2020	
	5	1	176	88C	20.27	3.33	5.05	1.62	0.78	0.52	0.57	715	1896	2643	
		5	176	88C	31.35	7.69	10.96	1.62	0.78	0.52	0.57	715	1896	2643	

40 CHARACTER DATA RECCRD 80K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PRCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	249	996	20.80	2.68	4.28	2.08	1.00	0.67	0.72	135	368	520	
		5	249	996	32.36	4.29	7.49	2.08	1.00	0.67	0.72	135	368	520	
	3	1	205	820	18.32	2.85	4.45	2.10	1.01	0.68	0.73	271	730	1028	
		5	205	820	29.89	5.53	8.72	2.10	1.01	0.68	0.73	271	730	1028	
	4	1	161	966	20.38	3.02	4.60	2.13	1.03	0.69	0.75	404	1080	1514	
		5	161	966	31.94	6.64	9.83	2.13	1.03	0.69	0.75	404	1080	1514	
	5	1	132	924	19.79	3.17	4.75	2.15	1.04	0.70	0.76	536	1422	1982	
		5	132	924	31.36	7.68	10.86	2.15	1.04	0.70	0.76	536	1422	1982	
	10	2	1	249	996	21.20	2.72	4.37	2.08	1.00	0.67	0.72	135	368	520
			5	249	996	32.60	4.32	7.54	2.08	1.00	0.67	0.72	135	368	520
3		1	205	820	18.73	2.93	4.57	2.10	1.01	0.68	0.73	271	730	1028	
		5	205	820	30.13	5.58	8.80	2.10	1.01	0.68	0.73	271	730	1028	
4		1	161	966	20.78	3.12	4.75	2.13	1.03	0.69	0.75	404	1080	1514	
		5	161	966	32.19	6.71	9.92	2.13	1.03	0.69	0.75	404	1080	1514	
5		1	132	924	20.19	3.30	4.92	2.15	1.04	0.70	0.76	536	1422	1982	
		5	132	924	31.60	7.76	10.96	2.15	1.04	0.70	0.76	536	1422	1982	
20		2	1	249	996	22.01	2.81	4.55	2.08	1.00	0.67	0.72	135	368	520
			5	249	996	33.09	4.37	7.65	2.08	1.00	0.67	0.72	135	368	520
	3	1	205	820	19.54	3.08	4.81	2.10	1.01	0.68	0.73	271	730	1028	
		5	205	820	30.62	5.67	8.94	2.10	1.01	0.68	0.73	271	730	1028	
	4	1	161	966	21.59	3.32	5.04	2.13	1.03	0.69	0.75	404	1080	1514	
		5	161	966	32.67	6.83	10.09	2.13	1.03	0.69	0.75	404	1080	1514	
	5	1	132	924	21.00	3.55	5.26	2.15	1.04	0.70	0.76	536	1422	1982	
		5	132	924	32.09	7.91	11.17	2.15	1.04	0.70	0.76	536	1422	1982	

50 CHARACTER DATA RECCRD 80K MEMORY

CW LNG	MRG CRD	NO. CF	B	G	PRCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	199	995	20.90	2.89	4.48	2.60	1.25	0.84	0.90	108	294	416	
		5	199	995	32.46	4.50	7.70	2.60	1.25	0.84	0.90	108	294	416	
	3	1	164	984	20.74	3.07	4.66	2.62	1.27	0.84	0.92	216	584	822	
		5	164	984	32.31	5.75	8.93	2.62	1.27	0.84	0.92	216	584	822	
	4	1	129	903	19.61	3.23	4.81	2.66	1.28	0.86	0.93	323	864	1212	
		5	129	903	31.17	6.86	10.04	2.66	1.28	0.86	0.93	323	864	1212	
	5	1	105	945	20.20	3.39	4.96	2.69	1.30	0.87	0.95	429	1137	1585	
		5	105	945	31.77	7.91	11.07	2.69	1.30	0.87	0.95	429	1137	1585	
	10	2	1	199	995	21.30	2.93	4.57	2.60	1.25	0.84	0.90	108	294	416
			5	199	995	32.71	4.53	7.75	2.60	1.25	0.84	0.90	108	294	416
3		1	164	984	21.15	3.14	4.77	2.62	1.27	0.84	0.92	216	584	822	
		5	164	984	32.55	5.79	9.00	2.62	1.27	0.84	0.92	216	584	822	
4		1	129	903	20.01	3.34	4.96	2.66	1.28	0.86	0.93	323	864	1212	
		5	129	903	31.42	6.92	10.12	2.66	1.28	0.86	0.93	323	864	1212	
5		1	105	945	20.61	3.52	5.13	2.69	1.30	0.87	0.95	429	1137	1585	
		5	105	945	32.01	7.98	11.17	2.69	1.30	0.87	0.95	429	1137	1585	
20		2	1	199	995	22.11	3.03	4.75	2.60	1.25	0.84	0.90	108	294	416
			5	199	995	33.19	4.59	7.86	2.60	1.25	0.84	0.90	108	294	416
	3	1	164	984	21.96	3.29	5.01	2.62	1.27	0.84	0.92	216	584	822	
		5	164	984	33.04	5.88	9.15	2.62	1.27	0.84	0.92	216	584	822	
	4	1	129	903	20.82	3.54	5.25	2.66	1.28	0.86	0.93	323	864	1212	
		5	129	903	31.90	7.05	10.30	2.66	1.28	0.86	0.93	323	864	1212	
	5	1	105	945	21.42	3.77	5.47	2.69	1.30	0.87	0.95	429	1137	1585	
		5	105	945	32.50	8.14	11.38	2.69	1.30	0.87	0.95	429	1137	1585	
	40	2	1	199	995	23.73	3.21	5.11	2.60	1.25	0.84	0.90	108	294	416
			5	199	995	34.16	4.69	8.07	2.60	1.25	0.84	0.90	108	294	416
3		1	164	984	23.58	3.59	5.49	2.62	1.27	0.84	0.92	216	584	822	
		5	164	984	34.01	6.06	9.43	2.62	1.27	0.84	0.92	216	584	822	
4		1	129	903	22.44	3.95	5.84	2.66	1.28	0.86	0.93	323	864	1212	
		5	129	903	32.87	7.29	10.65	2.66	1.28	0.86	0.93	323	864	1212	
5		1	105	945	23.04	4.28	6.16	2.69	1.30	0.87	0.95	429	1137	1585	
		5	105	945	33.47	8.44	11.79	2.69	1.30	0.87	0.95	429	1137	1585	

## 6C CHARACTER DATA RECCRD 80K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS				
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI		
5	2	1	166	83C	18.69	3.1C	4.69	3.12	1.51	1.00	1.09	90	245	347		
		5	166	83C	30.26	4.72	7.90	3.12	1.51	1.00	1.09	90	245	347		
		3	1	136	816	18.50	3.28	4.86	3.15	1.52	1.01	1.10	180	486	685	
	4	5	136	816	30.06	5.96	9.14	3.15	1.52	1.01	1.10	180	486	685		
		1	107	963	20.57	3.45	5.02	3.19	1.54	1.03	1.12	269	720	1009		
		5	107	963	32.13	7.08	10.24	3.19	1.54	1.03	1.12	269	720	1009		
	5	1	88	968	20.64	3.61	5.17	3.23	1.56	1.04	1.14	357	948	1321		
		5	88	968	32.21	8.13	11.28	3.23	1.56	1.04	1.14	357	948	1321		
		2	1	166	83C	19.10	3.15	4.78	3.12	1.51	1.00	1.09	90	245	347	
	1C	2	5	166	83C	30.50	4.75	7.96	3.12	1.51	1.00	1.09	90	245	347	
			3	1	136	816	18.90	3.36	4.98	3.15	1.52	1.01	1.10	180	486	685
			5	136	816	30.31	6.01	9.21	3.15	1.52	1.01	1.10	180	486	685	
		4	1	107	963	20.97	3.55	5.17	3.19	1.54	1.03	1.12	269	720	1009	
			5	107	963	32.38	7.14	10.33	3.19	1.54	1.03	1.12	269	720	1009	
			1	88	968	21.04	3.74	5.34	3.23	1.56	1.04	1.14	357	948	1321	
5		5	88	968	32.45	8.21	11.38	3.23	1.56	1.04	1.14	357	948	1321		
		2	1	166	83C	19.91	3.24	4.96	3.12	1.51	1.00	1.09	90	245	347	
		5	166	83C	30.99	4.8C	8.06	3.12	1.51	1.00	1.09	90	245	347		
2C		3	1	136	816	19.71	3.51	5.22	3.15	1.52	1.01	1.10	180	486	685	
			5	136	816	30.79	6.10	9.35	3.15	1.52	1.01	1.10	180	486	685	
			1	107	963	21.78	3.76	5.46	3.19	1.54	1.03	1.12	269	720	1009	
		4	5	107	963	32.86	7.27	10.51	3.19	1.54	1.03	1.12	269	720	1009	
			1	88	968	21.85	3.99	5.68	3.23	1.56	1.04	1.14	357	948	1321	
			5	88	968	32.94	8.36	11.59	3.23	1.56	1.04	1.14	357	948	1321	
	4C	2	1	166	83C	21.53	3.42	5.32	3.12	1.51	1.00	1.09	90	245	347	
			5	166	83C	31.96	4.91	8.28	3.12	1.51	1.00	1.09	90	245	347	
			3	1	136	816	21.33	3.81	5.7C	3.15	1.52	1.01	1.10	180	486	685
		5	1	136	816	31.76	6.28	9.64	3.15	1.52	1.01	1.10	180	486	685	
			1	107	963	23.40	4.16	6.04	3.19	1.54	1.03	1.12	269	720	1009	
			5	107	963	33.83	7.51	10.86	3.19	1.54	1.03	1.12	269	720	1009	
		5	1	88	968	23.47	4.50	6.37	3.23	1.56	1.04	1.14	357	948	1321	
			5	88	968	33.91	8.66	12.00	3.23	1.56	1.04	1.14	357	948	1321	

## 70 CHARACTER DATA RECCRD 80K MEMORY

CW LNG	MRG CRD	NO. CF	B	G	PROCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS				
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI		
5	2	1	142	71C	17.12	3.31	4.89	3.64	1.76	1.17	1.27	77	210	297		
		5	142	71C	28.69	4.93	8.11	3.64	1.76	1.17	1.27	77	210	297		
		3	1	117	702	17.01	3.50	5.07	3.67	1.77	1.18	1.28	154	417	587	
	4	5	117	702	28.58	6.18	9.34	3.67	1.77	1.18	1.28	154	417	587		
		1	92	828	18.78	3.67	5.23	3.72	1.80	1.20	1.31	231	617	865		
		5	92	828	30.35	7.3C	10.45	3.72	1.80	1.20	1.31	231	617	865		
	5	1	75	825	18.75	3.83	5.38	3.77	1.82	1.22	1.33	306	812	1132		
		5	75	825	30.31	8.35	11.49	3.77	1.82	1.22	1.33	306	812	1132		
		2	1	142	71C	17.52	3.36	4.98	3.64	1.76	1.17	1.27	77	210	297	
	1C	2	5	142	71C	28.93	4.96	8.16	3.64	1.76	1.17	1.27	77	210	297	
			3	1	117	702	17.41	3.57	5.19	3.67	1.77	1.18	1.28	154	417	587
			5	117	702	28.82	6.22	9.42	3.67	1.77	1.18	1.28	154	417	587	
		4	1	92	828	19.19	3.77	5.38	3.72	1.80	1.20	1.31	231	617	865	
			5	92	828	30.59	7.36	10.54	3.72	1.80	1.20	1.31	231	617	865	
			1	75	825	19.15	3.96	5.55	3.77	1.82	1.22	1.33	306	812	1132	
5		5	75	825	30.56	8.43	11.59	3.77	1.82	1.22	1.33	306	812	1132		
		2	1	142	71C	18.33	3.45	5.16	3.64	1.76	1.17	1.27	77	210	297	
		5	142	71C	29.42	5.01	8.27	3.64	1.76	1.17	1.27	77	210	297		
2C		3	1	117	702	18.22	3.72	5.43	3.67	1.77	1.18	1.28	154	417	587	
			5	117	702	29.31	6.31	9.56	3.67	1.77	1.18	1.28	154	417	587	
			1	92	828	20.00	3.97	5.67	3.72	1.80	1.20	1.31	231	617	865	
		4	5	92	828	31.08	7.49	10.72	3.72	1.80	1.20	1.31	231	617	865	
			1	75	825	19.96	4.21	5.89	3.77	1.82	1.22	1.33	306	812	1132	
			5	75	825	31.04	8.58	11.79	3.77	1.82	1.22	1.33	306	812	1132	
	4C	2	1	142	71C	19.95	3.63	5.52	3.64	1.76	1.17	1.27	77	210	297	
			5	142	71C	30.39	5.12	8.49	3.64	1.76	1.17	1.27	77	210	297	
			3	1	117	702	19.84	4.02	5.91	3.67	1.77	1.18	1.28	154	417	587
		5	1	117	702	30.28	6.49	9.85	3.67	1.77	1.18	1.28	154	417	587	
			1	92	828	21.62	4.38	6.25	3.72	1.80	1.20	1.31	231	617	865	
			5	92	828	32.05	7.73	11.07	3.72	1.80	1.20	1.31	231	617	865	
		5	1	75	825	21.58	4.72	6.58	3.77	1.82	1.22	1.33	306	812	1132	
			5	75	825	32.01	8.89	12.21	3.77	1.82	1.22	1.33	306	812	1132	



80 CHARACTER DATA RECORD 80K MEMORY

CW LNC	MRG ORD	NO. CF	P	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	124	620	15.97	3.52	5.10	4.16	2.01	1.34	1.45	67	184	260	
		5	124	620	27.54	5.14	8.32	4.16	2.01	1.34	1.45	67	184	260	
	3	1	102	714	17.29	3.71	5.28	4.20	2.03	1.35	1.47	135	364	514	
		5	102	714	28.86	6.39	9.55	4.20	2.03	1.35	1.47	135	364	514	
	4	1	80	720	17.38	3.89	5.44	4.25	2.05	1.37	1.49	202	540	757	
		5	80	720	28.95	7.52	10.66	4.25	2.05	1.37	1.49	202	540	757	
	5	1	66	726	17.47	4.05	5.59	4.31	2.08	1.39	1.52	268	711	991	
		5	66	726	29.04	8.58	11.70	4.31	2.08	1.39	1.52	268	711	991	
	10	2	1	124	620	16.38	3.57	5.19	4.16	2.01	1.34	1.45	67	184	260
			5	124	620	27.78	5.17	8.37	4.16	2.01	1.34	1.45	67	184	260
		3	1	102	714	17.70	3.78	5.40	4.20	2.03	1.35	1.47	135	364	514
			5	102	714	29.10	6.44	9.62	4.20	2.03	1.35	1.47	135	364	514
		4	1	80	720	17.79	3.99	5.58	4.25	2.05	1.37	1.49	202	540	757
			5	80	720	29.19	7.58	10.75	4.25	2.05	1.37	1.49	202	540	757
		5	1	66	726	17.88	4.18	5.76	4.31	2.08	1.39	1.52	268	711	991
5			66	726	29.28	8.65	11.80	4.31	2.08	1.39	1.52	268	711	991	
20		2	1	124	620	17.19	3.66	5.37	4.16	2.01	1.34	1.45	67	184	260
			5	124	620	28.27	5.23	8.48	4.16	2.01	1.34	1.45	67	184	260
		3	1	102	714	18.51	3.93	5.64	4.20	2.03	1.35	1.47	135	364	514
			5	102	714	29.59	6.53	9.77	4.20	2.03	1.35	1.47	135	364	514
		4	1	80	720	18.60	4.19	5.88	4.25	2.05	1.37	1.49	202	540	757
			5	80	720	29.68	7.71	10.92	4.25	2.05	1.37	1.49	202	540	757
		5	1	66	726	18.69	4.43	6.10	4.31	2.08	1.39	1.52	268	711	991
	5		66	726	29.77	8.80	12.00	4.31	2.08	1.39	1.52	268	711	991	
	40	2	1	124	620	18.81	3.84	5.73	4.16	2.01	1.34	1.45	67	184	260
			5	124	620	29.24	5.24	8.69	4.16	2.01	1.34	1.45	67	184	260
		3	1	102	714	20.13	4.24	6.11	4.20	2.03	1.35	1.47	135	364	514
			5	102	714	30.56	6.71	10.05	4.20	2.03	1.35	1.47	135	364	514
		4	1	80	720	20.22	4.60	6.46	4.25	2.05	1.37	1.49	202	540	757
			5	80	720	30.65	7.95	11.28	4.25	2.05	1.37	1.49	202	540	757
		5	1	66	726	20.31	4.94	6.78	4.31	2.08	1.39	1.52	268	711	991
5			66	726	30.74	9.11	12.41	4.31	2.08	1.39	1.52	268	711	991	

