IBM

705 Generalized Merge Program Merge 52

Merge 52 is a generalized 2-5 way merging program, and is more powerful than 2-3 way merging program, Merge 51, which it supersedes.

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MERGE 52 — 2, 3, 4, OR 5 WAY MERGE

PURPOSE

Merge 52 is a generalized merge program written for a Model I or Model II 705 using the 754 Tape Control Unit. The program will combine, at the user's option, 2, 3, 4, or 5 sorted files into one sequenced file.

SPECIFICATIONS

1. Number of Input Records Each individual input file may consist of no more than 99 reels of tape. Therefore, the number of input records in each input file is limited only in that these records must be contained on 99 reels of tape, or less.

2. Record Arrangement Records may be either single or blocked. The records should contain no Record Marks or Group Marks except as mentioned below. In any particular merge operation, all records must fall into the same category, which may be any one of the following:

   Blocked Records When records are blocked, the last character of each record must be a Record Mark in order to indicate the end of the record. Individual records must always be of fixed length and a multiple of five, including the Record Mark.

   Single Records Single records are divided into three categories because Merge 52 processes certain types of single records differently than others. These categories, and the restrictions which apply to each, are as mentioned below. There are three factors involved regarding single records: (1) Being a multiple of five. (2) Ending in a Record Mark; and (3) Fixed length. All combinations of the presence or absence of these factors are possible, except that no variable length record should end in a Record Mark, giving a total of 6 possible cases.

   a. Single records which are a multiple of five characters in length, and end in a Record Mark, must always be of fixed length. The input grouping, punched in columns 35-37 of the control card, for this type of record is 001. (Case 1)

   b. All other single records of fixed length are indicated by an input grouping of 000 in the control card. This category includes:

Single records of fixed length which are a multiple of five characters in length but do not end in a Record Mark (Case 2)

Single records of fixed length which are not a multiple of five characters in length. These records may or may not, as desired, end in a Record Mark (Cases 3 & 4)

c. Single records of variable length are also indicated by input grouping of 000. These records must not end in a Record Mark (Cases 5 & 6)

3. Minimum and Maximum Record and Block Size The minimum length for both single and blocked records is ten characters. The maximum length for either single records or for record blocks will depend on the amount of available memory space, and on the number of input files. The following two tables show the maximum allowable lengths for the various combinations of these factors.

Table I. Maximum lengths for record blocks, or for single records which are a multiple of five characters in length and end in a Record Mark.

No. of Input Files	705 Model	Maximum Length	
		Without Added Instructions	With Added Instructions *
2 or 3	I	2555	2555- S/6
4	I	1845	1845- S/8
5	I	1435	1435- S/10
2 or 3	II	5885	5885- S/6
4	II	4345	4345- S/8
5	II	3435	3435- S/10

Table II. Maximum length for all other single records.

No. of Input Files	705 Model	Maximum Length	
		Without Added Instructions	With Added Instructions *
2 or 3	I	2554	2554- S/6
4	I	1844	1844- S/8
5	I	1434	1434- S/10
2 or 3	II	5884	5884- S/6
4	II	4344	4344- S/8
5	II	3434	3434- S/10

* S = the total memory space occupied by the added instructions. The use of added instructions with Merge 52 is described in a later paragraph.

4. Control Fields From one to five fields within the record may be used to control merging. The records within each input file must be in sequence according to these control fields. The fields may be in any order, need not be adjoining, and may overlap. The sum of the control fields is referred to as the control word. This control word must not exceed fifty characters in length and must not be made up entirely of nines, if nines padding is used, nor should it consist entirely of blanks if blanks padding is used. Optimum performance results if adjacent control fields which are in proper order are combined into one control word.

5. Padding If the number of records in any input file is not evenly divisible by the number of records per block, the partial block remaining may be filled out with either blanks or nines padding but not both. The same type of padding must be contained by all input files which contain padding. If more than one input file contains a padded block, it is possible for the merge to develop full blocks of padding in the output. Such blocks will not be written on the output tape. A message at the completion of the merge will indicate how many blocks of padding have been dropped. (See also Note on page 23).

6. Hash Totals A hash total accumulated from the first ten digits of the record is written at the end of the output tapes of Merge 52 after the tape marks. If ten digit hash totals have been written at the end of the input tapes, after the tape marks, as is the case with tapes coming from Sort 54 (presently being written), a comparison can be made between the input and output final hash totals. A message at the completion of the merge ("Hash Totals Agree" or "Hash Totals Do Not Agree") indicates whether or not these hash totals are equal. The use of padded blocks does not affect the accuracy of the hash total comparison, although full blocks of padding are dropped, because the records within those blocks contribute to the hash total.

   The hash total comparison will be voided under the following conditions:

   a. The hash total at the end of one of the input tapes is unreadable.
   b. One of the first ten characters of an input record is unreadable.
   c. The program on tape 0205 is unreadable. This is the program which performs the comparison.

   If the comparison is void, this fact will be stated in a message ("Hash Total Comparison Void") at the completion of the merge. (See also Note on page 23).

7. Unreadable Records After three unsuccessful attempts to read an input record correctly, the block containing this record is written on tape 0205 and the block is eliminated from the merge. A message at the completion of the merge states the number of blocks, if any, written on 0205.

8. Tape Labels on Input Tapes Alteration switch 0916 should be turned off if the first record on the input tapes is to be a tape label. The only limitations placed upon such tape labels by Merge 52 is that they may not contain any Group Marks, and that they must be no longer than the single records or blocks being merged. The tape label will be typed out for inspection. A Halt has been programmed at this point to provide an opportunity for replacing any incorrect tape.

9. Tape Labels on Output Tapes Alteration switch 0915 should be turned off if a tape label is to be written as the first record on the output tapes. The data for this tape label is punched into a card, which is placed behind the control card. The label cannot exceed eighty characters in length, and the contents of the label are fixed. If it is desired to vary the contents of this label on succeeding output tapes, instructions must be added to Merge 52 to perform this function. There is no provision for handling output tapes which have been previously labeled. Such labels will be erased unless the necessary instructions are added.

10. Output Grouping The grouping of output records will in all cases be identical to the grouping of the input records.

11. Checkpoint and Restart Checkpoint and restart have been incorporated into Merge 52. If an 0901 error is detected during the writing of a record, the message "0901 write 020-" will be typed out. The program will then automatically go into restart. If the 0901 indicator should come on for any other reason, the operator must manually transfer to 00459 in order to restart. The checkpoint and restart procedure is set up in such a way that it will not go back to a restart point which is beyond the beginning of the input and output tapes mounted at the time of the error or checkpoint. A checkpoint is always made before the message to change tape reels is typed out, in order to make certain that the program and memory are in proper condition at this point. (See also Note on page 23).

12. Sequence Checking of Input There is no separate sequence check on input files. However, because each input file has its own read-in area, the sequence checking of records when they are transmitted to the write-out area, as described in section (b) of "Running Program" on page 7, functions as an effective

input sequence checking device. A sequence error in an input file will, therefore, result in a Halt 0015.

Until the operator gains experience in the operation of Merge 52, corrective action to be taken when Halt 0015 occurs will usually consist of restarting the merging operation. As the operator becomes familiar with Merge 52, the method of correction may be influenced by the size of the merge (i.e. total number of input tape reels) and by the proportion of the work completed when Halt 0015 occurs. His method will depend largely on the type of error: either a reel of input tape has been mounted out of sequence, or one of the input files is not properly sorted.

The occurrence of a sequence error can be guarded against as follows:

a. Input tape reel mounted out of sequence - use tape labelling procedures on all input tapes.

b. Input file out of sequence - make sure that all input files have been properly sorted before commencing the merge operation. If the records were originally on punched cards, sorted by a punched card sorter, and then converted to tape, they should always be sequence checked. This may be done by the use of a simple sequence checking program or by the use of a generalized sort program which, as it takes advantage of sorted sequences, will also be very fast as it should only require one to two sorting passes at the most.

13. Checking on the Number of Input Reels If the number of input reels punched into the control card differs from the number of reels actually mounted during the merge, an error condition will result.

Two cases may be distinguished:

Case I - If the number of reels of input specified in the control card is less than the actual number of reels of input, the discrepancy will be revealed by the occurrence of Halt 9999, indicating the completion of the merge, at a time when the final reel or reels of an input file remain unmerged.

In this case, after completion of the original merging operation, a separate merge must be run to combine the omitted reel (or reels) with the merged file. This can be accomplished

by determining the section of the merged file which encompasses the omitted reel, then running a two way merge of this section and the omitted reel.

Case II - Halt 0020 results, necessitating a reel change on the tape unit indicated, after the final reel of the file has been mounted. This Halt may thus be caused by:

a. incorrect punching of the control card, in which case action should be taken as indicated in the Operating Instructions on page 16, or

b. omission of one or more of the earlier reels of the relevant input file, in which case the same action should be taken as in Case I above.

It is noted again that the inadvertent omission of tape reels can be avoided by the rigorous application of tape labeling procedures.

GENERAL DESCRIPTION

Merge 52 consists of two phases. The first of these is the Assignment Program. The second is referred to as the Running Program.

1. Assignment Program

a. The Assignment Program reads in the control card, and checks wherever possible to ascertain that it has been correctly punched.

b. Operating on the basis of the information contained in the control card, the program sets up the necessary operations and addresses within the body of the Running Program.

c. The program places within a certain area of the Running Program special instructions for blocks containing nines padding, blocks containing blanks padding, or single records not ending in a Record Mark, depending on which instructions apply.

d. The program turns off all Input/Output indicators on the tape units and rewinds all of the tapes.

e. If tape labels are to be written on the output tapes, the program reads in the tape label card and writes the label on the first output tape.

f. The program moves the instructions for the initial pulling of control words* to the end of available memory. Since these instructions are used only once, the area they occupy can later be used as part of the last write-out area.

g. In order to conserve memory space, the area occupied by the Assignment Program in the beginning is later used as a read-in area for input records.

* "Pulling of control words" refers to the process of taking the control fields from each record, combining these fields into a control word for the record, and depositing this control word in the appropriate area. Only the initial pulling of control words is done by the Assignment Program. Subsequently, each time a record is sent to the write-out area, the process of pulling the control word is performed for the next record by the Running Program.

2. Running Program

a. If there are tape labels on the input tapes, the Running Program reads and types out these labels for inspection. The first record or block on each input tape is then read into the read-in area for that tape. The control field information from the first record of each file is assembled into a control word and deposited in a control area for each file.

b. The control words are compared, the record with the lowest control word is moved to the write-out area, and the next record in the same block is moved up to take its place. The control word of this new record then replaces the control word of the record sent to the write-out area, and a new comparison is made.

Records are sequence checked as they are moved to the write-out area. When all of the records in any of the read-in areas have been transmitted to a write-out area, a Read-While-Write operation takes place. Thus, when merging single records, there will be a Read-While-Write after the merging of each record.

c. Full blocks of blank padding which accumulate in the write-out area are written on the output tape. The output tape is then rewound before the first block containing records is written, so that the padding blocks will not appear in the final output.

Full blocks of nines padding which accumulate in the write-out area are not written on the output tape: When the write-out area is found to consist entirely of nines padding, a Group Mark is unloaded on the first position of the area before the Read-While-Write operation takes place.

d. An end of file on the output tape does not delay the merge. The output alternates between tape units 0201 and 0203 to allow time for reel changes. A reel change on an input tape unit always halts the merge, since it is possible that the next record to be merged might come from the tape being mounted.

e. After all records have been merged, a hash total comparison is made if called for on the control card. This comparison checks that the hash total of the records merged agrees with that of the input records. The comparison is performed by a program called in from tape 0205. The end of job message states whether or not these totals agree.

3. Added Instructions

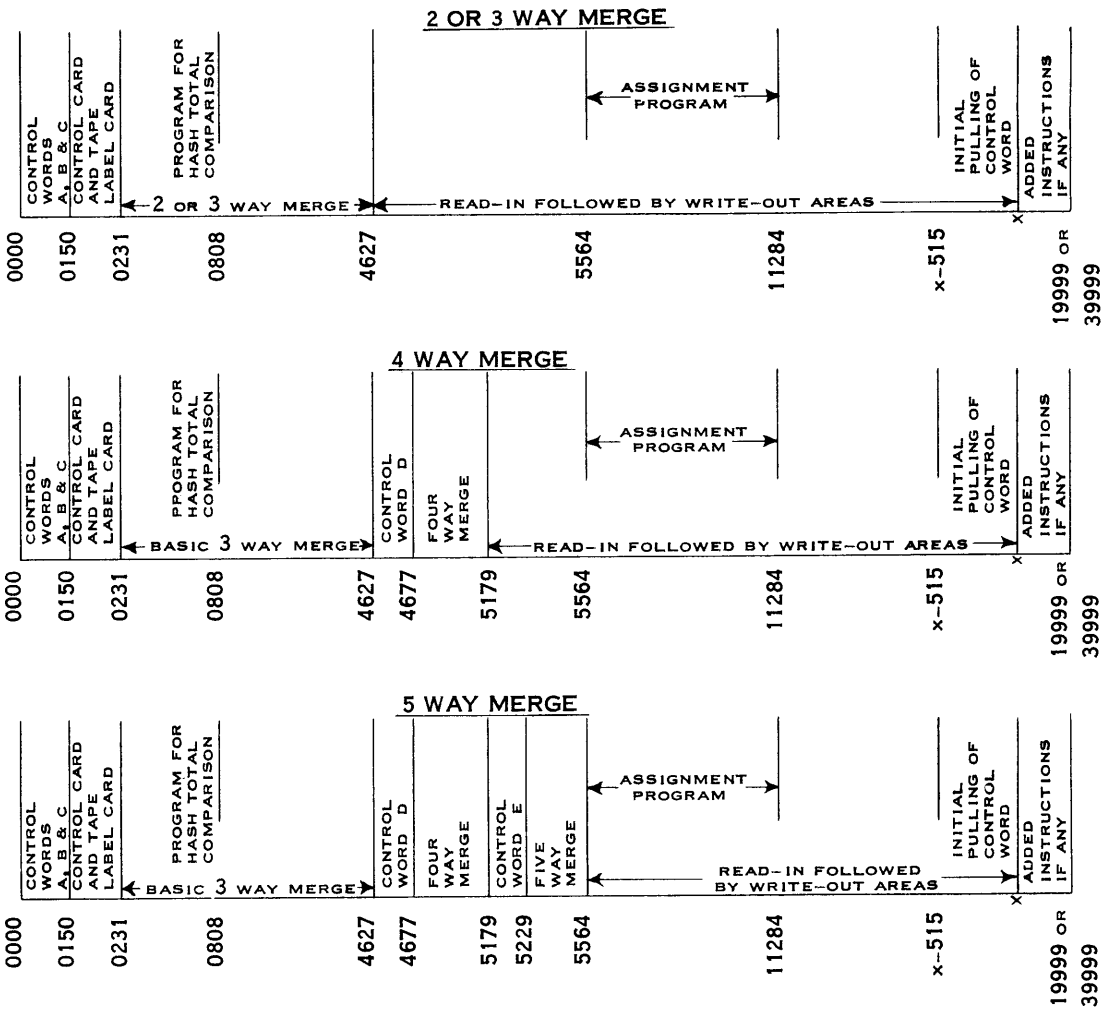
Instructions may be added to modify Merge 52 or to perform additional operations along with the merge. These instructions must be placed at the end of memory where they may occupy memory space according to maximum record length or block length of the input. They must in no case, however, exceed 8,000 characters in length for a Model I 705, or 19,000 characters for a Model II 705.

When instructions are added to Merge 52, it is necessary to replace some original instructions in the program with Transfer instructions which transfer out of the Running Program to the added instructions. Great care should be exercised in making these changes because many of the instructions in Merge 52 are switches or have addresses which are either calculated or modified. Original Transfer instructions can usually be safely replaced by the new Transfers and, as far as possible, this should be done.

Program cards for additional instructions should be inserted in the Merge 52 program deck immediately before the final "00" control card.

MEMORY ALLOCATION:

The following diagrams show the actual locations in memory of the various portions of the program for a 2, 3, 4 and 5 way merge.



As indicated on the above diagrams, the location in memory of the read-in and write-out areas will vary according to the number of input files. These areas will always be grouped in memory with the read-in area for tape 0200 appearing first, followed by the remaining read-in areas and then the write-out areas. The number of write-out areas always equals the number of read-in areas. There will be a gap of five memory positions between the end of each area and the beginning of the next. The location of the first read-in area will be as follows:

Two or three way merge:	04630
Four way merge:	05180
Five way merge:	05570

CONTROL CARD PREPARATION

The control card for Merge 52 should be punched as outlined below, and placed behind the final "00" transfer control card of the deck of Merge 52 program cards. All fields applicable to the merge operation being performed should be completely punched in the control card, i.e. leading zeros must be inserted where necessary. All fields not applicable to the merge under operation should be left blank.

1. Layout of the Control Card

Card Columns	Length	Information to be Punched (See Comments Next Page)
1 - 4	04	Position in the record of the units position of major control field
5 - 6	02	Length of major control field
7 - 10	04	Position in the record of the units position of control field #2
11 - 12	02	Length of control field #2
13 - 16	04	Position in the record of the units position of control field #3
17 - 18	02	Length of control field #3
19 - 22	04	Position in the record of the units position of control field #4
23 - 24	02	Length of control field #4
25 - 28	04	Position in the record of the units position of control field #5
29 - 30	02	Length of control field #5
31 - 34	04	Record length
35 - 37	03	Input grouping
38	01	Padding indicator (blank or "9")
39 - 43	05	Available memory

Card Columns	Length	Information to be Punched (See Comments Below)
44 - 53	10	Number of input records (if known)
54	01	Hash total indicator
55 - 56	02	Number of reels of input on 0200
57 - 58	02	Number of reels of input on 0202
59 - 60	02	Number of reels of input on 0204
61 - 62	02	Number of reels of input on 0206
63 - 64	02	Number of reels of input on 0208
65 - 66	02	Control word length
67	01	Number of input files

2. Comments on the Preparation of the Control Card

Position in the Record of Units Positions, and Length of Control Fields (Cols. 1-30) The units position of a control field is defined as the relative position of the right hand character of the control field with reference to the first character of the record, which is considered as character "1".

For Example:

For a major control field including characters 131 through 140 of the record, columns one through four of the control card would be punched 0140. Columns five and six would be punched 10.

The card columns pertaining to control fields 2, 3, 4, and 5 should be left blank if they are not applicable to the operation being run.

Record Length (Cols. 31-34) If variable length records are being merged, the record length punched in the control card must be the length of the longest input record.

Input Grouping (Cols. 35-37) If input consists of fixed-length single records which are a multiple of five characters in length and

end in a Record Mark, then the input grouping must be 001. For all other single record input, the input grouping must be 000. If input consists of blocked records, the input grouping should indicate the number of records per block.

Padding Indicator (Col. 38) If blocks containing nines as padding are to be merged, the padding indicator must be a "9". Otherwise it must be left blank.

Available Memory (Cols. 39-43) Available memory will normally be 20000 for a Model I 705 and 40000 for a Model II. If added instructions have been placed at the end of memory, the available memory figure will be reduced by the length of the added instructions. The minimum value will be 12000 for a Model I and 21000 for a Model II.

Number of Input Records (Cols. 44-53) If the number of input records is not known, this area of the control card should be left blank.

Hash Total Indicator (Col. 54) If a hash total comparison is to be made, an "H" must be punched as the hash total indicator. Otherwise, this column should be left blank.

Number of Reels of Input (Cols. 55-64) Columns 55 through 58 must be filled in for a two way merge; 55 through 60 for three way; 55 through 62 for four way; and 55 through 64 for a five way merge.

Control Word Length (Cols. 65-66) The control word length is the sum of the individual lengths of all control fields.

Number of Input Files (Col. 67) The number of input files will be either 2, 3, 4 or 5.

3. Control Card Checking by the Assignment Program
(See also Halts 0001 through 0004, and "Explanation of Messages" following the list of Program Stops)

The assignment program performs a number of checks on the basis of the information punched in the control card. Specifically, they are as follows:

a. The control field columns are checked to make certain that

at least one control field is specified, and that no control field length is given without a units position also being specified for the field.

b. The record length and available memory figures are used to determine whether or not sufficient memory space is available to perform the merge. The record length is also checked to see that it is not less than the minimum of ten characters.

c. The columns specifying the input grouping are checked to make certain that they are not blank.

d. The number of input records, if punched in the control card, is checked against the total number of records merged at the completion of the merge. If these columns of the control card are blank, the check is not made.

e. The specified control word length is checked against the sum of the control field lengths to make certain that they agree. A check is also made to ascertain that the control word does not exceed fifty characters in length.

f. The number of control card fields, punched in the card columns indicating the number of reels of input, is checked against the number of input files. For a two way merge, the columns referring to tape units 0200 and 0202 must be filled in; for a three way merge, those referring to 0200, 0202, and 0204, etc.

4. Additional Optional Check

An optional feature of the Merge 52 program is an automatic check of the block length against the product of the record length and the input grouping, as punched in the control card. (Note: This comparison is bypassed for input grouping of 000.)

The program cards for this feature are furnished with the Merge 52 program deck and are identified as cards P1 thru P6, which are inserted in front of the final "00" transfer control card in the Merge 52 deck.

It is not possible to exaggerate the importance of checking and rechecking the accuracy and completeness of data punched into the control card.

OPERATOR'S INSTRUCTIONS

1. Tape Unit Requirements

A minimum of six tape units is required for Merge 52:
The output tapes are 0201 and 0203.
Unreadable blocks of records are written on 0205.
The checkpoint tape is 0207.
For a two way merge, 0200 and 0202 are used as input tapes.

For a three way merge, 0204 is added as the third input tape. 0206 is added for a four way merge, and 0208 for a five way merge. These tape units must be used in the order described. For example:
An attempt to use 0200, 0202, 0204, and 0208 as input tapes for a four way merge would result in an error message. 0208 would have to be replaced by 0206 for the program to function.

2. Alteration Switches

0911 0912 0913 0914		Not used, always OFF
		0915 Controls Output Tape Labeling
0915	OFF	A tape label is to be written as the first record on each output tape. The information for the label is contained in the card which follows the control card. (See Paragraph 9 of Specifications.)
0915	ON	No tape labels are to be written on the output tapes.
		0916 Controls Input Tape Labels
0916	OFF	The first record on each input tape is a tape label.
0916	ON	There are no tape labels on the input tapes.

3. Check Indicators

0900	AUTOMATIC	
0901	AUTOMATIC	
0902		PROGRAM
0903	AUTOMATIC	
0904	AUTOMATIC	
0905	AUTOMATIC	

4. Program Loading

The program deck for Merge 52 should be loaded into the Card reader in the following order:

Load 71 - One card.
Merge 52 program cards, numbered serially 001 through 189.
Optional feature cards, if desired, identified as cards P1 through P6.
Merge 52 "00" transfer control card (Transfer to 05584).
Merge 52 control card.
Tape label card for output tapes, if used.

After loading the cards, the following manual operations will start the merge:

	Manual Instructions
Clear Memory	
Depress Instruct Key	
Select the Card Reader	2 00100
Read into 00000	Y 00000
START	

5. Procedure for Interrupting and Completing the Merge

If operations must be terminated prior to the completion of the merge, the procedure listed below should be followed in order to permit subsequent completion of the program.

a. Wait for the next typewritten message which specifies that an input tape must be changed (followed by Halt 0020).

b. Manually transfer to 03839 and press the START key.

c. At Halt 3333, rewind all tapes.

d. Remove the completed input tape specified by the typewritten message.

e. Remove the remaining tapes and mark each one for return to the same tape unit.

When resuming the merge, make certain that all tapes which were removed in step "e" above are replaced on the tape units on which they had been mounted. The input tape removed in step "d" is

replaced by the next reel from that input file. Then perform the following manual operations:

		Manual Instructions
	Clear Memory	
	Depress Instruct Key	
	Select Tape Unit 0207	2 00207
	Read into 00000	Y 00000
Model II Only:	Read into 19999	Y 19999
	Transfer to 00459	1 00459
	START	

For a 705 Model II it is necessary to read also into 19999, because two tape records have to be read into the machine from tape unit 0207.

6. Halt 0020 When Indicated File Appears Completely Merged

If the Number of Reels of Input punched into the control card agrees with the number of reels actually mounted on the relevant tape unit during the merge, Halt 0020 indicating this tape unit will not again occur after the final reel belonging to this file has been mounted.

Should Halt 0020 recur under these conditions, the following possibilities exist:

a. The last tape in the file in question has been inadvertently forgotten.

   Corrective Action Mount this last tape reel on the indicated tape unit and press the START key to continue the merge.

b. A tape reel, other than the last tape reel of the file in question, has been omitted.

   Corrective Action Complete the merge, using the corrective action as under c below. Thereafter the omitted reel must be combined with the merged file in a separate merging run. (Refer also to Specification 13, "Checking on the Number of Input Reels", on page 5.)

c. The control card is incorrectly punched and specifies more than the actual number of reels of input.

   Corrective Action Manual correction of this situation should proceed as follows:

Store a 1 at 03090 for no more reels on 0200
03035 for no more reels on 0202
02740 for no more reels on 0204
05045 for no more reels on 0206
05525 for no more reels on 0208

Then, manually transfer to 02704 and press the START key.

7. Non-Programmed Stop

If a non-programmed (error) stop should occur caused by the turning on of an 0900, 0901, 0903, 0904, or 0905 check indicator, and if the Instruction Counter reads less than 05569, perform the following manual operations:

Depress the INSTRUCT key
Manually transfer to 00459
Press the START key (to go into the restart procedure).

If the Instruction Counter reads 05569 or above, two possibilities exist:

a. The error has occurred during the assignment part of the program, i.e. before the merge proper has started. In this case, reload the cards and restart the merge.

b. The error has occurred in an area of additional instructions added by the user of Merge 52. The user should provide for this contingency when programming the additional instructions. A suggested procedure is to integrate any added instructions with the checkpoint and restart feature of the Merge 52 program.

PROGRAM STOPS

Optional Feature Stop

Stop 0000 The product of the input grouping and the record length, as punched in the control card, does not equal the actual block length. Correct the control card, reload the entire deck, and restart the merge from the beginning. (See "Additional Optional Check" on page 13.)

Stops in the Assignment Program

Stop 0001 Either an 0902 Read/Write check or an end of file has occurred in attempting to read the control card. An 0902 may indicate improper punching. An end of file indicates that the control card is missing. Reload a correct control card in the card reader, and press

the START key to continue.

Stop 0002 False TRA upon reading of the control card. The "Any" indicator has been turned on but neither an 0902 nor an end of file has occurred. Reload the control card and press the START key to continue.

Stop 0003 Either incorrect or insufficient information was entered in the control card. The typewriter message will give specific details. Correct the control card, reload the card reader, and press the START key to continue.

Stop 0004 The block length (if the input consists of blocked records) or the record length (if the input consists of single records) exceeds the available memory space. See Tables I and II in the Specifications to verify this fact. There are two alternative methods of correcting this condition:

a. If instructions have been added at the end of memory, they may be removed to provide more space.

b. Change a four way merge to a three way merge or a five way to a four way, and merge the remaining input file on a second run. In this connection, it should be noted that changing from a three way merge to a two way merge does not affect the memory space requirements.

To proceed, reload the entire deck along with the revised control card, and begin again.

Stop 0005 False TRA upon reading the tape label card. The "Any" indicator has been turned on but neither an 0902 nor an end of file has occurred. Reload the tape label card and press the START key to continue.

Stop 0006 Either Alteration Switch 0915 was erroneously set to OFF, or an 0902 or end of file has occurred in attempting to read the tape label card. An 0902 may indicate improper punching. An end of file indicates that the tape label card is missing. If an 0902 or end of file has occurred, load a correct tape label card and press the START key to continue. If 0915 was erroneously left at OFF, it is necessary to turn it to ON, reload the entire deck, and begin again.

Stop 0007 False TRA upon writing the tape label on the first output tape. The "Any" indicator has been turned on but neither an 0901, 0902, nor an end of file has occurred. Press the START key to go into the restart procedure.

Stop 0008 An end of file has occurred on the first output tape while writing the tape label. This should not occur. Replace the tape on 0201 and press the START key. The tape label will be written on the new tape and the merge will continue.

Stop 0009 Third successive 0902, but no 0901, has occurred in writing the tape label on the first output tape. Press the START key to try three more times; or reverse the dial settings on tape units 0201 and 0209 (i.e. tape unit 0209 switched to 0201, and 0201 to 0209). Make certain that 0209 is at load point, then press the START key to try three more times.

Stops in the Running Program

Stop 0010 This is a common halt for false TRA while reading or writing tapes during the Running Program. The "Any" indicator has been turned on but neither a tape end of file nor an 0902 has occurred while reading; or the "Any" indicator has been turned on but neither an 0901, an 0902, nor a tape end of file has occurred while writing. Press the START key to go into the restart procedure.

Stop 0011 Third successive 0902, but no 0901, has occurred while writing a checkpoint. Press the START key to try three more times; or reverse the dial settings on tape units 0207 and 0209 (i.e. tape unit 0209 switched to 0207, and 0207 to 0209). Make certain that 0209 is at load point, then press the START key to try three more times.

Stop 0012 Third successive 0902 while reading back the checkpoint tape during a restart. Press the START key to try three more times.

Stop 0013 This halt has been provided to allow for inspection of the tape label on the input tape. If it is correct, press the START key to continue the program. If incorrect, replace with the proper tape, manually transfer to 00859, and press the START key to read the tape label on the replacement tape. If 0916 was set to OFF by mistake and there are no tape labels on the input tapes, it is necessary to turn 0916 to ON, reload the entire deck, and begin again.