90 CHARACTER DATA RECORD 80K MEMORY

CW LNC	MRG ORD	NO. CF	P	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	111	555	15.17	3.74	5.31	4.68	2.26	1.51	1.63	60	163	231	
		5	111	555	26.74	5.36	8.52	4.68	2.26	1.51	1.63	60	163	231	
	3	1	91	637	16.33	3.92	5.48	4.72	2.28	1.52	1.65	120	324	457	
		5	91	637	27.89	6.41	9.76	4.72	2.28	1.52	1.65	120	324	457	
	4	1	71	639	16.36	4.10	5.65	4.79	2.31	1.54	1.68	179	480	672	
		5	71	639	27.93	7.74	10.87	4.79	2.31	1.54	1.68	179	480	672	
	5	1	58	638	16.35	4.27	5.80	4.85	2.35	1.57	1.72	238	631	880	
		5	58	638	27.92	8.80	11.91	4.85	2.35	1.57	1.72	238	631	880	
	10	2	1	111	555	15.58	3.78	5.40	4.68	2.26	1.51	1.63	60	163	231
			5	111	555	26.98	5.38	8.58	4.68	2.26	1.51	1.63	60	163	231
		3	1	91	637	16.73	4.00	5.60	4.72	2.28	1.52	1.65	120	324	457
			5	91	637	28.14	6.65	9.83	4.72	2.28	1.52	1.65	120	324	457
		4	1	71	639	16.76	4.20	5.79	4.79	2.31	1.54	1.68	179	480	672
			5	71	639	28.17	7.80	10.96	4.79	2.31	1.54	1.68	179	480	672
		5	1	58	638	16.76	4.40	5.97	4.85	2.35	1.57	1.72	238	631	880
5			58	638	28.16	8.88	12.01	4.85	2.35	1.57	1.72	238	631	880	
20		2	1	111	555	16.39	3.87	5.58	4.68	2.26	1.51	1.63	60	163	231
			5	111	555	27.47	5.44	8.68	4.68	2.26	1.51	1.63	60	163	231
		3	1	91	637	17.54	4.15	5.84	4.72	2.28	1.52	1.65	120	324	457
			5	91	637	28.62	6.74	9.97	4.72	2.28	1.52	1.65	120	324	457
		4	1	71	639	17.57	4.41	6.08	4.79	2.31	1.54	1.68	179	480	672
			5	71	639	28.66	7.92	11.13	4.79	2.31	1.54	1.68	179	480	672
		5	1	58	638	17.57	4.65	6.31	4.85	2.35	1.57	1.72	238	631	880
	5		58	638	28.65	9.03	12.21	4.85	2.35	1.57	1.72	238	631	880	
	40	2	1	111	555	18.01	4.05	5.94	4.68	2.26	1.51	1.63	60	163	231
			5	111	555	28.44	5.55	8.90	4.68	2.26	1.51	1.63	60	163	231
		3	1	91	637	19.16	4.45	6.32	4.72	2.28	1.52	1.65	120	324	457
			5	91	637	29.59	6.92	10.26	4.72	2.28	1.52	1.65	120	324	457
		4	1	71	639	19.19	4.82	6.67	4.79	2.31	1.54	1.68	179	480	672
			5	71	639	29.63	8.17	11.48	4.79	2.31	1.54	1.68	179	480	672
		5	1	58	638	19.19	5.16	6.99	4.85	2.35	1.57	1.72	238	631	880
5			58	638	29.62	9.33	12.62	4.85	2.35	1.57	1.72	238	631	880	

ICC CHARACTER DATA RECCRC 80K MEMORY

CW LNG	MRG ORD	NC. CF	B	G	PRCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	99	495	14.02	3.95	5.51	5.21	2.51	1.67	1.81	54	147	208	
		5	99	495	24.30	5.57	8.73	5.21	2.51	1.67	1.81	54	147	208	
	3	1	82	574	15.56	4.14	5.69	5.25	2.53	1.69	1.83	108	292	411	
		5	82	574	27.12	6.82	9.97	5.25	2.53	1.69	1.83	108	292	411	
	4	1	64	576	15.59	4.32	5.85	5.32	2.57	1.71	1.87	161	432	605	
		5	64	576	27.16	7.96	11.08	5.32	2.57	1.71	1.87	161	432	605	
	5	1	52	572	15.54	4.49	6.01	5.39	2.61	1.74	1.91	214	568	791	
		5	52	572	27.11	9.02	12.12	5.39	2.61	1.74	1.91	214	568	791	
	10	2	1	99	495	14.38	3.99	5.60	5.21	2.51	1.67	1.81	54	147	208
			5	99	495	24.51	5.60	8.78	5.21	2.51	1.67	1.81	54	147	208
		3	1	82	574	15.96	4.21	5.81	5.25	2.53	1.69	1.83	108	292	411
			5	82	574	27.37	6.87	10.04	5.25	2.53	1.69	1.83	108	292	411
4		1	64	576	16.00	4.42	6.00	5.32	2.57	1.71	1.87	161	432	605	
		5	64	576	27.40	8.02	11.17	5.32	2.57	1.71	1.87	161	432	605	
5		1	52	572	15.95	4.62	6.18	5.39	2.61	1.74	1.91	214	568	791	
		5	52	572	27.35	9.10	12.22	5.39	2.61	1.74	1.91	214	568	791	
20		2	1	99	495	15.10	4.08	5.78	5.21	2.51	1.67	1.81	54	147	208
			5	99	495	24.95	5.65	8.89	5.21	2.51	1.67	1.81	54	147	208
		3	1	82	574	16.77	4.36	6.05	5.25	2.53	1.69	1.83	108	292	411
			5	82	574	27.85	6.96	10.18	5.25	2.53	1.69	1.83	108	292	411
	4	1	64	576	16.81	4.62	6.29	5.32	2.57	1.71	1.87	161	432	605	
		5	64	576	27.89	8.14	11.34	5.32	2.57	1.71	1.87	161	432	605	
	5	1	52	572	16.76	4.87	6.52	5.39	2.61	1.74	1.91	214	568	791	
		5	52	572	27.84	9.25	12.42	5.39	2.61	1.74	1.91	214	568	791	
	40	2	1	99	495	16.54	4.27	6.14	5.21	2.51	1.67	1.81	54	147	208
			5	99	495	25.81	5.76	9.11	5.21	2.51	1.67	1.81	54	147	208
		3	1	82	574	18.39	4.66	6.53	5.25	2.53	1.69	1.83	108	292	411
			5	82	574	28.82	7.14	10.47	5.25	2.53	1.69	1.83	108	292	411
4		1	64	576	18.43	5.03	6.88	5.32	2.57	1.71	1.87	161	432	605	
		5	64	576	28.86	8.39	11.69	5.32	2.57	1.71	1.87	161	432	605	
5		1	52	572	18.38	5.38	7.20	5.39	2.61	1.74	1.91	214	568	791	
		5	52	572	28.81	9.56	12.83	5.39	2.61	1.74	1.91	214	568	791	

120 CHARACTER DATA RECCRC 80K MEMORY

CW LNG	MRG CRD	NC. CF	B	G	PRCESS TIME MILLISECCNDS/RECORD			TAPE TIME MILLISECCNDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	83	415	13.12	4.37	5.92	6.25	3.01	2.01	2.17	45	122	173	
		5	83	415	23.40	6.00	9.14	6.25	3.01	2.01	2.17	45	122	173	
	3	1	68	476	13.98	4.56	6.10	6.30	3.04	2.03	2.20	90	243	342	
		5	68	476	24.26	7.26	10.38	6.30	3.04	2.03	2.20	90	243	342	
	4	1	53	477	14.00	4.75	6.27	6.38	3.08	2.06	2.24	134	360	504	
		5	53	477	24.29	8.40	11.49	6.38	3.08	2.06	2.24	134	360	504	
	5	1	44	484	14.11	4.93	6.43	6.46	3.13	2.09	2.29	178	474	660	
		5	44	484	24.39	9.47	12.53	6.46	3.13	2.09	2.29	178	474	660	
	10	2	1	83	415	13.48	4.42	6.01	6.25	3.01	2.01	2.17	45	122	173
			5	83	415	23.62	6.02	9.19	6.25	3.01	2.01	2.17	45	122	173
		3	1	68	476	14.34	4.64	6.22	6.30	3.04	2.03	2.20	90	243	342
			5	68	476	24.48	7.30	10.45	6.30	3.04	2.03	2.20	90	243	342
4		1	53	477	14.36	4.85	6.42	6.38	3.08	2.06	2.24	134	360	504	
		5	53	477	24.50	8.46	11.58	6.38	3.08	2.06	2.24	134	360	504	
5		1	44	484	14.47	5.06	6.60	6.46	3.13	2.09	2.29	178	474	660	
		5	44	484	24.61	9.54	12.64	6.46	3.13	2.09	2.29	178	474	660	
20		2	1	83	415	14.20	4.51	6.19	6.25	3.01	2.01	2.17	45	122	173
			5	83	415	24.05	6.08	9.30	6.25	3.01	2.01	2.17	45	122	173
		3	1	68	476	15.06	4.79	6.46	6.30	3.04	2.03	2.20	90	243	342
			5	68	476	24.91	7.39	10.59	6.30	3.04	2.03	2.20	90	243	342
	4	1	53	477	15.08	5.06	6.71	6.38	3.08	2.06	2.24	134	360	504	
		5	53	477	24.93	8.58	11.76	6.38	3.08	2.06	2.24	134	360	504	
	5	1	44	484	15.19	5.31	6.94	6.46	3.13	2.09	2.29	178	474	660	
		5	44	484	25.04	9.69	12.84	6.46	3.13	2.09	2.29	178	474	660	
	40	2	1	83	415	15.64	4.69	6.55	6.25	3.01	2.01	2.17	45	122	173
			5	83	415	24.92	6.19	9.52	6.25	3.01	2.01	2.17	45	122	173
		3	1	68	476	16.50	5.09	6.94	6.30	3.04	2.03	2.20	90	243	342
			5	68	476	25.78	7.57	10.88	6.30	3.04	2.03	2.20	90	243	342
4		1	53	477	16.52	5.47	7.29	6.38	3.08	2.06	2.24	134	360	504	
		5	53	477	25.80	8.83	12.11	6.38	3.08	2.06	2.24	134	360	504	
5		1	44	484	16.63	5.82	7.62	6.46	3.13	2.09	2.29	178	474	660	
		5	44	484	25.90	10.00	13.25	6.46	3.13	2.09	2.29	178	474	660	

140 CHARACTER DATA RECORD 80K MEMORY

CW LNG	MRG GRD	NO. CF	H	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	71	355	12.51	4.79	6.34	7.29	3.51	2.34	2.53	38	105	148	
		5	71	355	22.79	6.42	9.55	7.29	3.51	2.34	2.53	38	105	148	
	3	1	58	406	13.23	4.99	6.52	7.35	3.55	2.37	2.57	77	208	293	
		5	58	406	23.51	7.69	10.79	7.35	3.55	2.37	2.57	77	208	293	
	4	1	46	414	13.35	5.18	6.69	7.44	3.59	2.40	2.61	115	308	432	
		5	46	414	23.63	8.84	11.91	7.44	3.59	2.40	2.61	115	308	432	
	5	1	37	444	13.78	5.37	6.85	7.55	3.65	2.44	2.67	153	405	565	
		5	37	444	24.06	9.92	12.95	7.55	3.65	2.44	2.67	153	405	565	
	10	2	1	71	355	12.87	4.84	6.43	7.29	3.51	2.34	2.53	38	105	148
			5	71	355	23.01	6.45	9.61	7.29	3.51	2.34	2.53	38	105	148
3		1	58	406	13.59	5.07	6.64	7.35	3.55	2.37	2.57	77	208	293	
		5	58	406	23.73	7.73	10.87	7.35	3.55	2.37	2.57	77	208	293	
4		1	46	414	13.71	5.29	6.83	7.44	3.59	2.40	2.61	115	308	432	
		5	46	414	23.85	8.90	12.00	7.44	3.59	2.40	2.61	115	308	432	
5		1	37	444	14.14	5.50	7.02	7.55	3.65	2.44	2.67	153	405	565	
		5	37	444	24.28	9.99	13.06	7.55	3.65	2.44	2.67	153	405	565	
20		2	1	71	355	13.59	4.93	6.61	7.29	3.51	2.34	2.53	38	105	148
			5	71	355	23.44	6.51	9.71	7.29	3.51	2.34	2.53	38	105	148
	3	1	58	406	14.31	5.22	6.88	7.35	3.55	2.37	2.57	77	208	293	
		5	58	406	24.16	7.82	11.01	7.35	3.55	2.37	2.57	77	208	293	
	4	1	46	414	14.43	5.49	7.12	7.44	3.59	2.40	2.61	115	308	432	
		5	46	414	24.28	9.02	12.17	7.44	3.59	2.40	2.61	115	308	432	
	5	1	37	444	14.86	5.75	7.36	7.55	3.65	2.44	2.67	153	405	565	
		5	37	444	24.71	10.15	13.26	7.55	3.65	2.44	2.67	153	405	565	
	40	2	1	71	355	15.03	5.11	6.97	7.29	3.51	2.34	2.53	38	105	148
			5	71	355	24.30	6.62	9.93	7.29	3.51	2.34	2.53	38	105	148
3		1	58	406	15.75	5.52	7.36	7.35	3.55	2.37	2.57	77	208	293	
		5	58	406	25.02	8.00	11.30	7.35	3.55	2.37	2.57	77	208	293	
4		1	46	414	15.87	5.90	7.71	7.44	3.59	2.40	2.61	115	308	432	
		5	46	414	25.14	9.26	12.52	7.44	3.59	2.40	2.61	115	308	432	
5		1	37	444	16.30	6.26	8.04	7.55	3.65	2.44	2.67	153	405	565	
		5	37	444	25.57	10.45	13.67	7.55	3.65	2.44	2.67	153	405	565	

160 CHARACTER DATA RECORD 80K MEMORY

CW LNG	MRG GRD	NO. CF	H	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	62	310	12.11	5.22	6.75	8.33	4.01	2.68	2.89	33	92	130	
		5	62	310	22.39	6.85	9.96	8.33	4.01	2.68	2.89	33	92	130	
	3	1	51	357	12.77	5.42	6.93	8.40	4.05	2.70	2.93	67	182	257	
		5	51	357	23.06	8.12	11.21	8.40	4.05	2.70	2.93	67	182	257	
	4	1	40	360	12.82	5.62	7.10	8.51	4.11	2.74	2.99	101	270	378	
		5	40	360	23.11	9.28	12.33	8.51	4.11	2.74	2.99	101	270	378	
	5	1	33	363	12.88	5.81	7.26	8.62	4.17	2.78	3.05	134	355	495	
		5	33	363	23.16	10.36	13.37	8.62	4.17	2.78	3.05	134	355	495	
	10	2	1	62	310	12.47	5.26	6.84	8.33	4.01	2.68	2.89	33	92	130
			5	62	310	22.61	6.88	10.02	8.33	4.01	2.68	2.89	33	92	130
3		1	51	357	13.13	5.49	7.05	8.40	4.05	2.70	2.93	67	182	257	
		5	51	357	23.27	8.16	11.28	8.40	4.05	2.70	2.93	67	182	257	
4		1	40	360	13.18	5.72	7.25	8.51	4.11	2.74	2.99	101	270	378	
		5	40	360	23.32	9.34	12.41	8.51	4.11	2.74	2.99	101	270	378	
5		1	33	363	13.24	5.93	7.43	8.62	4.17	2.78	3.05	134	355	495	
		5	33	363	23.37	10.43	13.47	8.62	4.17	2.78	3.05	134	355	495	
20		2	1	62	310	13.19	5.35	7.02	8.33	4.01	2.68	2.89	33	92	130
			5	62	310	23.04	6.93	10.13	8.33	4.01	2.68	2.89	33	92	130
	3	1	51	357	13.85	5.64	7.29	8.40	4.05	2.70	2.93	67	182	257	
		5	51	357	23.70	8.25	11.42	8.40	4.05	2.70	2.93	67	182	257	
	4	1	40	360	13.90	5.93	7.54	8.51	4.11	2.74	2.99	101	270	378	
		5	40	360	23.75	9.46	12.59	8.51	4.11	2.74	2.99	101	270	378	
	5	1	33	363	13.96	6.19	7.78	8.62	4.17	2.78	3.05	134	355	495	
		5	33	363	23.81	10.59	13.68	8.62	4.17	2.78	3.05	134	355	495	
	40	2	1	62	310	14.63	5.54	7.38	8.33	4.01	2.68	2.89	33	92	130
			5	62	310	23.90	7.04	10.34	8.33	4.01	2.68	2.89	33	92	130
3		1	51	357	15.29	5.95	7.77	8.40	4.05	2.70	2.93	67	182	257	
		5	51	357	24.57	8.44	11.71	8.40	4.05	2.70	2.93	67	182	257	
4		1	40	360	15.34	6.33	8.13	8.51	4.11	2.74	2.99	101	270	378	
		5	40	360	24.62	9.71	12.94	8.51	4.11	2.74	2.99	101	270	378	
5		1	33	363	15.40	6.70	8.46	8.62	4.17	2.78	3.05	134	355	495	
		5	33	363	24.67	10.89	14.09	8.62	4.17	2.78	3.05	134	355	495	

180 CHARACTER DATA RECCRC 80K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	55	275	11.85	5.64	7.16	9.37	4.52	3.01	3.26	30	81	115	
		5	55	275	22.13	7.28	10.38	9.37	4.52	3.01	3.26	30	81	115	
	3	1	45	315	12.42	5.85	7.35	9.45	4.56	3.04	3.30	60	162	228	
		5	45	315	22.70	8.55	11.62	9.45	4.56	3.04	3.30	60	162	228	
	4	1	35	315	12.43	6.06	7.52	9.58	4.63	3.09	3.37	89	239	336	
		5	35	315	22.71	9.72	12.74	9.58	4.63	3.09	3.37	89	239	336	
	5	1	29	348	12.90	6.25	7.68	9.70	4.69	3.13	3.43	119	315	440	
		5	29	348	23.18	10.81	13.79	9.70	4.69	3.13	3.43	119	315	440	
	1C	2	1	55	275	12.21	5.69	7.25	9.37	4.52	3.01	3.26	30	81	115
			5	55	275	22.35	7.31	10.43	9.37	4.52	3.01	3.26	30	81	115
3		1	45	315	12.78	5.92	7.47	9.45	4.56	3.04	3.30	60	162	228	
		5	45	315	22.91	8.60	11.69	9.45	4.56	3.04	3.30	60	162	228	
4		1	35	315	12.79	6.16	7.67	9.58	4.63	3.09	3.37	89	239	336	
		5	35	315	22.92	9.78	12.83	9.58	4.63	3.09	3.37	89	239	336	
5		1	29	348	13.26	6.38	7.85	9.70	4.69	3.13	3.43	119	315	440	
		5	29	348	23.40	10.88	13.89	9.70	4.69	3.13	3.43	119	315	440	
2C		2	1	55	275	12.93	5.78	7.43	9.37	4.52	3.01	3.26	30	81	115
			5	55	275	22.78	7.36	10.54	9.37	4.52	3.01	3.26	30	81	115
	3	1	45	315	13.50	6.07	7.70	9.45	4.56	3.04	3.30	60	162	228	
		5	45	315	23.35	8.69	11.84	9.45	4.56	3.04	3.30	60	162	228	
	4	1	35	315	13.51	6.36	7.96	9.58	4.63	3.09	3.37	89	239	336	
		5	35	315	23.36	9.90	13.01	9.58	4.63	3.09	3.37	89	239	336	
	5	1	29	348	13.98	6.63	8.20	9.70	4.69	3.13	3.43	119	315	440	
		5	29	348	23.83	11.04	14.10	9.70	4.69	3.13	3.43	119	315	440	
	4C	2	1	55	275	14.37	5.96	7.79	9.37	4.52	3.01	3.26	30	81	115
			5	55	275	23.64	7.47	10.75	9.37	4.52	3.01	3.26	30	81	115
3		1	45	315	14.94	6.38	8.18	9.45	4.56	3.04	3.30	60	162	228	
		5	45	315	24.21	8.87	12.12	9.45	4.56	3.04	3.30	60	162	228	
4		1	35	315	14.95	6.77	8.54	9.58	4.63	3.09	3.37	89	239	336	
		5	35	315	24.22	10.15	13.36	9.58	4.63	3.09	3.37	89	239	336	
5		1	29	348	15.42	7.14	8.88	9.70	4.69	3.13	3.43	119	315	440	
		5	29	348	24.69	11.34	14.51	9.70	4.69	3.13	3.43	119	315	440	

200 CHARACTER DATA RECCRC 80K MEMORY

CW LNG	MRG CRD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	49	294	12.34	6.07	7.57	10.42	5.02	3.35	3.62	27	73	104	
		5	49	294	22.63	7.71	10.79	10.42	5.02	3.35	3.62	27	73	104	
	3	1	41	287	12.25	6.27	7.76	10.50	5.06	3.38	3.66	54	146	205	
		5	41	287	22.53	8.98	12.03	10.50	5.06	3.38	3.66	54	146	205	
	4	1	32	288	12.28	6.48	7.93	10.64	5.14	3.43	3.74	80	216	302	
		5	32	288	22.56	10.15	13.16	10.64	5.14	3.43	3.74	80	216	302	
	5	1	26	312	12.63	6.69	8.10	10.78	5.22	3.48	3.82	107	284	395	
		5	26	312	22.91	11.25	14.21	10.78	5.22	3.48	3.82	107	284	395	
	1C	2	1	49	294	12.70	6.11	7.66	10.42	5.02	3.35	3.62	27	73	104
			5	49	294	22.84	7.73	10.84	10.42	5.02	3.35	3.62	27	73	104
3		1	41	287	12.61	6.35	7.88	10.50	5.06	3.38	3.66	54	146	205	
		5	41	287	22.75	9.02	12.11	10.50	5.06	3.38	3.66	54	146	205	
4		1	32	288	12.64	6.59	8.08	10.64	5.14	3.43	3.74	80	216	302	
		5	32	288	22.78	10.21	13.25	10.64	5.14	3.43	3.74	80	216	302	
5		1	26	312	12.99	6.82	8.27	10.78	5.22	3.48	3.82	107	284	395	
		5	26	312	23.12	11.33	14.31	10.78	5.22	3.48	3.82	107	284	395	
2C		2	1	49	294	13.42	6.20	7.84	10.42	5.02	3.35	3.62	27	73	104
			5	49	294	23.27	7.79	10.95	10.42	5.02	3.35	3.62	27	73	104
	3	1	41	287	13.33	6.50	8.12	10.50	5.06	3.38	3.66	54	146	205	
		5	41	287	23.18	9.12	12.25	10.50	5.06	3.38	3.66	54	146	205	
	4	1	32	288	13.36	6.79	8.37	10.64	5.14	3.43	3.74	80	216	302	
		5	32	288	23.21	10.34	13.42	10.64	5.14	3.43	3.74	80	216	302	
	5	1	26	312	13.71	7.07	8.61	10.78	5.22	3.48	3.82	107	284	395	
		5	26	312	23.56	11.48	14.52	10.78	5.22	3.48	3.82	107	284	395	
	4C	2	1	49	294	14.86	6.39	8.20	10.42	5.02	3.35	3.62	27	73	104
			5	49	294	24.14	7.90	11.17	10.42	5.02	3.35	3.62	27	73	104
3		1	41	287	14.77	6.80	8.60	10.50	5.06	3.38	3.66	54	146	205	
		5	41	287	24.05	9.30	12.54	10.50	5.06	3.38	3.66	54	146	205	
4		1	32	288	14.80	7.20	8.96	10.64	5.14	3.43	3.74	80	216	302	
		5	32	288	24.07	10.58	13.77	10.64	5.14	3.43	3.74	80	216	302	
5		1	26	312	15.15	7.59	9.30	10.78	5.22	3.48	3.82	107	284	395	
		5	26	312	24.42	11.79	14.93	10.78	5.22	3.48	3.82	107	284	395	

220 CHARACTER DATA RECCRC 80K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	45	270	12.24	6.49	7.99	11.45	5.52	3.68	3.98	24	66	94	
		5	45	270	22.52	8.13	11.20	11.45	5.52	3.68	3.98	24	66	94	
	3	1	37	259	12.09	6.70	8.17	11.55	5.57	3.72	4.03	49	132	186	
		5	37	259	22.37	9.41	12.45	11.55	5.57	3.72	4.03	49	132	186	
	4	1	29	261	12.13	6.92	8.35	11.70	5.65	3.77	4.11	73	196	275	
		5	29	261	22.41	10.59	13.58	11.70	5.65	3.77	4.11	73	196	275	
	5	1	24	288	12.52	7.13	8.52	11.85	5.73	3.82	4.19	97	258	360	
		5	24	288	22.80	11.69	14.63	11.85	5.73	3.82	4.19	97	258	360	
	10C	2	1	45	270	12.60	6.53	8.08	11.45	5.52	3.68	3.98	24	66	94
			5	45	270	22.73	8.16	11.26	11.45	5.52	3.68	3.98	24	66	94
3		1	37	259	12.45	6.78	8.29	11.55	5.57	3.72	4.03	49	132	186	
		5	37	259	22.59	9.46	12.52	11.55	5.57	3.72	4.03	49	132	186	
4		1	29	261	12.49	7.02	8.50	11.70	5.65	3.77	4.11	73	196	275	
		5	29	261	22.63	10.65	13.66	11.70	5.65	3.77	4.11	73	196	275	
5		1	24	288	12.88	7.25	8.69	11.85	5.73	3.82	4.19	97	258	360	
		5	24	288	23.02	11.77	14.73	11.85	5.73	3.82	4.19	97	258	360	
20C		2	1	45	270	13.32	6.63	8.26	11.45	5.52	3.68	3.98	24	66	94
			5	45	270	23.17	8.21	11.36	11.45	5.52	3.68	3.98	24	66	94
	3	1	37	259	13.17	6.93	8.53	11.55	5.57	3.72	4.03	49	132	186	
		5	37	259	23.02	9.55	12.66	11.55	5.57	3.72	4.03	49	132	186	
	4	1	29	261	13.21	7.23	8.79	11.70	5.65	3.77	4.11	73	196	275	
		5	29	261	23.06	10.78	13.84	11.70	5.65	3.77	4.11	73	196	275	
	5	1	24	288	13.60	7.51	9.03	11.85	5.73	3.82	4.19	97	258	360	
		5	24	288	23.45	11.92	14.93	11.85	5.73	3.82	4.19	97	258	360	
	40C	2	1	45	270	14.76	6.81	8.62	11.45	5.52	3.68	3.98	24	66	94
			5	45	270	24.03	8.32	11.58	11.45	5.52	3.68	3.98	24	66	94
3		1	37	259	14.61	7.23	9.01	11.55	5.57	3.72	4.03	49	132	186	
		5	37	259	23.89	9.73	12.95	11.55	5.57	3.72	4.03	49	132	186	
4		1	29	261	14.65	7.64	9.38	11.70	5.65	3.77	4.11	73	196	275	
		5	29	261	23.93	11.02	14.19	11.70	5.65	3.77	4.11	73	196	275	
5		1	24	288	15.04	8.02	9.72	11.85	5.73	3.82	4.19	97	258	360	
		5	24	288	24.32	12.23	15.34	11.85	5.73	3.82	4.19	97	258	360	

240 CHARACTER DATA RECORD 80K MEMORY

CW LNG	MRG CRD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	41	246	11.70	6.91	8.40	12.50	6.02	4.02	4.34	22	61	86	
		5	41	246	20.70	8.56	11.61	12.50	6.02	4.02	4.34	22	61	86	
	3	1	34	238	11.60	7.13	8.59	12.60	6.08	4.05	4.40	45	121	171	
		5	34	238	20.60	9.84	12.86	12.60	6.08	4.05	4.40	45	121	171	
	4	1	26	260	12.35	7.36	8.77	12.78	6.18	4.12	4.50	67	179	251	
		5	26	260	22.63	11.04	13.99	12.78	6.18	4.12	4.50	67	179	251	
	5	1	22	264	12.42	7.56	8.94	12.92	6.25	4.17	4.57	89	237	330	
		5	22	264	22.70	12.14	15.04	12.92	6.25	4.17	4.57	89	237	330	
	10C	2	1	41	246	12.02	6.96	8.49	12.50	6.02	4.02	4.34	22	61	86
			5	41	246	20.89	8.59	11.67	12.50	6.02	4.02	4.34	22	61	86
3		1	34	238	11.91	7.20	8.71	12.60	6.08	4.05	4.40	45	121	171	
		5	34	238	20.78	9.89	12.93	12.60	6.08	4.05	4.40	45	121	171	
4		1	26	260	12.71	7.46	8.92	12.78	6.18	4.12	4.50	67	179	251	
		5	26	260	22.85	11.10	14.08	12.78	6.18	4.12	4.50	67	179	251	
5		1	22	264	12.78	7.69	9.11	12.92	6.25	4.17	4.57	89	237	330	
		5	22	264	22.92	12.21	15.15	12.92	6.25	4.17	4.57	89	237	330	
20C		2	1	41	246	12.65	7.05	8.67	12.50	6.02	4.02	4.34	22	61	86
			5	41	246	21.27	8.64	11.78	12.50	6.02	4.02	4.34	22	61	86
	3	1	34	238	12.54	7.35	8.95	12.60	6.08	4.05	4.40	45	121	171	
		5	34	238	21.16	9.98	13.08	12.60	6.08	4.05	4.40	45	121	171	
	4	1	26	260	13.43	7.67	9.21	12.78	6.18	4.12	4.50	67	179	251	
		5	26	260	23.28	11.22	14.26	12.78	6.18	4.12	4.50	67	179	251	
	5	1	22	264	13.50	7.95	9.45	12.92	6.25	4.17	4.57	89	237	330	
		5	22	264	23.35	12.37	15.35	12.92	6.25	4.17	4.57	89	237	330	
	40C	2	1	41	246	13.91	7.23	9.03	12.50	6.02	4.02	4.34	22	61	86
			5	41	246	22.02	8.75	11.99	12.50	6.02	4.02	4.34	22	61	86
3		1	34	238	13.80	7.66	9.42	12.60	6.08	4.05	4.40	45	121	171	
		5	34	238	21.92	10.16	13.37	12.60	6.08	4.05	4.40	45	121	171	
4		1	26	260	14.87	8.08	9.79	12.78	6.18	4.12	4.50	67	179	251	
		5	26	260	24.14	11.47	14.61	12.78	6.18	4.12	4.50	67	179	251	
5		1	22	264	14.94	8.46	10.13	12.92	6.25	4.17	4.57	89	237	330	
		5	22	264	24.21	12.68	15.76	12.92	6.25	4.17	4.57	89	237	330	

26C CHARACTER DATA RECORD 80K MEMORY

CW LNC	MRG ORC	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS				
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI		
5	2	1	38	228	11.68	7.33	8.81	13.54	6.52	4.35	4.70	20	56	80		
		5	38	228	20.68	8.98	12.03	13.54	6.52	4.35	4.70	20	56	80		
		3	1	31	217	11.54	7.56	9.00	13.66	6.59	4.40	4.77	41	112	158	
	3	5	31	217	20.53	10.28	13.28	13.66	6.59	4.40	4.77	41	112	158		
		4	1	24	240	11.87	7.79	9.19	13.85	6.69	4.46	4.87	62	165	232	
		5	24	240	20.87	11.48	14.41	13.85	6.69	4.46	4.87	62	165	232		
	5	1	20	240	11.89	8.01	9.36	14.02	6.78	4.52	4.96	82	218	304		
		5	20	240	20.88	12.59	15.47	14.02	6.78	4.52	4.96	82	218	304		
		10	2	1	38	228	11.99	7.38	8.90	13.54	6.52	4.35	4.70	20	56	80
	5			38	228	20.86	9.01	12.08	13.54	6.52	4.35	4.70	20	56	80	
	3			1	31	217	11.85	7.63	9.12	13.66	6.59	4.40	4.77	41	112	158
	3		5	31	217	20.72	10.32	13.35	13.66	6.59	4.40	4.77	41	112	158	
			4	1	24	240	12.19	7.90	9.33	13.85	6.69	4.46	4.87	62	165	232
			5	24	240	21.06	11.54	14.50	13.85	6.69	4.46	4.87	62	165	232	
	5		1	20	240	12.20	8.14	9.53	14.02	6.78	4.52	4.96	82	218	304	
5			20	240	21.07	12.67	15.57	14.02	6.78	4.52	4.96	82	218	304		
20			2	1	38	228	12.62	7.47	9.08	13.54	6.52	4.35	4.70	20	56	80
	5			38	228	21.24	9.07	12.19	13.54	6.52	4.35	4.70	20	56	80	
	3			1	31	217	12.48	7.79	9.36	13.66	6.59	4.40	4.77	41	112	158
	3		5	31	217	21.10	10.41	13.49	13.66	6.59	4.40	4.77	41	112	158	
			4	1	24	240	12.82	8.10	9.63	13.85	6.69	4.46	4.87	62	165	232
			5	24	240	21.44	11.66	14.67	13.85	6.69	4.46	4.87	62	165	232	
	5		1	20	240	12.83	8.40	9.87	14.02	6.78	4.52	4.96	82	218	304	
		5	20	240	21.45	12.82	15.77	14.02	6.78	4.52	4.96	82	218	304		
		40	2	1	38	228	13.88	7.66	9.44	13.54	6.52	4.35	4.70	20	56	80
	5			38	228	22.00	9.18	12.40	13.54	6.52	4.35	4.70	20	56	80	
	3			1	31	217	13.74	8.09	9.84	13.66	6.59	4.40	4.77	41	112	158
	3		5	31	217	21.86	10.60	13.78	13.66	6.59	4.40	4.77	41	112	158	
			4	1	24	240	14.08	8.52	10.21	13.85	6.69	4.46	4.87	62	165	232
			5	24	240	22.19	11.91	15.03	13.85	6.69	4.46	4.87	62	165	232	
	5		1	20	240	14.09	8.51	10.56	14.02	6.78	4.52	4.96	82	218	304	
5			20	240	22.21	13.13	16.18	14.02	6.78	4.52	4.96	82	218	304		

28C CHARACTER DATA RECORD 80K MEMORY

CW LNC	MRG ORC	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS				
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI		
5	2	1	35	210	11.66	7.76	9.22	14.58	7.03	4.69	5.07	19	52	74		
		5	35	210	20.65	9.41	12.44	14.58	7.03	4.69	5.07	19	52	74		
		3	1	29	203	11.57	7.98	9.41	14.70	7.09	4.73	5.13	38	104	146	
	3	5	29	203	20.57	10.71	13.69	14.70	7.09	4.73	5.13	38	104	146		
		4	1	23	207	11.64	8.22	9.60	14.88	7.19	4.80	5.23	57	154	216	
		5	23	207	20.64	11.90	14.82	14.88	7.19	4.80	5.23	57	154	216		
	5	1	18	216	11.79	8.47	9.78	15.13	7.32	4.89	5.36	76	202	281		
		5	18	216	20.78	13.06	15.89	15.13	7.32	4.89	5.36	76	202	281		
		10	2	1	35	210	11.97	7.81	9.31	14.58	7.03	4.69	5.07	19	52	74
	5			35	210	20.84	9.44	12.49	14.58	7.03	4.69	5.07	19	52	74	
	3			1	29	203	11.89	8.06	9.53	14.70	7.09	4.73	5.13	38	104	146
	3		5	29	203	20.76	10.75	13.76	14.70	7.09	4.73	5.13	38	104	146	
			4	1	23	207	11.96	8.32	9.74	14.88	7.19	4.80	5.23	57	154	216
			5	23	207	20.83	11.96	14.91	14.88	7.19	4.80	5.23	57	154	216	
	5		1	18	216	12.10	8.59	9.95	15.13	7.32	4.89	5.36	76	202	281	
5			18	216	20.97	13.13	15.99	15.13	7.32	4.89	5.36	76	202	281		
20			2	1	35	210	12.60	7.90	9.49	14.58	7.03	4.69	5.07	19	52	74
	5			35	210	21.22	9.50	12.60	14.58	7.03	4.69	5.07	19	52	74	
	3			1	29	203	12.52	8.21	9.77	14.70	7.09	4.73	5.13	38	104	146
	3		5	29	203	21.13	10.84	13.91	14.70	7.09	4.73	5.13	38	104	146	
			4	1	23	207	12.59	8.53	10.04	14.88	7.19	4.80	5.23	57	154	216
			5	23	207	21.21	12.09	15.09	14.88	7.19	4.80	5.23	57	154	216	
	5		1	18	216	12.73	8.85	10.30	15.13	7.32	4.89	5.36	76	202	281	
		5	18	216	21.35	13.29	16.20	15.13	7.32	4.89	5.36	76	202	281		
		40	2	1	35	210	13.86	8.08	9.85	14.58	7.03	4.69	5.07	19	52	74
	5			35	210	21.98	9.61	12.82	14.58	7.03	4.69	5.07	19	52	74	
	3			1	29	203	13.78	8.52	10.25	14.70	7.09	4.73	5.13	38	104	146
	3		5	29	203	21.89	11.03	14.19	14.70	7.09	4.73	5.13	38	104	146	
			4	1	23	207	13.85	8.94	10.62	14.88	7.19	4.80	5.23	57	154	216
			5	23	207	21.96	12.34	15.44	14.88	7.19	4.80	5.23	57	154	216	
	5		1	18	216	13.99	9.37	10.98	15.13	7.32	4.89	5.36	76	202	281	
5			18	216	22.11	13.60	16.61	15.13	7.32	4.89	5.36	76	202	281		