Stop 0014 An end of file has occurred in attempting to read the first record on an input tape. This indicates that an incorrect tape has been mounted. Mount the proper tape on the tape unit indicated by the Select Register on the console. Press the START key to go into the restart procedure.

Stop 0015 A sequence error has occurred in an input file. Pressing the START key will cause typing out of the block containing the sequence error. (Specification No. 12, "Sequence Checking of Input ", on page 4 explains the corrective action to be taken in this case.)

Stop 0016 Third successive 0902, but no 0901, has occurred while writing the hash total at the end of an output tape. Press the START key to attempt to write once more. Continuation of the merge can be forced by manually transferring to 02184, and pressing the START key.

It is advisable to note on this output tape that its hash total probably would not be usable, if the tape is to become input for a later merge.

Stop 0017 Third successive 0902, but no 0901, has occurred in writing a record block or single record on an output tape. Press the START key to try once more.

Stop 0020 Change reels on the input tape unit specified by the typewriter message and press the START key to continue the merge. See "Halt 0020 When Indicated File Appears Completely Merged" on page 16, and "Checking on the Number of Input Reels" on page 5, for further comments on this Halt.

Stop 0021 A TRA has occurred while writing the checkpoint in the special routine for "Interrupting and Completing" the merge. Press the START key to try again; or reverse the dial settings on tape units 0207 and 0209 (i.e. tape unit 0207 switched to tape unit 0209, and 0209 to 0207). Make certain that 0209 stands at load point, then press the START key to try again.

Stop 3333 The special routine for "Interrupting and Completing" the merge has been completed. See "Procedure for Interrupting and Completing the Merge" on page 15 for further details.

Stop 9999 Final halt. The merge has been completed.

Stop 0205 Results from an 0902 error, when writing the special program on hash total comparison on tape unit 0205 from "00" card (No. 12). Clear memory, reload cards, and restart the merge.

Explanation of messages

The messages listed below refer to errors which have been made in the punching of the control card. A further explanation is provided here to forestall any possible doubts as to the reason why the control card is in error.

Message	Explanation
L1 IS BLANK	The field specifying the length of the major control field has been left blank.
SUM L NOT EQ TOTAL LNG CW	The sum of the lengths of the individual control fields is not equal to the value punched for the control word length.
P1 INCORRECT P2 INCORRECT P3 INCORRECT P4 INCORRECT P5 INCORRECT	The units position of a control field, for which a length is specified, has been punched in the control card as zero or blank.
IG BLANK	The field specifying the input grouping has been left blank.
# I/P REC UNEQ # MERGED	The number of records which have been merged, as determined by a count during the merging process, does not agree with the number of input records specified in the control card.
NO REELS INPUT BLANK	The field specifying either the number of reels of input on 0200 or the number of reels on 0202 has been left blank
NO REELS INPUT A ZERO NO REELS INPUT B ZERO	The field specifying either the number of reels of input on 0200 or the number of reels on 0202 has been punched as zero.
LNG CW GR 50	The control word length punched

Message	Explanation
	in the control card exceeds the specified maximum of fifty characters.
WRONG ORDER OF MERGE GIVEN.	Totalling the fields which specify the number of reels for the various input tape units indicates a certain number of input files. This total does not agree with the number of input files specified in column 67 of the control card.
INPUT GRPG OR REC LGTH WRONG. RELOAD DECK AND START OVER.	The product of the record length and the input grouping, as punched in the control card, does not equal the actual block length.

SUNDRY NOTES

1. Padding

The necessity for padding originates when the number of records is not a multiple of the number of records grouped in a block. In general, it may be said that Merge 52 will treat a record of padding as a regular record. Therefore, it has to follow all rules as to length, record marks, etc., imposed on the regular records to be merged. This is also the reason why blanks padding retained in the merge will precede the regular records, and nines padding retained in the merge will be at the end of the merged file.

Merge 52 determines whether or not a record is padding according to the first "n" characters of the record, where "n" equals the number of characters in the control word; in other words, if nines padding is used, the presence of all nines in the first "n" characters of a record would be sufficient indication to the program that the whole record is padding, and thus, this record may be dropped.

2. Hash Totals

It is important to realize that the hash total comparison will only prove equal if the input hash total, with which Merge 52 compares its own hash total, is obtained in the identical manner. The hash total in Merge 52 is created as follows:

The first ten digits of the record are loaded into ASU 05. The zoning, if any, is stripped from these ten characters by adding minus zero to ASU 05, and then the resultant contents of ASU 05 are added, by an ADM instruction, to the unsigned constant memory field containing the hash total.

Hash totals are written behind the tape mark of each output tape, but only the sum of all output hash totals is compared to the sum of all input hash totals.

The program for hash total comparison is the first record on tape unit 0205. The merge program attempts to reclaim the first ten characters of unreadable records which are dumped on tape 0205, in order to accomplish the hash total comparison.

3. Checkpoints

The first checkpoint is made immediately following the completion of the assignment program. Thereafter, checkpoints are made each

time a reel change occurs on either an input or output tape unit. One checkpoint, made prior to changing the tape reels, is used to make certain that the program and memory are in proper condition. A second checkpoint, made immediately upon the resumption of the merge, is used as a reference point in restart procedures.

Upon restart, tapes are rewound and spaced forward to the proper records instead of being backspaced. Checkpoints are written consecutively on tape 0207.

4. Utilization of Even Numbered Tape Units Not Used by Merge 52

Tape units which are not being used when running a 2, 3, or 4 way merge (i.e. units 0204, 0206, and/or 0208) can be utilized profitably as alternate input units. The next reel, from the input file or files on which the next end of file is anticipated, can be mounted on these stand-by tape units prior to Halt 0020.

When this stop then occurs for the relevant input file, set the Address Selection Switch of the tape unit containing the new input reel to the proper tape address, and take the input tape unit which had the end of file off the line.

5. Read-in Area of Input Blocks

After a block of records has been read into the read-in area, records are operated on individually, but always in the memory area of the first record. Thus, before it can be operated on, the second, third, etc. record of a block must first be transmitted into the memory area of the first record. During merging, a 5-record input block may therefore appear in the read-in area as follows:

Read-in Area, File 2

Record 4	Record 2	Record 3	Record 4	Record 5

This fact should be remembered when examining a memory dump or memory print-out taken during the operation of Merge 52.

LISTING OF STORAGE UNITS AND THE PURPOSE FOR WHICH EACH IS UTILIZED

The following information may be useful when adding instructions:

Storage Unit	Purpose for Which Utilized
Accumulator	Set to the length of the control word. Contains a control word for purposes of comparison.
ASU 01	Set one position. Contains a "1" for setting switches.
ASU 02	Set one position. Contains an "A" for setting switches.
ASU 03	A counter for the number of records in the write area. Indicates when the write area is completely filled.
ASU 04	A counter which is set one position. Indicates which output area is currently being filled.
ASU 05	Set ten positions to contain the hash total.
ASU 06 ASU 07 ASU 08 ASU 09 ASU 10	Counters which are used to indicate the number of records in each of the five read-in areas. These counters indicate, for each read-in area, when all of the records in the area have been sent to a write-out area.
ASU 11	Set four positions; contains the constant "record length".
ASU 12	A counter which is similar to that in ASU 03. Contains similar, but not necessarily identical, information to that in ASU 03, and uses the information at a different time in the program.
ASU 13	Set four positions; contains a constant.
ASU 14 ASU 15	Used for various purposes such as transmission of data, normalize and transfer operations, etc. These ASU's are always set as necessary immediately before being utilized.

FORMULA FOR ESTIMATING OPERATING TIME FOR MERGE 52

Order of Merge	Merging Time (Minutes)
2	$N/60,000\ (2.86 + .111\ C.W. + .0748L + K_b)$
3	$N/60,000\ (2.88 + .125\ C.W. + .0748L + K_b)$
4	$N/60,000\ (3.14 + .136\ C.W. + .0748L + K_b)$
5	$N/60,000\ (3.26 + .150\ C.W. + .0748L + K_b)$

Where:
- N = Number of Records to be Merged
- $C.W.$ = Control Word Length
- L = Record Length
- K_b = Blocking Constant

$K_b = 1/RB\ (11.77 - .0034L)$
Where RB = Number of Records per Block

Notes:

1. If "9s" padding is used, add the following number of minutes to the merging time:

   $N/60,000\ (.07 + .017\ C.W.)$

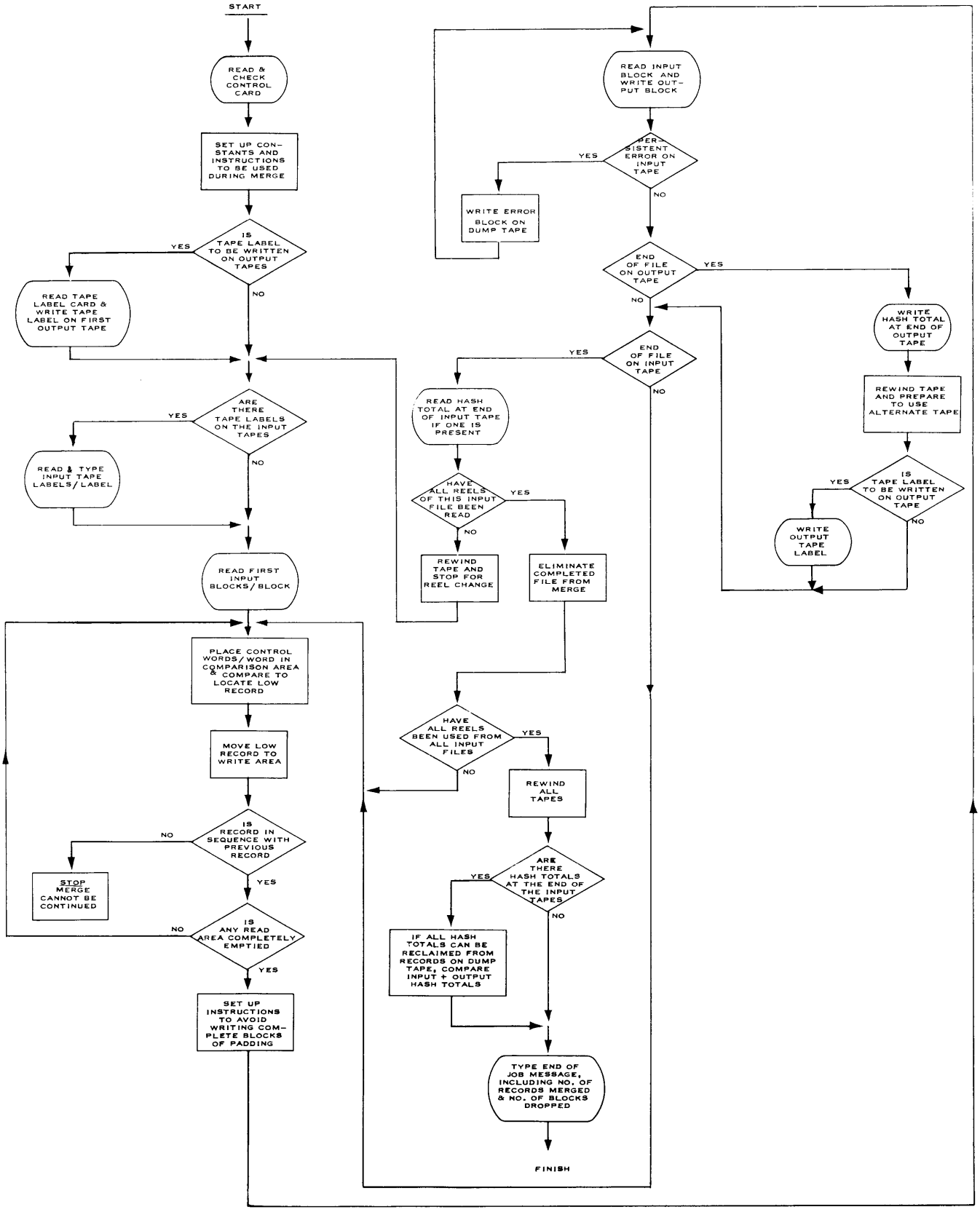
2. The above merging times assume that end of file for all files will be reached practically simultaneously. If one file in a four way merge should happen to be considerably smaller than the other three, the merging time computed on the basis of a four way merge would probably be slightly high. The actual time would be somewhere between this time and the time required for a three way merge.

3. Tape changing time, set up time, and termination time are not included in the above estimate. The time required for these operations must be taken into consideration when estimating the total time required for a merging run.

Program decks may be obtained, upon request, from:

Program Librarian
Applied Programming Publications
590 Madison Avenue
New York 22, New York

MERGE 52 SIMPLIFIED FLOW CHART



MERGE 52

INDEX FOR DETAIL FLOW CHART

TABLE OF PROGRAM CONNECTOR LOCATIONS

CON.	PAGE	CON.	PAGE	CON.	PAGE
1	2	A	3	AA	8
2	2	B	3	BB	8
		C	3	CC	8
		D	3		
		E	3	C/P	3
		F	3	P1	1
		G	3	P2	3
		H	3	R/S	3
		I	3	RW	5
		J	4		
		K	4		
		L	4		
		M	4		
		N	5		
		O	5		
		P	5		
		Q	5		
		R	6		
		S	6		
		T	7		
		U	7		
		V	7		
		W	7		
		X	7		
		Y	7		
		Z	8		

INDEX FOR DETAIL FLOW CHART - Continued

LOCATION OF SWITCHES

SWITCH	PAGE	SWITCH	PAGE
1A	3	44	6
1B	3	45	6
2A	3	46	6
2B	3	47	6
3	3	48	6
4	3	49	6
5	3	50	6
6	3	51	6
7	3	52	6
8	3	53	7
9	3	54	7
10	3	55	7
11	4	56	7
12	4	57A	8
13	4	57B	8
14	4	58	8
15	4	59A	7
16	4	59B	7
17	4	60	1
18	4	61	1
19	4	62	2
20	4	63	2
21	4	64	2
22	5		
23	5		
24	5		
25	5		
26	5		
27	5		
28	5		
29	5		
30	5		
31	5		
32	5		
33	5		
34	5		
35	5		
36	5		
37	5		
38	4		
39	4		
40	4		
41	4		
42	4		
43	4		

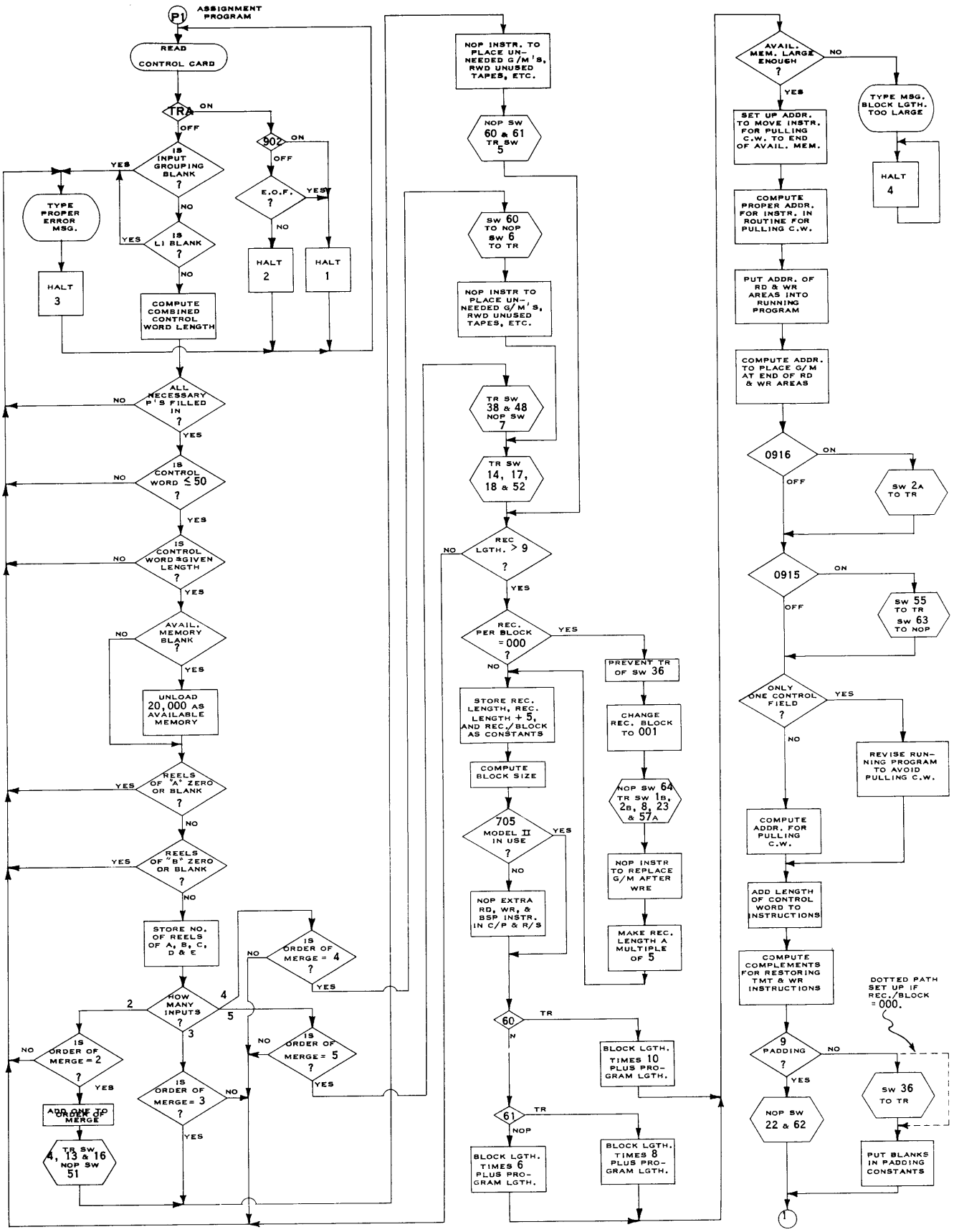
LOCATION OF HALTS

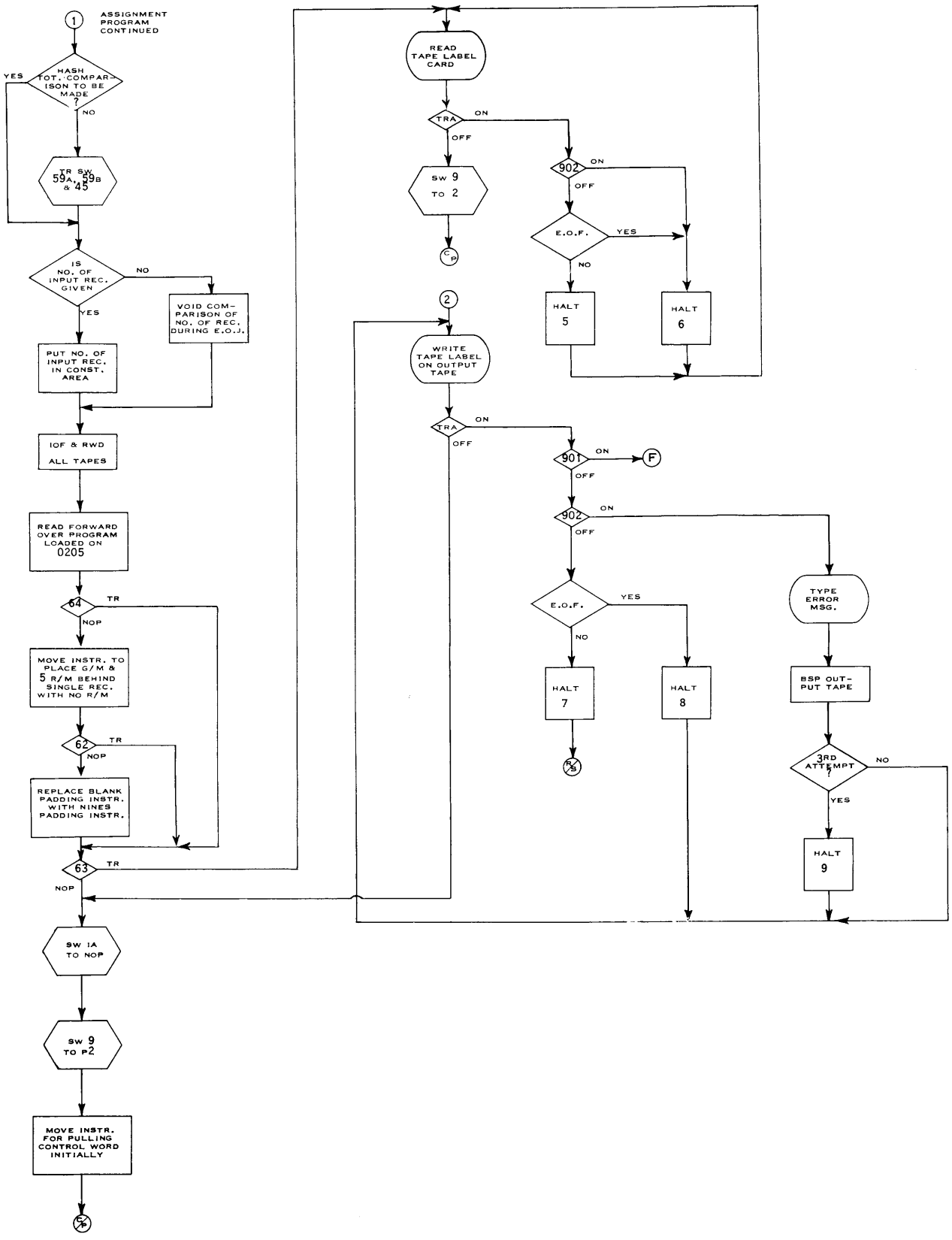
HALT NO.	PAGE
1	1
2	1
3	1
4	1
5	2
6	2
7	2
8	2
9	2
10	3
11	3
12	3
13	3
14	3
15	4
16	7
17	7
18	7
19	8
20	6
21	8
3333	8
9999	7

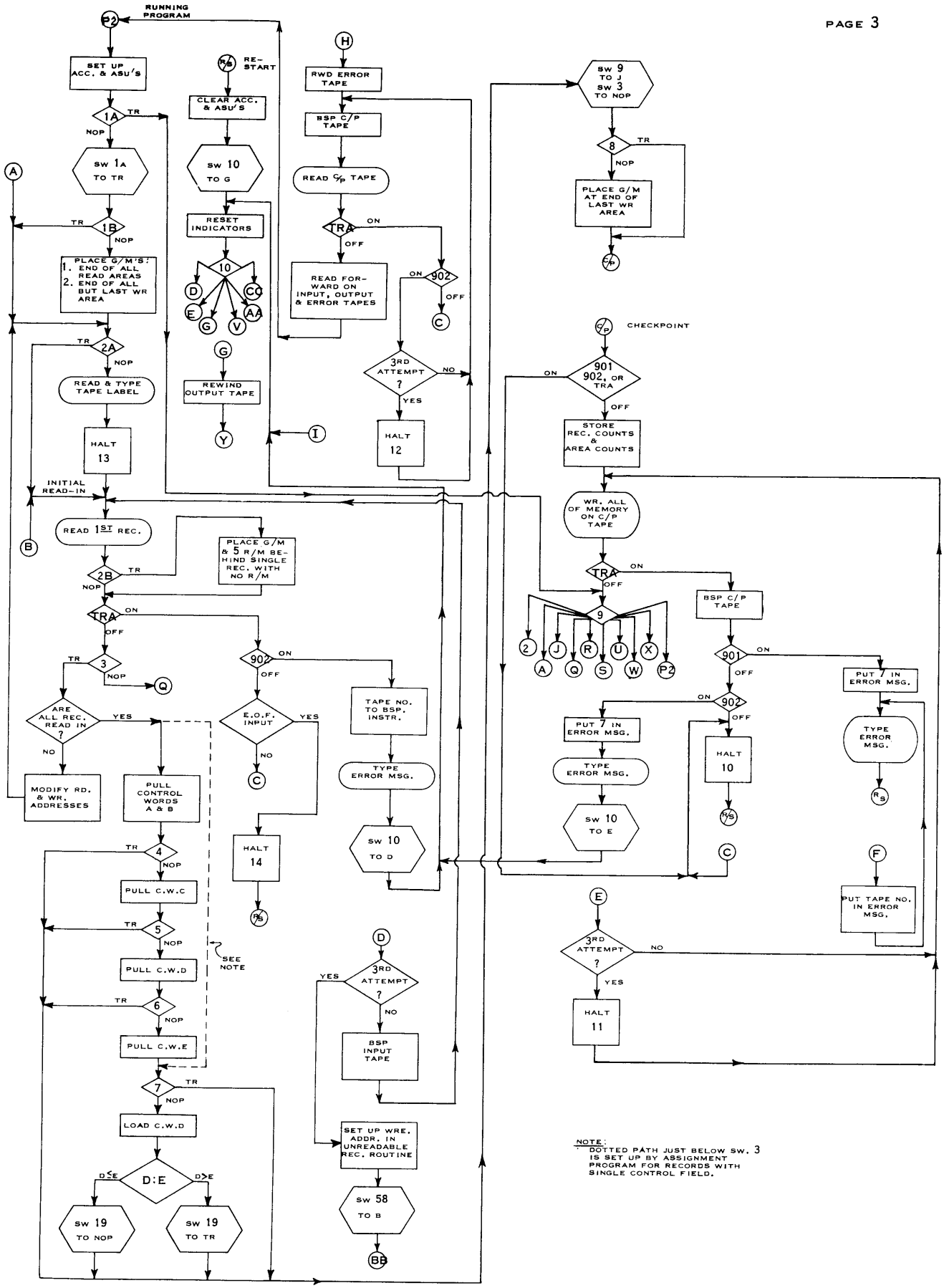
ABBREVIATIONS

ACC.	ACCUMULATOR
AVAIL.	AVAILABLE
CONST.	CONSTANT
C/P	CHECKPOINT
CTR.	COUNTER
C.W.	CONTROL WORD
E.O.F.	END OF FILE
E.O.J.	END OF JOB
G/M	GROUP MARK
INSTR.	INSTRUCTION
I/O	INPUT-OUTPUT
I/P	INPUT
L1	LENGTH OF CONTROL FIELD #1
LGTH.	LENGTH
MEM.	MEMORY
MSG.	MESSAGE
P	UNITS POSITION OF CONTROL FIELD
REC.	RECORD
R/M	RECORD MARK
R/S	RESTART
SEQ.	SEQUENCE
T/M	TAPE MARK
TOT.	TOTAL
UNEQ.	UNEQUAL

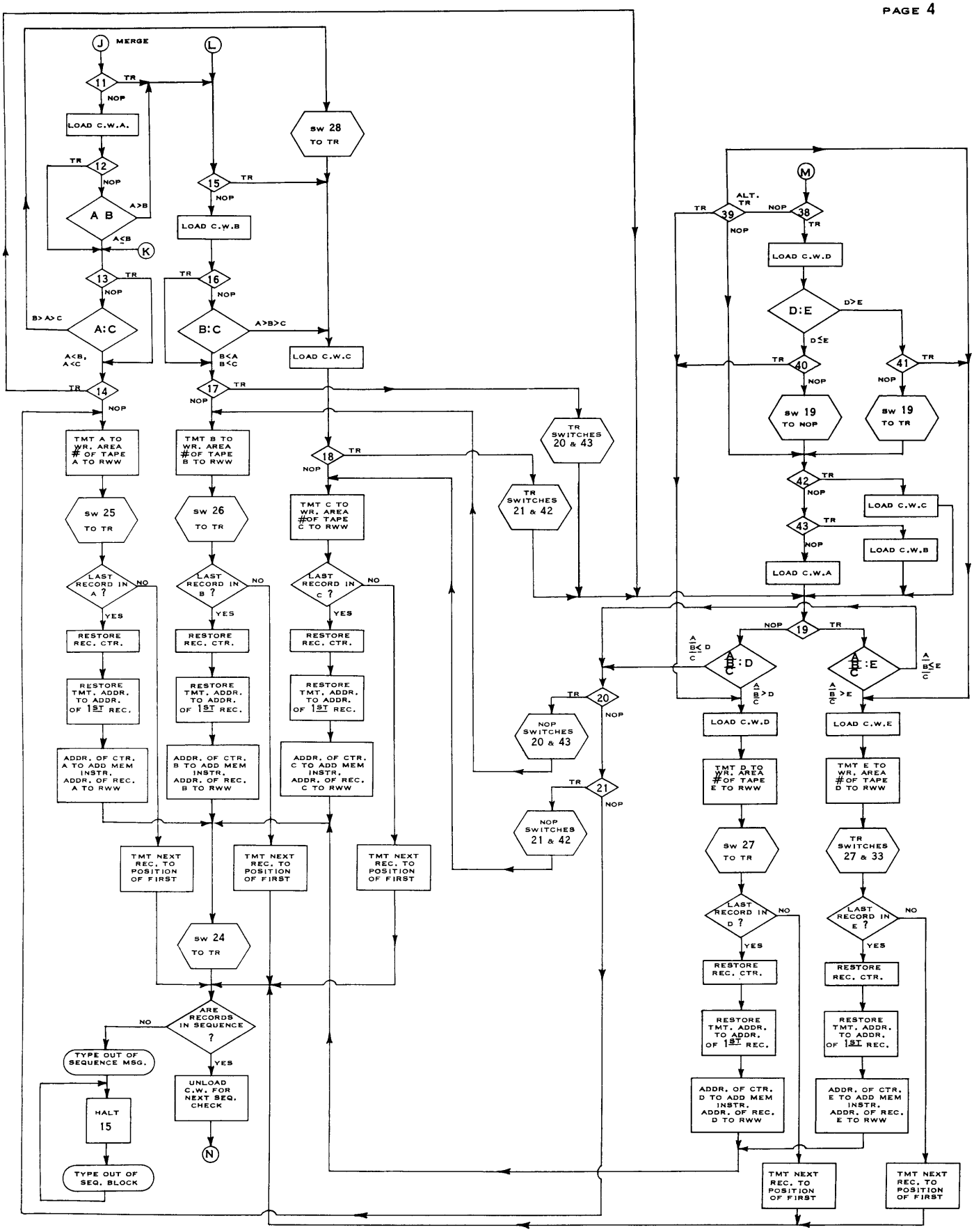
MERGE 52 DETAIL FLOW CHART

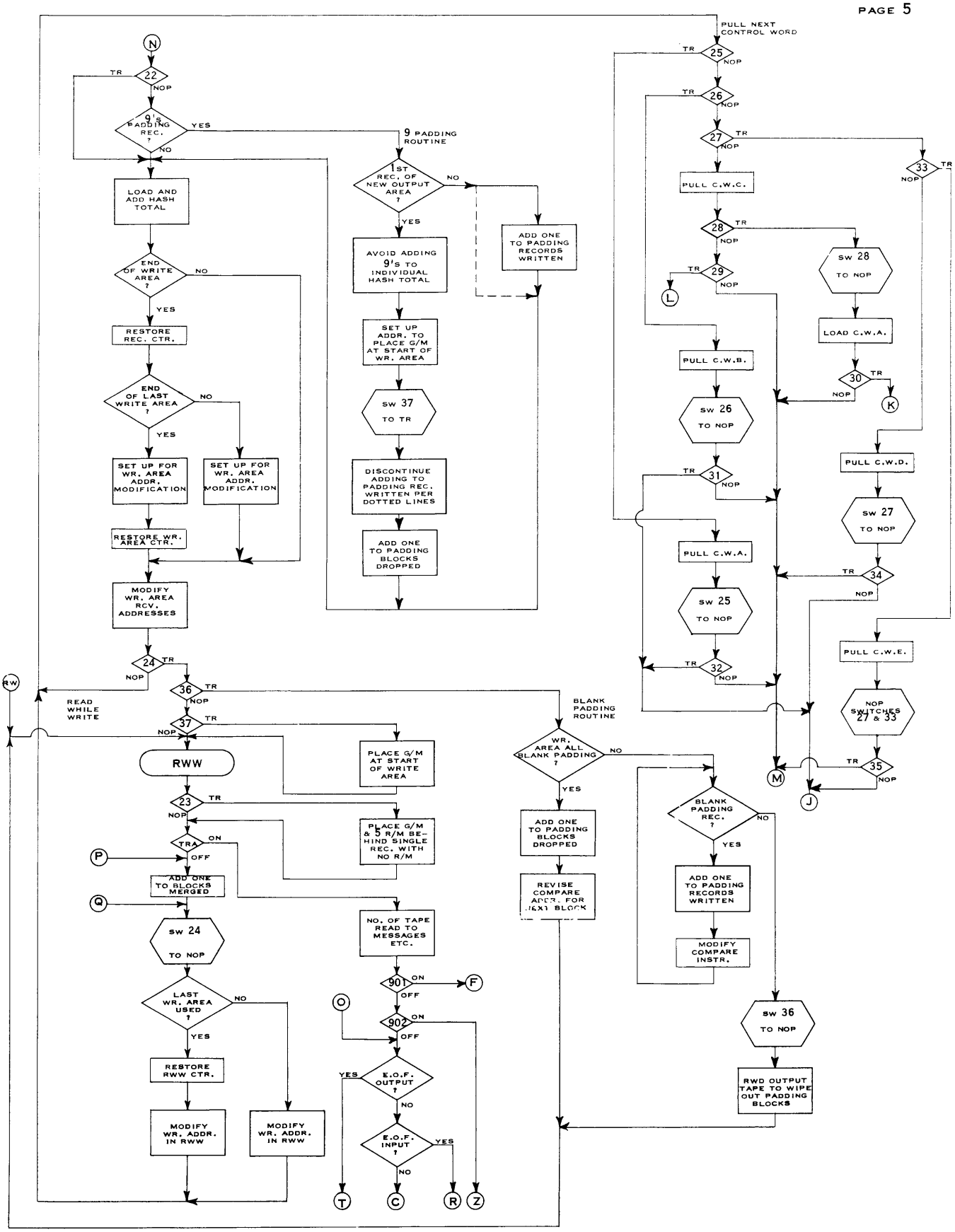


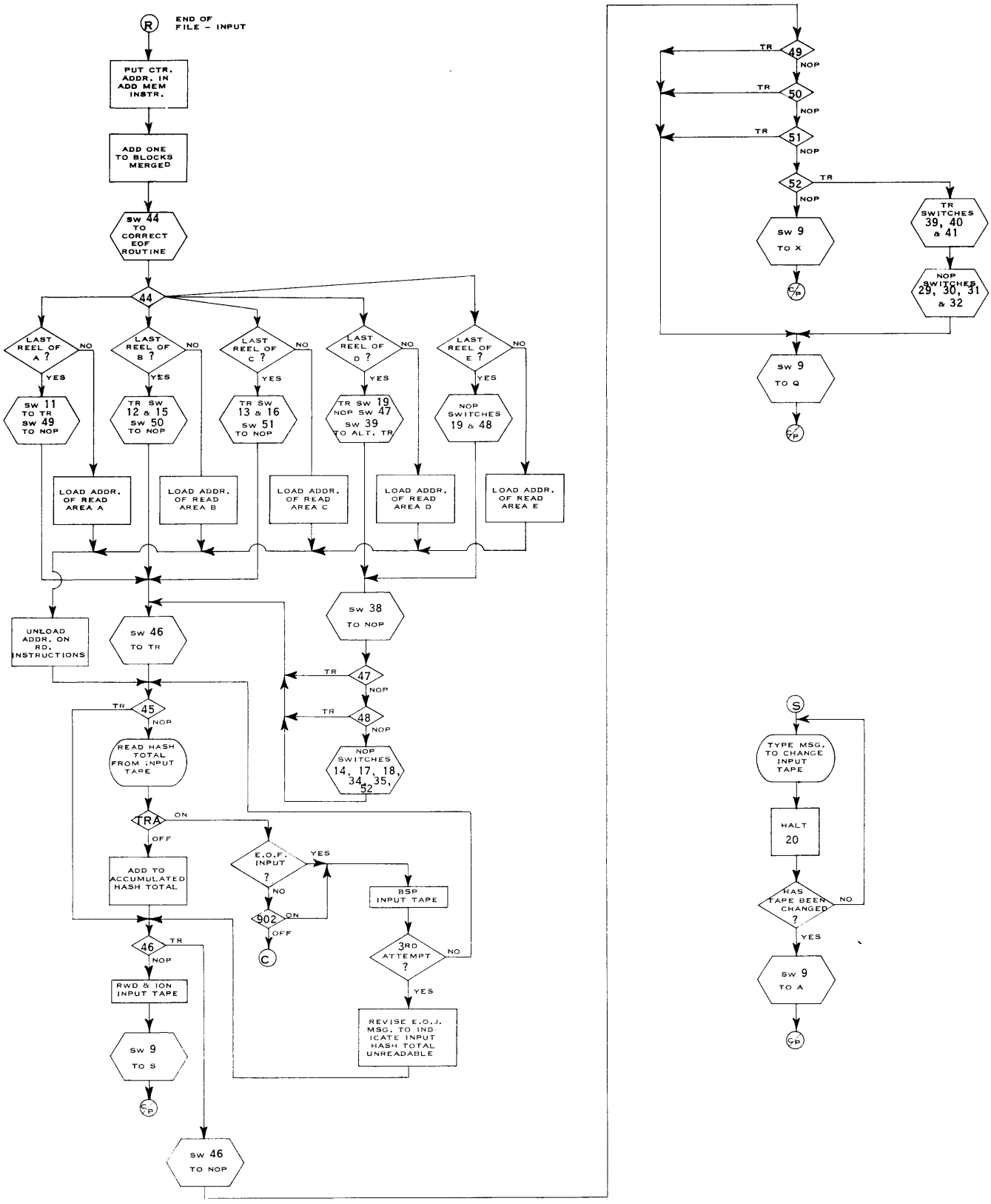

1
ASSIGNMENT PROGRAM CONTINUED
HASH TOT. COMPARISON TO BE MADE ?
YES
NO
TR SW 59A, 59B & 45
IS NO. OF INPUT REC. GIVEN
NO
YES
VOID COMPARISON OF NO. OF REC. DURING E.O.J.
PUT NO. OF INPUT REC. IN CONST. AREA
IOF & RWD ALL TAPES
READ FORWARD OVER PROGRAM LOADED ON 0205
64
TR
NOP
MOVE INSTR. TO PLACE G/M & 5 R/M BEHIND SINGLE REC. WITH NO R/M
62
TR
NOP
REPLACE BLANK PADDING INSTR. WITH NINES PADDING INSTR.
63
TR
NOP
SW 1A TO NOP
SW 9 TO P2
MOVE INSTR. FOR PULLING CONTROL WORD INITIALLY
P2
READ TAPE LABEL CARD
TRA
ON
OFF
SW 9 TO 2
C P
902
ON
OFF
E.O.F.
YES
NO
HALT 5
HALT 6
2
WRITE TAPE LABEL ON OUTPUT TAPE
TRA
ON
OFF
901
ON
F
OFF
902
ON
OFF
E.O.F.
YES
NO
HALT 7
HALT 8
R/S
TYPE ERROR MSG.
BSP OUTPUT TAPE
3RD ATTEMPT ?
NO
YES
HALT 9

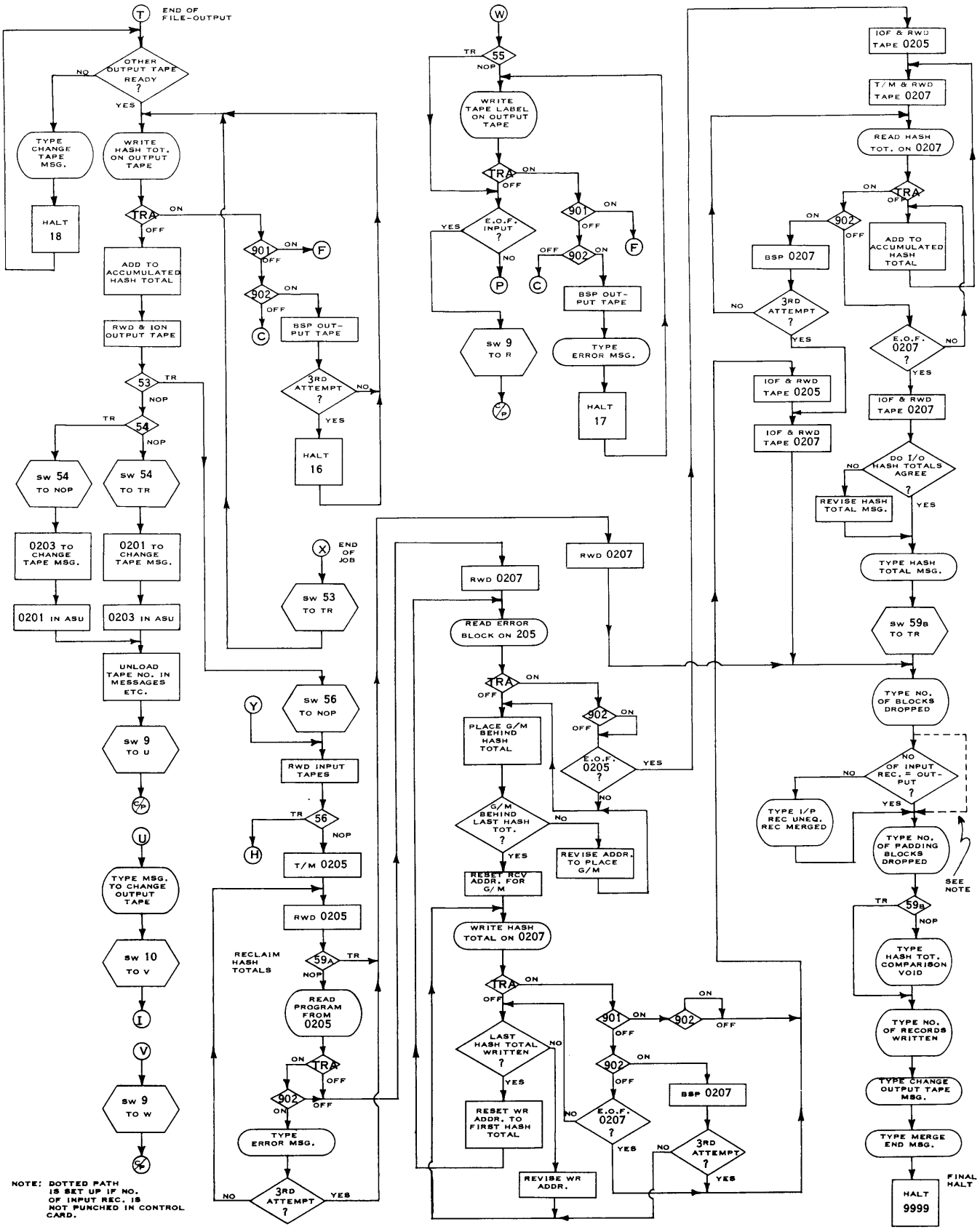


NOTE:
* DOTTED PATH JUST BELOW SW. 3 IS SET UP BY ASSIGNMENT PROGRAM FOR RECORDS WITH SINGLE CONTROL FIELD.

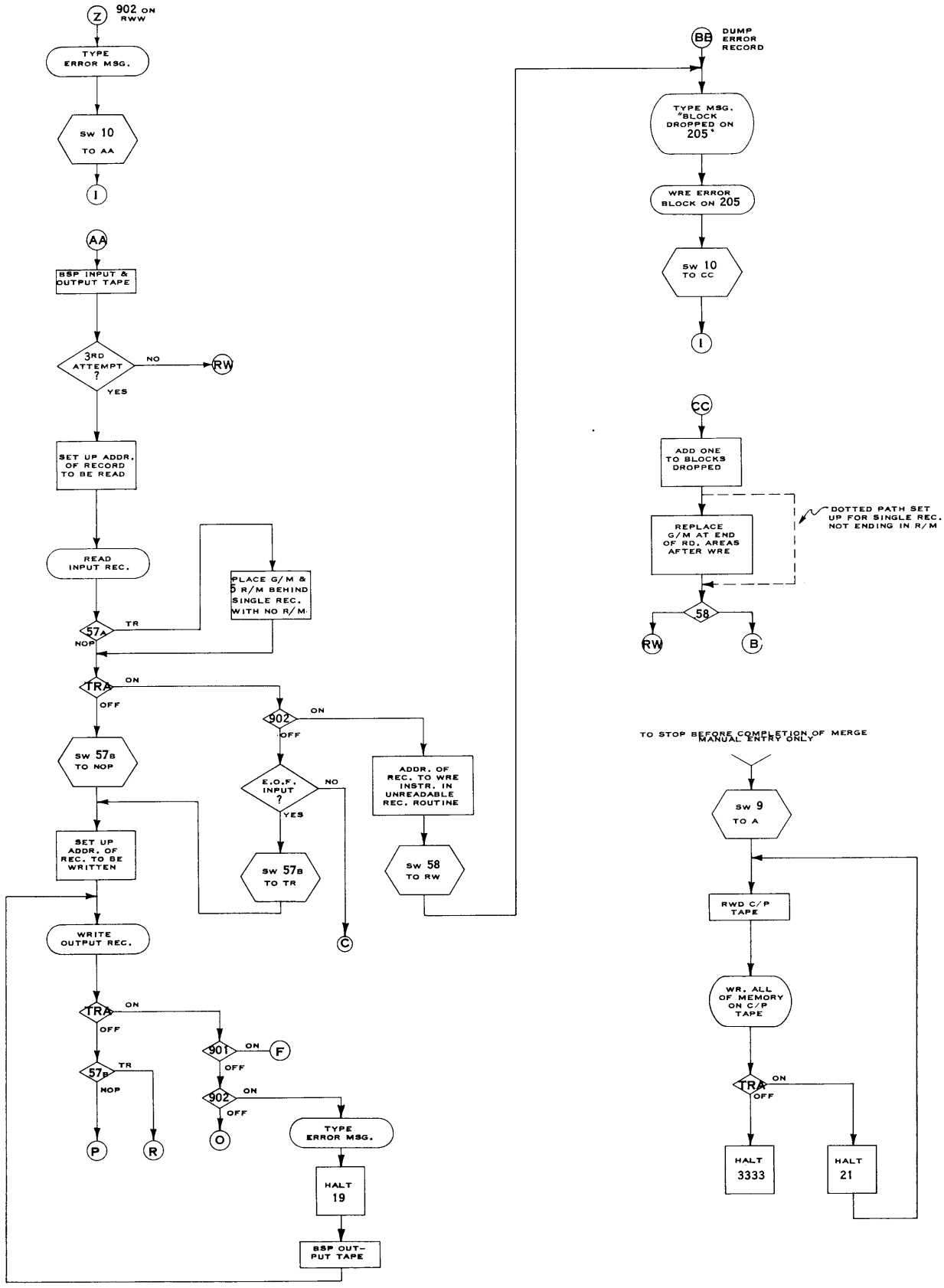

J MERGE
L
11
TR
NOP
LOAD C.W.A.
12
A B
A>B
A≤B
K
13
A:C
B>A>C
A<B, A<C
14
TMT A TO WR. AREA # OF TAPE A TO RWW
SW 25 TO TR
LAST RECORD IN A ?
NO
YES
RESTORE REC. CTR.
RESTORE TMT. ADDR. TO ADDR. OF 1ST REC.
ADDR. OF CTR. A TO ADD MEM INSTR. ADDR. OF REC. A TO RWW
TMT NEXT REC. TO POSITION OF FIRST
15
LOAD C.W.B
16
B:C
A>B>C
B<A B<C
17
TMT B TO WR. AREA #OF TAPE B TO RWW
SW 26 TO TR
LAST RECORD IN B ?
RESTORE REC. CTR.
RESTORE TMT. ADDR. TO ADDR. OF 1ST REC.
ADDR. OF CTR. B TO ADD MEM INSTR. ADDR. OF REC. B TO RWW
TMT NEXT REC. TO POSITION OF FIRST
SW 24 TO TR
ARE RECORDS IN SEQUENCE ?
NO
TYPE OUT OF SEQUENCE MSG.
HALT 15
TYPE OUT OF SEQ. BLOCK
YES
UNLOAD C.W. FOR NEXT SEQ. CHECK
N
SW 28 TO TR
LOAD C.W.C
18
TMT C TO WR. AREA #OF TAPE C TO RWW
LAST RECORD IN C ?
RESTORE REC. CTR.
RESTORE TMT. ADDR. TO ADDR. OF 1ST REC.
ADDR. OF CTR. C TO ADD MEM INSTR. ADDR. OF REC. C TO RWW
TMT NEXT REC. TO POSITION OF FIRST
TR SWITCHES 20 & 43
TR SWITCHES 21 & 42
20
NOP SWITCHES 20 & 43
21
NOP SWITCHES 21 & 42
M
ALT. TR
38
39
LOAD C.W.D
D:E
D>E
D≤E
40
41
SW 19 TO NOP
SW 19 TO TR
42
LOAD C.W.C
43
LOAD C.W.B
LOAD C.W.A
19
A/B/C < D
A/B/C > D
A/B/C ≤ E
A/B/C > E
LOAD C.W.D
LOAD C.W.E
TMT D TO WR. AREA #OF TAPE E TO RWW
TMT E TO WR. AREA #OF TAPE D TO RWW
SW 27 TO TR
TR SWITCHES 27 & 33
LAST RECORD IN D ?
LAST RECORD IN E ?
RESTORE REC. CTR.
RESTORE TMT. ADDR. TO ADDR. OF 1ST REC.
ADDR. OF CTR. D TO ADD MEM INSTR. ADDR. OF REC. D TO RWW
ADDR. OF CTR. E TO ADD MEM INSTR. ADDR. OF REC. E TO RWW
TMT NEXT REC. TO POSITION OF FIRST


PULL NEXT CONTROL WORD
25
26
27
33
PULL C.W.C.
28
SW 28 TO NOP
LOAD C.W.A.
29
30
PULL C.W.B.
SW 26 TO NOP
31
PULL C.W.D.
SW 27 TO NOP
PULL C.W.A.
SW 25 TO NOP
34
32
PULL C.W.E.
NOP SWITCHES 27 & 33
35
N
22
9'S PADDING REC. ?
YES
NO
9 PADDING ROUTINE
1ST REC. OF NEW OUTPUT AREA ?
AVOID ADDING 9'S TO INDIVIDUAL HASH TOTAL
SET UP ADDR. TO PLACE G/M AT START OF WR. AREA
SW 37 TO TR
DISCONTINUE ADDING TO PADDING REC. WRITTEN PER DOTTED LINES
ADD ONE TO PADDING BLOCKS DROPPED
ADD ONE TO PADDING RECORDS WRITTEN
LOAD AND ADD HASH TOTAL
END OF WRITE AREA ?
RESTORE REC. CTR.
END OF LAST WRITE AREA ?
SET UP FOR WR. AREA ADDR. MODIFICATION
RESTORE WR. AREA CTR.
MODIFY WR. AREA RCV. ADDRESSES
24
RW
READ WHILE WRITE
36
37
RWW
23
TRA
P
Q
ADD ONE TO BLOCKS MERGED
SW 24 TO NOP
LAST WR. AREA USED ?
RESTORE RWW CTR.
MODIFY WR. ADDR. IN RWW
PLACE G/M AT START OF WRITE AREA
PLACE G/M & S R/M BEHIND SINGLE REC. WITH NO R/M
NO. OF TAPE READ TO MESSAGES ETC.
901
902
O
E.O.F. OUTPUT ?
E.O.F. INPUT ?
T
C
R
Z
F
BLANK PADDING ROUTINE
WR. AREA ALL BLANK PADDING ?
ADD ONE TO PADDING BLOCKS DROPPED
REVISE COMPARE ADDR. FOR NEXT BLOCK
BLANK PADDING REC. ?
ADD ONE TO PADDING RECORDS WRITTEN
MODIFY COMPARE INSTR.
SW 36 TO NOP
RWD OUTPUT TAPE TO WIPE OUT PADDING BLOCKS
M
J
K
L


R
END OF FILE - INPUT
PUT CTR. ADDR. IN ADD MEM INSTR.
ADD ONE TO BLOCKS MERGED
SW 44 TO CORRECT EOF ROUTINE
44
LAST REEL OF A ?
LAST REEL OF B ?
LAST REEL OF C ?
LAST REEL OF D ?
LAST REEL OF E ?
NO
YES
SW 11 TO TR SW 49 TO NOP
TR SW 12 & 15 SW 50 TO NOP
TR SW 13 & 16 SW 51 TO NOP
TR SW 19 NOP SW 47 SW 39 TO ALT. TR
NOP SWITCHES 19 & 48
LOAD ADDR. OF READ AREA A
LOAD ADDR. OF READ AREA B
LOAD ADDR. OF READ AREA C
LOAD ADDR. OF READ AREA D
LOAD ADDR. OF READ AREA E
UNLOAD ADDR. ON RD. INSTRUCTIONS
SW 46 TO TR
SW 38 TO NOP
TR
NOP
45
47
48
READ HASH TOTAL FROM INPUT TAPE
NOP SWITCHES 14, 17, 18, 34, 35, 52
TRA
ON
OFF
ADD TO ACCUMULATED HASH TOTAL
E.O.F. INPUT ?
YES
NO
902
C
BSP INPUT TAPE
3RD ATTEMPT ?
REVISE E.O.J. MSG. TO INDICATE INPUT HASH TOTAL UNREADABLE
46
RWD & ION INPUT TAPE
SW 9 TO S
SW 46 TO NOP
49
50
51
52
SW 9 TO X
TR SWITCHES 39, 40 & 41
NOP SWITCHES 29, 30, 31 & 32
SW 9 TO Q
S
TYPE MSG. TO CHANGE INPUT TAPE
HALT 20
HAS TAPE BEEN CHANGED ?
SW 9 TO A



NOTE: DOTTED PATH IS SET UP IF NO. OF INPUT REC. IS NOT PUNCHED IN CONTROL CARD.