## 3CC CHARACTER DATA RECORD 80K MEMORY

CW LNG	MRG ORD	NO. CF	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS						
			B	G	PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI		
5	2	1	33	198	11.72	8.18	9.64	15.62	7.53	5.02	5.43	18	49	69		
		5	33	198	20.72	9.84	12.85	15.62	7.53	5.02	5.43	18	49	69		
		3	1	27	189	11.61	8.41	9.83	15.75	7.60	5.07	5.50	36	97	137	
	5	27	5	27	189	20.60	11.14	14.10	15.75	7.60	5.07	5.50	36	97	137	
			4	1	21	210	11.92	8.66	10.02	15.97	7.71	5.15	5.61	53	143	201
			5	21	210	20.91	12.35	15.24	15.97	7.71	5.15	5.61	53	143	201	
	5	1	17	204	11.85	8.90	10.20	16.20	7.84	5.23	5.74	71	189	263		
			5	17	204	20.85	13.50	16.31	16.20	7.84	5.23	5.74	71	189	263	
			10C	2	1	33	198	12.03	8.23	9.73	15.62	7.53	5.02	5.43	18	49
	5	33	198	20.91	9.86	12.90	15.62	7.53	5.02	5.43	18	49	69			
			3	1	27	189	11.92	8.49	9.95	15.75	7.60	5.07	5.50	36	97	137
			5	27	189	20.79	11.18	14.18	15.75	7.60	5.07	5.50	36	97	137	
	4	1	21	210	12.23	8.76	10.16	15.97	7.71	5.15	5.61	53	143	201		
			5	21	210	21.10	12.41	15.33	15.97	7.71	5.15	5.61	53	143	201	
			5	17	204	12.17	9.03	10.37	16.20	7.84	5.23	5.74	71	189	263	
5	17	204	21.04	13.57	16.41	16.20	7.84	5.23	5.74	71	189	263				
		20C	2	1	33	198	12.66	8.32	9.91	15.62	7.53	5.02	5.43	18	49	69
		5	33	198	21.28	9.92	13.01	15.62	7.53	5.02	5.43	18	49	69		
3	1	27	189	12.55	8.64	10.19	15.75	7.60	5.07	5.50	36	97	137			
		5	27	189	21.17	11.28	14.32	15.75	7.60	5.07	5.50	36	97	137		
		4	1	21	210	12.86	8.97	10.46	15.97	7.71	5.15	5.61	53	143	201	
5	21	210	21.48	12.54	15.51	15.97	7.71	5.15	5.61	53	143	201				
		5	17	204	12.80	9.29	10.71	16.20	7.84	5.23	5.74	71	189	263		
		5	17	204	21.42	13.73	16.62	16.20	7.84	5.23	5.74	71	189	263		
40C	2	1	33	198	13.92	8.51	10.27	15.62	7.53	5.02	5.43	18	49	69		
		5	33	198	22.04	10.03	13.23	15.62	7.53	5.02	5.43	18	49	69		
		3	1	27	189	13.81	8.95	10.67	15.75	7.60	5.07	5.50	36	97	137	
	5	27	189	21.93	11.46	14.61	15.75	7.60	5.07	5.50	36	97	137			
			4	1	21	210	14.12	9.38	11.04	15.97	7.71	5.15	5.61	53	143	201
			5	21	210	22.24	12.79	15.86	15.97	7.71	5.15	5.61	53	143	201	
	5	1	17	204	14.06	9.80	11.40	16.20	7.84	5.23	5.74	71	189	263		
			5	17	204	22.17	14.04	17.03	16.20	7.84	5.23	5.74	71	189	263	

## 4CC CHARACTER DATA RECORD 80K MEMORY

CW LNG	MRG CRD	NO. CF	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS						
			B	G	PH1	PH2	PH3	733C	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI		
5	2	1	24	144	12.12	10.31	11.70	20.85	10.05	6.70	7.25	13	36	51		
		5	24	144	21.12	11.98	14.92	20.85	10.05	6.70	7.25	13	36	51		
		3	1	20	140	12.08	10.55	11.90	21.02	10.14	6.76	7.34	27	72	102	
	5	20	140	21.08	13.30	16.18	21.02	10.14	6.76	7.34	27	72	102			
			4	1	16	144	12.16	10.82	12.10	21.27	10.27	6.86	7.47	40	108	151
			5	16	144	21.15	14.53	17.32	21.27	10.27	6.86	7.47	40	108	151	
	5	1	13	156	12.35	11.09	12.29	21.57	10.43	6.96	7.63	53	142	197		
			5	13	156	21.34	15.71	18.40	21.57	10.43	6.96	7.63	53	142	197	
			10C	2	1	24	144	12.44	10.36	11.79	20.85	10.05	6.70	7.25	13	36
	5	24	144	21.31	12.01	14.97	20.85	10.05	6.70	7.25	13	36	51			
			3	1	20	140	12.40	10.63	12.02	21.02	10.14	6.76	7.34	27	72	102
			5	20	140	21.27	13.35	16.25	21.02	10.14	6.76	7.34	27	72	102	
	4	1	16	144	12.47	10.92	12.24	21.27	10.27	6.86	7.47	40	108	151		
			5	16	144	21.34	14.60	17.41	21.27	10.27	6.86	7.47	40	108	151	
			5	13	156	12.66	11.22	12.46	21.57	10.43	6.96	7.63	53	142	197	
5	13	156	21.53	15.79	18.50	21.57	10.43	6.96	7.63	53	142	197				
		20C	2	1	24	144	13.07	10.45	11.97	20.85	10.05	6.70	7.25	13	36	51
		5	24	144	21.68	12.07	15.08	20.85	10.05	6.70	7.25	13	36	51		
3	1	20	140	13.03	10.78	12.26	21.02	10.14	6.76	7.34	27	72	102			
		5	20	140	21.64	13.44	16.39	21.02	10.14	6.76	7.34	27	72	102		
		4	1	16	144	13.10	11.13	12.54	21.27	10.27	6.86	7.47	40	108	151	
5	16	144	21.72	14.72	17.58	21.27	10.27	6.86	7.47	40	108	151				
		5	13	156	13.29	11.48	12.80	21.57	10.43	6.96	7.63	53	142	197		
		5	13	156	21.91	15.95	18.71	21.57	10.43	6.96	7.63	53	142	197		
40C	2	1	24	144	14.33	10.64	12.33	20.85	10.05	6.70	7.25	13	36	51		
		5	24	144	22.44	12.18	15.29	20.85	10.05	6.70	7.25	13	36	51		
		3	1	20	140	14.29	11.09	12.74	21.02	10.14	6.76	7.34	27	72	102	
	5	20	140	22.40	13.62	16.68	21.02	10.14	6.76	7.34	27	72	102			
			4	1	16	144	14.36	11.55	13.12	21.27	10.27	6.86	7.47	40	108	151
			5	16	144	22.48	14.97	17.94	21.27	10.27	6.86	7.47	40	108	151	
	5	1	13	156	14.55	12.00	13.49	21.57	10.43	6.96	7.63	53	142	197		
			5	13	156	22.67	16.26	19.12	21.57	10.43	6.96	7.63	53	142	197	

500 CHARACTER DATA RECCRC 80K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	19	114	12.42	12.43	13.77	26.07	12.57	8.38	9.07	10	29	41	
		5	19	114	20.14	14.12	16.98	26.07	12.57	8.38	9.07	10	29	41	
	3	1	16	112	12.41	12.69	13.97	26.27	12.67	8.46	9.17	21	58	82	
		5	16	112	20.13	15.46	18.25	26.27	12.67	8.46	9.17	21	58	82	
	4	1	12	12C	12.56	13.03	14.20	26.70	12.90	8.61	9.40	32	86	120	
		5	12	12C	20.27	16.78	19.42	26.70	12.90	8.61	9.40	32	86	120	
	5	1	1C	13C	13.16	13.32	14.40	27.03	13.08	8.73	9.58	42	113	157	
		5	1C	13C	22.15	17.98	20.51	27.03	13.08	8.73	9.58	42	113	157	
	1C	2	1	19	114	12.69	12.48	13.86	26.07	12.57	8.38	9.07	10	29	41
			5	19	114	20.30	14.15	17.03	26.07	12.57	8.38	9.07	10	29	41
3		1	16	112	12.68	12.77	14.09	26.27	12.67	8.46	9.17	21	58	82	
		5	16	112	20.29	15.51	18.32	26.27	12.67	8.46	9.17	21	58	82	
4		1	12	12C	12.83	13.14	14.34	26.70	12.90	8.61	9.40	32	86	120	
		5	12	12C	20.43	16.84	19.51	26.70	12.90	8.61	9.40	32	86	120	
5		1	1C	13C	13.47	13.45	14.57	27.03	13.08	8.73	9.58	42	113	157	
		5	1C	13C	22.34	18.06	20.61	27.03	13.08	8.73	9.58	42	113	157	
2C		2	1	19	114	13.23	12.57	14.04	26.07	12.57	8.38	9.07	10	29	41
			5	19	114	20.62	14.21	17.14	26.07	12.57	8.38	9.07	10	29	41
	3	1	16	112	13.22	12.92	14.33	26.27	12.67	8.46	9.17	21	58	82	
		5	16	112	20.61	15.60	18.46	26.27	12.67	8.46	9.17	21	58	82	
	4	1	12	12C	13.37	13.35	14.64	26.70	12.90	8.61	9.40	32	86	120	
		5	12	12C	20.76	16.97	19.68	26.70	12.90	8.61	9.40	32	86	120	
	5	1	1C	13C	14.10	13.71	14.91	27.03	13.08	8.73	9.58	42	113	157	
		5	1C	13C	22.72	18.22	20.81	27.03	13.08	8.73	9.58	42	113	157	
	4C	2	1	19	114	14.31	12.76	14.40	26.07	12.57	8.38	9.07	10	29	41
			5	19	114	21.27	14.32	17.36	26.07	12.57	8.38	9.07	10	29	41
3		1	16	112	14.30	13.23	14.81	26.27	12.67	8.46	9.17	21	58	82	
		5	16	112	21.26	15.79	18.75	26.27	12.67	8.46	9.17	21	58	82	
4		1	12	12C	14.45	13.77	15.22	26.70	12.90	8.61	9.40	32	86	120	
		5	12	12C	21.40	17.22	20.04	26.70	12.90	8.61	9.40	32	86	120	
5		1	1C	13C	15.36	14.24	15.60	27.03	13.08	8.73	9.58	42	113	157	
		5	1C	13C	23.47	18.53	21.22	27.03	13.08	8.73	9.58	42	113	157	

750 CHARACTER DATA RECCRC 80K MEMORY

CW LNG	MRG CRD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	13	78	14.80	17.71	18.92	39.07	18.83	12.56	13.58	7	19	27	
		5	13	78	22.51	19.45	22.13	39.07	18.83	12.56	13.58	7	19	27	
	3	1	1C	8C	14.87	18.09	19.17	39.53	19.08	12.73	13.83	14	38	54	
		5	1C	8C	22.58	20.92	23.44	39.53	19.08	12.73	13.83	14	38	54	
	4	1	8	8C	14.91	18.47	19.41	40.04	19.35	12.91	14.10	21	57	80	
		5	8	8C	22.62	22.29	24.63	40.04	19.35	12.91	14.10	21	57	80	
	5	1	7	84	14.99	18.77	19.61	40.41	19.54	13.04	14.29	28	75	105	
		5	7	84	22.71	23.50	25.72	40.41	19.54	13.04	14.29	28	75	105	
	1C	2	1	13	78	15.07	17.76	19.01	39.07	18.83	12.56	13.58	7	19	27
			5	13	78	22.68	19.47	22.18	39.07	18.83	12.56	13.58	7	19	27
3		1	1C	8C	15.14	18.17	19.29	39.53	19.08	12.73	13.83	14	38	54	
		5	1C	8C	27.74	20.97	23.52	39.53	19.08	12.73	13.83	14	38	54	
4		1	8	8C	15.18	18.58	19.56	40.04	19.35	12.91	14.10	21	57	80	
		5	8	8C	22.78	22.35	24.72	40.04	19.35	12.91	14.10	21	57	80	
5		1	7	84	15.26	18.91	19.79	40.41	19.54	13.04	14.29	28	75	105	
		5	7	84	22.87	23.58	25.83	40.41	19.54	13.04	14.29	28	75	105	
2C		2	1	13	78	15.61	17.86	19.19	39.07	18.83	12.56	13.58	7	19	27
			5	13	78	23.00	19.53	22.29	39.07	18.83	12.56	13.58	7	19	27
	3	1	1C	8C	15.68	18.33	19.53	39.53	19.08	12.73	13.83	14	38	54	
		5	1C	8C	23.07	21.06	23.66	39.53	19.08	12.73	13.83	14	38	54	
	4	1	8	8C	15.72	18.79	19.85	40.04	19.35	12.91	14.10	21	57	80	
		5	8	8C	23.11	22.48	24.90	40.04	19.35	12.91	14.10	21	57	80	
	5	1	7	84	15.80	19.17	20.13	40.41	19.54	13.04	14.29	28	75	105	
		5	7	84	23.19	23.74	26.03	40.41	19.54	13.04	14.29	28	75	105	
	4C	2	1	13	78	16.69	18.05	19.55	39.07	18.83	12.56	13.58	7	19	27
			5	13	78	23.65	19.65	22.51	39.07	18.83	12.56	13.58	7	19	27
3		1	1C	8C	16.76	18.65	20.01	39.53	19.08	12.73	13.83	14	38	54	
		5	1C	8C	23.71	21.25	23.95	39.53	19.08	12.73	13.83	14	38	54	
4		1	8	8C	16.80	19.22	20.43	40.04	19.35	12.91	14.10	21	57	80	
		5	8	8C	23.76	22.74	25.25	40.04	19.35	12.91	14.10	21	57	80	
5		1	7	84	16.88	19.70	20.81	40.41	19.54	13.04	14.29	28	75	105	
		5	7	84	23.84	24.06	26.44	40.41	19.54	13.04	14.29	28	75	105	



1000 CHARACTER DATA RECCRD 80K MEMORY

CW LNG	MRC ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS		
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI
5	2	1	9	54	16.94	23.09	24.10	52.26	25.20	16.81	18.20	5	14	20
		5	9	54	23.37	24.87	27.32	52.26	25.20	16.81	18.20	5	14	20
	3	1	8	56	16.99	23.38	24.32	52.54	25.35	16.91	18.35	10	29	41
		5	8	56	23.41	26.25	28.60	52.54	25.35	16.91	18.35	10	29	41
	4	1	6	60	17.11	23.91	24.62	53.39	25.80	17.22	18.80	16	43	60
5		6	60	23.53	27.79	29.85	53.39	25.80	17.22	18.80	16	43	60	
5	1	5	65	17.66	24.35	24.88	54.07	26.16	17.46	19.16	21	56	78	
	5	5	65	25.38	29.17	30.99	54.07	26.16	17.46	19.16	21	56	78	
1C	2	1	9	54	17.16	23.14	24.19	52.26	25.20	16.81	18.20	5	14	20
		5	9	54	23.50	24.90	27.37	52.26	25.20	16.81	18.20	5	14	20
	3	1	8	56	17.21	23.46	24.44	52.54	25.35	16.91	18.35	10	29	41
		5	8	56	23.55	26.30	28.67	52.54	25.35	16.91	18.35	10	29	41
	4	1	6	60	17.33	24.02	24.77	53.39	25.80	17.22	18.80	16	43	60
5		6	60	23.67	27.86	29.93	53.39	25.80	17.22	18.80	16	43	60	
5	1	5	65	17.93	24.49	25.05	54.07	26.16	17.46	19.16	21	56	78	
	5	5	65	25.54	29.26	31.09	54.07	26.16	17.46	19.16	21	56	78	
2C	2	1	9	54	17.61	23.24	24.37	52.26	25.20	16.81	18.20	5	14	20
		5	9	54	23.77	24.96	27.48	52.26	25.20	16.81	18.20	5	14	20
	3	1	8	56	17.66	23.62	24.68	52.54	25.35	16.91	18.35	10	29	41
		5	8	56	23.82	26.40	28.81	52.54	25.35	16.91	18.35	10	29	41
	4	1	6	60	17.78	24.24	25.06	53.39	25.80	17.22	18.80	16	43	60
5		6	60	23.94	27.99	30.11	53.39	25.80	17.22	18.80	16	43	60	
5	1	5	65	18.47	24.76	25.40	54.07	26.16	17.46	19.16	21	56	78	
	5	5	65	25.86	29.42	31.30	54.07	26.16	17.46	19.16	21	56	78	
4C	2	1	9	54	18.51	23.44	24.73	52.26	25.20	16.81	18.20	5	14	20
		5	9	54	24.31	25.08	27.69	52.26	25.20	16.81	18.20	5	14	20
	3	1	8	56	18.56	23.94	25.16	52.54	25.35	16.91	18.35	10	29	41
		5	8	56	24.36	26.59	29.10	52.54	25.35	16.91	18.35	10	29	41
	4	1	6	60	18.68	24.67	25.65	53.39	25.80	17.22	18.80	16	43	60
5		6	60	24.48	28.25	30.46	53.39	25.80	17.22	18.80	16	43	60	
5	1	5	65	19.55	25.30	26.08	54.07	26.16	17.46	19.16	21	56	78	
	5	5	65	26.51	29.74	31.71	54.07	26.16	17.46	19.16	21	56	78	