Z
902 ON RWW
TYPE ERROR MSG.
SW 10 TO AA
I
AA
BSP INPUT & OUTPUT TAPE
3RD ATTEMPT ?
NO
RW
YES
SET UP ADDR. OF RECORD TO BE READ
READ INPUT REC.
PLACE G/M & 5 R/M BEHIND SINGLE REC. WITH NO R/M
57A
TR
NOP
TRA
ON
OFF
902
ON
OFF
SW 57B TO NOP
E.O.F. INPUT ?
NO
YES
ADDR. OF REC. TO WRE INSTR. IN UNREADABLE REC. ROUTINE
SW 57B TO TR
SW 58 TO RW
C
SET UP ADDR. OF REC. TO BE WRITTEN
WRITE OUTPUT REC.
TRA
ON
OFF
901
ON
F
OFF
57B
TR
NOP
902
ON
OFF
P
R
O
TYPE ERROR MSG.
HALT 19
BSP OUT-PUT TAPE
BB
DUMP ERROR RECORD
TYPE MSG. "BLOCK DROPPED ON 205"
WRE ERROR BLOCK ON 205
SW 10 TO CC
I
CC
ADD ONE TO BLOCKS DROPPED
REPLACE G/M AT END OF RD. AREAS AFTER WRE
DOTTED PATH SET UP FOR SINGLE REC. NOT ENDING IN R/M
58
RW
B
TO STOP BEFORE COMPLETION OF MERGE MANUAL ENTRY ONLY
SW 9 TO A
RWD C/P TAPE
WR. ALL OF MEMORY ON C/P TAPE
TRA
ON
OFF
HALT 3333
HALT 21

```
C LNG      SYMBOLIC          INCR          ACTUAL        S      DATA OR DESCRIPTION
L       LOC   OP   ADDR          ASU  LOC   OP ADDR ADDR N

7       1.98.0                                                MERGE 52
7       1.99.0                                                CONTROL CARD AND TAPE LABEL CARD INFORMATION
6       2.00.0       00151
5 001   2.01.0                          00151
5 004   2.02.0                          00155                 P1
5 002   2.03.0                          00157                 L1
5 004   2.04.0                          00161                 P2
5 002   2.05.0                          00163                 L2
5 004   2.06.0                          00167                 P3
5 002   2.07.0                          00169                 L3
5 004   2.08.0                          00173                 P4
5 002   2.09.0                          00175                 L4
5 004   2.10.0                          00179                 P5
5 002   2.11.0                          00181                 L5
5 004   2.12.0                          00185                 INDIVIDUAL RECORD LENGTH, INPUT
5 003   2.13.0                          00188                 INPUT GROUPING
5 001   2.14.0                          00189                 PADDING INDICATOR
5 005   2.15.0                          00194                 AVAILABLE MEMORY
5 010   2.16.0                          00204                 # INPUT RECORDS IF KNOWN
5 001   2.17.0                          00205                 HASH TOTAL INDICATOR
5 002   2.18.0                          00207                 # REELS OF INPUT A
5 002   2.19.0                          00209                 # REELS OF INPUT B
5 002   2.20.0                          00211                 # REELS OF INPUT C
5 002   2.21.0                          00213                 # REELS INPUT D
5 002   2.22.0                          00215                 # REELS INPUT E
5 002   2.23.0                          00217                 CW LENGTH
5 001   2.24.0                          00218                 ORDER OF MERGE
5 013   2.25.0                          00231                 END OF TAPE LABEL CARD AREA
2 003   2.26.0                          00234
6       3.00.0       3.00.0  001  -                           0205
7       3.00.1                                                ATTEMPT TO RECLAIM HASH TOTALS FROM UNREADABLE REC
2 035   3.00.2                    00    00269                 PROGRAM FOR RECLAIMING HASH TOTALS
2 040   3.00.3                          00309                 FROM UNREADABLE RECORDS ON THIS TAPE
1       3.01.0 SEL     0207       00    00314 2   0207 0207
1       3.01.1 RWD     0002       00    00319 3   0002 0002
        3.01.2 RAD  12.22.0       15    00324 H   4210 4BA0
1       3.01.3 SEL     0205       00    00329 2   0205 0205
        3.02.0 RD   20.02.0       00    00334 Y   4627 4627   READ RECORD FROM 0205
        3.03.0 TRA   3.23.0       00    00339 I   0444 0444
        3.04.0 RCV  20.02.0 &010  00    00344 U   4637 4637   G/M BEHIND HASH TOTAL
        3.05.0 TMT  12.44.0       01    00349 9   4376 43X6
        3.06.0 SUB  12.14.0       15    00354 P   4185 4AH5   SUBTRACT ONE
        3.07.0 TRZ   3.10.0       15    00359 N   0374 0CG4
        3.08.0 ADM   3.04.0       11    00364 6   0344 0LD4   ADD RECORD LGTH TO RCV ADDR
        3.09.0 TR    3.04.0       00    00369 1   0344 0344
        3.10.0 RCV   3.04.0 -003  00    00374 U   0341 0341   RESET RCV ADDR
        3.11.0 TMT   3.74.0 -003  13    00379 9   0760 0GW0
        3.12.0 RAD  12.22.0       15    00384 H   4210 4BA0   RECORDS PER BLOCK
        3.12.1 RAD  12.13.0       14    00389 H   4184 4AQ4   000 IN ASU 14
1       3.13.0 SEL     0207       00    00394 2   0207 0207
        3.14.0 WR   20.02.0       00    00399 R   4627 4627
        3.15.0 TRA   3.28.0       00    00404 I   0469 0469
        3.16.0 SUB  12.14.0       15    00409 P   4185 4AH5   SUBTRACT ONE
        3.17.0 TRZ   3.20.0       15    00414 N   0429 0DB9
        3.18.0 ADM   3.14.0       11    00419 6   0399 0LI9   ADD RECORD LENGTH TO WR ADDR
        3.19.0 TR    3.13.0       00    00424 1   0394 0394
        3.20.0 RCV   3.14.0 -003  00    00429 U   0396 0396   RESET WR ADDR
        3.21.0 TMT   3.75.0 -003  13    00434 9   0764 0GW4
        3.22.0 TR    3.01.2       00    00439 1   0324 0324
1       3.23.0 SEL     0902       00    00444 2   0902 0902   TURN OFF INDICATOR
        3.24.0 TRS   3.25.0       00    00449 O   0454 0454
1       3.25.0 SEL     0205       00    00454 2   0205 0205
        3.26.0 TRS   3.39.0       00    00459 O   0524 0524
        3.27.0 TR    3.04.0       00    00464 1   0344 0344   TO CONTINUE
1       3.28.0 SEL     0901       00    00469 2   0901 0901
        3.29.0 TRS   3.72.9       00    00474 O   0719 0719   HASH TOTAL CONTAINS REDUNDANT CHARACTER
1       3.30.0 SEL     0902       00    00479 2   0902 0902
        3.31.0 TRS   3.35.0       00    00484 O   0504 0504
1       3.32.0 SEL     0207       00    00489 2   0207 0207
        3.33.0 TRS   3.73.1       00    00494 O   0729 0729   EOF WRITING 0207
        3.34.0 TR    3.16.0       00    00499 1   0409 0409   TO CONTINUE
1       3.35.0 SEL     0207       00    00504 2   0207 0207
1       3.36.0 BSP     0004       00    00509 3   0004 0004
        3.37.0 NTR   3.14.0       14    00514 X   0399 0CR9
        3.38.0 TR    3.73.1       00    00519 1   0729 0729   PERSISTENT 0902
1       3.39.0 SEL     0205       00    00524 2   0205 0205
1       3.40.0 IOF     0000       00    00529 3   0000 0000
1       3.41.0 RWD     0002       00    00534 3   0002 0002
1       3.46.0 SEL     0207       00    00539 2   0207 0207
1       3.47.0 WTM     0001       00    00544 3   0001 0001
1       3.48.0 RWD     0002       00    00549 3   0002 0002
        3.49.0 RAD  12.13.0       14    00554 H   4184 4AQ4   000 IN ASU 14
1       3.50.0 RD      0000       00    00559 Y   0000 0000
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C LNG      SYMBOLIC          INCR          ACTUAL          S      DATA OR DESCRIPTION
L      LOC   OP   ADDR                ASU  LOC   OP ADDR ADDR N

       3•51•0 TRA  3•56•0              00  00564 I  0589 0589
1      3•52•0 LOD     0009             05  00569 8  0009 0##9    LOAD HASH TOTAL
       3•53•0 ADD 12•16•0              05  00574 G  4187 4/Y7     STRIP ZONING
       3•54•0 ADM 12•02•0              05  00579 6  4128 4/S8     ADD TO ACCUMULATED HASH TOTAL
       3•55•0 TR   3•50•0              00  00584 1  0559 0559
1      3•56•0 SEL     0902             00  00589 2  0902 0902
       3•57•0 TRS  3•61•0              00  00594 O  0614 0614
1      3•58•0 SEL     0207             00  00599 2  0207 0207
       3•59•0 TRS  3•64•1              00  00604 O  0634 0634    TO COMPARE HASH TOTALS
       3•60•0 TR   3•52•0              00  00609 1  0569 0569    TO CONTINUE
1      3•61•0 SEL     0207             00  00614 2  0207 0207
1      3•62•0 BSP     0004             00  00619 3  0004 0004
       3•63•0 NTR  3•50•0              14  00624 X  0559 0EN9
       3•64•0 TR   3•73•4              00  00629 1  0744 0744    PERSISTENT 0902
1      3•64•1 IOF     0000             00  00634 3  0000 0000
1      3•64•2 RWD     0002             00  00639 3  0002 0002
       3•65•0 LOD 12•02•0              05  00644 8  4128 4/S8     LOAD HASH TOTAL ACCUMULATED FROM RECORDS
       3•66•0 CMP 12•04•0              05  00649 4  4148 4/U8     COMPARE TO HASH TOTAL ACCUMULATED
       3•67•0 TRE  3•70•1              00  00654 L  0689 0689     FROM END OF INPUT TAPES
       3•67•1 RAD 12•10•0              14  00659 H  4172 4AP2
       3•67•2 ADD 12•12•0              14  00664 G  4181 4AQ1
       3•67•3 ADM  3•70•1              14  00669 6  0689 0FQ9     REVISE RCV ADDRESS
1      3•68•0 SET     0012             14  00674 B  0012 06J2     REVISE HASH TOTAL MSG
       3•69•0 LOD  3•76•0              14  00679 8  0779 0GP9
       3•70•0 UNL  3•77•0              14  00684 7  0807 0H-7
       3•70•1 RCV  3•77•0 -006         00  00689 U  0801 0801     PLACE G/M
       3•70•2 TMT 12•36•0              01  00694 9  4300 43#0
1      3•71•0 SEL     0500             00  00699 2  0500 0500
       3•72•0 WR   3•77•0 -027         00  00704 R  0780 0780     HASH TOTAL MSG
       3•72•1 UNL 11•43•0 -004         01  00709 7  3765 37W5     SW 59B TO TR
       3•72•2 TR  11•31•0              00  00714 1  3709 3709
1      3•72•9 SEL     0902             00  00719 2  0902 0902     TURN OFF INDICATOR
       3•73•0 TRS  3•73•1              00  00724 O  0729 0729
1      3•73•1 SEL     0205             00  00729 2  0205 0205
1      3•73•2 IOF     0000             00  00734 3  0000 0000
1      3•73•3 RWD     0002             00  00739 3  0002 0002
1      3•73•4 SEL     0207             00  00744 2  0207 0207
1      3•73•5 IOF     0000             00  00749 3  0000 0000
1      3•73•6 RWD     0002             00  00754 3  0002 0002
       3•73•7 TR  11•31•0              00  00759 1  3709 3709
7      3•73•9                                                  CONSTANTS
3      3•74•0      20•02•0 &010            00763     4637 4637  ADDR TO PLACE G/M BEHIND FIRST HASH TOTAL
3      3•75•0      20•02•0                 00767     4627 4627  ADDR OF FIRST HASH TOTAL
2 012  3•76•0                              00779                DO NOT AGREE
2 028  3•77•0                              00807                I/O HASH TOTALS AGREE
2 001  3•78•0                              00808
6      3•90•0       3•00•0
1      3•91•0 RCV     0000             00  00239 U  0000 0000     PLACE G/M AT END OF LAST WRITE AREA
       3•92•0 TMT 12•01•0              01  00244 9  4118 41/8
7      4•00•1                                                  WRITE A CHECKPOINT
       4•01•0 TRA  4•27•0              00  00249 I  0379 0379
1      4•02•0 SEL     0902             00  00254 2  0902 0902
       4•03•0 TRS  4•27•0              00  00259 O  0379 0379
1      4•04•0 SEL     0901             00  00264 2  0901 0901
       4•05•0 TRS  4•27•0              00  00269 O  0379 0379
       4•06•0 ST  12•73•0              03  00274 F  4607 46G7
       4•07•0 ST  12•74•0              04  00279 F  4608 4W08
       4•08•0 ST  12•75•0              06  00284 F  4611 4WJ1
       4•09•0 ST  12•76•0              07  00289 F  4614 4WA4
       4•10•0 ST  12•77•0              08  00294 F  4617 4017
       4•11•0 ST  20•06•0              09  00299 F  4682 40Y2
       4•12•0 ST  30•05•0              10  00304 F  5235 5KL5
       4•13•0 ST  12•78•0              12  00309 F  4618 4F18
       4•14•0 RAD 12•13•0              14  00314 H  4184 4AQ4
1      4•15•0 SEL     0207             00  00319 2  0207 0207     WRITE ALL OF MEMORY ON 0207
1      4•16•0 WR      0000             01  00324 R  0000 00#0
1      4•17•0 WR     19999             01  00329 R 19999 Z9Z9
       4•18•0 TRA  4•20•0              00  00334 I  0344 0344
1      4•19•0 TR                       00  00339 1                SWITCH 9
7      4•19•1                                                  ERROR WRITING CHECKPOINT
1      4•20•0 SEL     0207             00  00344 2  0207 0207     BACKSPACE 0207
1      4•21•0 BSP     0004             00  00349 3  0004 0004
1      4•22•0 BSP     0004             00  00354 3  0004 0004
1      4•23•0 SEL     0901             00  00359 2  0901 0901
       4•24•0 TRS  4•29•0              00  00364 O  0389 0389
1      4•25•0 SEL     0902             00  00369 2  0902 0902
       4•26•0 TRS  4•34•0              00  00374 O  0414 0414
1      4•27•0 HLT     0010             00  00379 J  0010 0010     FALSE TRA  GO TO RESTART
       4•28•0 TR   4•43•0              00  00384 1  0459 0459     GO TO RESTART
       4•29•0 RCV 12•31•0              00  00389 U  4277 4277     PUT 7 IN ERROR
       4•30•0 TMT  4•20•0              01  00394 9  0344 03U4     MESSAGE
1      4•31•0 SEL     0500             00  00399 2  0500 0500
       4•32•0 WR  12•30•0 &001         00  00404 R  4264 4264
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C LNG      SYMBOLIC          INCR          ACTUAL          S      DATA OR DESCRIPTION
L      LOC    OP    ADDR              ASU  LOC   OP ADDR ADDR N

       4.33.0 TR    4.43.0            00  00409 1  0459 0459    GO TO RESTART
       4.34.0 RCV  12.39.0            00  00414 U  4332 4332    PUT 7 IN ERROR MESSAGE
       4.35.0 TMT   4.20.0            01  00419 9  0344 03U4    902 WRITING C/P
1      4.36.0 SEL     0500            00  00424 2  0500 0500
       4.37.0 WR   12.38.0 &001       00  00429 R  4319 4319
       4.38.0 RCV   4.54.0 -003       00  00434 U  0511 0511
       4.39.0 TMT  11.90.0 -003       13  00439 9  3976 3IX6
       4.40.0 NTR   4.15.0            14  00444 X  0319 0CJ9
1      4.41.0 HLT     0011            00  00449 J  0011 0011    PERSISTENT 902 WRITING C/P  START TO TRY AGAIN
       4.42.0 TR    4.14.0            00  00454 1  0314 0314    BACK TO TRY WRITING 3 MORE TIMES
7      4.42.1                                                    RESTART PROCEDURE
1      4.43.0 SET     0000            00  00459 B  0000 0000    CLEAR 00 AND ASU
1      4.44.0 SET     0256            00  00464 B  0256 0256
1      4.45.0 SET     0000            01  00469 B  0000 00#0
1      4.46.0 SET     0260            01  00474 B  0260 02W0
       4.47.0 RCV   4.54.0 -003       00  00479 U  0511 0511    TR ADDRESS AFTER TURNING OFF
       4.48.0 TMT  11.91.0 -003       01  00484 9  3980 39Y0    ERROR LIGHTS
       4.49.0 TRA   4.50.0            00  00489 I  0494 0494
1      4.50.0 SEL     0901            00  00494 2  0901 0901
       4.51.0 TRS   4.52.0            00  00499 O  0504 0504
1      4.52.0 SEL     0902            00  00504 2  0902 0902
       4.53.0 TRS   4.54.0            00  00509 O  0514 0514
1      4.54.0 TR                      00  00514 1                SWITCH 10
1      4.55.0 SEL     0201            00  00519 2  0201 0201
1      4.56.0 IOF     0000            00  00524 3  0000 0000
1      4.57.0 RWD     0002            00  00529 3  0002 0002
       4.58.0 RAD  12.14.0            01  00534 H  4185 41Y5    SET ASU 01 TO 1
       4.59.0 TR   11.05.0            00  00539 1  3569 3569    TO REWIND INPUT TAPES
1      4.60.0 IOF     0000            00  00544 3  0000 0000
1      4.61.0 RWD     0002            00  00549 3  0002 0002
       4.62.0 RAD  12.13.0            14  00554 H  4184 4AQ4    SET ASU 14
1      4.63.0 SEL     0207            00  00559 2  0207 0207    SELECT C/P TAPE
1      4.64.0 BSP     0004            00  00564 3  0004 0004
1      4.65.0 BSP     0004            00  00569 3  0004 0004
1      4.66.0 RD      0000            00  00574 Y  0000 0000    READ C/P TAPE
1      4.67.0 RD     19999            00  00579 Y 19999 Z999
       4.68.0 TRA   4.99.0            00  00584 I  0739 0739
       4.69.0 RAD  12.59.0            00  00589 H  4555 4555    CTR A
       4.70.0 TRZ   4.75.0            00  00594 N  0619 0619
1      4.71.0 SEL     0200            00  00599 2  0200 0200
1      4.72.0 RD      0000            01  00604 Y  0000 00#0
       4.73.0 SUB  12.14.0            00  00609 P  4185 4185
       4.74.0 TR    4.70.0            00  00614 1  0594 0594
       4.75.0 RAD  12.60.0            00  00619 H  4560 4560    CTR B
       4.76.0 TRZ   4.81.0            00  00624 N  0649 0649
1      4.77.0 SEL     0202            00  00629 2  0202 0202
1      4.78.0 RD      0000            01  00634 Y  0000 00#0
       4.79.0 SUB  12.14.0            00  00639 P  4185 4185
       4.80.0 TR    4.76.0            00  00644 1  0624 0624
       4.81.0 RAD  12.61.0            00  00649 H  4565 4565    CTR C
       4.82.0 TRZ  20.10.0            00  00654 N  4699 4699
1      4.83.0 SEL     0204            00  00659 2  0204 0204
1      4.84.0 RD      0000            01  00664 Y  0000 00#0
       4.85.0 SUB  12.14.0            00  00669 P  4185 4185
       4.86.0 TR    4.82.0            00  00674 1  0654 0654
       4.87.0 RAD  12.64.0            00  00679 H  4580 4580    CTR R
       4.88.0 TRZ   4.93.0            00  00684 N  0709 0709
1      4.89.0 SEL     0201            00  00689 2  0201 0201
1      4.90.0 RD      0000            01  00694 Y  0000 00#0
       4.91.0 SUB  12.14.0            00  00699 P  4185 4185
       4.92.0 TR    4.88.0            00  00704 1  0684 0684
       4.93.0 RAD  12.65.0            00  00709 H  4585 4585    CTR U
       4.94.0 TRZ   5.05.0            00  00714 N  0769 0769    TRANSFER TO RESET ALL ASU CONTENTS
1      4.95.0 SEL     0205            00  00719 2  0205 0205
1      4.96.0 RD      0000            01  00724 Y  0000 00#0
       4.97.0 SUB  12.14.0            00  00729 P  4185 4185
       4.98.0 TR    4.94.0            00  00734 1  0714 0714
1      4.99.0 SEL     0902            00  00739 2  0902 0902
       5.00.0 TRS   5.02.0            00  00744 O  0754 0754
       5.01.0 TR    4.27.0            00  00749 1  0379 0379    HALT
       5.02.0 NTR   4.63.0            14  00754 X  0559 0EN9
1      5.03.0 HLT     0012            00  00759 J  0012 0012    902 READING C/P DURING R/S
       5.04.0 TR    4.62.0            00  00764 1  0554 0554    MAKE THREE MORE ATTEMPTS TO READ
7      5.04.1                                                    SET UP ASUS
       5.05.0 RAD  12.14.0            01  00769 H  4185 41Y5    1 TO # 1
1      5.06.0 SET     0001            02  00774 B  0001 00-1
       5.07.0 LOD  12.14.0            02  00779 8  4185 41Q5    A TO 02
       5.08.0 RAD  12.73.0            03  00784 H  4607 46G7    # RECORDS IN WRITE AREA IN 3 # R/B INITIALLY
       5.09.0 RAD  12.74.0            04  00789 H  4608 4W08    # OF WR AREAS BEFORE RETURNING TO FIRST
1      5.10.0 SET     0010            05  00794 B  0010 0#/0    FOR HASH TOTAL
       5.11.0 RAD  12.75.0            06  00799 H  4611 4WJ1    # OF REC IN A BEFORE RETURNING TO FIRST
       5.12.0 RAD  12.76.0            07  00804 H  4614 4WA4    # OF REC IN B BEFORE RETURNING TO FIRST
       5.13.0 RAD  12.77.0            08  00809 H  4617 4017    # OF REC IN C BEFORE RETURNING TO FIRST
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C LNG       SYMBOLIC          INCR            ACTUAL          S       DATA OR DESCRIPTION
L      LOC    OP   ADDR              ASU  LOC   OP ADDR ADDR N

       5.14.0 RAD 20.06.0            09  00814 H  4682 4OY2    # OF REC IN D BEFORE RETURNING TO FIRST
       5.15.0 RAD 30.05.0            10  00819 H  5235 5KL5    # OF REC IN E BEFORE RETURNING TO FIRST
       5.16.0 RAD 12.20.0            11  00824 H  4203 4K&3    RECORD LENGTH 4 PLACES
       5.17.0 RAD 12.78.0            12  00829 H  4618 4F18    # OF REC IN WR AREA BEFORE RETURNING TO FIRST
1      5.18.0 SET     0004           13  00834 B  0004 0&#4
       5.19.0 LOD 12.79.0            13  00839 8  4622 4FS2    COMPLIMENT TO RESTORE TMTS
1      5.20.0 SET                    00  00844 B               SET ACC TO CONTROL WORD LENGTH
       5.21.0 TR    4.19.0           00  00849 1  0339 0339    SWITCH 1A
1      5.22.0 TR      0004           00  00854 1  0004 0004
7      5.22.1                                                  INITIAL READ IN ROUTINE
       5.23.0 NOP   5.33.0           00  00859 A  0909 0909    SW 2A TR IF NO TAPE LABEL ON INPUT
1      5.24.0 SEL     0200           00  00864 2  0200 0200    READ TAPE LABEL
1      5.25.0 RWW     0000           00  00869 S  0000 0000
1      5.26.0 RD      0000           00  00874 Y  0000 0000
       5.27.0 TMT 12.44.0            01  00879 9  4376 43X6
1      5.28.0 SEL     0500           00  00884 2  0500 0500
       5.29.0 WR  12.32.0 &001       00  00889 R  4279 4279    WRITE TAPE #
1      5.30.0 WR      0000           00  00894 R  0000 0000    TYPE TAPE LABEL
1      5.31.0 HLT     0013           00  00899 J  0013 0013    AFTER TYPING TAPE LABEL  EXAMINE AND START
       5.32.0 ADM 12.59.0            01  00904 6  4555 45V5
       5.33.0 RAD 12.13.0            14  00909 H  4184 4AQ4    RESTORE CTR FOR ERROR ROUTINES
       5.34.0 ADM 12.59.0            01  00914 6  4555 45V5    ADD 1 TO CTR A, B, C, D, OR E
1      5.35.0 SEL     0200           00  00919 2  0200 0200    READ FIRST RECORD
1      5.36.0 RWW     0000           00  00924 S  0000 0000
1      5.36.1 RD      0000           00  00929 Y  0000 0000
       5.36.2 NOP 10.39.0            00  00934 A  3459 3459    SWITCH 2B TR FOR SINGLE RECORDS NOT ENDING IN R/M
       5.37.0 TRA   5.40.0           00  00939 I  0954 0954
1      5.38.0 TR      0079           00  00944 1  0079 0079
       5.39.0 TR    7.40.0           00  00949 1  1954 1954    TO CONTINUE MERGING
7      5.39.1                                                  TRA ROUTINE FOR INITIAL READ IN
1      5.40.0 SEL     0902           00  00954 2  0902 0902
       5.41.0 TRS   5.47.0           00  00959 O  0989 0989
1      5.42.0 SEL     0200           00  00964 2  0200 0200
       5.43.0 TRS   5.45.0           00  00969 O  0979 0979
       5.44.0 TR    4.27.0           00  00974 1  0379 0379    HALT
1      5.45.0 HLT     0014           00  00979 J  0014 0014    EOF READING FIRST RECORD  CHANGE TAPE & START
       5.46.0 TR    4.43.0           00  00984 1  0459 0459    TRANSFER TO RESTART
       5.47.0 RCV 12.27.0            00  00989 U  4242 4242    WRITE ERROR MESSAGE
       5.48.0 TMT   5.35.0           01  00994 9  0919 09/9
       5.49.0 RCV   5.62.0           00  00999 U  1064 1064    TAPE # TO BACKSPACE INSTRUCTION
       5.50.0 TMT   5.35.0           01  01004 9  0919 09/9
1      5.51.0 SEL     0500           00  01009 2  0500 0500
       5.52.0 WR  12.27.0 -011       00  01014 R  4231 4231
       5.53.0 RCV   4.54.0 -003     00  01019 U  0511 0511
       5.54.0 TMT 11.92.0 -003     13  01024 9  3984 3IY4
       5.55.0 TR    4.49.0           00  01029 1  0489 0489
       5.56.0 NTR   5.62.0           14  01034 X  1064 1&04
       5.57.0 RCV 10.25.0 -003     00  01039 U  3386 3386    SET RETURN ADDRESSES READ ADDRESS
       5.58.0 TMT   5.36.0 -003     13  01044 9  0921 0IS1    INTO WRITE UNREADABLE ADDRESS
       5.59.0 RCV 10.38.0 -003     00  01049 U  3451 3451    RETURN ADDR IF RECORD IS NOT CORRECTED
       5.60.0 TMT 11.85.0 -003     13  01054 9  3956 3IV6
       5.61.0 TR  10.22.0            00  01059 1  3374 3374    WRITE RECORD ON ERROR TAPE
1      5.62.0 SEL     0200           00  01064 2  0200 0200    BACKSPACE FOR 902
1      5.63.0 BSP     0004           00  01069 3  0004 0004    AND TRY TO
       5.64.0 TR    5.36.0           00  01074 1  0924 0924    READ AGAIN
7      5.64.1                                                  MERGE
       5.65.0 NOP   5.92.0           00  01079 A  1214 1214    SWITCH 11 TR AT END OF INPUT A
       5.66.0 LOD 12.83.0            00  01084 8  0000 0000    LOAD C W A
       5.67.0 NOP   5.70.0           00  01089 A  1104 1104    SWITCH 12 TR AT END OF INPUT B
       5.68.0 CMP 12.85.0            00  01094 4  0050 0050    COMPARE A TO B
       5.69.0 TRH   5.92.0           00  01099 K  1214 1214    A B
       5.70.0 NOP   5.73.0           00  01104 A  1119 1119    SWITCH 13 TR AT END OF INPUT C
       5.71.0 CMP 12.87.0            00  01109 4  0100 0100    COMPARE A TO C
       5.72.0 TRH   6.16.0           00  01114 K  1334 1334    A C
       5.73.0 NOP 20.21.0            00  01119 A  4754 4754    SWITCH 14 TR FOR 4 OR 5 WAY
7      5.73.1                                                  TMT A TO WRITE AREA
1      5.74.0 RCV     0004           00  01124 U  0004 0004
1      5.75.0 TMT     0004           00  01129 9  0004 0004
       5.76.0 RCV   7.34.0           00  01134 U  1919 1919    PLACE # OF TAPE UNIT A TO RWW
       5.77.0 TMT 12.06.0 -004     01  01139 9  4159 41V9    SEQ ROUTINE
       5.78.0 UNL   6.69.0 -004     01  01144 7  1590 15Z0    SW 25 TO TR
       5.79.0 SUB 12.14.0            06  01149 P  4185 4/Q5    TEST FOR LAST RECORD IN A
       5.80.0 TRZ   5.85.0           06  01154 N  1179 1/P9
       5.81.0 ADM   5.83.0           11  01159 6  1169 1JF9    ADD RECORD LENGTH TO MOVE NEXT RECORD
1      5.82.0 RCV     0004           00  01164 U  0004 0004    MOVE NEXT RECORD INTO POSITION OF FIRST
1      5.83.0 TMT     0004           00  01169 9  0004 0004
       5.84.0 TR    6.36.0           00  01174 1  1434 1434    TO SEQUENCE CHECK
7      5.84.1                                                  LAST RECORD USED FROM AREA A
       5.85.0 RAD 12.22.0            06  01179 H  4210 4SJ0    RESTORE RECORD CTR
       5.86.0 ADM   5.83.0           13  01184 6  1169 1AW9    RESTORE ADDRESS BY COMPLIMENTING
       5.87.0 RCV   7.32.0 -003     00  01189 U  1906 1906
       5.88.0 TMT 11.81.0 -003     13  01194 9  3940 3IU0    ADDR CTR A TO ADD MEM INSTR
       5.89.0 RCV   7.35.0 -003     00  01199 U  1921 1921    ADDRESS OF A TO
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C LNG       SYMBOLIC          INCR              ACTUAL          S       DATA OR DESCRIPTION
L       LOC    OP    ADDR              ASU  LOC   OP ADDR ADDR N

        5.90.0 TMT  11.74.0 -003 13  01204 9  3912 3I/2     RWW
        5.91.0 TR    6.35.0      00  01209 1  1429 1429
7       5.91.1                                              A B
        5.92.0 NOP   6.17.0      00  01214 A  1339 1339     SW 15 TR AT END OF INPUT B
        5.93.0 LOD  12.85.0      00  01219 8  0050 0050
        5.94.0 NOP   5.97.0      00  01224 A  1239 1239     SW 16 TR AT END OF INPUT C
        5.95.0 CMP  12.87.0      00  01229 4  0100 0100     COMPARE B TO C
        5.96.0 TRH   6.17.0      00  01234 K  1339 1339     B C
        5.97.0 NOP  20.19.0      00  01239 A  4744 4744     SW 17 TR FOR 4 OR 5 WAY
7       5.97.1                                              TMT B TO WRITE AREA
1       5.98.0 RCV     0004      00  01244 U  0004 0004
1       5.99.0 TMT     0004      00  01249 9  0004 0004
        6.00.0 RCV   7.34.0      00  01254 U  1919 1919     PLACE # OF TAPE UNIT B INTO RWW
        6.01.0 TMT  12.06.0 -003 01  01259 9  4160 41W0     SEQ ROUTINE
        6.02.0 UNL   6.70.0 -004 01  01264 7  1595 15Z5     SW 26 TR
        6.03.0 SUB  12.14.0      07  01269 P  4185 4/H5     TEST FOR LAST RECORD IN B
        6.04.0 TRZ   6.09.0      07  01274 N  1299 1SI9
        6.05.0 ADM   6.07.0      11  01279 6  1289 1KH9     ADD RECORD LENGTH TO MOVE NEXT RECORD
1       6.06.0 RCV     0004      00  01284 U  0004 0004     MOVE NEXT RECORD INTO POSITION OF FIRST
1       6.07.0 TMT     0004      00  01289 9  0004 0004
        6.08.0 TR    6.36.0      00  01294 1  1434 1434     TO SEQUENCE CHECK
7       6.08.1                                              LAST RECORD IN B
        6.09.0 RAD  12.22.0      07  01299 H  4210 4SA0     RESTORE RECORD CTR
        6.10.0 ADM   6.07.0      13  01304 6  1289 1BY9     RESTORE ADDRESS BY COMPLIMENTING
        6.11.0 RCV   7.32.0 -003 00  01309 U  1906 1906
        6.12.0 TMT  11.82.0 -003 13  01314 9  3944 3IU4     ADDR CTR B TO ADD MEM INSTR
        6.13.0 RCV   7.35.0 -003 00  01319 U  1921 1921     ADDRESS OF B TO
        6.14.0 TMT  11.75.0 -003 13  01324 9  3916 3I/6     RWW
        6.15.0 TR    6.35.0      00  01329 1  1429 1429
7       6.15.1                                              A GREATER THAN C  B GREATER THAN C
        6.16.0 UNL   6.84.0 -004 01  01334 7  1665 16W5     SW 28 TO TR
        6.17.0 LOD  12.87.0      00  01339 8  0100 0100     LOAD CONTROL WORD C
        6.18.0 NOP  20.16.0      00  01344 A  4729 4729     SW 18 TR FOR 4 OR 5 WAY
1       6.19.0 RCV     0004      00  01349 U  0004 0004     MOVE C TO WRITE AREA
1       6.20.0 TMT     0004      00  01354 9  0004 0004
        6.21.0 RCV   7.34.0      00  01359 U  1919 1919     PLACE # OF TAPE UNIT C TO RWW
        6.22.0 TMT  12.06.0 -002 01  01364 9  4161 41W1     SEQ ROUTINE
        6.23.0 SUB  12.14.0      08  01369 P  4185 4J85     TEST FOR LAST RECORD IN C
        6.24.0 TRZ   6.29.0      08  01374 N  1399 1L99
        6.25.0 ADM   6.27.0      11  01379 6  1389 1LH9     ADD RECORD LENGTH TO MOVE NEXT RECORD
1       6.26.0 RCV     0004      00  01384 U  0004 0004     MOVE NEXT RECORD INTO POSITION OF FIRST
1       6.27.0 TMT     0004      00  01389 9  0004 0004
        6.28.0 TR    6.36.0      00  01394 1  1434 1434     TRANSFER TO SEQUENCE CHECK
7       6.28.1                                              LAST RECORD IN C
        6.29.0 RAD  12.22.0      08  01399 H  4210 4K10     RESTORE RECORD CTR
        6.30.0 ADM   6.27.0      13  01404 6  1389 1CY9     RESTORE ADDRESS BY COMPLIMENTING
        6.31.0 RCV   7.32.0 -003 00  01409 U  1906 1906
        6.32.0 TMT  11.83.0 -003 13  01414 9  3948 3IU8
        6.33.0 RCV   7.35.0 -003 00  01419 U  1921 1921     ADDRESS OF C TO
        6.34.0 TMT  11.76.0 -003 13  01424 9  3920 3IS0     RWW
        6.35.0 UNL   6.68.0 -004 01  01429 7  1585 15Y5     SW 24 TO TR
7       6.35.1                                              SEQUENCE CHECK
        6.36.0 CMP  11.98.0      00  01434 4  4057 4057
        6.37.0 TRH   6.51.0      00  01439 K  1509 1509
        6.38.0 TRE   6.51.0      00  01444 L  1509 1509
7       6.38.1                                              OUT OF SEQUENCE
        6.39.0 RCV   6.43.0      00  01449 U  1469 1469     TAPE # OF SEL INSTR
        6.40.0 TMT   7.34.0      01  01454 9  1919 19/9
        6.41.0 RCV  12.42.0 &004 00  01459 U  4359 4359     TAPE # TO ERROR MESSAGE
        6.42.0 TMT   6.43.0      01  01464 9  1469 14W9
1       6.43.0 SEL     0200      00  01469 2  0200 0200
1       6.44.0 BSP     0004      00  01474 3  0004 0004
1       6.45.0 RD      0000      00  01479 Y  0000 0000
1       6.46.0 SEL     0500      00  01484 2  0500 0500
        6.47.0 WR   12.42.0 &001 00  01489 R  4356 4356
1       6.47.1 HLT     0015      00  01494 J  0015 0015     OUT OF SEQUENCE
1       6.48.0 WR      0000      00  01499 R  0000 0000
        6.50.0 TR    6.47.1      00  01504 1  1494 1494
        6.51.0 UNL  11.98.0      00  01509 7  4057 4057     UNLOAD CW FOR NEXT COMPARISON
        6.52.0 TR    6.56.0      00  01514 1  1529 1529     SW 22 TR IF BLANK PADDING
        6.53.0 CMP  11.99.0      00  01519 4  4107 4107
        6.54.0 TRE  10.39.0      00  01524 L  3459 3459
1       6.56.0 LOD     0009      05  01529 8  0009 0##9     HASH
        6.57.0 ADD  12.16.0      05  01534 G  4187 4/Y7     STRIP ZONING
        6.58.0 ADM  12.00.0      05  01539 6  4117 4//7     ADD TO HASH TOTAL
        6.59.0 SUB  12.14.0      03  01544 P  4185 41H5     TEST TO SEE IF END OF WRITE AREA
        6.60.0 TRZ   7.21.0      03  01549 N  1854 18E4
        6.61.0 ADM   6.56.0      11  01554 6  1529 1NB9     ADD RECORD LENGTH TO GET NEXT HASH TOTAL FIGURE
        6.62.0 ADM   5.74.0      11  01559 6  1124 1JB4     ADD RECORD LENGTH TO RCVS
        6.63.0 ADM   5.98.0      11  01564 6  1244 1KD4
        6.64.0 ADM   6.19.0      11  01569 6  1349 1LD9
        6.65.0 ADM  20.34.0      11  01574 6  4819 4QA9
        6.66.0 ADM  30.18.0      11  01579 6  5299 5KI9
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C LNG       SYMBOLIC          INCR            ACTUAL          S       DATA OR DESCRIPTION
L       LOC    OP   ADDR              ASU  LOC   OP ADDR ADDR N

        6.67.0 RAD 12.20.0             11  01584 H  4203 4K&3     RECORD LENGTH
        6.68.0 NOP  7.29.0             00  01589 A  1894 1894     SWITCH 24
        6.69.0 NOP  6.91.0             00  01594 A  1704 1704     SWITCH 25 TR TO PULL CW A
        6.70.0 NOP  7.06.0             00  01599 A  1779 1779     SWITCH 26 TR TO PULL CW B
        6.71.0 NOP 20.52.0             00  01604 A  4909 4909     SWITCH 27 TR TO PULL CW D OR E
1       6.72.0 SET     0000            14  01609 B  0000 0&-0     PULL CW C
        6.73.0 RCV 12.87.0             00  01614 U  0100 0100
1       6.74.0 TMT     0000            14  01619 9  0000 0&-0
1       6.75.0 SET     0000            14  01624 B  0000 0&-0
1       6.76.0 TMT     0000            14  01629 9  0000 0&-0
1       6.77.0 SET     0000            14  01634 B  0000 0&-0
1       6.78.0 TMT     0000            14  01639 9  0000 0&-0
1       6.79.0 SET     0000            14  01644 B  0000 0&-0
1       6.80.0 TMT     0000            14  01649 9  0000 0&-0
1       6.81.0 SET     0000            14  01654 B  0000 0&-0
1       6.82.0 TMT     0000            14  01659 9  0000 0&-0
        6.83.0 RAD 12.14.0             01  01664 H  4185 41Y5     RESTORE ASU 01 TO ONE
        6.84.0 NOP  6.87.0             00  01669 A  1684 1684     SWITCH 28
        6.85.0 TR   5.92.0             00  01674 1  1214 1214     SWITCH 29 NOP FOR EOF A&B&C
        6.86.0 TR  20.68.0             00  01679 1  4989 4989     EOF ABC ON 4 OR 5 WAY
        6.87.0 UNL  6.84.0 -004        02  01684 7  1665 16O5     SW 28 TO NOP
        6.88.0 LOD 12.83.0             00  01689 8  0000 0000
        6.89.0 TR   5.70.0             00  01694 1  1104 1104     SW 30 NOP FOR EOF A&B&C
        6.90.0 TR  20.68.0             00  01699 1  4989 4989     EOF ABC ON 4 OR 5 WAY
1       6.91.0 SET     0000            14  01704 B  0000 0&-0     PULL CW A
        6.92.0 RCV 12.83.0             00  01709 U  0000 0000
1       6.93.0 TMT     0000            14  01714 9  0000 0&-0
1       6.94.0 SET     0000            14  01719 B  0000 0&-0
1       6.95.0 TMT     0000            14  01724 9  0000 0&-0
1       6.96.0 SET     0000            14  01729 B  0000 0&-0
1       6.97.0 TMT     0000            14  01734 9  0000 0&-0
1       6.98.0 SET     0000            14  01739 B  0000 0&-0
1       6.99.0 TMT     0000            14  01744 9  0000 0&-0
1       7.00.0 SET     0000            14  01749 B  0000 0&-0
1       7.01.0 TMT     0000            14  01754 9  0000 0&-0
        7.02.0 RAD 12.14.0             01  01759 H  4185 41Y5     RESTORE ASU # 01 TO ONE
        7.03.0 UNL  6.69.0 -004        02  01764 7  1590 15R0     SW 25 TO NOP
        7.04.0 TR   5.65.0             00  01769 1  1079 1079     SW 32 NOP FOR EOF A&B&C
        7.05.0 TR  20.68.0             00  01774 1  4989 4989     EOF ABC ON 4 OR 5 WAY
1       7.06.0 SET     0000            14  01779 B  0000 0&-0     PULL CW B
        7.07.0 RCV 12.85.0             00  01784 U  0050 0050
1       7.08.0 TMT     0000            14  01789 9  0000 0&-0
1       7.09.0 SET     0000            14  01794 B  0000 0&-0
1       7.10.0 TMT     0000            14  01799 9  0000 0&-0
1       7.11.0 SET     0000            14  01804 B  0000 0&-0
1       7.12.0 TMT     0000            14  01809 9  0000 0&-0
1       7.13.0 SET     0000            14  01814 B  0000 0&-0
1       7.14.0 TMT     0000            14  01819 9  0000 0&-0
1       7.15.0 SET     0000            14  01824 B  0000 0&-0
1       7.16.0 TMT     0000            14  01829 9  0000 0&-0
        7.17.0 RAD 12.14.0             01  01834 H  4185 41Y5
        7.18.0 UNL  6.70.0 -004        02  01839 7  1595 15R5     SW 26 TO NOP
        7.19.0 TR   5.65.0             00  01844 1  1079 1079     SW 31 NOP FOR EOF A&B&C
        7.20.0 TR  20.68.0             00  01849 1  4989 4989     EOF ABC ON 4 OR 5 WAY
        7.21.0 RAD 12.22.0             03  01854 H  4210 42A0     RESTORE ASU # 03
        7.22.0 SUB 12.14.0             12  01859 P  4185 4A85     TESC FOR END OF LAST WRITE AREA
        7.23.0 TRZ  7.26.0             12  01864 N  1879 1H79
        7.24.0 RAD 12.19.0             11  01869 H  4199 4JI9     RECORD LENGTH PLUS 5 TO GET BEGINNING OF NEXT
        7.25.0 TR   6.61.0             00  01874 1  1554 1554
        7.26.0 LOD 12.80.0             11  01879 8  4626 4OB6     COMPLIMENT ADDED TO RESTORE RCVS
        7.27.0 RAD 12.24.0             12  01884 H  4215 4B15     RESTORE ASU 12
        7.28.0 TR   6.61.0             00  01889 1  1554 1554     INTO WR ADDRESS
        7.29.0 NOP 10.39.0             00  01894 A  3459 3459     SWITCH 36
        7.30.0 NOP 11.68.0             00  01899 A  3889 3889     SWITCH 37
        7.31.0 ADM 12.64.0             01  01904 6  4580 45Y0     ADD 1 TO CTR R
1       7.32.0 ADM     0000            00  01909 6  0000 0000
        7.33.0 RAD 12.13.0             14  01914 H  4184 4AQ4     000 IN ASU 14
1       7.34.0 SEL     0200            00  01919 2  0200 0200
1       7.35.0 RWW     0000            00  01924 S  0000 0000
1       7.36.0 SEL     0201            00  01929 2  0201 0201
1       7.37.0 WR      0000            00  01934 R  0000 0000
        7.37.1 NOP 10.43.0             00  01939 A  3479 3479     SW 23 TR FOR SINGLE REC NOT ENDING IN R/M
        7.38.0 TRA  7.50.0             00  01944 I  2004 2004
        7.39.0 ADM 12.66.0             01  01949 6  4592 45Z2     ADD 1 TO BLOCKS MERGED
        7.40.0 UNL  6.68.0 -004        02  01954 7  1585 15Q5     SW 24 TO NOP
        7.41.0 SUB 12.14.0             04  01959 P  4185 4/85     TEST IF LAST WR AREA JUST USED
        7.42.0 TRZ  7.46.0             04  01964 N  1984 1Z84
        7.43.0 RAD 12.21.0             14  01969 H  4207 4B-7     MODIFY WR ADDRESS
        7.44.0 ADM  7.37.0             14  01974 6  1934 1IL4
        7.45.0 TR   6.69.0             00  01979 1  1594 1594
        7.46.0 RAD 12.24.0             04  01984 H  4215 4S15     RESTORE ASU 04
        7.47.0 RCV  7.37.0 -003        00  01989 U  1931 1931     RESET WRITE ADDRESS
        7.48.0 TMT 11.77.0 -003        13  01994 9  3924 3IS4
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C LNG       SYMBOLIC          INCR            ACTUAL          S       DATA OR DESCRIPTION
L        LOC   OP   ADDR              ASU  LOC   OP ADDR ADDR  N

       7•49•0 TR   6•69•0            00  01999 1  1594 1594
7      7•49•1                                                      TRA ROUTINE
       7•50•0 LOD  7•34•0            01  02004 8  1919 19/9      # OF TAPE READ
       7•51•0 UNL  8•43•0            01  02009 7  2469 24W9
       7•52•0 UNL  7•75•0            01  02014 7  2129 21S9
       7•53•0 UNL  5•24•0            01  02019 7  0864 08W4
       7•54•0 UNL  5•35•0            01  02024 7  0919 09/9
       7•55•0 UNL 12•33•0            01  02029 7  4287 42Y7      INTO TAPE LABEL MESSAGE
       7•56•0 UNL 12•35•0            01  02034 7  4299 42Z9
       7•57•0 UNL 12•37•0 -005       01  02039 7  4312 43/2
       7•58•0 UNL  9•81•0            01  02044 7  3159 31V9
       7•59•0 UNL  9•88•0            01  02049 7  3194 31Z4
       7•60•0 UNL 10•01•0            01  02054 7  3269 32W9
       7•61•0 UNL 12•31•0            01  02059 7  4277 42X7      TAPE NUMBER TO ERROR MESSAGE
       7•62•0 UNL  9•34•0            01  02064 7  2924 29S4
       7•63•0 UNL  5•42•0            01  02069 7  0964 09W4
       7•64•0 UNL  9•06•0            01  02074 7  2784 27Y4
       7•65•0 UNL  9•21•0            01  02079 7  2859 28V9
       7•66•0 UNL  9•14•0            01  02084 7  2824 28S4
       7•67•0 UNL 12•49•0            01  02089 7  4451 44V1      INTO HASH TOTAL MSG
       7•68•0 RAD 12•14•0            01  02094 H  4185 41Y5      RESTORE ASU # 1 TO 1
1      7•69•0 SEL    0901            00  02099 2  0901 0901      TEST 0901
       7•70•0 TRS  8•70•0            00  02104 O  2604 2604
1      7•71•0 SEL    0902            00  02109 2  0902 0902      TEST 0902
       7•72•0 TRS  9•76•0            00  02114 O  3134 3134
1      7•73•0 SEL    0201            00  02119 2  0201 0201      END OF FILE ON OUTPUT
       7•74•0 TRS  7•78•0            00  02124 O  2144 2144
1      7•75•0 SEL    0200            00  02129 2  0200 0200      TEST FOR EOF ON INPUT
       7•76•0 TRS  8•73•0            00  02134 O  2619 2619
       7•77•0 TR   4•27•0            00  02139 1  0379 0379      HALT
7      7•77•1                                                      END OF FILE ON OUTPUT
1      7•78•0 SEL    0203            00  02144 2  0203 0203      WAS TAPE CHANGED AT LAST EOF QUEST
       7•79•0 TRS  8•66•0            00  02149 O  2584 2584
       7•80•0 RAD 12•13•0            14  02154 H  4184 4AQ4
1      7•81•0 SEL    0201            00  02159 2  0201 0201
1      7•82•0 WTM    0001            00  02164 3  0001 0001
1      7•83•0 IOF    0000            00  02169 3  0000 0000
       7•84•0 WR  12•00•0 -009       00  02174 R  4108 4108      WRITE HASH TOTAL ON OUTPUT TAPE
       7•85•0 TRA  7•93•0            00  02179 I  2219 2219
       7•86•0 LOD 12•00•0            05  02184 8  4117 4//7      HASH TOTAL FOR EACH O/P TAPE
       7•87•0 ADM 12•02•0            05  02189 6  4128 4/S8      ADD TO ACCUMULATED HASH TOTAL
1      7•88•0 SET    0000            05  02194 B  0000 0##0
1      7•89•0 SET    0010            05  02199 B  0010 0#/0
       7•90•0 UNL 12•00•0            05  02204 7  4117 4//7      RESET HASH TOTAL TO ZERO
1      7•91•0 ION    0003            00  02209 3  0003 0003
       7•92•0 TR   8•03•0            00  02214 1  2269 2269      TO REWIND TAPE
1      7•93•0 SEL    0901            00  02219 2  0901 0901
       7•94•0 TRS  8•70•0            00  02224 O  2604 2604
1      7•95•0 SEL    0902            00  02229 2  0902 0902
       7•96•0 TRS  7•98•0            00  02234 O  2244 2244
       7•97•0 TR   7•86•0            00  02239 1  2184 2184      TO CONTINUE
1      7•98•0 SEL    0201            00  02244 2  0201 0201
1      7•99•0 BSP    0004            00  02249 3  0004 0004
       8•00•0 NTR  7•84•0            14  02254 X  2174 2AP4
1      8•01•0 HLT    0016            00  02259 J  0016 0016      PERSISTENT 902 WRITING HASH TOTAL
       8•02•0 TR   7•84•0            00  02264 1  2174 2174
1      8•03•0 RWD    0002            00  02269 3  0002 0002
       8•04•0 NOP 11•02•1            00  02274 A  3564 3564      SWITCH 53 TR FOR END OF JOB
       8•05•0 NOP  8•60•0            00  02279 A  2554 2554      SWITCH 54
       8•06•0 UNL  8•05•0 -004       01  02284 7  2275 22X5      SW 54 TO TR
       8•07•0 UNL 12•29•0            01  02289 7  4262 42W2      TAPE NO INTO MESSAGE
       8•08•0 UNL  7•78•0            01  02294 7  2144 21U4      AND INTO SELECT
       8•09•0 LOD 12•07•0            01  02299 8  4164 41W4      LOAD # OF SECOND O/P TAPE
       8•10•0 UNL  7•36•0            01  02304 7  1929 19S9      PLACE IN RWW AND SELECT INSTRUCTIONS
       8•11•0 UNL  7•73•0            01  02309 7  2119 21/9      FOR EOF
       8•12•0 UNL  8•39•0            01  02314 7  2449 24U9      TO WRITE TAPE LABEL
       8•13•0 UNL  8•51•0            01  02319 7  2509 25#9
       8•14•0 UNL  4•55•0            01  02324 7  0519 05/9
       8•15•0 UNL  4•89•0            01  02329 7  0689 06Y9
       8•16•0 UNL 12•37•0            01  02334 7  4317 43/7      902 ERROR MESSAGE FOR RWW
       8•17•0 UNL  9•83•0            01  02339 7  3169 31W9      TO BACKSPACE TAPE
       8•18•0 UNL  9•94•0            01  02344 7  3234 32T4      TO SEPARATE WRITE
       8•19•0 UNL 12•39•0            01  02349 7  4332 43T2      902 ERROR MESSAGE FOR WRITE
       8•20•0 UNL 10•19•0            01  02354 7  3359 33V9
       8•21•0 UNL 12•31•0            01  02359 7  4277 42X7
       8•22•0 UNL  7•81•0            01  02364 7  2159 21V9
       8•23•0 UNL  7•98•0            01  02369 7  2244 22U4
       8•24•0 RAD 12•14•0            01  02374 H  4185 41Y5      RESTORE ASU # 1 TO 1
       8•25•0 RAD 12•11•0            14  02379 H  4177 4AP7      SET CTR R TO ZERO
       8•26•0 ST  12•64•0            14  02384 F  4580 4EQ0
       8•27•0 RCV  4•19•0 -003       00  02389 U  0336 0336
       8•28•0 TMT 11•78•0 -003       13  02394 9  3928 3IS8
       8•29•0 TR   4•01•0            00  02399 1  0249 0249      TR TO C/P
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C LNG       SYMBOLIC          INCR          ACTUAL          S       DATA OR DESCRIPTION
L     LOC   OP   ADDR              ASU  LOC  OP ADDR ADDR  N

1     8.30.0 SEL     0500          00  02404 2  0500 0500
      8.31.0 WR  12.29.0 -010      00  02409 R  4252 4252    WRITE # OF COMPLETED TAPE
      8.32.0 RCV  4.54.0 -003      00  02414 U  0511 0511
      8.33.0 TMT 11.93.0 -003      13  02419 9  3988 3IY8
      8.34.0 TR   4.49.0           00  02424 1  0489 0489
      8.35.0 RCV  4.19.0 -003      00  02429 U  0336 0336
      8.36.0 TMT 11.88.0 -003      13  02434 9  3968 3IW8
      8.37.0 TR   4.01.0           00  02439 1  0249 0249
      8.38.0 NOP  8.43.0           00  02444 A  2469 2469    SW 55 TR IF NO TAPE LABEL
1     8.39.0 SEL     0203          00  02449 2  0203 0203    WRITE TAPE LABEL
      8.40.0 WR   2.25.0 -080      00  02454 R  0151 0151
      8.41.0 TRA  8.46.0           00  02459 I  2484 2484
      8.42.0 ADM 12.64.0           01  02464 6  4580 45Y0
1     8.43.0 SEL     0200          00  02469 2  0200 0200    TEST FOR END OF INPUT
      8.44.0 TRS  8.57.0           00  02474 O  2539 2539
      8.45.0 TR   7.39.0           00  02479 1  1949 1949
1     8.46.0 SEL     0901          00  02484 2  0901 0901
      8.47.0 TRS  8.70.0           00  02489 O  2604 2604
1     8.48.0 SEL     0902          00  02494 2  0902 0902
      8.49.0 TRS  8.51.0           00  02499 O  2509 2509
      8.50.0 TR   4.27.0           00  02504 1  0379 0379    HALT
1     8.51.0 SEL     0203          00  02509 2  0203 0203
1     8.52.0 BSP     0004          00  02514 3  0004 0004
1     8.53.0 SEL     0500          00  02519 2  0500 0500
      8.54.0 WR  12.38.0 &001      00  02524 R  4319 4319
1     8.55.0 HLT     0017          00  02529 J  0017 0017    902 WRITING TAPE LABEL  START TO TRY AGAIN
      8.56.0 TR   8.39.0           00  02534 1  2449 2449
      8.57.0 RCV  4.19.0 -003      00  02539 U  0336 0336    SW 9 TO GO TO EOF INPUT ROUTINE
      8.58.0 TMT 11.79.0 -003      13  02544 9  3932 3IT2
      8.59.0 TR   4.01.0           00  02549 1  0249 0249    TO CHECK POINT
      8.60.0 UNL  8.05.0 -004      02  02554 7  2275 22P5    SW 54 TO NOP
      8.61.0 LOD  7.36.0           01  02559 8  1929 19S9    TAPE # INTO MESSAGE
      8.62.0 UNL 12.29.0           01  02564 7  4262 42W2    AND INTO SELECT
      8.63.0 UNL  7.78.0           01  02569 7  2144 21U4
      8.64.0 RAD 12.14.0           01  02574 H  4185 41Y5    LOAD NO OF 1ST OUTPUT TAPE
      8.65.0 TR   8.10.0           00  02579 1  2304 2304
1     8.66.0 SEL     0500          00  02584 2  0500 0500
      8.67.0 WR  12.27.0 &002      00  02589 R  4244 4244    WRITE MESSAGE AGAIN
1     8.68.0 HLT     0018          00  02594 J  0018 0018    CHANGE OUTPUT TAPE
      8.69.0 TR   7.78.0           00  02599 1  2144 2144
      8.70.0 RCV 12.31.0           00  02604 U  4277 4277
      8.71.0 TMT  7.36.0           01  02609 9  1929 19S9
      8.72.0 TR   4.31.0           00  02614 1  0399 0399
7     8.72.1                                                 END OF FILE ON INPUT
      8.73.0 RCV  5.34.0 -003      00  02619 U  0911 0911    CORRECT CTR IN ADD MEM INSTR
      8.74.0 TMT  7.32.0 -003      13  02624 9  1906 1I#6
      8.75.0 RCV  5.32.0 -003      00  02629 U  0901 0901
      8.76.0 TMT  7.32.0 -003      13  02634 9  1906 1I#6
      8.77.0 RCV  8.80.0 -003      00  02639 U  2651 2651
      8.78.0 TMT  7.32.0 -003      13  02644 9  1906 1I#6
      8.79.0 RAD 12.11.0           01  02649 H  4177 41X7    SET CTR TO ZERO
1     8.80.0 ST      0000          01  02654 F  0000 00#0
      8.81.0 RAD 12.14.0           01  02659 H  4185 41Y5
      8.82.0 ADM 12.66.0           01  02664 6  4592 45Z2    ADD 1 TO BLOCKS MERGED
1     8.83.0 SET     0001          00  02669 B  0001 0001
      8.84.0 LOD  7.34.0           00  02674 8  1919 1919    LAST DIGIT OF INPUT TAPE ADDR
      8.85.0 MPY 12.17.0           00  02679 V  4191 4191    TO DETERMINE CORRECT EOF ROUTINE
1     8.86.0 SHR     0001          00  02684 C  0001 0001
      8.87.0 ADD 12.18.0           00  02689 G  4195 4195    ADDR OF EOF A TRANSFER INSTR
      8.88.0 UNL  8.90.0           00  02694 7  2704 2704
1     8.89.0 SET     0000          00  02699 B  0000 0000    RESET ACC
1     8.90.0 TR      00            00  02704 1  00   00#     SW 44 TR TO CORRECT EOF ROUTINE
      8.91.0 TR   9.66.0           00  02709 1  3084 3084    EOF A
      8.92.0 TR   9.55.0           00  02714 1  3029 3029    EOF B
      8.93.0 TR   8.96.0           00  02719 1  2734 2734    EOF C
      8.94.0 TR  20.78.0           00  02724 1  5039 5039    EOF D
      8.95.0 TR  30.62.0           00  02729 1  5519 5519    EOF E
7     8.95.1                                                 END OF FILE C
      8.96.0 RAD 12.69.0           14  02734 H  4598 4ER8    # OF REELS OF C
      8.97.0 SUB 12.14.0           14  02739 P  4185 4AQ5
      8.98.0 TRZ  9.39.0           14  02744 N  2949 2IM9    END OF ALL REELS OF C
      8.99.0 ST  12.69.0           14  02749 F  4598 4ER8    # OF REELS OF C REMAINING
1     9.00.0 SET     0004          14  02754 B  0004 0&-4
      9.01.0 LOD 11.76.0           14  02759 8  3923 3IK3    READ IN ADDRESS OF C
      9.02.0 UNL  5.25.0           14  02764 7  0869 0HO9
      9.03.0 UNL  5.30.0           14  02769 7  0894 0HR4
      9.04.0 UNL  5.36.0           14  02774 7  0924 0IK4