1500 CHARACTER DATA RECCRD 80K MEMORY

CW LNG	MRC CRD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS		
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI
5	2	1	6	36	22.47	33.71	34.43	78.39	37.80	25.22	27.30	3	9	13
		5	6	36	28.90	35.59	37.64	78.39	37.80	25.22	27.30	3	9	13
	3	1	5	40	22.57	34.18	34.72	79.07	38.16	25.46	27.66	7	19	27
		5	5	40	28.99	37.17	38.99	79.07	38.16	25.46	27.66	7	19	27
	4	1	4	40	22.65	34.75	35.05	80.09	38.70	25.82	28.20	10	28	40
5		4	40	29.08	38.81	40.27	80.09	38.70	25.82	28.20	10	28	40	
5	1	3	42	22.82	35.68	35.49	81.78	39.60	26.43	29.10	14	37	51	
	5	3	42	29.24	40.72	41.60	81.78	39.60	26.43	29.10	14	37	51	
1C	2	1	6	36	22.69	33.77	34.52	78.39	37.80	25.22	27.30	3	9	13
		5	6	36	29.03	35.62	37.70	78.39	37.80	25.22	27.30	3	9	13
	3	1	5	40	22.79	34.27	34.84	79.07	38.16	25.46	27.66	7	19	27
		5	5	40	29.13	37.22	39.06	79.07	38.16	25.46	27.66	7	19	27
	4	1	4	40	22.88	34.90	35.19	80.09	38.70	25.82	28.20	10	28	40
5		4	40	29.21	38.87	40.36	80.09	38.70	25.82	28.20	10	28	40	
5	1	3	42	23.04	35.82	35.66	81.78	39.60	26.43	29.10	14	37	51	
	5	3	42	29.38	40.80	41.70	81.78	39.60	26.43	29.10	14	37	51	
2C	2	1	6	36	23.14	33.87	34.70	78.39	37.80	25.22	27.30	3	9	13
		5	6	36	29.30	35.68	37.80	78.39	37.80	25.22	27.30	3	9	13
	3	1	5	40	23.24	34.44	35.07	79.07	38.16	25.46	27.66	7	19	27
		5	5	40	29.40	37.33	39.21	79.07	38.16	25.46	27.66	7	19	27
	4	1	4	40	23.33	35.13	35.49	80.09	38.70	25.82	28.20	10	28	40
5		4	40	29.48	39.01	40.53	80.09	38.70	25.82	28.20	10	28	40	
5	1	3	42	23.49	36.11	36.00	81.78	39.60	26.43	29.10	14	37	51	
	5	3	42	29.65	40.97	41.90	81.78	39.60	26.43	29.10	14	37	51	
4C	2	1	6	36	24.04	34.08	35.06	78.39	37.80	25.22	27.30	3	9	13
		5	6	36	29.84	35.81	38.02	78.39	37.80	25.22	27.30	3	9	13
	3	1	5	40	24.14	34.77	35.55	79.07	38.16	25.46	27.66	7	19	27
		5	5	40	29.94	37.53	39.49	79.07	38.16	25.46	27.66	7	19	27
	4	1	4	40	24.23	35.58	36.07	80.09	38.70	25.82	28.20	10	28	40
5		4	40	30.02	39.28	40.89	80.09	38.70	25.82	28.20	10	28	40	
5	1	3	42	24.39	36.67	36.69	81.78	39.60	26.43	29.10	14	37	51	
	5	3	42	30.19	41.31	42.31	81.78	39.60	26.43	29.10	14	37	51	

2000 CHARACTER DATA RECORD 80K MEMORY

CW LNG	MRG ORD	NO. CF	B	G	PROCESS TIME MILLISECONDS/RECORD			TAPE TIME MILLISECONDS/RECORD				MAXIMUM NUMBER OF RECORDS IN THOUSANDS			
					PH1	PH2	PH3	7330	729 II	729 IV	729 V	200 CPI	556 CPI	800 CPI	
5	2	1	4	28	27.73	44.59	44.85	105.09	50.70	33.82	36.70	2	7	10	
		5	4	28	32.87	46.60	48.07	105.09	50.70	33.82	36.70	2	7	10	
	3	1	4	28	27.73	44.76	45.02	105.09	50.70	33.82	36.70	5	14	20	
		5	4	28	32.87	47.83	49.30	105.09	50.70	33.82	36.70	5	14	20	
	4	1	3	30	27.89	45.67	45.47	106.78	51.60	34.43	37.60	8	21	30	
		5	3	30	33.03	49.82	50.70	106.78	51.60	34.43	37.60	8	21	30	
	5	1	2	32	28.19	47.32	46.21	110.17	53.40	35.65	39.40	10	27	38	
		5	2	32	33.33	52.62	52.32	110.17	53.40	35.65	39.40	10	27	38	
	10	2	1	4	28	27.91	44.65	44.94	105.09	50.70	33.82	36.70	2	7	10
			5	4	28	32.98	46.64	48.12	105.09	50.70	33.82	36.70	2	7	10
3		1	4	28	27.91	44.85	45.14	105.09	50.70	33.82	36.70	5	14	20	
		5	4	28	32.98	47.88	49.37	105.09	50.70	33.82	36.70	5	14	20	
4		1	3	30	28.07	45.78	45.62	106.78	51.60	34.43	37.60	8	21	30	
		5	3	30	33.14	49.89	50.78	106.78	51.60	34.43	37.60	8	21	30	
5		1	2	32	28.37	47.46	46.38	110.17	53.40	35.65	39.40	10	27	38	
		5	2	32	33.44	52.71	52.42	110.17	53.40	35.65	39.40	10	27	38	
20		2	1	4	28	28.27	44.76	45.12	105.09	50.70	33.82	36.70	2	7	10
			5	4	28	33.20	46.70	48.23	105.09	50.70	33.82	36.70	2	7	10
	3	1	4	28	28.27	45.02	45.38	105.09	50.70	33.82	36.70	5	14	20	
		5	4	28	33.20	47.99	49.51	105.09	50.70	33.82	36.70	5	14	20	
	4	1	3	30	28.43	46.02	45.91	106.78	51.60	34.43	37.60	8	21	30	
		5	3	30	33.35	50.03	50.96	106.78	51.60	34.43	37.60	8	21	30	
	5	1	2	32	28.73	47.76	46.73	110.17	53.40	35.65	39.40	10	27	38	
		5	2	32	33.66	52.89	52.63	110.17	53.40	35.65	39.40	10	27	38	
	40	2	1	4	28	28.99	44.99	45.48	105.09	50.70	33.82	36.70	2	7	10
			5	4	28	33.63	46.84	48.44	105.09	50.70	33.82	36.70	2	7	10
3		1	4	28	28.99	45.36	45.86	105.09	50.70	33.82	36.70	5	14	20	
		5	4	28	33.63	48.19	49.80	105.09	50.70	33.82	36.70	5	14	20	
4		1	3	30	29.15	46.48	46.50	106.78	51.60	34.43	37.60	8	21	30	
		5	3	30	33.79	50.31	51.31	106.78	51.60	34.43	37.60	8	21	30	
5		1	2	32	29.45	48.36	47.41	110.17	53.40	35.65	39.40	10	27	38	
		5	2	32	34.09	53.24	53.04	110.17	53.40	35.65	39.40	10	27	38	

OPERATING PROCEDURES

The Program Deck

The Sort/Merge 12 program deck consists of:

1. The Assignment Phase
2. Phase 1 (the internal sort): 9 blocks
3. Phase 2 (the internal merge passes): 18 blocks
4. Phase 3 (the output merge pass)

A block is defined as a portion of the program deck ending with an execute card.

Figure 28 shows the proper order of the program deck and the control card packages required by the program.

Tape Requirements

The tape units that must be available for a particular application are those specified in control card 1, columns 2-6, 11-15 and 68-72.

Program Loading

The Sort/Merge 12 program deck, as distributed, is designed primarily for loading from the card reader; however, the deck may also be adapted to loading from tape.

From the Card Reader

1. Clear storage
2. DISPLAY: 00247
3. ALTER:  $L\%1100257R.V.$
4. ADDRESS SET: to location 00247
5. START

From Tape

To read in the program from the systems tape, the X control fields of the read instructions contained in the first and third cards of the five-card load program must be modified. The X control fields are contained in columns 11-13 and 45-47 of the first card, and in columns 48-50 of the third card. The original contents of each of these sets of three columns are %11 (the read is to be from the channel 1 card reader). Each field must be changed to %B0 to indicate that the read is to be from tape unit 0 on channel 1. (Unit 0 on channel 1 must be used, or the tape reread routine will not work.)

1. Clear storage
2. DISPLAY: 00247
3. ALTER:  $L\%B000257R.V.$
4. ADDRESS SET: to location 00247
5. START

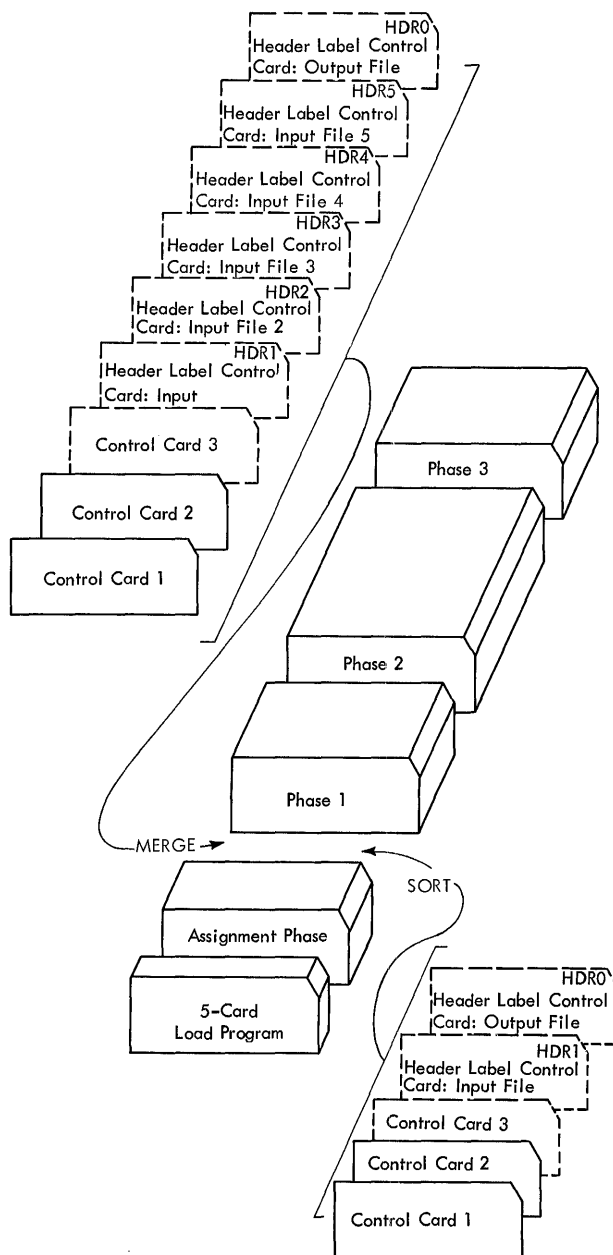


Figure 28. The Program Deck

If a tape parity error occurs during the loading of the program from tape, the load program halts at location 00397 and the channel 1 DATA CHECK light is turned on. The record that is in error may be reread by pressing COMPUTER RESET, then START. If after several attempts, the record has not been read successfully, the program tape may have to be regenerated.

Placing the Sort/Merge 12 program on tape does not affect the procedures for control card loading.

If the control cards are to be read from the card reader, they should be placed in the hopper in the proper order, and the card reader should be placed in the ready status. The following section describes how control cards are loaded from magnetic tape.

### Control Card Loading

#### From the Card Reader

To load control cards from the card reader, follow the procedure indicated above for program loading from the card reader.

#### From Tape

To load control cards from tape, core-storage locations 15138-15142 must be overlaid with the information described below. The required patch card must precede the execute card for the Assignment Phase (card 999S1200).

Location 15138, labeled TAPEIN, must contain the character  $\bar{1}$ .

Location 15139-15142, labeled PROGTAPE, must contain the address of the tape unit from which the control card information is to be read, the parity, and the operation code of an error test on the corresponding channel.

For example, if control cards are to be read in from tape unit 5 on channel 2, in even parity, locations 15138-15142 contain  $\bar{1} \bar{2} \bar{U}5X$ .

The patch card is punched  $\bar{1} \bar{5} \bar{1} \bar{3} \bar{8} \bar{0} \bar{0} \bar{0} \bar{0} \bar{5} \bar{1} \bar{2} \bar{U} \bar{5} X$ . If the control cards are on the systems tape, they are on channel 1, unit 0, in odd parity. The corresponding patch card is punched  $\bar{1} \bar{5} \bar{1} \bar{3} \bar{8} \bar{0} \bar{0} \bar{0} \bar{0} \bar{5} \bar{1} \bar{0} \bar{B} \bar{O} \bar{R}$ .

### Operation of the Restart Program for Card Input: Sorting Applications

The Sort/Merge 12 program deck contains a restart program for use with the checkpoint feature. A checkpoint record is automatically written at the beginning of each merging pass of a sorting application; that is, at the beginning of each pass of Phase 2 and at the beginning of the Phase 3 pass. If a halt occurs during one of these merging passes, the user can take advantage of the restart program, and the last recorded checkpoint record, by restarting the application at the beginning of the pass that precedes the one during which the halt occurred.

The procedure for a restart operation is as follows:

1. Remove any portion of the program deck that is still in the card reader.
2. Place the restart program in the card reader. Place on top of the restart program the portion of

the program deck previously removed from the card reader.

3. Clear core storage and load the restart program. (See the standard card loading procedure outlined under "Program Loading - From the Card Reader.")

4. Press INQUIRY REQUEST as the program is being loaded.

5. After the request has been made, and the console I/O printer has typed an I and spaced, type in the mode, channel, parity and unit on which the checkpoint was written, in that order. (Each time a checkpoint is written, the message CHKPT XXXN is typed out, where XXXN indicates the mode, channel, parity and unit that are specified in step 5.) For example, M%B1 would be typed to specify that the checkpoint has been written on channel 1, unit 1, in the Move mode, and in odd parity.

6. Press INQUIRY RELEASE to give control to the restart program. The sorting application will continue from that stage of the program at which the last checkpoint was taken.

The restart program must be removed from the Sort/Merge 12 program deck after a restart has been effected.

To restart the last pass of Phase 2, it may be necessary to reread part of the program deck. If this action is required, a message will inform the operator. If the program is loaded from tape, the restart program performs this function automatically.

The restart program can be loaded from a magnetic tape unit on channel 1 by inserting the following program change card immediately preceding execute card 999S12RS.

Initial Location	Length	Contents	Seq No.	Block
00091	00002	nBu	998	S12RS

The tape unit number (0, 1, . . . or 9) must be punched in column 15, to specify the tape unit from which the restart program will be read.

If both the Sort/Merge 12 program and the restart program are read from tape, the restart program must be on a unit other than "0".

### HALTS, MESSAGES, AND CORRECTIVE ACTION

Sort/Merge 12 Messages are divided into the following groups:

1. Messages which primarily indicate current program status. These may help the operator to make his particular application run more efficiently; for example, an analysis of the messages concerning BMAX, B and G might lead to a better choice of Bi for a future run.

2. Programmed halts with messages; each halt is preceded by an explanatory message.
3. Programmed halts without messages; these are identified by their I-Addresses. The messages and halts are listed alphabetically, except that the halts without messages are listed by their I-Addresses. The following information is given for each halt or message:
  - The message (if any)
  - The I-Address (if any) displayed with the message
  - An explanation of the message
  - The action (if any) to be taken by the machine operator (If a choice is allowed, both actions are given.)

XXXXX ARE FULL - MORE DATA THAN TAPES WILL HOLD

I-Address: 10662.

Explanation: A short reel work tape has been mounted.

Action: Mount full reel work tapes and restart sort from beginning.

\*AT XXXXX

I-Address: Variable.

Explanation: There has been a parity error when attempting to read a tape. XXXXX is the address(es) of inserted asterisks.

Action:

1. Correct the block and press START.
2. Press COMPUTER RESET AND START, to dump the block on either the console printer or the specified dump tape.

B = XXXX

I-Address: None.

Explanation: XXXX represents the sort blocking factor that is computed by the Assignment Phase and actually used in processing the particular application. This message appears only when fixed-length records are to be sorted.

Action: None.

BI=XXXX

I-Address: None.

Explanation: XXXX represents the input blocking factor specified by the user in control card 1. This message appears only when fixed-length records are to be sorted. (See messages under CORRECT ERROR AND RELOAD PROGRAM.)