      9.05.0 RAD 12.13.0           14  02779 H  4184 4AQ4
1     9.06.0 SEL     0200          00  02784 2  0200 0200
      9.07.0 NOP  9.25.0           00  02789 A  2879 2879    SWITCH 45
1     9.08.0 IOF     0000          00  02794 3  0000 0000
      9.09.0 RD  12.05.0 -009      00  02799 Y  4149 4149    READ HASH TOTAL FROM END OF TAPE
      9.10.0 TRA  9.14.0           00  02804 I  2824 2824
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C L	LNG	SYMBOLIC LOC	OP	ADDR	INCR	ASU	ACTUAL LOC	OP	ADDR	ADDR	S N	DATA OR DESCRIPTION
		9.11.0	LOD	12.05.0		05	02809	8	4158	4/V8		
		9.12.0	ADM	12.04.0		05	02814	6	4148	4/U8		ACCUMULATE HASH TOTALS FROM INPUT
		9.13.0	TR	9.25.0		00	02819	1	2879	2879		TRANSFER TO REWIND TAPE
1		9.14.0	SEL	0200		00	02824	2	0200	0200		
		9.15.0	TRS	9.19.0		00	02829	O	2849	2849		
1		9.16.0	SEL	0902		00	02834	2	0902	0902		
		9.17.0	TRS	9.19.0		00	02839	O	2849	2849		
		9.18.0	TR	4.27.0		00	02844	1	0379	0379		HALT
1		9.19.0	SEL	0500		00	02849	2	0500	0500		
		9.20.0	WR	12.49.0	-022	00	02854	R	4429	4429		902 READING HASH TOTAL
1		9.21.0	SEL	0200		00	02859	2	0200	0200		
1		9.22.0	BSP	0004		00	02864	3	0004	0004		
		9.23.0	NTR	9.06.0		14	02869	X	2784	2GQ4		
		9.24.0	UNL	11.19.0	-004	01	02874	7	3635	36T5		SW 59A TO TR
		9.25.0	NOP	9.44.0		00	02879	A	2974	2974		SWITCH 46
1		9.26.0	RWD	0002		00	02884	3	0002	0002		
1		9.27.0	ION	0003		00	02889	3	0003	0003		
		9.28.0	RCV	4.19.0	-003	00	02894	U	0336	0336		
		9.29.0	TMT	11.87.0	-003	13	02899	9	3964	3IW4		
		9.30.0	TR	4.01.0		00	02904	1	0249	0249		TO CHECKPOINT
1		9.31.0	SEL	0500		00	02909	2	0500	0500		TYPE # OF TAPE TO BE CHANGED
		9.32.0	WR	12.34.0	&001	00	02914	R	4289	4289		CHANGE 0204
1		9.33.0	HLT	0020		00	02919	J	0020	0020		CHANGE INPUT TAPE
1		9.34.0	SEL	0200		00	02924	2	0200	0200		TAPE HAS NOT BEEN CHANGED
		9.35.0	TRS	9.31.0		00	02929	O	2909	2909		TYPE MSG AND HALT AGAIN
		9.36.0	RCV	4.19.0	-003	00	02934	U	0336	0336		SWITCH 9 TO INITIAL READ IN ROUTINE
		9.37.0	TMT	11.86.0	-003	13	02939	9	3960	3IW0		
		9.38.0	TR	4.01.0		00	02944	1	0249	0249		TO CHECK POINT
		9.39.0	UNL	5.70.0	-004	01	02949	7	1100	11#0		SW 13 TO TR
		9.40.0	UNL	5.94.0	-004	01	02954	7	1220	12S0		SW 16 TO TR
		9.41.0	UNL	9.47.0	-004	02	02959	7	2985	29Q5		SW 51 TO NOP
		9.42.0	UNL	9.25.0	-004	01	02964	7	2875	28X5		SW 46 TO TR
		9.43.0	TR	9.05.0		00	02969	1	2779	2779		
		9.44.0	UNL	9.25.0	-004	02	02974	7	2875	28P5		SW 46 TO NOP
		9.45.0	TR	9.52.0		00	02979	1	3014	3014		SWITCH 49
		9.46.0	TR	9.52.0		00	02984	1	3014	3014		SWITCH 50
		9.47.0	TR	9.52.0		00	02989	1	3014	3014		SWITCH 51
		9.48.0	NOP	20.99.0		00	02994	A	5144	5144		SWITCH 52 TR FOR 4 OR 5 WAY EXCEPT EOF D&E
		9.49.0	RCV	4.19.0	-003	00	02999	U	0336	0336		SW 9 TO END OF JOB
		9.50.0	TMT	11.80.0	-003	13	03004	9	3936	3IT6		
		9.51.0	TR	4.01.0		00	03009	1	0249	0249		TRANSFER TO CHECK POINT
		9.52.0	RCV	4.19.0	-003	00	03014	U	0336	0336		SW 9 TO CONTINUE MERGE
		9.53.0	TMT	11.72.0	-003	13	03019	9	3904	3I#4		
		9.54.0	TR	4.01.0		00	03024	1	0249	0249		TO CHECK POINT
7		9.54.1										END OF FILE B
		9.55.0	RAD	12.68.0		14	03029	H	4596	4ER6		# OF REELS OF B
		9.56.0	SUB	12.14.0		14	03034	P	4185	4AQ5		
		9.57.0	TRZ	9.62.0		14	03039	N	3064	3&04		END OF ALL REELS OF B
		9.58.0	ST	12.68.0		14	03044	F	4596	4ER6		
1		9.59.0	SET	0004		14	03049	B	0004	0&-4		
		9.60.0	LOD	11.75.0		14	03054	8	3919	3IJ9		READ IN ADDRESS OF B
		9.61.0	TR	9.02.0		00	03059	1	2764	2764		
		9.62.0	UNL	5.67.0	-004	01	03064	7	1085	10Y5		SW 12 TO TR
		9.63.0	UNL	5.92.0	-004	01	03069	7	1210	12/0		SW 15 TO TR
		9.64.0	UNL	9.46.0	-004	02	03074	7	2980	29Q0		SW 50 TO NOP
		9.65.0	TR	9.42.0		00	03079	1	2964	2964		
7		9.65.1										END OF FILE A
		9.66.0	RAD	12.67.0		14	03084	H	4594	4ER4		# OF REELS OF A
		9.67.0	SUB	12.14.0		14	03089	P	4185	4AQ5		
		9.68.0	TRZ	9.73.0		14	03094	N	3119	3AJ9		END OF ALL REELS OF A
		9.69.0	ST	12.67.0		14	03099	F	4594	4ER4		
1		9.70.0	SET	0004		14	03104	B	0004	0&-4		
		9.71.0	LOD	11.74.0		14	03109	8	3915	3IJ5		READ IN ADDRESS OF A
		9.72.0	TR	9.02.0		00	03114	1	2764	2764		
		9.73.0	UNL	5.65.0	-004	01	03119	7	1075	10X5		SW 11 TO TR
		9.74.0	UNL	9.45.0	-004	02	03124	7	2975	29P5		SW 49 TO NOP
		9.75.0	TR	9.42.0		00	03129	1	2964	2964		
1		9.76.0	SEL	0500		00	03134	2	0500	0500		
		9.77.0	WR	12.36.0	&001	00	03139	R	4301	4301		WRITE ERROR MESSAGE
		9.78.0	RCV	4.54.0	-003	00	03144	U	0511	0511		
		9.79.0	TMT	11.94.0	-003	13	03149	9	3992	3IZ2		
		9.80.0	TR	4.49.0		00	03154	1	0489	0489		
1		9.81.0	SEL	0200		00	03159	2	0200	0200		BACKSPACE BOTH TAPES
1		9.82.0	BSP	0004		00	03164	3	0004	0004		
1		9.83.0	SEL	0201		00	03169	2	0201	0201		
1		9.84.0	BSP	0004		00	03174	3	0004	0004		
		9.85.0	NTR	7.34.0		14	03179	X	1919	1IJ9		
		9.86.0	RCV	9.89.0	-003	00	03184	U	3196	3196		SEPARATE READ ROUTINE
		9.87.0	TMT	7.35.0	-003	13	03189	9	1921	1IS1		PLACE READ ADDRESS FOR READ
1		9.88.0	SEL	0200		00	03194	2	0200	0200		
1		9.89.0	RWW			00	03199	S				
1		9.89.1	RD	0000		00	03204	Y	0000	0000		
		9.89.2	NOP	10.47.0		00	03209	A	3499	3499		SW 57A TR FOR SINGLE REC NOT ENDING IN R/M

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C LNG       SYMBOLIC          INCR          ACTUAL          S       DATA OR DESCRIPTION
L      LOC    OP   ADDR              ASU  LOC   OP ADDR ADDR N

       9.90.0 TRA  9.99.0            00  03214 I  3259 3259
       9.91.0 UNL  9.97.0 -004      02  03219 7  3245 32M5     SW 57B TO NOP
7      9.91.1                                                   SEPARATE WRITE ROUTINE
       9.92.0 RCV  9.95.0 -003      00  03224 U  3236 3236     WRITE ADDRESS TO SEPARATE ROUTINE
       9.93.0 TMT  7.37.0 -003      13  03229 9  1931 1IT1     FROM RWW
1      9.94.0 SEL    0201           00  03234 2  0201 0201     WRITE
1      9.95.0 WR                    00  03239 R
       9.96.0 TRA 10.11.0           00  03244 I  3319 3319     TRA QUEST
       9.97.0 NOP  8.73.0           00  03249 A  2619 2619     SW 57B NOP IF ERROR CORRECTED ITSELF
       9.98.0 TR   7.39.0           00  03254 1  1949 1949     BACK TO MAIN ROUTINE
1      9.99.0 SEL    0902           00  03259 2  0902 0902     ERROR ON RD
      10.00.0 TRS 10.06.0           00  03264 O  3294 3294
1     10.01.0 SEL    0200           00  03269 2  0200 0200     END OF FILE ON INPUT QUEST
      10.02.0 TRS 10.04.0           00  03274 O  3284 3284
      10.03.0 TR   4.27.0           00  03279 1  0379 0379     HALT
      10.04.0 UNL  9.97.0 -004      01  03284 7  3245 32U5     SW 57B TO TR
      10.05.0 TR   9.92.0           00  03289 1  3224 3224     TO SEPARATE WRITE ROUTINE
      10.06.0 RCV 10.25.0 -003      00  03294 U  3386 3386     READ ADDRESS INTO UNREADABLE ROUTINE
      10.07.0 TMT  9.89.0 -003      13  03299 9  3196 3AZ6
      10.08.0 RCV 10.38.0 -003      00  03304 U  3451 3451
      10.09.0 TMT 11.84.0 -003      13  03309 9  3952 3IV2     RETURN ADDRESS IF RECORD IS DROPPED
      10.10.0 TR  10.22.0           00  03314 1  3374 3374
1     10.11.0 SEL    0901           00  03319 2  0901 0901
      10.12.0 TRS  8.70.0           00  03324 O  2604 2604
1     10.13.0 SEL    0902           00  03329 2  0902 0902
      10.14.0 TRS 10.16.0           00  03334 O  3344 3344     TR TO TEST FOR EOF ON OUTPUT
      10.15.0 TR   7.73.0           00  03339 1  2119 2119
1     10.16.0 SEL    0500           00  03344 2  0500 0500     WRITE ERROR MESSAGE
      10.17.0 WR  12.38.0 &001      00  03349 R  4319 4319
1     10.18.0 HLT    0019           00  03354 J  0019 0019     902 WRITING  HAVE R/W 3 TIMES  START TO TRY AGAIN
1     10.19.0 SEL    0201           00  03359 2  0201 0201     BACKSPACE WRITE TAPE
1     10.20.0 BSP    0004           00  03364 3  0004 0004
      10.21.0 TR   9.94.0           00  03369 1  3234 3234     BACK TO TRY AGAIN
7     10.21.1                                                  WRITE A RECORD THAT CANT BE READ
1     10.22.0 SEL    0500           00  03374 2  0500 0500     WRITE MESSAGE INCLUDING ADDRESS OF RECORD
      10.23.0 WR  12.40.0 &001      00  03379 R  4334 4334
1     10.24.0 SEL    0205           00  03384 2  0205 0205     WRITE RECORD ON TAPE 0205
1     10.25.0 WRE                   00  03389 Z
      10.26.0 RCV   4.54.0 -003     00  03394 U  0511 0511     SET TR ADDR AFTER TURNING OFF ERROR LIGHTS
      10.27.0 TMT 11.89.0 -003      13  03399 9  3972 3IX2
      10.28.0 TR   4.49.0           00  03404 1  0489 0489
      10.29.0 ADM 12.70.0           01  03409 6  4600 46#0     ADD 1 TO # OF BLOCKS DROPPED FROM MERGE
      10.30.0 ADM 12.65.0           01  03414 6  4585 45Y5     ADD 1 TO CTR U FOR CHECKPOINT
      10.31.0 LOD 12.56.0           01  03419 8  4526 45S6     REPLACE G/M AT END OF READ AREAS
1     10.32.0 UNL    0000           01  03424 7  0000 00#0     AFTER GIVING WRE INSTRUCTION
1     10.33.0 UNL    0000           01  03429 7  0000 00#0
1     10.34.0 UNL    0000           01  03434 7  0000 00#0
1     10.35.0 UNL    0000           01  03439 7  0000 00#0
1     10.36.0 UNL    0000           01  03444 7  0000 00#0
      10.37.0 RAD 12.14.0           01  03449 H  4185 41Y5
1     10.38.0 TR                    00  03454 1                 SWITCH 58
7     10.38.1                                                  BLANKS PADDING AREA - ALSO USED FOR NINES PADDING
7     10.38.2                                                  OR FOR SPECIAL INSTR FOR SINGLE REC WITH NO R/M
      10.39.0 LOD 11.99.0           00  03459 8  4107 4107
1     10.40.0 CMP    0000           00  03464 4  0000 0000
      10.41.0 TRE 10.53.0           00  03469 L  3529 3529
      10.42.0 RCV 10.44.0 -003      00  03474 U  3481 3481
      10.43.0 TMT 11.97.0 -003      13  03479 9  4004 46#4
1     10.44.0 CMP    0000           00  03484 4  0000 0000     DOES RECORD CONSIST OF PADDING
      10.45.0 TRE 10.50.0           00  03489 L  3514 3514     YES
      10.46.0 UNL   7.29.0 -004     02  03494 7  1890 18R0     SW 36 TO NOP
1     10.47.0 SEL    0201           00  03499 2  0201 0201     RWD TO WIPE OUT BLANK PADDING BLOCKS
1     10.48.0 RWD    0002           00  03504 3  0002 0002
      10.49.0 TR  11.68.0           00  03509 1  3889 3889     READ OVER TAPE LABEL, IF REQUIRED
      10.50.0 ADM 12.71.0           01  03514 6  4603 46#3     ADD 1 TO # PADDING RECORDS WRITTEN
      10.51.0 ADM 10.44.0           11  03519 6  3484 3MH4     ADD RECORD LENGTH TO CMP INSTR
      10.52.0 TR  10.44.0           00  03524 1  3484 3484
      10.53.0 ADM 12.72.0           01  03529 6  4604 46#4     ADD 1 TO PADDING BLOCKS DROPPED
      10.54.0 RAD 12.21.0           14  03534 H  4207 4B-7
      10.55.0 ADM 10.40.0           14  03539 6  3464 3DO4     ADD TO CMP NEXT BLOCK TO BLANKS
      10.56.0 ADM 11.97.0           14  03544 6  4007 46-7
      10.57.0 TR   7.32.0           00  03549 1  1909 1909
7     11.00.1                                                  END OF JOB
      11.01.0 UNL   8.04.0 -004     01  03554 7  2270 22X0     SW 53 TO TR
      11.02.0 TR   7.80.0           00  03559 1  2154 2154
      11.02.1 UNL 11.14.0 -004      02  03564 7  3610 36J0     SW 56 TO NOP
      11.05.0 RAD 12.25.0           14  03569 H  4220 4BK0     NO. OF TAPES IN ASU 14
1     11.06.0 SEL    0200           00  03574 2  0200 0200
1     11.07.0 IOF    0000           00  03579 3  0000 0000
1     11.08.0 RWD    0002           00  03584 3  0002 0002
      11.09.0 ADM 11.06.0           01  03589 6  3574 35X4     INCREASE TAPE ADDR BY TWO
      11.10.0 ADM 11.06.0           01  03594 6  3574 35X4
      11.11.0 NTR 11.06.0           14  03599 X  3574 3EP4
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C LNG      SYMBOLIC              INCR          ACTUAL              S      DATA OR DESCRIPTION
L       LOC   OP   ADDR                 ASU   LOC   OP ADDR ADDR  N

        11.12.0 UNL 11.06.0              14  03604 7  3574 3EP4     RESET TAPE ADDR TO 0200
1       11.13.0 SEL    0205              00  03609 2  0205 0205
        11.14.0 TR   4.60.0              00  03614 1  0544 0544     SW 56 NOP FOR END OF JOB
1       11.15.0 WTM    0001              00  03619 3  0001 0001
        11.16.0 RAD 12.13.0              14  03624 H  4184 4AQ4     000 IN ASU 14
1       11.17.0 SEL    0205              00  03629 2  0205 0205
1       11.18.0 RWD    0002              00  03634 3  0002 0002
        11.19.0 NOP 11.30.1              00  03639 A  3699 3699     SWITCH 59A
        11.20.0 RD   3.00.2 -034        00  03644 Y  0235 0235     READ IN PROGRAM TO ATTEMPT HASH TOTAL COMPARISON
        11.21.0 TRA 11.23.0              00  03649 I  3659 3659     USING RECORDS DUMPED ON 0205
        11.22.0 TR   3.01.0              00  03654 1  0314 0314
1       11.23.0 SEL    0902              00  03659 2  0902 0902
        11.24.0 TRS 11.26.0              00  03664 O  3674 3674
        11.25.0 TR   3.01.0              00  03669 1  0314 0314     TO CONTINUE
        11.26.0 RCV 12.27.0              00  03674 U  4242 4242
        11.27.0 TMT 12.41.0              01  03679 9  4354 43V4     5 TO ERROR MSG
1       11.28.0 SEL    0500              00  03684 2  0500 0500
        11.29.0 WR  12.27.0 -011         00  03689 R  4231 4231     902 READ 0205
        11.30.0 NTR 11.17.0              14  03694 X  3629 3FK9     TO TRY AGAIN
1       11.30.1 SEL    0207              00  03699 2  0207 0207
1       11.30.2 RWD    0002              00  03704 3  0002 0002
        11.31.0 RAD 12.70.0              00  03709 H  4600 4600     # OF BLOCKS DROPPED
        11.32.0 UNL 12.45.0 -022         00  03714 7  4378 4378
1       11.33.0 SEL    0500              00  03719 2  0500 0500
        11.34.0 WR  12.45.0 -023         00  03724 R  4377 4377     # OF BLOCKS DROPPED
        11.35.0 ADD 12.66.0              00  03729 G  4592 4592     BLOCKS DROPPED PLUS BLOCKS MERGED
        11.36.0 MPY 12.22.0              00  03734 V  4210 4210     MPY BY RECORDS PER BLOCK
        11.37.0 CMP 12.03.0              00  03739 4  4138 4138
        11.38.0 TRE 11.40.0              00  03744 L  3754 3754     HAVE CORRECT # OF RECORDS
        11.39.0 WR  12.57.0 -022         00  03749 R  4527 4527     # I/P REC UNEQ # MERGED
        11.40.0 RAD 12.72.0              00  03754 H  4604 4604
        11.41.0 UNL 12.55.0 -023         00  03759 7  4502 4502
        11.42.0 WR  12.55.0 -023         00  03764 R  4502 4502     # OF PADDING BLOCKS DROPPED
        11.43.0 NOP 11.45.0              00  03769 A  3779 3779     SWITCH 59B
        11.44.0 WR  12.47.0 -025         00  03774 R  4402 4402     HASH TOTAL COMPARISON VOID
        11.45.0 RAD 12.66.0              00  03779 H  4592 4592     BLOCKS MERGED
        11.46.0 SUB 12.72.0              00  03784 P  4604 4604     SUBTRACT PADDING BLOCKS DROPPED
        11.47.0 MPY 12.22.0              00  03789 V  4210 4210     MPY BY RECORDS PER BLOCK
        11.48.0 UNL 12.53.0 -028         00  03794 7  4472 4472     # OF RECORDS MERGED
        11.49.0 RAD 12.71.0              00  03799 H  4603 4603
        11.50.0 UNL 12.53.0 -008         00  03804 7  4492 4492     PADDING RECORDS WRITTEN
        11.51.0 WR  12.53.0 -037         00  03809 R  4463 4463     # OF RECORDS WRITTEN
        11.52.0 RCV 12.29.0              00  03814 U  4262 4262
        11.53.0 TMT  7.36.0              01  03819 9  1929 19S9
        11.54.0 WR  12.29.0 -010         00  03824 R  4252 4252     REMOVE OUTPUT TAPE
        11.55.0 WR  12.51.0 -008         00  03829 R  4453 4453     MERGE END
1       11.56.0 HLT    9999              00  03834 J  9999 9999     FINAL STOP
7       11.57.1                                                     ROUTINE FOR STOPPING AT END OF DAY
        11.58.0 RCV  4.19.0 -003         00  03839 U  0336 0336
        11.59.0 TMT 11.86.0 -003         13  03844 9  3960 3IW0
1       11.60.0 SEL    0207              00  03849 2  0207 0207
1       11.61.0 RWD    0002              00  03854 3  0002 0002
1       11.62.0 WR     0000              01  03859 R  0000 00#0
1       11.63.0 WR    19999              01  03864 R 19999 Z9Z9
        11.64.0 TRA 11.66.0              00  03869 I  3879 3879
1       11.65.0 HLT    3333              00  03874 J  3333 3333
1       11.66.0 HLT    0021              00  03879 J  0021 0021     TRA HALT
        11.67.0 TR  11.60.0              00  03884 1  3849 3849     TO TRY AGAIN
7       11.67.1                                                     READ OVER TAPE LABEL, IF REQD WITH BL PADDING
7       11.67.2                                                     PLACE G/M TO PREVENT WRITING NINE PADDING BLOCK
1       11.68.0 RD     0000              01  03889 Y  0000 00#0     READ OVER TAPE LABEL
        11.69.0 TR   7.31.0              00  03894 1  1904 1904
2 005   11.70.0                              03899
7       11.70.1                                                     CONSTANTS AND WORK AREAS
3       11.71.0       7.39.0                 03903     1949 1949     ADDR TO CONTINUE MERGE
3       11.72.0       7.40.0                 03907     1954 1954     ADDR TO CONTINUE MERGE
3       11.73.0       5.65.0                 03911     1079 1079     ADDR OF MERGE
2 004   11.74.0                              03915                   0000 READ ADDRESS OF A
2 004   11.75.0                              03919                   0000 READ ADDRESS OF B
2 004   11.76.0                              03923                   0000 READ ADDRESS OF C
2 004   11.77.0                              03927                   0000  WRITE ADDR OF FIRST AREA
3       11.78.0       8.30.0                 03931     2404 2404     ADDR OF INSTR TO WRITE OUTPUT TAPE NUMBER
3       11.79.0       8.73.0                 03935     2619 2619     ADDR OF EOF INPUT ROUTINE
3       11.80.0      11.01.0                 03939     3554 3554     ADDR OF END OF JOB ROUTINE
3       11.81.0      12.59.0          01     03943     4555 45V5     ADDRESS OF CTR A
3       11.82.0      12.60.0          01     03947     4560 45W0     ADDRESS OF CTR B
3       11.83.0      12.61.0          01     03951     4565 45W5     ADDRESS OF CTR C
3       11.84.0       7.32.0                 03955     1909 1909     RETURN ADDR IF RECORD IS NOT CORRECTED
3       11.85.0       5.33.0                 03959     0909 0909     RETURN ADDR IF RECORD IS NOT CORRECTED
3       11.86.0       5.23.0                 03963     0859 0859     ADDR OF INITIAL READ IN ROUTINE
3       11.87.0       9.31.0                 03967     2909 2909     ADDR OF CHANGE INPUT TAPE MSG
3       11.88.0       8.38.0                 03971     2444 2444     ADDR TO CONTINUE EOF OUTPUT ROUTINE
3       11.89.0      10.29.0                 03975     3409 3409     ADDR TO CONTINUE UNREADABLE RECORD ROUTINE
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C LNG      SYMBOLIC          INCR          ACTUAL          S       DATA OR DESCRIPTION
L       LOC   OP   ADDR          ASU  LOC   OP ADDR ADDR N

3      11.90.0      4.40.0           03979    0444 0444     ADDR TO CONTINUE C/P ROUTINE
3      11.91.0      4.55.0           03983    0519 0519     ADDR TO CONTINUE RESTART ROUTINE
3      11.92.0      5.56.0           03987    1034 1034     ADDR TO CONTINUE INITIAL READ IN ROUTINE
3      11.93.0      8.35.0           03991    2429 2429     ADDR TO CONTINUE EOF OUTPUT ROUTINE
3      11.94.0      9.81.0           03995    3159 3159     ADDR OF INSTR TO BACKSPACE TAPES
3      11.95.0     10.45.0           03999    3489 3489
3      11.96.0     12.02.0      05   04003    4128 4/S8     ADDR OF ACCUMULATED HASH TOTAL
2 004 11.97.0                        04007                   0000 WORK AREA FOR PADDING
2 050 11.98.0                        04057
2 050 11.99.0                        04107                   99999999999999999999999999999999999999999999999999
2 010 12.00.0                        04117                   0000000000  HASH TOTAL UNSIGNED
2 001 12.01.0                        04118                   ¤
2 010 12.02.0                        04128                   0000000000  ACCUMULATED HASH TOTAL
5 010 12.03.0                        04138                   # INPUT RECORDS
2 010 12.04.0                        04148                   0000000000  ACCUM HASH TOTAL FROM TAPES
2 010 12.05.0                        04158                   0000000000 HASH TOTAL FROM EACH TAPE
2 005 12.06.0                        04163                   02468
2 001 12.07.0                        04164                   3
2 003 12.08.0                        04167                   000   # R/B. UNSIGNED
7      12.08.1                                                SIGNED CONSTANTS
2 001 12.09.0                        04168
2 004 12.10.0                        04172                 & 0002
2 005 12.11.0                        04177                 & 00000
2 004 12.12.0                        04181                 & 0005
2 003 12.13.0                        04184                 & 000
2 001 12.14.0                        04185                 & 1
2 001 12.15.0                        04186                 & 4
2 001 12.16.0                        04187                 - 0
2 004 12.17.0                        04191                 & 0025
3      12.18.0      8.91.0          04195    2709 2709    & ADDR OF EOF A TRANSFER INSTR
2 004 12.19.0                        04199                 & RECORD LENGTH PLUS FIVE
2 004 12.20.0                        04203                 & 0000 RECORD LENGTH
2 004 12.21.0                        04207                 & BLOCK LENGTH PLUS FIVE
2 003 12.22.0                        04210                 & 000 # RECORDS PER BLOCK
2 004 12.23.0                        04214                 & 0000 LENGTH OF C W
2 001 12.24.0                        04215                 & 0     ORDER OF MERGE
2 005 12.25.0                        04220                 & 00000  TO DETER CORRECT # OF TAPES TO BE READ IN
2 010 12.26.0                        04230
7      12.26.1                                                MESSAGES
2 012 12.27.0                        04242                   902 READ 200
2 009 12.28.0                        04251                   ¤REPEAT
2 011 12.29.0                        04262                   REMOVE 0201
2 001 12.30.0                        04263                   ¤ G/M
2 014 12.31.0                        04277                   901 WRITE 0201
2 001 12.32.0                        04278                   ¤ G/M
2 009 12.33.0                        04287                   TAPE 0200
2 001 12.34.0                        04288                   ¤ G/M
2 011 12.35.0                        04299                   CHANGE 0200
2 001 12.36.0                        04300                   ¤ G/M
2 017 12.37.0                        04317                   902 R/W 0200 0201
2 001 12.38.0                        04318                   ¤ G/M
2 014 12.39.0                        04332                   902 WRITE 0201
2 001 12.40.0                        04333                   ¤ G/M
2 021 12.41.0                        04354                   BLOCK WRITTEN ON 0205
2 001 12.42.0                        04355                   ¤ G/M
2 020 12.43.0                        04375                   0200 OUT OF SEQUENCE
2 001 12.44.0                        04376                   ¤ G/M
2 024 12.45.0                        04400                      BLOCKS WRITTEN ON 205
2 001 12.46.0                        04401                   ¤
2 026 12.47.0                        04427                   HASH TOTAL COMPARISON VOID
2 001 12.48.0                        04428                   ¤  G/M
2 023 12.49.0                        04451                   902 RD HASH TOT ON 0200
2 001 12.50.0                        04452                   ¤  G/M
2 009 12.51.0                        04461                   MERGE END
2 001 12.52.0                        04462                   ¤
2 038 12.53.0                        04500                              REC MERGED INCL     PADDING
2 001 12.54.0                        04501                   ¤
2 024 12.55.0                        04525                     PADDING BLOCKS DROPPED
2 001 12.56.0                        04526                   ¤
2 023 12.57.0                        04549                   # I/P REC UNEQ # MERGED
2 001 12.58.0                        04550                   ¤
2 005 12.59.0                        04555                 & 00000 CTR A
2 005 12.60.0                        04560                 & 00000 CTR B
2 005 12.61.0                        04565                 & 00000 CTR C
2 005 12.62.0                        04570                 & 00000      CTR D
2 005 12.63.0                        04575                 & 00000      CTR E
2 005 12.64.0                        04580                 & 00000  CTR R
2 005 12.65.0                        04585                 & 00000  CTR U
2 007 12.66.0                        04592                 & 0000000   BLOCKS MERGED
5 002 12.67.0                        04594                 & 01 # OF REELS OF INPUT A
5 002 12.68.0                        04596                 & 01 # OF REELS OF INPUT B
5 002 12.69.0                        04598                 & 01 # OF REELS OF INPUT C
2 002 12.70.0                        04600                 & 00     # BLOCKS DROPPED FROM MERGE
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C LNG      SYMBOLIC          INCR          ACTUAL          S      DATA OR DESCRIPTION
L       LOC   OP   ADDR          ASU  LOC   OP ADDR ADDR  N

2 003 12.71.0                        04603                &  000     # PADDED RECORDS WRITTEN
2 001 12.72.0                        04604                &  0 # PADDING BLOCKS DROPPED
5 003 12.73.0                        04607                   # RECORDS IN WR AREA
5 001 12.74.0                        04608                &  0     # OF WRITE AREAS
5 003 12.75.0                        04611                &  000     # OF RECORDS IN A
5 003 12.76.0                        04614                &  000     # OF RECORDS IN B
5 003 12.77.0                        04617                &  000     # OF RECORDS IN C
5 001 12.78.0                        04618                &  0     # OF WRITE AREAS
5 004 12.79.0                        04622                   COMPLIMENT TO RESTORE TMTS
5 004 12.80.0                        04626                   COMPLIMENT TO RESTORE WRITE AREA
6     12.81.0
6     12.82.0       00000
5 001 12.83.0                        00000                   BEGINNING OF CWA
5 049 12.84.0                        00049
5 001 12.85.0                        00050                   BEGINNING OF CWB
5 049 12.86.0                        00099
5 001 12.87.0                        00100                   BEGINNING OF CWC
5 049 12.88.0                        00149
6     20.01.0     12.81.0       -
5 001 20.02.0                        04627                   BEGINNINGOF CW D
5 049 20.03.0                        04676
2 001 20.04.0                        04677
5 002 20.05.0                        04679                        # OF REELS OF INPUT D
5 003 20.06.0                        04682                &  000     # OF RECORDS IN D
3     20.07.0     12.62.0       01  04686    4570 45X0      ADDRESS OF CTR D
3     20.08.0     30.17.0           04690    5294 5294      ADDR OF LOAD CW E INSTR
2 004 20.09.0                        04694                   0000     READ IN ADDRESS OF D
      20.10.0 RAD 12.62.0       00  04699 H  4570 4570      CTR D
      20.11.0 TRZ 30.08.0       00  04704 N  5249 5249
1     20.12.0 SEL    0206       00  04709 2  0206 0206
1     20.13.0 RD     0000       01  04714 Y  0000 00#0
      20.14.0 SUB 12.14.0       00  04719 P  4185 4185
      20.15.0 TR  20.11.0       00  04724 1  4704 4704
7     20.15.1                                              FOUR WAY MERGE
      20.16.0 UNL 20.25.0 -004  01  04729 7  4770 47X0      SW 21 TO TR
      20.17.0 UNL 20.70.0 -004  01  04734 7  4995 49Z5      SW 42 TO TR
      20.18.0 TR  20.21.0       00  04739 1  4754 4754
      20.19.0 UNL 20.24.0 -004  01  04744 7  4765 47W5      SW 20 TO TR
      20.20.0 UNL 20.71.0 -004  01  04749 7  5000 50#0      SW 43 TO TR
      20.21.0 NOP 30.14.0       00  04754 A  5279 5279      SW 19 TR FOR E LESS THAN D ON 5 WAY
7     20.21.1                                              A/B/C COMPARED TO D
      20.22.0 CMP 20.02.0       00  04759 4  4627 4627
      20.23.0 TRH 20.33.0       00  04764 K  4814 4814
      20.24.0 NOP 20.30.0       00  04769 A  4799 4799      SWITCH 20
      20.25.0 NOP 20.27.0       00  04774 A  4784 4784      SWITCH 21
      20.26.0 TR   5.74.0       00  04779 1  1124 1124      TO MOVE A TO WRITE AREA
      20.27.0 UNL 20.25.0 -004  02  04784 7  4770 47P0      SW 21 TO NOP
      20.28.0 UNL 20.70.0 -004  02  04789 7  4995 49R5      SW 42 TO NOP
      20.29.0 TR   6.19.0       00  04794 1  1349 1349      TO MOVE C TO WRITE AREA
      20.30.0 UNL 20.24.0 -004  02  04799 7  4765 47O5      SW 20 TO NOP
      20.31.0 UNL 20.71.0 -004  02  04804 7  5000 50-0      SW 43 TO NOP
      20.32.0 TR   5.98.0       00  04809 1  1244 1244      TO MOVE B TO WRITE AREA
7     20.32.1                                              A/B/C GREATER THAN D
      20.33.0 LOD 20.02.0       00  04814 8  4627 4627      LOAD CW D
1     20.34.0 RCV    0004       00  04819 U  0004 0004      MOVE D TO WRITE AREA
1     20.35.0 TMT    0004       00  04824 9  0004 0004
      20.36.0 RCV   7.34.0      00  04829 U  1919 1919      PLACE # OF TAPE UNIT D IN RWW
      20.37.0 TMT 12.06.0 -001  01  04834 9  4162 41W2      SEQ ROUTINE
      20.38.0 UNL  6.71.0 -004  01  04839 7  1600 16#0      SW 27 TO TR
      20.39.0 SUB 12.14.0       09  04844 P  4185 4JY5      TEST FOR LAST RECORD IN D
      20.40.0 TRZ 20.45.0       09  04849 N  4874 4QX4
      20.41.0 ADM 20.43.0       11  04854 6  4864 4QF4      ADD RECORD LENGTH TO MOVE NEXT RECORD
1     20.42.0 RCV    0004       00  04859 U  0004 0004      MOVE NEXT RECORD INTO POSITION OF FIRST
1     20.43.0 TMT    0004       00  04864 9  0004 0004
      20.44.0 TR   6.36.0       00  04869 1  1434 1434      TO SEQUENCE CHECK
7     20.44.1                                              LAST RECORD IN D
      20.45.0 RAD 12.22.0       09  04874 H  4210 4K/0      RESTORE RECORD CTR
      20.46.0 ADM 20.43.0       13  04879 6  4864 4HW4      RESTORE ADDRESS BY COMPLIMENTING
      20.47.0 RCV   7.32.0 -003 00  04884 U  1906 1906      ADDR CTR D TO ADD MEM INSTR
      20.48.0 TMT 20.07.0 -003  13  04889 9  4683 4FY3
      20.49.0 RCV   7.35.0 -003 00  04894 U  1921 1921      ADDR OF D TO
      20.50.0 TMT 20.09.0 -003  13  04899 9  4691 4FZ1      RWW
      20.51.0 TR   6.35.0       00  04904 1  1429 1429
      20.52.0 NOP 30.37.0       00  04909 A  5394 5394      SWITCH 33 TR TO PULL CW E
1     20.53.0 SET    0000       14  04914 B  0000 0&-0      PULL CW D
      20.54.0 RCV 20.02.0       00  04919 U  4627 4627
1     20.55.0 TMT    0000       14  04924 9  0000 0&-0
1     20.56.0 SET    0000       14  04929 B  0000 0&-0
1     20.57.0 TMT    0000       14  04934 9  0000 0&-0
1     20.58.0 SET    0000       14  04939 B  0000 0&-0
1     20.59.0 TMT    0000       14  04944 9  0000 0&-0
1     20.60.0 SET    0000       14  04949 B  0000 0&-0
1     20.61.0 TMT    0000       14  04954 9  0000 0&-0
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C LNG      SYMBOLIC          INCR          ACTUAL          S      DATA OR DESCRIPTION
L      LOC    OP   ADDR              ASU  LOC   OP ADDR ADDR N

1      20.62.0 SET     0000          14  04959 B  0000 0&-0
1      20.63.0 TMT     0000          14  04964 9  0000 0&-0
       20.64.0 RAD 12.14.0           01  04969 H  4185 41Y5     RESTORE ASU 01 TO 1
       20.65.0 UNL  6.71.0 -004      02  04974 7  1600 16-0     SW 27 TO NOP
       20.66.0 TR  20.68.0           00  04979 1  4989 4989     SWITCH 34 NOP FOR EOF D AND E
       20.67.0 TR   5.65.0           00  04984 1  1079 1079     EOF D&E ON 4 OR 5 WAY
       20.68.0 NOP 30.53.0           00  04989 A  5474 5474     SWITCH 38 TR FOR 5 WAY
7      20.68.1                                                  RELOAD CW A/B/C
       20.69.0 NOP 20.33.0           00  04994 A  4814 4814     SWITCH 39 TR FOR EOF A&B&C
       20.70.0 NOP 20.74.0           00  04999 A  5019 5019     SWITCH 42 TR TO LOAD CW C
       20.71.0 NOP 20.76.0           00  05004 A  5029 5029     SWITCH 43 TR TO LOAD CW B
       20.72.0 LOD 12.83.0           00  05009 8  0000 0000     LOAD CW A
       20.73.0 TR  20.21.0           00  05014 1  4754 4754     TO COMPARE
       20.74.0 LOD 12.87.0           00  05019 8  0100 0100     LOAD CW C
       20.75.0 TR  20.21.0           00  05024 1  4754 4754     TO COMPARE
       20.76.0 LOD 12.85.0           00  05029 8  0050 0050     LOAD CW B
       20.77.0 TR  20.21.0           00  05034 1  4754 4754     TO COMPARE
7      20.77.1                                                  END OF FILE D
       20.78.0 RAD 20.05.0           14  05039 H  4679 4FP9     # OF REELS OF D
       20.79.0 SUB 12.14.0           14  05044 P  4185 4AQ5
       20.80.0 TRZ 20.85.0           14  05049 N  5074 5&P4     END OF ALL REELS OF D
       20.81.0 ST  20.05.0           14  05054 F  4679 4FP9     # OF REELS OF D REMAINING
1      20.82.0 SET     0004          14  05059 B  0004 0&-4
       20.83.0 LOD 20.09.0           14  05064 8  4694 4FR4     READ IN ADDRESS OF D
       20.84.0 TR   9.02.0           00  05069 1  2764 2764
7      20.84.1                                                  END OF ALL REELS OF D
       20.85.0 UNL 20.21.0 -004      01  05074 7  4750 47V0     SW 19 TO TR
       20.86.0 UNL 20.90.0 -004      02  05079 7  5095 50R5     SW 47 TO NOP
       20.87.0 RCV 20.69.0 -003      00  05084 U  4991 4991
       20.88.0 TMT 20.08.0 -003      13  05089 9  4687 4FY7     SET SW 39 TO ALTERNATE TRANSFER
       20.89.0 UNL 20.68.0 -004      02  05094 7  4985 49Q5     SW 38 TO NOP
       20.90.0 TR   9.42.0           00  05099 1  2964 2964     SW 47 NOP FOR EOF D
       20.91.0 NOP  9.42.0           00  05104 A  2964 2964     SW 48 TR FOR 5 WAY EXCEPT EOF E
7      20.91.1                                                  EOF D&E
       20.92.0 UNL  5.73.0 -004      02  05109 7  1115 11J5     SW 14 TO NOP
       20.93.0 UNL  5.97.0 -004      02  05114 7  1235 12L5     SW 17 TO NOP
       20.94.0 UNL  6.18.0 -004      02  05119 7  1340 13M0     SW 18 TO NOP
       20.95.0 UNL 20.66.0 -004      02  05124 7  4975 49P5     SW 34 TO NOP
       20.96.0 UNL  9.48.0 -004      02  05129 7  2990 29R0     SW 52 TO NOP
       20.97.0 UNL 30.51.0 -004      02  05134 7  5460 5400     SW 35 TO NOP
       20.98.0 TR   9.42.0           00  05139 1  2964 2964
7      20.98.1                                                  EOF A&B&C
       20.99.0 UNL 30.56.0 -004      01  05144 7  5485 54Y5     SW 40 TO TR
       21.00.0 UNL 30.59.0 -004      01  05149 7  5500 55#0     SW 41 TO TR
       21.01.0 UNL 20.69.0 -004      01  05154 7  4990 49Z0     SW 39 TO TR
       21.02.0 UNL  7.04.0 -004      02  05159 7  1765 1705     SW 32 TO NOP
       21.03.0 UNL  6.85.0 -004      02  05164 7  1670 16P0     SW 29 TO NOP
       21.04.0 UNL  6.89.0 -004      02  05169 7  1690 16R0     SW 30 TO NOP
       21.05.0 UNL  7.19.0 -004      02  05174 7  1840 18M0     SW 31 TO NOP
       21.06.0 TR   9.52.0           00  05179 1  3014 3014
5 001  30.01.0                           05180                  BEGINNING OF CW E
5 049  30.02.0                           05229
2 001  30.03.0                           05230
5 002  30.04.0                           05232                       # OF REELS OF INPUT E
5 003  30.05.0                           05235              &  000     # OF RECORDS IN E
3      30.06.0      12.63.0         01  05239    4575 45X5     ADDRESS OF CTR E
2 004  30.07.0                           05243                  0000     READ IN ADDRESS OF E
       30.08.0 RAD 12.63.0           00  05249 H  4575 4575     CTR E
       30.09.0 TRZ  4.87.0           00  05254 N  0679 0679
1      30.10.0 SEL     0208          00  05259 2  0208 0208
1      30.11.0 RD      0000          01  05264 Y  0000 00#0
       30.12.0 SUB 12.14.0           00  05269 P  4185 4185
       30.13.0 TR  30.09.0           00  05274 1  5254 5254
7      30.13.1                                                  FIVE WAY MERGE
       30.14.0 CMP 30.01.0           00  05279 4  5180 5180     A/B/C COMPARED TO E
       30.15.0 TRH 30.17.0           00  05284 K  5294 5294
       30.16.0 TR  20.24.0           00  05289 1  4769 4769
7      30.16.1                                                  A/B/C GREATER THAN E
       30.17.0 LOD 30.01.0           00  05294 8  5180 5180     LOAD CW E
1      30.18.0 RCV     0004          00  05299 U  0004 0004     MOVE E TO WRITE AREA
1      30.19.0 TMT     0004          00  05304 9  0004 0004
       30.20.0 RCV  7.34.0           00  05309 U  1919 1919     PLACE # OF TAPE UNIT E IN RWW
       30.21.0 TMT 12.06.0           01  05314 9  4163 41W3     SEQ ROUTINE
       30.22.0 UNL 20.52.0 -004      01  05319 7  4905 49#5     SW 33 TO TR
       30.23.0 UNL  6.71.0 -004      01  05324 7  1600 16#0     SW 27 TO TR
       30.24.0 SUB 12.14.0           10  05329 P  4185 4JQ5     TEST FOR LAST RECORD IN E
       30.25.0 TRZ 30.30.0           10  05334 N  5359 5LN9
       30.26.0 ADM 30.28.0           11  05339 6  5349 5LD9     ADD RECORD LENGTH TO MOVE NEXT RECORD
1      30.27.0 RCV     0004          00  05344 U  0004 0004     MOVE NEXT RECORD INTO POSITION OF FIRST
1      30.28.0 TMT     0004          00  05349 9  0004 0004
       30.29.0 TR   6.36.0           00  05354 1  1434 1434     TO SEQUENCE CHECK
7      30.29.1                                                  LAST RECORD IN E
       30.30.0 RAD 12.22.0           10  05359 H  4210 4KJ0     RESTORE RECORD CTR
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C LNG      SYMBOLIC          INCR          ACTUAL          S      DATA OR DESCRIPTION
L      LOC   OP   ADDR                ASU  LOC  OP ADDR  ADDR N

       30.31.0 ADM 30.28.0             13  05364 6  5349 5CU9    RESTORE ADDRESS BY COMPLIMENTING
       30.32.0 RCV  7.32.0 -003 00     00  05369 U  1906 1906    ADDR CTR E TO ADD MEM INSTR
       30.33.0 TMT 30.06.0 -003 13     13  05374 9  5236 5BT6
       30.34.0 RCV  7.35.0 -003 00     00  05379 U  1921 1921    ADDR OF E TO
       30.35.0 TMT 30.07.0 -003 13     13  05384 9  5240 5BU0    RWW
       30.36.0 TR   6.35.0             00  05389 1  1429 1429
1      30.37.0 SET     0000            14  05394 B  0000 0&-0    PULL CW E
       30.38.0 RCV 30.01.0             00  05399 U  5180 5180
1      30.39.0 TMT     0000            14  05404 9  0000 0&-0
1      30.40.0 SET     0000            14  05409 B  0000 0&-0
1      30.41.0 TMT     0000            14  05414 9  0000 0&-0
1      30.42.0 SET     0000            14  05419 B  0000 0&-0
1      30.43.0 TMT     0000            14  05424 9  0000 0&-0
1      30.44.0 SET     0000            14  05429 B  0000 0&-0
1      30.45.0 TMT     0000            14  05434 9  0000 0&-0
1      30.46.0 SET     0000            14  05439 B  0000 0&-0
1      30.47.0 TMT     0000            14  05444 9  0000 0&-0
       30.48.0 RAD 12.14.0             01  05449 H  4185 41Y5
       30.49.0 UNL 20.52.0 -004 02     02  05454 7  4905 49-5    SW 33 TO NOP
       30.50.0 UNL  6.71.0 -004 02     02  05459 7  1600 16-0    SW 27 TO NOP
       30.51.0 TR  20.68.0             00  05464 1  4989 4989    SWITCH 35 NOP FOR EOF D&E
       30.52.0 TR   5.65.0             00  05469 1  1079 1079    EOF D&E ON 4 OR 5 WAY
7      30.52.1                                                    COMPARE D TO E
       30.53.0 LOD 20.02.0             00  05474 8  4627 4627    LOAD CW D
       30.54.0 CMP 30.01.0             00  05479 4  5180 5180    D E
       30.55.0 TRH 30.59.0             00  05484 K  5504 5504
       30.56.0 NOP 20.33.0             00  05489 A  4814 4814    SWITCH 40 TR FOR EOF A&B&C
       30.57.0 UNL 20.21.0 -004 02     02  05494 7  4750 47N0    SW 19 TO NOP
       30.58.0 TR  20.70.0             00  05499 1  4999 4999
       30.59.0 NOP 30.17.0             00  05504 A  5294 5294    SWITCH 41 TR FOR EOF A&B&C
       30.60.0 UNL 20.21.0 -004 01     01  05509 7  4750 47V0    SW 19 TO TR
       30.61.0 TR  20.70.0             00  05514 1  4999 4999
7      30.61.1                                                    END OF FILE E
       30.62.0 RAD 30.04.0             14  05519 H  5232 5BL2    # OF REELS OF E
       30.63.0 SUB 12.14.0             14  05524 P  4185 4AQ5
       30.64.0 TRZ 30.69.0             14  05529 N  5554 5EN4    END OF ALL REELS OF E
       30.65.0 ST  30.04.0             14  05534 F  5232 5BL2    # OF REELS OF E REMAINING
1      30.66.0 SET     0004            14  05539 B  0004 06-4
       30.67.0 LOD 30.07.0             14  05544 8  5243 5BM3    READ IN ADDRESS OF E
       30.68.0 TR   9.02.0             00  05549 1  2764 2764
7      30.68.1                                                    END OF ALL REELS OF E
       30.69.0 UNL 20.21.0 -004 02     02  05554 7  4750 47N0    SW 19 TO NOP
       30.70.0 UNL 20.91.0 -004 02     02  05559 7  5100 51-0    SW 48 TO NOP
       30.71.0 TR  20.89.0             00  05564 1  5094 5094
7      50.00.1                                                    ASSIGNMENT PROGRAM
1      50.01.0 RCV                     00  05569 U               MOVE INSTRUCTIONS FOR PULLING
       50.02.0 TMT 80.04.0             00  05574 9 10809 #809    CONTROL WORDS INITIALLY
       50.03.0 TR   4.01.0             00  05579 1  0249 0249    TO CHECKPOINT
1      50.04.0 SEL     0100            00  05584 2  0100 0100 0
       50.05.0 RD   2.01.0 &001 00     00  05589 Y  0152 0152
       50.06.0 TRA 51.03.0             00  05594 I  6084 6084
1      50.07.0 SET     0003            03  05599 B  0003 00&3    LOAD INPUT GROUPING
       50.08.0 LOD  2.13.0             03  05604 8  0188 01H8
       50.09.0 CMP 59.41.0             03  05609 4 10129 #1B9    COMPARE TO BLANKS
       50.10.0 TRE 51.17.0             00  05614 L  6154 6154
1      50.11.0 SET     0005            05  05619 B  0005 0##5
       50.12.0 RAD 59.43.0             01  05624 H 10131 #1T1    ASU 01 TO 1
1      50.13.0 SET     0001            02  05629 B  0001 00-1    ASU 02 TO A
       50.14.0 LOD 59.43.0             02  05634 8 10131 #1L1
1      50.14.1 SET     0004            06  05639 B  0004 0#-4    FOR P1, 2, 3, 4, OR 5
1      50.15.0 SET     0002            00  05644 B  0002 0002
       50.16.0 LOD  2.03.0             00  05649 8  0157 0157    L1
       50.17.0 CMP 59.41.0             00  05654 4 10129 #129    COMPARE TO BLANKS
       50.18.0 TRE 51.23.0             00  05659 L  6184 6184
       50.19.0 ST  60.27.0             00  05664 F 10347 #347    COMPUTE COMBINED LENGTH OF CW
       50.20.0 LOD  2.05.0             00  05669 8  0163 0163    L2
       50.21.0 CMP 59.41.0             00  05674 4 10129 #129
       50.22.0 TRE 59.33.0             00  05679 L 10084 #084    TO TEST P1
       50.23.0 ADM 60.27.0             00  05684 6 10347 #347
       50.24.0 LOD  2.07.0             00  05689 8  0169 0169    L3
       50.25.0 CMP 59.41.0             00  05694 4 10129 #129
       50.26.0 TRE 59.27.0             00  05699 L 10054 #054    TO TEST P1 & P2
       50.27.0 ADM 60.27.0             00  05704 6 10347 #347
       50.28.0 LOD  2.09.0             00  05709 8  0175 0175    L4
       50.29.0 CMP 59.41.0             00  05714 4 10129 #129
       50.30.0 TRE 59.21.0             00  05719 L 10024 #024    TO TEST P1, 2, 3
       50.31.0 ADM 60.27.0             00  05724 6 10347 #347
       50.32.0 LOD  2.11.0             00  05729 8  0181 0181    L5
       50.33.0 CMP 59.41.0             00  05734 4 10129 #129
       50.34.0 TRE 59.15.0             00  05739 L  9994 9994    TO TEST P1, 2, 3, 4
       50.35.0 ADM 60.27.0             00  05744 6 10347 #347
       50.36.0 TR  59.09.0             00  05749 1  9964 9964    TO TEST P1, 2, 3, 4, 5
       50.37.0 RAD 60.27.0             00  05754 H 10347 #347
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C LNG       SYMBOLIC          INCR          ACTUAL          S       DATA OR DESCRIPTION
L       LOC   OP   ADDR            ASU  LOC   OP ADDR ADDR N

      50.38.0 CMP 59.60.0         00  05759 4 10182 #182    COMBINED CW LENGTH COMPARED TO 50
      50.39.0 TRH 51.20.0         00  05764 K  6169 6169    GREATER THAN 50
      50.40.0 CMP  2.23.0         00  05769 4  0217 0217    COMPARE TO GIVEN CW LENGTH
      50.41.0 TRE 50.43.0         00  05774 L  5784 5784
      50.42.0 TR  50.96.0         00  05779 1  6049 6049
1     50.43.0 SET    0001         06  05784 B  0001 0#-1
      50.44.0 LOD  2.24.0         06  05789 8  0218 0SJ8
1     50.45.0 SET    0005         05  05794 B  0005 0##5    LOAD AVAILABLE MEMORY
      50.46.0 LOD  2.15.0         05  05799 8  0194 0/Z4    COMPARE TO BLANKS
      50.47.0 CMP 59.41.0         05  05804 4 10129 #/S9
      50.48.0 TRE 51.26.0         05  05809 L  6199 6/Z9
1     50.49.0 SET    0004         08  05814 B  0004 0-04
      50.50.0 LOD  2.18.0         00  05819 8  0207 0207    # REELS INPUT A
      50.51.0 CMP 59.41.0         00  05824 4 10129 #129    COMPARE TO BLANKS
      50.52.0 TRE 51.00.0         00  05829 L  6069 6069
      50.53.0 CMP 59.61.0         00  05834 4 10185 #185    COMPARE TO ZEROS
      50.54.0 TRE 51.11.0         00  05839 L  6124 6124
      50.55.0 ST  12.67.0         00  05844 F  4594 4594
      50.56.0 LOD  2.19.0         00  05849 8  0209 0209    # REELS INPUT B
      50.57.0 CMP 59.41.0         00  05854 4 10129 #129
      50.58.0 TRE 51.00.0         00  05859 L  6069 6069
      50.59.0 CMP 59.61.0         00  05864 4 10185 #185    COMPARE TO ZEROS
      50.60.0 TRE 51.14.0         00  05869 L  6139 6139
      50.61.0 ST  12.68.0         00  05874 F  4596 4596
      50.62.0 LOD  2.20.0         00  05879 8  0211 0211    # REELS INPUT C
      50.63.0 CMP 59.41.0         00  05884 4 10129 #129
      50.64.0 TRE 50.85.0         00  05889 L  5994 5994    # OF REELS OF C EQUAL TO BLANKS
      50.65.0 CMP 59.61.0         00  05894 4 10185 #185
      50.66.0 TRE 50.85.0         00  05899 L  5994 5994    # REELS C EQUAL TO ZERO
      50.67.0 ST  12.69.0         00  05904 F  4598 4598
      50.68.0 LOD  2.21.0         00  05909 8  0213 0213    # REELS INPUT D
      50.69.0 CMP 59.41.0         00  05914 4 10129 #129    COMPARE TO BLANKS
      50.70.0 TRE 50.88.0         00  05919 L  6009 6009
      50.71.0 CMP 59.61.0         00  05924 4 10185 #185    COMPARE TO ZEROS
      50.72.0 TRE 50.88.0         00  05929 L  6009 6009
      50.73.0 ST  20.05.0         00  05934 F  4679 4679
      50.74.0 LOD  2.22.0         00  05939 8  0215 0215    # REELS INPUT E
      50.75.0 CMP 59.41.0         00  05944 4 10129 #129
      50.76.0 TRE 50.92.0         00  05949 L  6029 6029    COMPARE TO BLANKS
      50.77.0 CMP 59.61.0         00  05954 4 10185 #185
      50.78.0 TRE 50.92.0         00  05959 L  6029 6029    COMPARE TO ZEROS
      50.79.0 ST  30.04.0         00  05964 F  5232 5232
      50.80.0 CMP 59.65.0         06  05969 4 10189 #/Q9    HAVE FIVE INPUTS
      50.81.0 TRE 51.92.0         00  05974 L  6499 6499    COMPARE ORDER OF MERGE TO FIVE
1     50.82.0 SEL    0500         00  05979 2  0500 0500    WRONG ORDER OF MERGE GIVEN
      50.83.0 WR  60.42.0 -025    00  05984 R 10476 #476
      50.84.0 TR  50.98.0         00  05989 1  6059 6059
      50.85.0 CMP 59.62.0         06  05994 4 10186 #/Q6    TWO INPUTS
      50.86.0 TRE 51.29.0         00  05999 L  6214 6214    COMPARE ORDER OF MERGE TO TWO
      50.87.0 TR  50.82.0         00  06004 1  5979 5979
      50.88.0 CMP 59.63.0         06  06009 4 10187 #/Q7    THREE INPUTS
      50.89.0 ST  12.24.0         06  06014 F  4215 4SJ5
      50.90.0 TRE 51.37.0         00  06019 L  6254 6254    COMPARE ORDER OF MERGE TO 3
      50.91.0 TR  50.82.0         00  06024 1  5979 5979
      50.92.0 CMP 59.64.0         06  06029 4 10188 #/Q8    FOUR INPUTS
      50.93.0 ST  12.24.0         06  06034 F  4215 4SJ5
      50.94.0 TRE 51.67.0         00  06039 L  6389 6389    COMPARE ORDER OF MERGE TO FOUR
      50.95.0 TR  50.82.0         00  06044 1  5979 5979
1     50.96.0 SEL    0500         00  06049 2  0500 0500
      50.97.0 WR  60.28.0 -024    00  06054 R 10348 #348    SUM L NOT EQ TOTAL LNG CW
1     50.98.0 HLT    0003         00  06059 J  0003 0003    COMMON HALT FOR MISPUNCHED CONTROL CARD
      50.99.0 TR  50.04.0         00  06064 1  5584 5584
1     51.00.0 SEL    0500         00  06069 2  0500 0500
      51.01.0 WR  60.30.0 -020    00  06074 R 10374 #374    NO REELS INPUT BLANK
      51.02.0 TR  50.98.0         00  06079 1  6059 6059
1     51.03.0 SEL    0902         00  06084 2  0902 0902
      51.04.0 TRS 51.09.0         00  06089 O  6114 6114
1     51.05.0 SEL    0100         00  06094 2  0100 0100
      51.06.0 TRS 51.09.0         00  06099 O  6114 6114
1     51.07.0 HLT    0002         00  06104 J  0002 0002    FALSE TRA READING CONTROL CARD RELOAD CARD
      51.08.0 TR  50.04.0         00  06109 1  5584 5584
1     51.09.0 HLT    0001         00  06114 J  0001 0001    902 OR EOF ON CONTROL CARD RELOAD OR LOAD
      51.10.0 TR  50.04.0         00  06119 1  5584 5584
1     51.11.0 SEL    0500         00  06124 2  0500 0500
      51.12.0 WR  60.32.0 -021    00  06129 R 10396 #396    NO REELS INPUT A ZERO
      51.13.0 TR  50.98.0         00  06134 1  6059 6059
1     51.14.0 SEL    0500         00  06139 2  0500 0500
      51.15.0 WR  60.34.0 -021    00  06144 R 10419 #419    NO REELS INPUT B ZERO
      51.16.0 TR  50.98.0         00  06149 1  6059 6059
1     51.17.0 SEL    0500         00  06154 2  0500 0500