Action: None.

BI TOO LARGE

(See messages under CORRECT ERROR AND RELOAD PROGRAM.)

BI &/OR BO TOO LARGE

(See messages under CORRECT AND RELOAD PROGRAM.)

BLMAX=XXXXX

I-Address: None.

Explanation: XXXXX represents the maximum acceptable block size as computed by the Assignment Phase for an input file consisting of variable-length records. This message appears only when variable-length records are to be sorted.

Action: None.

BLOCKED OUTPUT NOT LEGAL WITH SPECIFIED INPUT FORMAT, PRESS START TO ACCEPT UNBLOCKED OUTPUT.

I-Address: 01795

Explanation: This message is associated only with merging applications. Either fixed-length unblocked records without record marks, or variable-length unblocked records without record marks and/or without record character count fields has been specified for input. Blocked records have been specified for output; however only unblocked output can result from the specified input format.

Action:

1. Press the start key if unblocked output is acceptable.
2. Correct cards and reload.

BMAX=XXXX

I-Address: None.

Explanation: XXXX represents the maximum sort blocking factor that can be handled by the Sort/Merge 12 program for a particular application. The computation of this maximum sort blocking factor does not take into consideration the size of G, and may not, therefore, be the sort blocking factor that is ultimately acceptable for the application. This message appears only when fixed-length records are to be sorted.

Action: None.

CD NOT = NO. GIVEN. PRESS START FOR CD=XXXX

I-Address: 02456.

Explanation: The total length of control data fields specified in control card 2, columns 3-6, does not equal the sum of the lengths of the individual control data fields.

Action:

1. Press the start key if the total contained in the message is acceptable.
2. Correct the control card and reload the program.

CHKPT XXXX

I-Address: None.

Explanation: XXXX represents the mode, channel, parity, and unit associated with each checkpoint record written during Phase 2 and Phase 3 of a sorting application.

Action: None.

CONTROL CARD MISSING OR OUT OF SEQUENCE  
(See messages under CORRECT ERROR AND RELOAD PROGRAM.)

CORRECT ERROR AND RELOAD PROGRAM

I-Address: 08958.

Explanation: This message is associated with a programmed halt caused by detectable control card errors. A message identifying the particular error appears first, followed by the CORRECT ERROR AND RELOAD PROGRAM message. The specific control card error messages are listed below.

BI=XXXX

BI TOO LARGE

The specified input blocking factor is larger than the sort blocking factor.

BI &/OR BO TOO LARGE

The sum of the input block length multiplied by the specified order of merge and the output block length is too large for the amount of core storage available to the particular application; that is, 2(BiL) (m) + 2BoL is larger than available storage.

CONTROL CARD MISSING OR OUT OF SEQUENCE

A check of columns 77-80 (the identification columns of each control card) indicates that a control card is missing or out of sequence. The control cards for a particular application should be in the following order:

CTL1

CTL2

CTL3 (optional)

HDR1 (optional: for sorting application)

HDR1

HDR2

.

.

.

HDR5

HDRO (optional)

ERROR IN CF SPECIFICATION, CF-CD O  
An analysis of data contained in control card 2

indicates that the number of characters contained in a control data field (CD) is greater than the position of the field within the record (CF). For example, if the low-order position of control data field 7 is 10, and the field consists of 13 characters, it cannot be wholly contained within the record.

ERROR IN L OR CF POSIT XXXX CH GIVEN  
YYYY INDICATED BY CF

A check of control card 1 (columns 33-36) and control card 2 indicates that the specified record length (XXXX) is less than the highest specified control data field position (YYYY). For example, this halt would occur if the specified record length was 0154 characters, and the highest specified control data field position occupied the 0156th character position in each record. The halt would also occur if the 0154th character position of the record contained a record mark, and the highest specified control data field position was specified as occupying that position of the record.

ERROR NO BIL GIVEN

The input blocking factor has not been punched in control card 1, columns 43-46.

ERROR NO BO GIVEN

The output blocking factor has not been punched in control card 1, columns 49-52.

ERROR NO BOL GIVEN

The output blocking factor has not been punched in control card 1, columns 49-52.

ERROR, NO MERGE CHANNEL

The channel used for input to Phase 2 of a sorting application, or for the first input file of a merging application, is not properly specified in control card 1, column 16.

MACHINE SIZE ERROR

A character other than a 2, 3, 4 or 5 has been specified in control card 1, column 66.

M AMBIGUOUS, CHECK TAPE DRIVE  
SPECIFICATION

Improper specification of tape units in control card 1, columns 2-6 and/or 11-15. For a sorting application the same number of tape units must be specified for input and output. For a merging application at least one input and one output unit must be specified.

MERGE PATCH PROGRAM TOO LARGE

The core-storage area reserved for user-inserted routines in Phase 2/Phase 3 of a sorting application, or in a merging application, is too large; i.e., storage is not available for the corresponding running program.

NO. REELS INPUT ≠ REELS ON INDIVIDUAL DRIVES

The total number of input tape reels specified in control card 1, columns 8-10, does not agree with the total calculated by the Sort/Merge 12 program from the data punched in control card 1, columns 21-30. This halt applies to a merging application only.

RECORD FORMAT ERROR

A character other than 0, 1, 2 or 3 has been punched in control card 1, column 32.

Action: Correct error and reload program.

DATA CHECK ON XXXXXXXXXXXX

I-Address: None.

Explanation: Data check has occurred on an I/O operation.

XXXXXXXXXX is the instruction which set the condition.

Action: Press START to try again. If error persists, restart at last checkpoint.

END OF JOB

I-Address: 18304.

Explanation: The application has been processed to end of job. This halt occurs in Phase 3 of a sorting application, and in a merging application.

Action: Dismount all output tapes.

ERROR IN CF SPECIFICATION, CF - CD < 0  
ERROR IN L OR CF POSIT XXXX CH GIVEN YYYY  
INDICATED BY CF  
ERROR NO BIL GIVEN  
ERROR NO BO GIVEN  
ERROR NO BOL GIVEN  
ERROR, NO MERGE CHANNEL.

(See messages under CORRECT ERROR AND RELOAD PROGRAM.)

G=XXXXX

I-Address: None.

Explanation: For fixed-length records: XXXX represents the number of records that can be sorted at one time in Phase 1 of a sorting application. For variable-length records: XXXXX represents the maximum number of records that can be sorted at one time in Phase 1 of a sorting application.

Action: None.

HASH TOTAL XXXXXXXXXXXXXXXXXXXX

I-Address: None.

Explanation: XXXXXXXXXXXXXXXXXXXX represents the hash total, if any, taken in the current phase. This message appears only when there is a 1-punch or a 2-punch in column 67 of control card 1.

Action: None.

MACHINE SIZE ERROR

M AMBIGUOUS, CHECK

MERGE PATCH PROGRAM

(See messages under CORRECT ERROR AND RELOAD PROGRAM.)

MFS=XXXXXXXX

I-Address: None.

Explanation: XXXXXXXX represents the maximum file size, as computed by the Assignment Phase, that can be sorted in a single run. This message appears only when fixed-length records are to be sorted.

Action: None.

MFS EXCEEDED

I-Address: 06130.

Explanation: The maximum file size has been exceeded; that is, more records have been processed than can be contained on m-1 full reels of tape.

Action: Press the START key if only a few records remain to be processed. If the file size is too large to be handled by the Sort/Merge 12 program, a continuous merge results after the START key is pressed. In that case, the file size must be adjusted and the application rerun.

MIN RECORD GIVEN < HIGH CD POSIT. PRESS START FOR MIN = XXXX

I-Address: 02310.

Explanation: The minimum record length specified in control card 1, columns 38-41, is not long enough to contain the rightmost control data field specified for the application.

Action: Press the start key if the minimum record length contained in the message (XXXX) is acceptable; otherwise, correct the control card and reload the program.

NO. REELS INPUT ≠ REELS ON INDIVIDUAL DRIVES

(See messages under CORRECT ERROR AND RELOAD PROGRAM.)

NOT EQUAL \* START TO CONTINUE

I-Address: 16263.

Explanation: The record count or hash total taken during the current pass is not equal to the record

count or hash total taken during the previous pass.

Action: Press START to continue.

#### NOT READY XXXXXXXXXXXX

I-Address: None.

Explanation: An I/O unit is not ready.

XXXXXXXXXXXX is the instruction which set the condition.

Action: Ready the I/O unit and press START.

#### OUTPUT BLOCKING > SORT BLOCKING: PRESS START FOR XXXX

I-Address: 08483.

Explanation: The output blocking factor specified in control card 1, columns 49-52, is larger than the sort blocking factor.

Action: Press the START key if the sort blocking factor contained in the message (XXXX) is acceptable for use as the output blocking factor; otherwise, correct the control card and reload the program.

#### OUTPUT COUNT < PHASE ONE INPUT COUNT

I-Address: 18168.

Explanation: Number of records read into Phase 1 is different from final count.

Action: Restart sort at last checkpoint. If error persists, restart sort from beginning.

#### 1 PASS NEEDED, GO TO PHASE 3.

I-Address: None.

Explanation: This message indicates that the number of sorted sequences produced by Phase 1 is one less than the specified order of merge (m); the application, therefore, can proceed directly to Phase 3.

Action: None.

#### PASS YY XXXXX SEQUENCES

I-Address: None.

Explanation: YY represents the number of the pass; XXXXX represents the number of sorted sequences produced by that pass. Phase 1 is designated "PASS 00."

Action: None.

#### PHASE 1 END

I-Address: None.

Explanation: Phase 1 has been completed.

Action: None.

#### PHASE 3\*\*\*OUTPUT ON TAPES XXX XXX....

I-Address: None.

Explanation: XXX XXX.... represents the channel, mode and unit, respectively, of each output tape unit. For example, %U1 would be written for

an even-parity tape mounted on channel 1, unit 1.

Action: None.

#### READER ERROR

I-Address: 09129.

Explanation: A read error has been detected during the reading of control cards or while passing Phase 1 for a merging application. This applies to card reading or tape reading operations.

Action: For errors detected from a card read, reload the error card and press the START key. For errors detected from a tape read, restart the application. Ninety-nine rereads would have been automatically attempted by the 1410 Input/Output Control System before this halt.

#### RECORD FORMAT ERROR

(See messages under CORRECT ERROR AND RELOAD PROGRAM.)

#### XXXXXXXXXXXX RECORDS PROCESSED

I-Address: None.

Explanation: XXXXXXXXXXXX represents the number of records processed in current phase. This message appears only when there is a 0-punch or a 2-punch in column 67 of control card 1.

Action: None.

#### TAPE XX FINISHED

I-Address: None.

Explanation: This halt occurs when there is either a 0-punch or a 2-punch in column 47 of control card 1, and when an end-of-reel condition is detected on the last tape reel of each input cycle. The mode (Move or Load) and the unit (0, 1... or 9) of the tape which is "finished" are indicated respectively by the XX of the message. For example, the message TAPE L3 FINISHED refers to the input tape reel mounted on unit 3 and read in the Load mode.

Action: Mount new reel (if needed) and press START.

#### TAPE XX HEADER IS....., IT SHOULD BE.....

I-Address: None.

Explanation: Tape XX header label does not correspond to provided control card information.

Action: Investigate error. Press START to accept the tape.

#### TAPE XX SHOULD BE XXXXX, IT IS XXXXX

I-Address: None.

Explanation: The block count in the trailer label of the input tape does not equal the number of blocks read.

Action: Press START to continue.



TAPE XXX SHOULD BE RETAINED UNTIL XXXXX

I-Address: None.

Explanation: The indicated output tape has an unexpired retention date.

Action: Press START to accept the tape.

WRONG LENGTH RECORD XXXXXXXXXXXX

I-Address: None.

Explanation: A wrong length record has been detected in executing the operation XXXXXXXXXXXX.

Action: Restart sort from beginning.

Halt: No message

I-Address: 10577.

Explanation: This halt occurs only upon detection of the end-of-reel condition associated with the last available output tape for sorting or merging applications. This halt enables the operator to mount the number of additional reels of tape (up to m reels) needed for the remaining output of the application.

Action: Mount the desired reels of tape and press START to continue processing.

Halt: No message

I-Address: 16253.

Explanation: Core-storage location 00158 should contain the order of merge. This halt occurs if no order of merge is found in this location in Phase 2.

Action: Reload the program.

Halt: No message

I-Address: 16939.

Explanation: This halt occurs only when there is a 0-punch in control card 1, column 63, specifying a halt after the last pass of Phase 2; i. e., before entering Phase 3. This halt can also occur during a merging application.

Action: Press the START key to continue processing.

Halt: No message

I-Address: 10777.

Explanation: This halt results if a record is found to be out of sequence. It should not occur unless a logical error exists in user-inserted routines.

Action: Reload the program.

APPENDIXES

APPENDIX A

CHARACTER		CARD CODE	BCD CODE (Core Storage)					
Com- merce (Report)	Science (Pro- gram)							
(1) -	b	No Punches	C					
	•	12-3-8		B	A	8	2 1	
	□	12-4-8	C	B	A	8 4		
(1) {	[	12-5-8		B	A	8 4	1	
	<	12-6-8		B	A	8 4 2		
	‡	12-7-8	C	B	A	8 4 2 1		
	& +	12	C	B	A			
	\$	11-3-8	C	B		8 2 1		
	*	11-4-8		B		8 4		
(1) {	]	11-5-8	C	B		8 4 1		
	;	11-6-8	C	B		8 4 2		
	Δ	11-7-8		B		8 4 2 1		
	—	11		B				
	/	0-1	C		A		1	
	,	0-3-8	C		A	8 2 1		
	% (	0-4-8			A	8 4		
(1) {	~	0-5-8	C		A	8 4 1		
	\	0-6-8	C		A	8 4 2		
	##	0-7-8			A	8 4 2 1		
(2) -	♠	2-8			A			
	# =	3-8				8 2 1		
	@ !	4-8	C			8 4		
(1) {	:	5-8				8 4 1		
	>	6-8				8 4 2		
	√	7-8	C			8 4 2 1		
(3) -	?	12-0	C	B	A	8 2		
	A	12-1		B	A		1	
	B	12-2		B	A		2	
	C	12-3	C	B	A		2 1	
	D	12-4		B	A		4	
	E	12-5	C	B	A		4 1	
	F	12-6	C	B	A		4 2	

Standard BCD Interchange Code

CHARACTER		CARD CODE	BCD CODE (Core Storage)					
Com- merce (Report)	Science (Pro- gram)							
	G	12-7		B	A		4 2 1	
	H	12-8		B	A	8		
	I	12-9	C	B	A	8	1	
(4)	!	11-0		B		8 2		
	J	11-1	C	B			1	
	K	11-2	C	B			2	
	L	11-3		B			2 1	
	M	11-4	C	B			4	
	N	11-5		B			4 1	
	O	11-6		B			4 2	
	P	11-7	C	B			4 2 1	
	Q	11-8	C	B		8		
	R	11-9		B		8	1	
	‡	0-2-8			A	8 2		
	S	0-2	C		A		2	
	T	0-3			A		2 1	
	U	0-4	C		A		4	
	V	0-5			A		4 1	
	W	0-6			A		4 2	
	X	0-7	C		A		4 2 1	
	Y	0-8	C		A	8		
	Z	0-9			A	8	1	
	Ø	0	C			8 2		
	1	1					1	
	2	2					2	
	3	3	C				2 1	
	4	4					4	
	5	5	C				4 1	
	6	6	C				4 2	
	7	7					4 2 1	
	8	8				8		
	9	9	C			8	1	

- (1) Print Blank
- (2) Print ‡
- (3) Print &
- (4) Print -

On IBM 1403 Printer  
having typical printing  
chain installed

APPENDIX B

80	CTL 1	
79	Control Card 3 Indicator	
78	Not Used	
77	Optional Tape Units (Channel in Column 7)	
76	Input File	
75	Record Count/Hash Total	
74	Core Storage Size	
73	Padding	
72	Output File	
71	Retention Cycle Check: Phase 1, 2	
70	Half Option: Phase 3	
69	Temporary Tape Label Handling	
68	Tape Marks	
67	Output File	
66	Header Labels	
65	File	
64	Tape Marks	
63	Input	
62	Header Labels	
61	File	
60	Dump Option	
59	Unreadable Record	
58	Scan Option	
57	Record	
56	Work Tape Density	
55	Merge Sequence Check	
54	Collating Sequence	
53	Output File	
52	Blocking Factor or Length	
51	Input File	
50	Parity/Mode	
49	Saving or Switching	
48	Not Used	
47	Blocking Factor or Length	
46	Input File	
45	Parity/Mode	
44	Minimum Record Length	
43	Record Char Ct Fld Length	
42	Record Length	
41	Record Format	
40	Unload Option	
39	Not Used	
38	Channel	
37	Tape Units	
36	Phase 1 Output; Phase 2 Work; (Final Output)	
35	Total Number of Reels	
34	Input File	
33	Channel	
32	Tape Units	
31	Phase 2 Work; (Input) (Final Output)	
30	S = Sort Application	

A

80	CTL 1	
79	Control Card 3 Indicator	
78	Not Used	
77	Optional Tape Units (Channel in Column 7)	
76	Input File	
75	Record Count/Hash Total	
74	Core Storage Size	
73	Padding	
72	Output File	
71	Retention Cycle Check: Phase 1, 2	
70	Half Option: Phase 3	
69	Temporary Tape Label Handling	
68	Tape Marks	
67	Output File	
66	Header Labels	
65	File	
64	Tape Marks	
63	Input	
62	Header Labels	
61	File	
60	Dump Option	
59	Unreadable Record	
58	Scan Option	
57	Record	
56	Work Tape Density	
55	Merge Sequence Check	
54	Collating Sequence	
53	Output File	
52	Blocking Factor or Length	
51	Input File	
50	Parity/Mode	
49	Saving or Switching	
48	Not Used	
47	Blocking Factor or Length	
46	Input File	
45	Parity/Mode	
44	Minimum Record Length	
43	Record Char Ct Fld Length	
42	Record Length	
41	Record Format	
40	Unload Option	
39	Not Used	
38	II E	
37	Number of Reels	
36	Input File	
35	II D	
34	II C	
33	II B	
32	II A	
31	Channels	
30	II E	
29	II D	
28	II C	
27	II B	
26	II A	
25	Tape Units	
24	Total Number of Reels	
23	Input File	
22	Channel	
21	Tape Units	
20	Phase 2 Work; (Input) (Final Output)	
19	S = Sort Application	

B

CTL 2	
Size	Field 10
Location	
Size	Field 9
Location	
Size	Field 8
Location	
Size	Field 7
Location	
Size	Field 6
Location	
Size	Field 5
Location	
Size	Field 4
Location	
Size	Field 3
Location	
Size	Field 2
Location	
Size	Field 1 (Major)
Location	
Total Length	
Total Number	

C

CTL 3	
Not Used	
Maximum Record Length: Form 3 Records	
Not Used	Date
Day	
Year	
User Area: Phase 2, Phase 3	
User Area	
User Area Phase 1	
Expected File Size	
Sort Application	Major Application

D

HDR	
or 1, 2, 3, 4, or 5	
O	
Not Used	
± (Record Mark)	
Not Used	
Not Used	Retention Cycle
- (Hyphen, 11-Punch)	
Creation Date	
File Name	
Not Used	
Reel Sequence Number	
- (Hyphen, 11-Punch)	
File Serial Number	
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File Number 1410-33  
Re: Form No. C28-0343  
This Newsletter No. N28-2006  
Date September 20, 1963  
Previous Newsletter Nos. None

IBM 1410 Tape Sorting/Merging Programs: Sort/Merge 12

This newsletter contains replacement pages and notes for corrections to the publication, IBM 1410 Tape Sorting/Merging Programs: Sort/Merge 12, Form C28-0343.

Pages 7, 8, 21 - 26, 99, 100, 107, 108 have been replaced because of extensive changes. A new cover page is also included to correct the revision notice on page 2. Text changes are indicated by a vertical bar at the left of the lines affected; figure changes by a dot (●) at the left of the figure title.

Other changes are to be made as shown below:

<u>Page</u>	<u>Amendment</u>
6	In column 2, the first line of the Note under "Collating Sequence" should be changed to read:  Note: A record mark (≠, 0-2-8 punch) should
12	In column 1, the first entry under "Initial Loc" should be changed to read:  ~02580
102	In column one, the message at the bottom should read:  ERROR IN CF SPECIFICATION, CF-CD<0

The IBM logo, consisting of the letters "IBM" in a bold, sans-serif font, is positioned inside a dark rectangular box.

**Systems Reference Library**

## **IBM 1410 Tape Sorting/Merging Programs: Sort/Merge 12**

This publication describes the functions and features of the IBM 1410 Sort/Merge 12 Program, a tape sorting and merging program using the Processing Overlap and Priority special features. It provides the programmer and operator with complete information for best use of the program. It presents substantial modifications and expansions to material in the previous Sort/Merge 12 publication, Form J28-0253. It also includes the 1410 Sorting times contained in Form C28-0293.

In addition to complete program specifications, the publication furnishes control card formats, detailed operating instructions, and information on the use of modification exits.



## PREFACE

This publication provides detailed information for programmers, systems analysts, and machine-room personnel on the use of the IBM 1410 Tape Sorting/Merging Program: Sort/Merge 12.

Sort/Merge 12 is an efficient tape sorting and merging program which is directed by user-supplied control cards. It makes use of the Overlap and Priority special features to permit overlap of the read/write and processing operations, and so provides most efficient use of computer time. The program can perform the following functions:

1. Sort and merge files composed of Form 1, Form 2, Form 3, or Form 4 data records (see "Record Formats").
2. Sort on one through ten control data fields; each field can contain from one through 9990 characters.
3. Merge two through five sequenced files.
4. Reblock and/or sequence check a sequenced file.
5. Label output tapes, as directed through control cards.
6. Provide automatic checkpoint and restart facilities.
7. Provide exit points to link Sort/Merge 12 to user-supplied routines to perform editing, summarizing, and other functions.

### Major Revision (July, 1963)

This publication supersedes the preliminary reference manual, IBM 1410 Tape Sorting/Merging Programs: Part II, Sort/Merge 12, Form J28-0253, with its associated Technical Newsletters (N28-1018 and N28-1020); and the Systems Reference Library publication, IBM 1410 Tape Sorting Programs, Sort/Merge 12: Sorting Times for the IBM 1410 with 7330, 729II, 729IV or 729V Tape Units, Form C28-0293, with its associated Technical Newsletter (N28-1056).

Copies of this and other IBM publications can be obtained through IBM Branch Offices. Address comments concerning the content of this publication to:  
IBM Corporation, Programming Systems Publications, Dept. D91, PO Box 390, Poughkeepsie, N. Y.

The only characters that are invalid for this purpose are the record mark and the group mark. Figure 2 gives the minimum and maximum parameters for control data fields. The fields can be in any order, separate or adjacent, but may not overlap (see Figure 3).

Major and Minor Fields

The first control data field specified is the major field. All subsequent fields are minor fields whose relative rank is determined by the order in which they are specified in control card 2.

Major control fields are compared first; if they are unequal, the data records are sorted in the ascending or descending sequence specified in control card 1. If the major fields are equal, the first minor control fields are compared. If the first minor fields are unequal, the data records are sequenced; if equal, the next minor control fields are compared. This action continues until the records are sequenced, or until all control data fields are equal.

The input order is not necessarily maintained for those records in which all control data fields compare equal; in that case, the two records are sequenced in arbitrary order, determined by the program.

USER-INSERTED ROUTINES

The user has the option of adding his own closed subroutines to Sort/Merge 12. These subroutines may perform nonstandard sorting functions, or those not related to such as editing. Exits which provide linkage to the user's sub-

rouines are supplied at logical points within Sort/Merge 12. The user must specify in control card 3 where his programming is to start. Space will be reserved for it from that specified location to the end of core storage. For full details on the exits available, linkages, programming considerations and suggested modifications, see "Modifications: User-Inserted Routines."

CHECKPOINT AND RESTART

The term checkpoint refers to periodic recording on tape of the contents of core storage to provide convenient points for subsequently restarting the program.

Checkpoint records are automatically written for each pass of Phase 2 and for the Phase 3 pass. These checkpoint records are written on the output tape unit specified last on control card

1. For example, if five units are specified in columns 2-6 and 11-15 of control card 1, checkpoint records in Phase 2 will always be written on the unit specified in column 6, for odd numbered passes; and in column 15, for even numbered passes. In Phase 3, only a checkpoint record will appear on the unit in column 6, if Phase 2 ended on an even pass, or in column 15, if Phase 2 ended on an odd pass; no data records will be written on it.

Sort/Merge 12 uses checkpoint records to re-initialize each pass of Phase 2 and for Phase 3. When it is necessary for the user to restart the program after a halt, the last recorded checkpoint is read into core storage, and the program is re-initialized to commence processing at the beginning of the pass during which the halt occurred.

FILES AND RECORDS

The Sort/Merge 12 Input/Output Control System is based on the IOCS described in IBM 1410 Input/Output Control System for Card and Tape Systems, Form C28-0334. The following information is essentially an abstract from that publication, combined with other material pertinent to Sort/Merge 12.

Record Formats

The four classes of record formats that can be handled by Sort/Merge 12 are summarized in Figure 5. Figure 4 is a schematic representation of each format.

	Minimum	Maximum
Number of Fields	1	10
Characters per Field	1	999
Total Number of Control Data Characters	1	9,990

Figure 2. Control Data Parameters

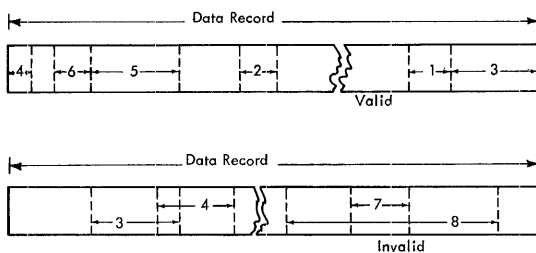
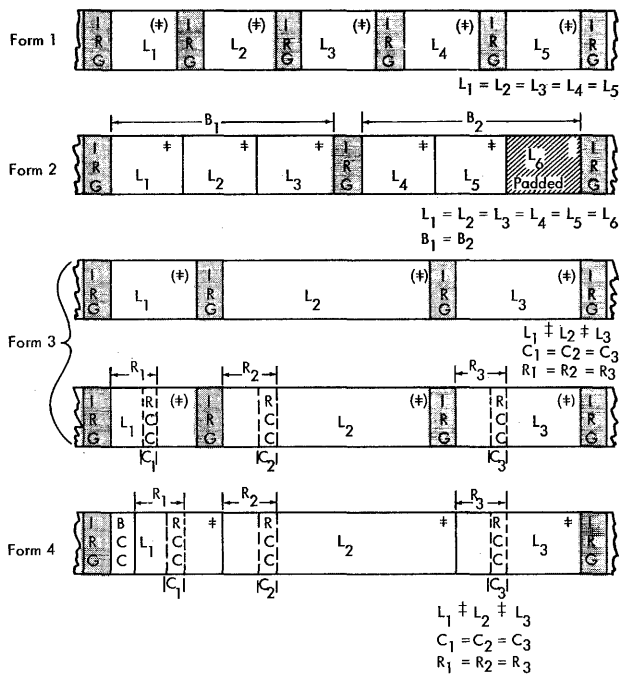


Figure 3. Control Data Field Configurations



- Notes:
1. IRG = Inter-Record Gap  
 RCC = Record Character Count  
 BCC = Block Character Count
  2. Record Marks, (#), in Parentheses, are optional.

Figure 4. Record Formats, Schematics

record marks, and Form 1 is specified for output, the record marks are retained throughout.

**Form 2:** If both input and output record format is Form 2, record marks are retained and short-length blocks are padded. For a merging application, if the input is Form 2 records, the output may not be Form 1 records.

**Form 3:** If the input file consists of Form 3 records without record marks and/or without record character count fields, record marks and record character counts (if necessary) are added for internal processing. If the output format is the same as the input format, the added record marks and the added record character count fields are deleted. If the output format is blocked records with a blocking factor greater than 1, the added record marks and record character count fields are retained.

**Form 4:** If both input and output format is Form 4, record marks and record character counts are retained for each record; and a proper block character count field is computed for each block. If Form 3 records are specified for output, the record marks and the record character count fields are retained. For a merging application, if the input is Form 4 records, the output cannot be Form 3 records.

Block Character Count Field

The block character count field consists of the first four characters of each Form 4 block of records. This field is a count of the total number of characters in the block, including the four characters of the block character count field, itself.

The block character count field has AB zone bits over the units position.

Record Character Count Field

The record character count field consists of two to four characters within a data record; and is a count of the total number of characters in the record, including those in the record character count field and the record mark, if any.

The record character count field must be in the same relative position in each record, and must be of the same length for each record

(Figure 4).

		With Record Marks	Without Record Marks
Fixed-Length	Unblocked	← Form 1 →	← Form 1 →
	Blocked ①	← Form 2 →	← Form 2 →
Variable Length	Unblocked ②	← Form 3 →	← Form 3 →
	Blocked ③	← Form 4 →	← Form 4 →

- ① With padding of short-length blocks.
- ② With or without Record Character Count fields.
- ③ With Record Character Counts and Block Character Count fields.

Figure 5. Record Formats

**Form 1:** If the input file consists of Form 1 records without record marks, a record mark is added at the end of each record by Sort/Merge 12 for internal processing. If Form 1 records are specified for output, the added record marks are deleted and the records are restored to their original length. If Form 2 records are specified for output, the added record marks are retained. If the input file consists of Form 1 records with

Card Column	Contents	Sorting	Merging
60	HEADER LABELS: OUTPUT TAPES		
	blank	Output tapes are <u>not</u> to contain header labels.	
	1	Information in the <u>input</u> header label control card also defines <u>output</u> header labels. If this option is chosen, column 58 must be punched 1 (Note 3).	
	2	Output tapes are to contain a new header label as specified in the <u>output</u> header label control card. If this option is chosen, an <u>output</u> header control card is required, and should be the last control card entered.	
61	TAPE MARKS: OUTPUT TAPES		
	blank	Output tape header labels (if any) are <u>not</u> to be followed by tape marks.	
	1	Each output tape header label is to be followed by a tape mark.	
62	TEMPORARY TAPE LABEL HANDLING: PHASES 1 and 2		
	blank	Phase 1 and Phase 2 output tapes are not to contain labels.	Always blank
	0	Phase 1 and Phase 2 output tapes are to contain labels.	
	1	Phase 1 and Phase 2 output tapes are to contain labels and tape marks.	
63	HALT OPTION: PHASE 3		
	blank	Program is <u>not</u> to halt prior to Phase 3.	Always blank
	0	Program is to halt prior to Phase 3.	
64	RETENTION CYCLE CHECK: PHASE 1 AND PHASE 2 OUTPUT LABELS		
	blank	Retention Cycles on Phase 1 and Phase 2 output labels are <u>not</u> to be checked.	Always blank
	0	Retention Cycles on Phase 1 and Phase 2 output labels are to be checked. This option requires that column 62 contain 0 or 1 and that control card 3 be included in the control card package.	
65	PADDING		
	blank	Padding records, when required to fill out short length blocks, to consist of blanks	
	9	Padding records to consist of 9s	
66	CORE STORAGE SIZE		
		Specifies the number of core-storage positions available:	
	2	20,000 positions	
	3	40,000 positions	
	4	60,000 positions	
	5	80,000 positions	

Figure 17. Control Card 1 (page 5)

Card Columns	Contents	Sorting	Merging
--------------	----------	---------	---------

67 RECORD COUNT/HASH TOTAL

Indicate whether record counts and/or hash totals are to be made.

	<u>Record Count</u>	<u>Hash Total</u>
blank	No	No
0	Yes	No
1	No	Yes
2	Yes	Yes

If the output file is to consist of Form 2 records, either 0 or 2 should be punched to insure that blocks created internally which consist entirely of the specified padding records are not written in the final output file.

68-72 OPTIONAL INPUT TAPE UNITS

all blanks	Input is from the units specified in columns 2-6.	Always blank
nynn	Input is from the tape unit(s) specified in column 7.  (See also columns 2-6.)	

73-75 blank These columns must be blank

76 CONTROL CARD 3

blank	Control card 3 is <u>not</u> included.
0	Control card 3 is <u>included</u>

77-80 CTL1 CONTROL CARD 1 IDENTIFIER

Notes:

1. If fewer than five units are specified, their identifying numbers are written left-justified, with the remaining field positions left blank.
2. The total number of input reels; that is, the sum of columns 21-22, 23-24, 25-26, 27-28, and 29-30, must be equal to or less than 495.
3. Control card 3 must be supplied in the control card package, with the current date specified in columns 18-22.
4. The final output file is written on the units specified in columns 2-6 or in columns 11-15. The group of units used is dependent upon the number of passes required by Phase 2. If the number of passes required in Phase 2 is even, the final output file is written on the units specified in columns 2-6; if the number of passes required is odd, the output is written on the units specified in columns 11-15.

For the special case where no passes are required by Phase 2, the output is written on the units specified in columns 2-6.

● Figure 17. Control Card 1 (page 6)

Card Columns	Contents	Sorting and Merging
1-2	nn	NUMBER OF CONTROL DATA FIELDS nn can be from 01 to 10
3-6	nnnn	TOTAL LENGTH OF CONTROL DATA FIELDS nnnn can be from 0001 to 9990
7-10	nnnn	FIELD 1 (MAJOR FIELD): LOCATION (Note 1)
11-13	nnn	FIELD 1: SIZE (Note 2)
14-17	nnnn	FIELD 2: LOCATION (Note 1)
18-20	nnn	FIELD 2: SIZE (Note 2)
21-24	nnnn	FIELD 3: LOCATION (Note 1)
25-27	nnn	FIELD 3: SIZE (Note 2)
28-31	nnnn	FIELD 4: LOCATION (Note 1)
32-34	nnn	FIELD 4: SIZE (Note 2)
35-38	nnnn	FIELD 5: LOCATION (Note 1)
39-41	nnn	FIELD 5: SIZE (Note 2)
42-45	nnnn	FIELD 6: LOCATION (Note 1)
46-48	nnn	FIELD 6: SIZE (Note 2)
49-52	nnnn	FIELD 7: LOCATION (Note 1)
53-55	nnn	FIELD 7: SIZE (Note 2)
56-59	nnnn	FIELD 8: LOCATION (Note 1)
60-62	nnn	FIELD 8: SIZE (Note 2)
63-66	nnnn	FIELD 9: LOCATION (Note 1)
67-69	nnn	FIELD 9: SIZE (Note 2)
70-73	nnnn	FIELD 10: (MOST MINOR FIELD): LOCATION (Note 1)
74-76	nnn	FIELD 10: SIZE (Note 2)
77-80	CTL2	CONTROL CARD 2 IDENTIFIER

Notes:

1. This is the location of the low-order (last) character of the field; for example: if this field consists of the 27th, 28th and 29th characters of each record, nnnn should be punched 0029.
2. This specifies the number of characters in the appropriate control data field; nn can be from 001 to 999.

**Figure 18. Control Card 2**

Card Columns	Contents	Sorting	Merging
1-7	EXPECTED FILE SIZE		
	all blanks	Number of records in input file unknown.	High-order padding will complete last block of Form 2 output, <u>or</u> output is Form 1, 3 or 4.
	nnnnnn	Exact or approximate number of records in input file. nnnnnn can vary from 0000001 to 9999999.	Exact number of records in input files if Form 2, and low-order padding is specified.
8-12	USER AREA: PHASE 1		
	all blanks	User-supplied routines are not incorporated.	Always blank
	nnnnn	Starting address of core-storage area to be reserved for user-supplied routines to be incorporated into Phase 1 (Note 1).	
13-17	USER AREA PHASE 2, PHASE 3, MERGE		
	all blanks	User-supplied routines are not incorporated.	
	nnnnn	Starting address of core-storage area to be reserved for user-supplied routines to be incorporated into Phases 2 and/or 3 (Note 1).	Starting address of core-storage area to be reserved for user-supplied routines to be incorporated into the merge program (Note 1).
18-22	DATE		
	yyddd	yy specifies the year (00-99); ddd specifies the day (001-366). The date should be punched if the retention cycle is to be checked for Phase 2 or Phase 3 output tape labels of a sort, or on temporary tape labels that are retained. Date should also be punched, for both sorting and merging applications, if this information is to be retained on output header labels.	
	all blanks	This field is left blank if none of the above options has been chosen.	
23-26	MAXIMUM RECORD LENGTH: FORM 3 RECORDS		
	all blanks	Always blank	Merge is performed on Form 1, Form 2, or Form 4 records, or size of output area for Form 3 records is equal to the input block length (BiL) (Note 2).
	nnnn		Size of longest record where output consists of Form 3 unblocked records; nnnn can be from 0001 to 9999.
27-76	all blanks	This field is not used.	

77-80 CTL3 CONTROL CARD 3 IDENTIFIER

Notes:

1. Core storage is reserved from this address to the last core-storage location of the machine (see control card T, column 66).
2. For example, if the input block length is 9999 characters, the merge program will specify an output area of 9999 characters, even though the longest record of the file does not, for instance, exceed 250 characters. If 9999 core-storage locations are not available for this output area, the particular merge cannot be processed.

● Figure 19. Control Card 3

Card Columns	Contents	Input Files	Output Files
--------------	----------	-------------	--------------

1-3      nnn      **TAPE-LABEL HANDLING**

nnn is determined by the appropriate table, below. "Yes" means that the item is to be checked or written; "No" that the option is not selected. In cases of conflict, YES has priority over NO.

Card Column	Contents	Header Labels				Trailer Labels
		File Serial Numbers	Reel Sequence Numbers	File Name	Creation Date	Block Character Count
1	0	Yes	Yes	Yes	Yes	Yes
	1	No	No	No	No	No
	2	No	No	Yes	No	Yes
2	0	Yes				
	1	No				
3	0		Do Not Update			
	1		Increment by 1*			

\*Optional for multi-reel input files.

Card Column	Contents	File Serial Numbers	Reel Sequence Numbers	File Name	Creation Date	Retention Cycle
1	0	No	No	No	No	Yes*
	1	No	No	No	No	No
2	0	Specified in Cols. 4-8				
	1	Replace by Tape Serial Number				
3	0		Do Not Update			
	1		Increment by 1**			

\*Current date must be supplied in control card 3 (columns 18-22).

\*\*Successively for each output reel.

4-8      **FILE SERIAL NUMBER**

	nnnnn	Specifies file serial to be checked if checking is specified in columns 1 or 2.	Specifies file serial if "0" is punched in column 2.
	all blanks		If "1" is punched in column 2.

● Figure 20. Header Label Control Card (page 1)



Card Columns	Contents	Input Files	Output Files
9	-	Hyphen, 11-punch (Note)	Hyphen, 11-punch (Note)
10-12		REEL SEQUENCE NUMBER	
	nnn	nnn can be from 001 to 999	
13	blank	(Note)	(Note)
14-23		FILE NAME	
	aaa...a	Any combination of the 64 valid 1410 characters (including blank) that identify the file.	
24-28		CREATION DATE	
	ddyyy		This field need not be punched if control card 3 is included in the control card package.
29	-	Hyphen, 11-punch (Note)	Hyphen, 11-punch (Note)
30-32		RETENTION CYCLE	
	nnn	Always blank	The number of days after the date specified in columns 24-28 (or in control card 3) that this file is to be preserved.
33	blank	(Note)	(Note)
34		Record Mark, #, 0-2-8 Punch (This character must be punched)(Note)	
35-76	all blanks	This field is not used.	
77-79	HDR	HEADER LABEL CONTROL CARD IDENTIFIER	
80		APPLICATION/FILE IDENTIFIER	
	I or O	Letter I, 12-9 punch. This card is for the <u>input</u> file in a <u>sorting</u> application.	Letter O, 11-6 Punch. This card is for the <u>output</u> file in either a <u>sorting</u> or <u>merging</u> application.
	1, 2, 3, 4, 5	This card is for the <u>input</u> file in a <u>merging</u> application. The Input file is to be mounted on the unit as specified in the following columns of control card 1:	
	Card 1	for Column	11
	2		12
	3		13
	4		14
	5		15

Note: For compatibility with format accepted by IOCS.

● Figure 20. Header Label Control Card (page 2)

OPERATOR'S GUIDE

OPERATING PROCEDURES

The Program Deck

The Sort/Merge 12 program deck consists of:

1. The Assignment Phase
2. Phase 1 (the internal sort): 9 blocks
3. Phase 2 (the internal merge passes): 9 blocks
4. Phase 3 (the output merge pass): 11 blocks

A block is defined as a portion of the program deck ending with an execute card.

Figure 28 shows the proper order of the program deck and the control card packages required by the program.

Tape Requirements

The tape units that must be available for a particular application are those specified in control card 1, columns 2-6, 11-15 and 68-72.

Program Loading

The Sort/Merge 12 program deck, as distributed, is designed primarily for loading from the card reader; however, the deck may also be adapted to loading from tape.

From the Card Reader

1. Clear storage
2. DISPLAY: 00247
3. ALTER: Y%1100257R.<sup>V</sup>
4. ADDRESS SET: to location 00247
5. START

From Tape

To read in the program from the systems tape, the X control fields of the read instructions contained in the first and third cards of the five-card load program must be modified. The X control fields are contained in columns 11-13 and 45-47 of the first card, and in columns 48-50 of the third card. The original contents of each of these sets of three columns are %11 (the read is to be from the channel 1 card reader). Each field must be changed to %B0 to indicate that the read is to be from tape unit 0 on channel 1. (Unit 0 on channel 1 must be used, or the tape reread routine will not work.)

1. Clear storage
2. DISPLAY: 00247
3. ALTER: L%B000257R.<sup>V</sup>
4. ADDRESS SET: to location 00247
5. START

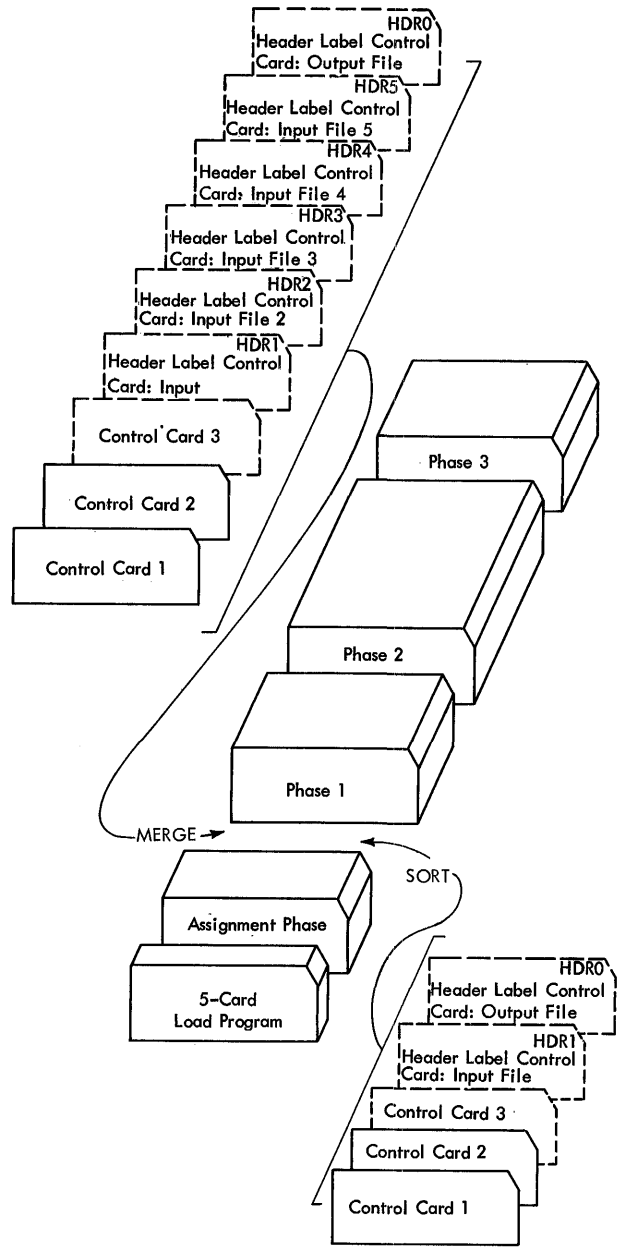


Figure 28. The Program Deck

If a tape parity error occurs during the loading of the program from tape, the load program halts at location 00397 and the channel 1 DATA CHECK light is turned on. The record that is in error may be reread by pressing COMPUTER RESET, then START. If after several attempts, the record has not been read successfully, the program tape may have to be regenerated.

Placing the Sort/Merge 12 program on tape does not affect the procedures for control card loading.

If the control cards are to be read from the card reader, they should be placed in the hopper in the proper order, and the card reader should be placed in the ready status. The following section describes how control cards are loaded from magnetic tape.

Control Card Loading

From the Card Reader

To load control cards from the card reader, follow the procedure indicated above for program loading from the card reader.

From Tape

To load control cards from tape, core-storage locations 15138-15142 must be overlaid with the information described below. The required patch card must precede the execute card for the Assignment Phase (card 999S1200).

Location 15138, labeled TAPEIN, must contain the character  $\bar{V}$ .

Location 15139-15142, labeled PROGTAPE, must contain the address of the tape unit from which the control card information is to be read, the parity, and the operation code of an error test on the corresponding channel.

For example, if control cards are to be read in from tape unit 5 on channel 2, in even parity, locations 15138-15142 contain  $\bar{V}$   $\bar{V}$ U5X $\bar{V}$ .

The patch card is punched 1513800005 $\bar{V}$  $\bar{V}$ U5X. If the control cards are on the systems tape, they are on channel 1, unit 0, in odd parity. The corresponding patch card is punched 1513800005 $\bar{V}$  $\bar{V}$ B0R.

Operation of the Restart Program for Card Input: Sorting Applications

The Sort/Merge 12 program deck contains a restart program for use with the checkpoint feature. A checkpoint record is automatically written at the beginning of each merging pass of a sorting application; that is, at the beginning of each pass of Phase 2 and at the beginning of the Phase 3 pass. If a halt occurs during one of these merging passes, the user can take advantage of the restart program, and the last recorded checkpoint record, by restarting the application at the beginning of the pass that precedes the one during which the halt occurred.

The procedure for a restart operation is as follows:

1. Remove any portion of the program deck that is still in the card reader.
2. Place the restart program in the card reader. Place on top of the restart program the portion of

the program deck previously removed from the card reader.

3. Clear core storage and load the restart program. (See the standard card loading procedure outlined under "Program Loading - From the Card Reader.")

4. Press INQUIRY REQUEST as the program is being loaded.

5. After the request has been made, and the console I/O printer has typed an I and spaced, type in the mode, channel, parity and unit on which the checkpoint was written, in that order. (Each time a checkpoint is written, the message CHKPT XXXN is typed out, where XXXN indicates the mode, channel, parity and unit that are specified in step 5.) For example, M%B1 would be typed to specify that the checkpoint has been written on channel 1, unit 1, in the Move mode, and in odd parity.

6. Press INQUIRY RELEASE to give control to the restart program. The sorting application will continue from that stage of the program at which the last checkpoint was taken.

The restart program must be removed from the Sort/Merge 12 program deck after a restart has been effected.

To restart the last pass of Phase 2, it may be necessary to reread part of the program deck. If this action is required, a message will inform the operator. If the program is loaded from tape, the restart program performs this function automatically.

The restart program can be loaded from a magnetic tape unit on channel 1 by inserting the following program change card immediately preceding execute card 999S12RS.

<u>Initial Location</u>	<u>Length</u>	<u>Contents</u>	<u>Seq No.</u>	<u>Block</u>
00091	00002	~BU	998	S12RS

The tape unit number (0, 1, . . . or 9) must be punched in column 15, to specify the tape unit from which the restart program will be read.

If both the Sort/Merge 12 program and the restart program are read from tape, the restart program must be on a unit other than "0".

HALTS, MESSAGES, AND CORRECTIVE ACTION

Sort/Merge 12 Messages are divided into the following groups:

1. Messages which primarily indicate current program status. These may help the operator to make his particular application run more efficiently; for example, an analysis of the messages concerning BMAX, B and G might lead to a better choice of Bi for a future run.

APPENDIX B

800	CTL 1	
799	Control Card 3 Indicator	
798	Not Used	
797	Not Used	
796	Not Used	
795	Not Used	
794	Not Used	
793	Not Used	
792	Not Used	
791	Not Used	
790	Optional Tape Units (Channel in Column 7)	Input File
689	Record Count/Hash Total	
66	Core Storage Size	
65	Padding	Output File
64	Retention Cycle Check: Phase 1, 2	
63	Halt Option: Phase 3	
62	Temporary Tape Label Handling	
61	Tape Marks	Output File
60	Header Labels	File
59	Tape Marks	Input
58	Header Labels	File
57	Dump Option	Unreadable Record
56	Scan Option	Record
55	Work Tape Density	
54	Merge Sequence Check	
53	Collating Sequence	
52	Blocking Factor or Length	
51	Output File	
49	Parity/Mode	
48	Saving or Switching	
47	Not Used	
46	Not Used	
45	Blocking Factor or Length	
44	Input File	
43	Parity/Mode	
42	Minimum Record Length	
41	Record Char Ct Fld Length	
39	Record Length	
38	Record Format	
37	Unload Option	
36	Not Used	
35	Not Used	
34	Not Used	
33	Not Used	
32	Not Used	
31	Not Used	
30	Not Used	
29	Not Used	
28	Not Used	
27	Not Used	
26	Not Used	
25	Not Used	
24	Not Used	
23	Not Used	
22	Not Used	
21	Not Used	
20	Not Used	
19	Not Used	
18	Not Used	
17	Not Used	
16	Channel	
15	Tape Units	
14	Phase 1 Output: Phase 2 Work; (Final Output)	
13	Not Used	
12	Not Used	
11	Not Used	
10	Total Number of Reels	
9	Input File	
8	Channel	
7	Not Used	
6	Tape Units	
5	Phase 2 Work; (Input) (Final Output)	
4	Output File	
3	Not Used	
2	Not Used	
1	S = Sort Application	

A

800	CTL 1	
799	Control Card 3 Indicator	
798	Not Used	
797	Not Used	
796	Not Used	
795	Not Used	
794	Not Used	
793	Not Used	
792	Not Used	
791	Not Used	
790	Not Used	
689	Record Count/Hash Total	
66	Core Storage Size	
65	Padding	Output File
64	Retention Cycle Check: Phase 1, 2	
63	Halt Option: Phase 3	
62	Temporary Tape Label Handling	
61	Tape Marks	Output File
60	Header Labels	File
59	Tape Marks	Input
58	Header Labels	File
57	Dump Option	Unreadable Record
56	Scan Option	Record
55	Not Used	
54	Merge Sequence Check	
53	Collating Sequence	Output File
52	Blocking Factor or Length	
51	Output File	
49	Parity/Mode	
48	Saving or Switching	
47	Not Used	
46	Not Used	
45	Blocking Factor or Length	
44	Input File	
43	Parity/Mode	
42	Minimum Record Length	
41	Record Char Ct Fld Length	
39	Record Length	
38	Record Format	
37	Unload Option	
36	Not Used	
35	Not Used	
34	Not Used	
33	Not Used	
32	Not Used	
31	Not Used	
30	II E	Number of Reels
29	II D	
28	II C	
27	II B	
26	II A	
25	II E	Channels
24	II D	
23	II C	
22	II B	
21	II A	
20	II E	Tape Units
19	II D	
18	II C	
17	II B	
16	II A	
15	Total Number of Reels	
14	Input File	
13	Channel	
12	Not Used	
11	Tape Units	
10	Output File	
9	Not Used	
8	Not Used	
7	Not Used	
6	Not Used	
5	Not Used	
4	Not Used	
3	Not Used	
2	Not Used	
1	M = Merge Application	

B

CTL 2																																																																															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Location										Field 10																																																																					
Size										Field 9																																																																					
Location										Field 8																																																																					
Size										Field 7																																																																					
Location										Field 6																																																																					
Size										Field 5																																																																					
Location										Field 4																																																																					
Size										Field 3																																																																					
Location										Field 2																																																																					
Size										Field 1 (Major)																																																																					
Location										Total Length																																																																					
Total Number																																																																															

C

CTL 3																																																																															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Not Used																										Not Used																																																					
User Area: Phase 2, Phase 3																																																																															
User Area Phase 1										Not Used																																																																					
Expected File Size																																																																															
Sort Application										Merge Application																																																																					

D

or 1, 2, 3, 4, or 5 0																																																																															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
HDR																																		Not Used																																													
Creation Date																																		Not Used																																													
File Name																																		Not Used																																													
Retention Cycle																																		Not Used																																													
Reel Sequence Number																																		Not Used																																													
File Serial Number																																		Not Used																																													
Tape Label Handling																																		Not Used																																													
Input Files																																		Output Files																																													

E