      51.18.0 WR  60.36.0 -007    00  06159 R 10442 #442    1G BLANK
      51.19.0 TR  50.98.0         00  06164 1  6059 6059
1     51.20.0 SEL    0500         00  06169 2  0500 0500
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C LNG      SYMBOLIC          INCR          ACTUAL          S      DATA OR DESCRIPTION
L       LOC   OP   ADDR          ASU  LOC   OP ADDR ADDR  N

        51.21.0 WR  60.38.0 -011 00  06174 R 10451 #451     LNG CW GR 50
        51.22.0 TR  50.98.0      00  06179 1  6059 6059
1       51.23.0 SEL    0500      00  06184 2  0500 0500
        51.24.0 WR  60.40.0 -010 00  06189 R 10464 #464     L1 IS BLANK
        51.25.0 TR  50.98.0      00  06194 1  6059 6059
        51.26.0 LOD 59.67.0      05  06199 8 10195 #/Z5     IF EQUAL TO BLANKS
        51.27.0 UNL  2.15.0      05  06204 7  0194 0/Z4     UNLOAD 20000
        51.28.0 TR  50.49.0      00  06209 1  5814 5814
        51.29.0 UNL 12.25.0 -002 02  06214 7  4218 42J8     TWO WAY MERGE
        51.30.0 ADD 12.14.0      06  06219 G  4185 4/Q5     ADD ONE TO ORDER OF MERGE
        51.31.0 ST  12.24.0      06  06224 F  4215 4SJ5
        51.32.0 UNL 80.41.0 -004 01  06229 7 10995 #9Z5     SW 4 TO TR
        51.33.0 UNL  5.70.0 -004 01  06234 7  1100 11#0     SW 13 TO TR
        51.34.0 UNL  5.94.0 -004 01  06239 7  1220 12S0     SW 16 TO TR
        51.35.0 UNL  9.47.0 -004 02  06244 7  2985 29Q5     SW 51 TO NOP
        51.36.0 UNL 58.23.0 -004 01  06249 7  9510 95/0
7       51.36.1                                            THREE WAY MERGE
        51.37.0 UNL 10.35.0 -004 02  06254 7  3435 34L5     AVOID PLACING EXTRA GROUP MARKS
        51.38.0 UNL  4.12.0 -004 02  06259 7  0300 03-0
        51.39.0 UNL  4.11.0 -004 02  06264 7  0295 02R5
        51.40.0 UNL  5.14.0 -004 02  06269 7  0810 08J0
        51.41.0 UNL  5.15.0 -004 02  06274 7  0815 08J5
        51.42.0 UNL 10.36.0 -004 02  06279 7  3440 34M0     WHEN DUMPING RECORD
        51.43.0 UNL  6.65.0 -004 02  06284 7  1570 15P0
        51.44.0 UNL  6.66.0 -004 02  06289 7  1575 15P5
        51.45.0 UNL 52.32.0 -004 02  06294 7  6695 66R5     TO COMPUTE READ IN ADDRESSES
        51.46.0 UNL 52.33.0 -004 02  06299 7  6700 67-0
        51.47.0 UNL 53.65.0 -004 01  06304 7  7295 72Z5
        51.48.0 UNL 80.10.0 -004 02  06309 7 10840 #8M0     NOOP INSTRUCTIONS TO PLACE G/M AFTER
        51.49.0 UNL 80.11.0 -004 02  06314 7 10845 #8M5     D AND E READ AND WRITE AREAS
        51.50.0 UNL 56.46.0 -004 01  06319 7  8640 86U0
        51.51.0 UNL 80.53.0 -004 01  06324 7 11055 /0V5     SW 5 TO TR
        51.52.0 UNL 80.15.0 -004 02  06329 7 10865 #8O5
        51.53.0 UNL 58.27.0 -004 01  06334 7  9530 95T0
        51.54.0 UNL 57.74.0 -004 02  06339 7  9265 92O5
        51.55.0 UNL 57.75.0 -004 02  06344 7  9270 92P0
        51.56.0 UNL 80.14.0 -004 02  06349 7 10860 #8O0
        51.57.0 UNL 12.25.0 -003 02  06354 7  4217 42J7
        51.58.0 UNL 54.32.0 -004 01  06359 7  7610 76/0
        51.59.0 RCV  4.82.0 -003 00  06364 U  0651 0651     PLACE ADDR IN TRZ IN RESTART
        51.60.0 TMT 59.79.0 -003 08  06369 9 10234 #K34
        51.61.0 RCV 52.81.0 -003 00  06374 U  6891 6891     PLACE ADDR OF LENGTH OF PROG IN SUB
        51.62.0 TMT 59.82.0 -003 08  06379 9 10246 #K46     INSTR
        51.66.0 TR  52.00.0      00  06384 1  6539 6539     TO COMPUTE BLOCK SIZE
7       51.66.1                                            FOUR WAY MERGE
        51.67.0 UNL 52.32.0 -004 02  06389 7  6695 66R5     SW 60 TO NOOP
        51.68.0 UNL 80.65.0 -004 01  06394 7 11115 /1/5     SW 6 TO TR
        51.69.0 UNL 80.11.0 -004 02  06399 7 10845 #8M5     NOOP INSTR PLACING G/M AFTER READ AREA
        51.70.0 UNL 80.15.0 -004 02  06404 7 10865 #8O5
        51.71.0 UNL 58.31.0 -004 01  06409 7  9550 95V0
        51.72.0 UNL 56.54.0 -004 01  06414 7  8680 86Y0
        51.73.0 UNL 10.36.0 -004 02  06419 7  3440 34M0
        51.74.0 UNL  6.66.0 -004 02  06424 7  1575 15P5
        51.75.0 UNL  4.12.0 -004 02  06429 7  0300 03-0
        51.76.0 UNL  5.15.0 -004 02  06434 7  0815 08J5
        51.77.0 UNL 12.25.0 -004 02  06439 7  4216 42J6
        51.78.0 UNL 53.87.0 -004 01  06444 7  7400 74#0
        51.79.0 UNL 54.38.0 -004 01  06449 7  7635 76T5
        51.80.0 UNL 57.72.0 -004 02  06454 7  9255 92N5
        51.81.0 UNL 20.99.0      02  06459 7  5144 51M4
        51.82.0 UNL 21.00.0      02  06464 7  5149 51M9
        51.83.0 UNL 20.97.0      02  06469 7  5134 51L4
        51.87.0 RCV 20.11.0 -003 00  06474 U  4701 4701     TRZ ADDR IN R/S CHANGED TO ELIMINATE
        51.88.0 TMT 59.79.0 -003 08  06479 9 10234 #K34     FIFTH BSP CTR
        51.89.0 RCV 52.81.0 -003 00  06484 U  6891 6891     ADDR OF LENGTH OF PROG
        51.90.0 TMT 59.81.0 -003 08  06489 9 10242 #K42
        51.91.0 TR  51.96.0      00  06494 1  6519 6519
7       51.91.1                                            FIVE WAY MERGE
        51.92.0 ST  12.24.0      06  06499 F  4215 4SJ5
        51.93.0 UNL 20.68.0 -004 01  06504 7  4985 49Y5     SW 38 TO TR
        51.94.0 UNL 80.78.0 -004 02  06509 7 11180 /1Q0     SW 7 TO NOP
        51.95.0 UNL 20.91.0 -004 01  06514 7  5100 51#0     SW 48 TO TR
        51.96.0 UNL  5.73.0 -004 01  06519 7  1115 11/5     SW 14 TO TR
        51.97.0 UNL  9.48.0 -004 01  06524 7  2990 29Z0     SW 52 TO TR
        51.98.0 UNL  5.97.0 -004 01  06529 7  1235 12T5     SW 17 TO TR
        51.99.0 UNL  6.18.0 -004 01  06534 7  1340 13U0     SW 18 TO TR
1       52.00.0 SET    0004      03  06539 B  0004 00&4
        52.01.0 LOD  2.12.0      03  06544 8  0185 01H5     RECORD LENGTH
        52.02.0 CMP 59.68.0      03  06549 4 10196 #1I6     COMPARE TO 0009
        52.03.0 TRH 52.07.0      03  06554 K  6574 65G4
1       52.04.0 SEL    0500      00  06559 2  0500 0500
        52.05.0 WR  60.48.0 -022 00  06564 R 10537 #537     RECORD LENGTH TOO SMALL
        52.06.0 TR  50.98.0      00  06569 1  6059 6059
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C LNG       SYMBOLIC          INCR          ACTUAL          S       DATA OR DESCRIPTION
L       LOC   OP   ADDR            ASU  LOC   OP ADDR ADDR N

1     52.07.0 SET     0003          00  06574 B   0003 0003
      52.08.0 LOD   2.13.0          00  06579 8   0188 0188    RECORDS PER BLOCK
      52.09.0 NTR 52.09.0           00  06584 X   6584 6584
      52.10.0 TRZ 57.17.0           00  06589 N   8994 8994    INPUT GROUPING IS 000
      52.11.0 LOD   2.12.0          03  06594 8   0185 01H5
      52.12.0 ST  12.20.0           03  06599 F   4203 4283    RECORD LENGTH
      52.13.0 ADD 12.12.0           03  06604 G   4181 41H1    ADD FIVE
      52.14.0 ST  12.19.0           03  06609 F   4199 41I9    RECORD LENGTH PLUS FIVE
      52.15.0 UNL 12.08.0           00  06614 7   4167 4167    REC PER BLOCK TO CONSTANT AREA
      52.16.0 ST  12.22.0           00  06619 F   4210 4210
      52.17.0 ST  12.73.0           00  06624 F   4607 4607
      52.18.0 MPY 12.20.0           00  06629 V   4203 4203    RECORD LENGTH TIMES # R/B
1     52.19.0 SET     0004          00  06634 B   0004 0004    EQUALS BLOCK LENGTH
      52.20.0 ST  59.46.0           00  06639 F  10144 #144
      52.21.0 ADD 12.12.0           00  06644 G   4181 4181    ADD FIVE
      52.22.0 ST  12.21.0           00  06649 F   4207 4207
      52.23.0 SUB 12.12.0           00  06654 P   4181 4181    SUBTRACT FIVE
      52.24.0 LOD   2.15.0          05  06659 8   0194 0/Z4    TEST AVAILABLE MEMORY FOR MODEL TWO
      52.25.0 CMP 59.67.0           05  06664 4  10195 #/Z5
      52.26.0 TRH 52.32.0           00  06669 K   6699 6699
      52.27.0 UNL   4.17.0 -004     02  06674 7   0325 03K5    NOOP EXTRA READ WRITE AND BSP IN
      52.28.0 UNL   4.22.0 -004     02  06679 7   0350 03N0    CHECKPOINT AND RESTART
      52.29.0 UNL   4.65.0 -004     02  06684 7   0565 0505
      52.30.0 UNL   4.67.0 -004     02  06689 7   0575 05P5
      52.31.0 UNL  11.63.0 -004     02  06694 7   3860 3800
      52.32.0 TR  57.47.0           00  06699 1   9134 9134    SW 60 TR IF 5 WAY MERGE
      52.33.0 TR  57.50.0           00  06704 1   9149 9149    SW 61 TR IF 4 WAY MERGE
      52.34.0 MPY 59.48.0           00  06709 V  10149 #149    MULTIPLY BLOCK LENGTH BY SIX
      52.35.0 ADD 59.51.0           00  06714 G  10155 #155    ADD PROGRAM LENGTH PLUS 30
      52.36.0 CMP   2.15.0          00  06719 4   0194 0194    COMPARE TO AVAILABLE MEMORY
      52.37.0 TRH 56.81.0           00  06724 K   8819 8819    BLOCK SIZE TOO LARGE
      52.38.0 LOD   2.15.0          00  06729 8   0194 0194
      52.39.0 SUB 59.55.0           00  06734 P  10170 #170    SUBTRACT LENGTH OF INSTRUCTION AREA
      52.40.0 UNL 60.26.0           00  06739 7  10344 #344
      52.41.0 ADD 59.49.0           00  06744 G  10150 #150    ADD FOUR
      52.42.0 UNL 60.25.0           00  06749 7  10339 #339
1     52.43.0 SET     0001          10  06754 B   0001 0--1
      52.44.0 LOD 60.25.0 -004      10  06759 8  10335 #LL5    LOAD HIGH ORDER POSITION TO DETER ZONING
      52.45.0 TRZ 52.57.0           10  06764 N   6824 6QK4
      52.46.0 CMP 59.62.0           10  06769 4  10186 #JQ6    COMPARE TO 2
      52.47.0 TRE 52.53.0           10  06774 L   6804 6Q-4
      52.48.0 TRH 52.55.0           00  06779 K   6814 6814
      52.49.0 LOD 12.09.0           10  06784 8   4168 4JO8    EQUAL TO 1
      52.50.0 ADM 60.25.0 -003      10  06789 6  10336 #LL6    LOAD AND ADD BLANK
      52.51.0 ADM 60.26.0 -003      10  06794 6  10341 #LM1
      52.52.0 TR  52.57.0           00  06799 1   6824 6824
      52.53.0 LOD 59.57.0           10  06804 8  10172 #JP2    EQUAL TO 2
      52.54.0 TR  52.50.0           00  06809 1   6789 6789
      52.55.0 LOD 59.56.0           10  06814 8  10171 #JP1
      52.56.0 TR  52.50.0           00  06819 1   6789 6789
      52.57.0 RCV 50.01.0 -003      00  06824 U   5566 5566    PUT ADDRESS OF AREA INTO RCV
      52.58.0 TMT 60.25.0 -003      08  06829 9  10336 #L36    INSTRUCTION
1     52.59.0 SET     0004          10  06834 B   0004 0--4
      52.60.0 LOD 60.26.0           10  06839 8  10344 #LM4
      52.61.0 ADM 60.01.0           10  06844 6  10314 #LJ4
      52.62.0 ADM 80.18.0           10  06849 6  10884 #QQ4
      52.63.0 ADM 80.41.0           10  06854 6  10999 #RR9
      52.64.0 ADM 80.53.0           10  06859 6  11059 /-N9
      52.65.0 ADM 80.65.0           10  06864 6  11119 /JJ9
      52.75.0 ADM 80.83.0           10  06869 6  11209 /K-9
      52.76.0 ADM 80.81.0           10  06874 6  11199 /JR9
      52.78.0 ADM 80.78.0           10  06879 6  11184 /JQ4
      52.79.0 ADM   5.22.0          10  06884 6   0854 0QN4
      52.80.0 ADM   5.38.0          10  06889 6   0944 0RM4
      52.81.0 RAD 59.59.0           00  06894 H  10180 #180    LENGTH OF PROGRAM FOR 3 4 OR 5 WAY MERGE
      52.82.0 ADM   5.25.0          00  06899 6   0869 0869    OR BEGINNING OF FIRST READ IN AREA
      52.83.0 ADM   5.26.0          00  06904 6   0874 0874
      52.84.0 ADM   5.30.0          00  06909 6   0894 0894
      52.85.0 ADM   5.36.0          00  06914 6   0924 0924
      52.86.0 ADM 80.21.0           00  06919 6  10899 #899
      52.87.0 ADM 80.23.0           00  06924 6  10909 #909
      52.88.0 ADM 80.25.0           00  06929 6  10919 #919
      52.89.0 ADM 80.27.0           00  06934 6  10929 #929
      52.90.0 ADM 80.29.0           00  06939 6  10939 #939
      52.92.0 ADM 80.07.0           00  06944 6  10829 #829
      52.93.0 ADM   5.75.0          00  06949 6   1129 1129
      52.94.0 ADM   5.82.0          00  06954 6   1164 1164
      52.95.0 ADM   5.83.0          00  06959 6   1169 1169
      52.96.0 ADM   6.93.0          00  06964 6   1714 1714
      52.97.0 ADM   6.95.0          00  06969 6   1724 1724
      52.98.0 ADM   6.97.0          00  06974 6   1734 1734
      52.99.0 ADM   6.99.0          00  06979 6   1744 1744
      53.00.0 ADM   7.01.0          00  06984 6   1754 1754
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C L	LNG	SYMBOLIC LOC	OP	ADDR	INCR	ASU	ACTUAL LOC	OP	ADDR	ADDR	S N	DATA OR DESCRIPTION
		53.01.0	ADM	7.35.0		00	06989	6	1924	1924		
		53.02.0	ADM	10.32.0		00	06994	6	3424	3424		
		53.03.0	ADM	11.74.0		00	06999	6	3915	3915		
		53.04.0	ADM	59.74.0		00	07004	6	10217	#217		
		53.05.0	UNL	59.85.0		00	07009	7	10262	#262		
		53.06.0	TR	53.27.0		00	07014	1	7114	7114		
		53.07.0	ADM	80.32.0		00	07019	6	10954	#954		
		53.08.0	ADM	80.34.0		00	07024	6	10964	#964		
		53.09.0	ADM	80.36.0		00	07029	6	10974	#974		
		53.10.0	ADM	80.38.0		00	07034	6	10984	#984		
		53.11.0	ADM	80.40.0		00	07039	6	10994	#994		
		53.13.0	ADM	80.08.0		00	07044	6	10834	#834		
		53.14.0	ADM	5.99.0		00	07049	6	1249	1249		
		53.15.0	ADM	6.06.0		00	07054	6	1284	1284		
		53.16.0	ADM	6.07.0		00	07059	6	1289	1289		
		53.17.0	ADM	7.08.0		00	07064	6	1789	1789		
		53.18.0	ADM	7.10.0		00	07069	6	1799	1799		
		53.19.0	ADM	7.12.0		00	07074	6	1809	1809		
		53.20.0	ADM	7.14.0		00	07079	6	1819	1819		
		53.21.0	ADM	7.16.0		00	07084	6	1829	1829		
		53.22.0	ADM	11.75.0		00	07089	6	3919	3919		
		53.23.0	ADM	10.33.0		00	07094	6	3429	3429		
		53.24.0	ADM	59.75.0		00	07099	6	10221	#221		
		53.25.0	RCV	53.42.0	-003	00	07104	U	7186	7186		
		53.26.0	TMT	59.93.0	-003	08	07109	9	10291	#K91		
1		53.27.0	SET	0005		00	07114	B	0005	0005		
		53.28.0	LOD	59.85.0		00	07119	8	10262	#262		
		53.29.0	ADD	12.21.0		00	07124	G	4207	4207		
		53.30.0	UNL	59.85.0		00	07129	7	10262	#262		
		53.31.0	LOD	59.85.0	-004	01	07134	8	10258	#2V8		LOAD HIGH ORDER POSITION
		53.32.0	TRZ	53.38.0		01	07139	N	7169	71W9		
		53.33.0	CMP	59.62.0		01	07144	4	10186	#1Y6		COMPARE TO TWO
		53.34.0	TRE	53.43.0		00	07149	L	7194	7194		
		53.35.0	TRH	53.45.0		00	07154	K	7204	7204		
		53.36.0	LOD	12.09.0		01	07159	8	4168	41W8		
		53.37.0	ADM	59.85.0	-003	01	07164	6	10259	#2V9		ADD ZONING
1		53.38.0	SET	0004		00	07169	B	0004	0004		
		53.39.0	LOD	59.85.0		00	07174	8	10262	#262		RELOAD ADDRESS
		53.40.0	SGN	59.85.0	-003	01	07179	T	10259	#2V9		STRIP ZONING FOR NEXT ADDITION
		53.41.0	RAD	59.43.0		01	07184	H	10131	#1T1		RESTORE ASU 01 TO 1
		53.42.0	TR	53.07.0		00	07189	1	7019	7019		
		53.43.0	LOD	59.57.0		01	07194	8	10172	#1X2		LOAD MINUS SIGN
		53.44.0	TR	53.37.0		00	07199	1	7164	7164		
		53.45.0	LOD	59.56.0		01	07204	8	10171	#1X1		LOAD PLUS SIGN
		53.46.0	TR	53.37.0		00	07209	1	7164	7164		
		53.47.0	ADM	80.44.0		00	07214	6	11014	/014		
		53.48.0	ADM	80.46.0		00	07219	6	11024	/024		
		53.49.0	ADM	80.48.0		00	07224	6	11034	/034		
		53.50.0	ADM	80.50.0		00	07229	6	11044	/044		
		53.51.0	ADM	80.52.0		00	07234	6	11054	/054		
		53.52.0	ADM	80.09.0		00	07239	6	10839	#839		
		53.54.0	ADM	10.34.0		00	07244	6	3434	3434		
		53.55.0	ADM	6.20.0		00	07249	6	1354	1354		
		53.56.0	ADM	6.26.0		00	07254	6	1384	1384		
		53.57.0	ADM	6.27.0		00	07259	6	1389	1389		
		53.58.0	ADM	6.74.0		00	07264	6	1619	1619		
		53.59.0	ADM	6.76.0		00	07269	6	1629	1629		
		53.60.0	ADM	6.78.0		00	07274	6	1639	1639		
		53.61.0	ADM	6.80.0		00	07279	6	1649	1649		
		53.62.0	ADM	6.82.0		00	07284	6	1659	1659		
		53.63.0	ADM	11.76.0		00	07289	6	3923	3923		
		53.64.0	ADM	59.76.0		00	07294	6	10225	#225		
		53.65.0	NOP	54.09.0		00	07299	A	7509	7509		
		53.66.0	RCV	53.42.0	-003	00	07304	U	7186	7186		
		53.67.0	TMT	59.86.0	-003	08	07309	9	10263	#K63		RETURN ADDRESS AFTER ADDING BLOCK LENGTH
		53.68.0	TR	53.27.0		00	07314	1	7114	7114		ADD BLOCK LENGTH PLUS 5 AND ZONE
		53.69.0	ADM	59.77.0		00	07319	6	10229	#229		
		53.70.0	ADM	20.35.0		00	07324	6	4824	4824		
		53.71.0	ADM	20.42.0		00	07329	6	4859	4859		
		53.72.0	ADM	20.43.0		00	07334	6	4864	4864		
		53.73.0	ADM	20.09.0		00	07339	6	4694	4694		
		53.74.0	ADM	20.55.0		00	07344	6	4924	4924		
		53.75.0	ADM	20.57.0		00	07349	6	4934	4934		
		53.76.0	ADM	20.59.0		00	07354	6	4944	4944		
		53.77.0	ADM	20.61.0		00	07359	6	4954	4954		
		53.78.0	ADM	20.63.0		00	07364	6	4964	4964		
		53.79.0	ADM	80.56.0		00	07369	6	11074	/074		
		53.80.0	ADM	80.58.0		00	07374	6	11084	/084		
		53.81.0	ADM	80.60.0		00	07379	6	11094	/094		
		53.82.0	ADM	80.62.0		00	07384	6	11104	/104		
		53.83.0	ADM	80.64.0		00	07389	6	11114	/114		
		53.84.0	ADM	80.10.0		00	07394	6	10844	#844		
		53.85.0	ADM	10.35.0		00	07399	6	3439	3439		

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C LNG      SYMBOLIC          INCR          ACTUAL          S      DATA OR DESCRIPTION
L      LOC   OP   ADDR              ASU  LOC   OP ADDR  ADDR N

       53.87.0 NOP  54.09.0          00  07404 A   7509 7509
       53.88.0 RCV  53.42.0 -003  00  07409 U   7186 7186
       53.89.0 TMT  59.87.0 -003  08  07414 9  10267 #K67    SET RETURN ADDRESS AFTER ADDING BLOCK LENGTH
       53.90.0 TR   53.27.0          00  07419 1   7114 7114
       53.91.0 ADM  30.19.0          00  07424 6   5304 5304    FIFTH READ IN AREA
       53.92.0 ADM  30.27.0          00  07429 6   5344 5344
       53.93.0 ADM  30.28.0          00  07434 6   5349 5349
       53.94.0 ADM  30.07.0          00  07439 6   5243 5243
       53.95.0 ADM  30.39.0          00  07444 6   5404 5404
       53.96.0 ADM  30.41.0          00  07449 6   5414 5414
       53.97.0 ADM  30.43.0          00  07454 6   5424 5424
       53.98.0 ADM  30.45.0          00  07459 6   5434 5434
       53.99.0 ADM  30.47.0          00  07464 6   5444 5444
       54.00.0 ADM  80.68.0          00  07469 6  11134 /134
       54.01.0 ADM  80.72.0          00  07474 6  11154 /154
       54.02.0 ADM  80.74.0          00  07479 6  11164 /164
       54.03.0 ADM  80.76.0          00  07484 6  11174 /174
       54.04.0 ADM  59.78.0          00  07489 6  10233 #233
       54.05.0 ADM  80.70.0          00  07494 6  11144 /144
       54.06.0 ADM  10.36.0          00  07499 6   3444 3444
       54.07.0 ADM  80.11.0          00  07504 6  10849 #849
       54.09.0 RCV  53.42.0 -003  00  07509 U   7186 7186
       54.10.0 TMT  59.88.0 -003  08  07514 9  10271 #K71    SET RETURN ADDR AFTER ADDING BLOCK LENGTH
       54.11.0 TR   53.27.0          00  07519 1   7114 7114    TRANSFER TO ADD BLOCK LENGTH
       54.12.0 ADM   5.74.0          00  07524 6   1124 1124
       54.13.0 ADM   5.98.0          00  07529 6   1244 1244
       54.14.0 ADM   6.19.0          00  07534 6   1349 1349
       54.15.0 ADM   6.45.0          00  07539 6   1479 1479
       54.16.0 ADM   6.48.0          00  07544 6   1499 1499
       54.17.0 ADM   6.56.0          00  07549 6   1529 1529
       54.18.0 ADM   7.37.0          00  07554 6   1934 1934
       54.19.0 ADM  10.40.0          00  07559 6   3464 3464
       54.20.0 ADM  10.44.0          00  07564 6   3484 3484
       54.21.0 ADM  11.77.0          00  07569 6   3927 3927
       54.22.0 ADM  30.18.0          00  07574 6   5299 5299
       54.23.0 ADM  20.34.0          00  07579 6   4819 4819
       54.24.0 ADM  11.97.0          00  07584 6   4007 4007
       54.26.0 ADM  80.12.0          00  07589 6  10854 #854
       54.27.0 RCV  53.42.0 -003  00  07594 U   7186 7186
       54.28.0 TMT  59.89.0 -003  08  07599 9  10275 #K75
       54.29.0 TR   53.27.0          00  07604 1   7114 7114
       54.30.0 ADM  80.13.0          00  07609 6  10859 #859
       54.32.0 NOP  54.44.0          00  07614 A   7664 7664    SWITCH TR FOR 3 WAY MERGE
       54.33.0 RCV  53.42.0 -003  00  07619 U   7186 7186
       54.34.0 TMT  59.90.0 -003  08  07624 9  10279 #K79
       54.35.0 TR   53.27.0          00  07629 1   7114 7114
       54.37.0 ADM  80.14.0          00  07634 6  10864 #864
       54.38.0 NOP  54.44.0          00  07639 A   7664 7664    TR FOR FOUR WAY MERGE
       54.39.0 RCV  53.42.0 -003  00  07644 U   7186 7186
       54.40.0 TMT  59.91.0 -003  08  07649 9  10283 #K83
       54.41.0 TR   53.27.0          00  07654 1   7114 7114
       54.43.0 ADM  80.15.0          00  07659 6  10869 #869
       54.44.0 RCV  53.42.0 -003  00  07664 U   7186 7186
       54.45.0 TMT  59.92.0 -003  08  07669 9  10287 #K87
       54.46.0 TR   53.27.0          00  07674 1   7114 7114
       54.48.0 ADM   3.91.0          00  07679 6   0239 0239    INSTR FOR PLACING G/M AT END OF LAST WRITE AREA
       54.49.0 RAD  59.46.0          00  07684 H  10144 #144    BLOCK LENGTH
       54.50.0 ADM   3.91.0          00  07689 6   0239 0239    ADD TO ADDRESSES TO
       54.51.0 ADM  80.07.0          00  07694 6  10829 #829    PLACE G/M AT END OF READ IN AREAS AND AT
       54.52.0 ADM  80.08.0          00  07699 6  10834 #834    END OF WRITE OUT AREAS
       54.53.0 ADM  80.09.0          00  07704 6  10839 #839
       54.54.0 ADM  80.10.0          00  07709 6  10844 #844
       54.55.0 ADM  80.11.0          00  07714 6  10849 #849
       54.56.0 ADM  10.32.0          00  07719 6   3424 3424    AFTER DUNPING UNREADABLE RECPRD
       54.57.0 ADM  10.33.0          00  07724 6   3429 3429
       54.58.0 ADM  10.34.0          00  07729 6   3434 3434
       54.59.0 ADM  10.35.0          00  07734 6   3439 3439
       54.60.0 ADM  10.36.0          00  07739 6   3444 3444
       54.61.0 ADM  80.12.0          00  07744 6  10854 #854
       54.62.0 ADM  80.13.0          00  07749 6  10859 #859
       54.63.0 ADM  80.14.0          00  07754 6  10864 #864
       54.64.0 ADM  80.15.0          00  07759 6  10869 #869
       54.65.0 SUB  12.20.0          00  07764 P   4203 4203
       54.66.0 ADM  10.40.0          00  07769 6   3464 3464
1      54.67.0 SEL     0916          00  07774 2   0916 0916    ALTERATION SWITCH FOR TAPE LABEL
       54.68.0 TRS  59.04.0          00  07779 O   9934 9934
1      54.69.0 SEL     0915          00  07784 2   0915 0915
       54.70.0 TRS  59.06.0          00  07789 O   9944 9944
7      54.70.1                                                 COMPUTE ADDRESSES TO PULL CONTROL WORD
1      54.71.0 SET     0002          03  07794 B   0002 0002
       54.72.0 LOD   2.03.0          03  07799 B   0157 01E7    LOAD L1
       54.73.0 ADM  80.19.0          03  07804 6  10889 #8H9    ADD TO SET INSTRUCTIONS
       54.74.0 ADM  80.30.0          03  07809 6  10944 #9D4
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LNG      SYMBOLIC          INCR          ACTUAL          S      DATA OR DESCRIPTION
       LOC   OP   ADDR          ASU  LOC   OP ADDR  ADDR N

     54.75.0 ADM 80.42.0        03  07814 6 11004 /0&4
     54.76.0 ADM 80.54.0        03  07819 6 11064 /0F4
     54.77.0 ADM 80.66.0        03  07824 6 11124 /1B4
     54.78.0 ADM  6.72.0        03  07829 6  1609 16&9
     54.79.0 ADM  6.91.0        03  07834 6  1704 17&4
     54.80.0 ADM  7.06.0        03  07839 6  1779 17G9
     54.81.0 ADM 20.53.0        03  07844 6  4914 49A4
     54.82.0 ADM 30.37.0        03  07849 6  5394 53I4
     54.83.0 ST   2.03.0        03  07854 F  0157 01E7
     54.84.0 RAD  2.02.0        04  07859 H  0155 0/55    LOAD P1
     54.85.0 SUB  2.03.0        04  07864 P  0157 0/57
     54.87.0 ADM 80.21.0        04  07869 6 10899 #Y99
     54.88.0 ADM 80.32.0        04  07874 6 10954 #Z54
     54.89.0 ADM 80.44.0        04  07879 6 11014 /#14
     54.90.0 ADM 80.56.0        04  07884 6 11074 /#74
     54.91.0 ADM 80.68.0        04  07889 6 11134 //34
     54.92.0 ADM  6.74.0        04  07894 6  1619 1W19
     54.93.0 ADM  6.93.0        04  07899 6  1714 1X14
     54.94.0 ADM  7.08.0        04  07904 6  1789 1X89
     54.95.0 ADM 20.55.0        04  07909 6  4924 4Z24
     54.96.0 ADM 30.39.0        04  07914 6  5404 5U04
     54.97.0 LOD  2.05.0        03  07919 8  0163 01F3    LOAD L2
     54.98.0 CMP 59.41.0        03  07924 4 10129 #1B9    COMP TO BLANKS
     54.99.0 TRE 56.06.0        03  07929 L  8444 84D4    ONLY ONE CONTROL FIELD
     55.00.0 ADM 80.22.0        03  07934 6 10904 #9&4
     55.01.0 ADM 80.33.0        03  07939 6 10959 #9E9
     55.02.0 ADM 80.45.0        03  07944 6 11019 /0A9
     55.03.0 ADM 80.57.0        03  07949 6 11079 /0G9
     55.04.0 ADM 80.69.0        03  07954 6 11139 /1C9
     55.05.0 ADM  6.75.0        03  07959 6  1624 16B4
     55.06.0 ADM  6.94.0        03  07964 6  1719 17A9
     55.07.0 ADM  7.09.0        03  07969 6  1794 17I4
     55.08.0 ADM 20.56.0        03  07974 6  4929 49B9
     55.09.0 ADM 30.40.0        03  07979 6  5409 54&9
     55.10.0 ST   2.05.0        03  07984 F  0163 01F3
     55.11.0 RAD  2.04.0        04  07989 H  0161 0/61    LOAD P2
     55.12.0 SUB  2.05.0        04  07994 P  0163 0/63
     55.14.0 ADM 80.23.0        04  07999 6 10909 #Z09
     55.15.0 ADM 80.34.0        04  08004 6 10964 #Z64
     55.16.0 ADM 80.46.0        04  08009 6 11024 /#24
     55.17.0 ADM 80.58.0        04  08014 6 11084 /#84
     55.18.0 ADM 80.70.0        04  08019 6 11144 //44
     55.19.0 ADM  6.76.0        04  08024 6  1629 1W29
     55.20.0 ADM  6.95.0        04  08029 6  1724 1X24
     55.21.0 ADM  7.10.0        04  08034 6  1799 1X99
     55.22.0 ADM 20.57.0        04  08039 6  4934 4Z34
     55.23.0 ADM 30.41.0        04  08044 6  5414 5U14
     55.24.0 LOD  2.07.0        03  08049 8  0169 01F9    LOAD L3
     55.25.0 CMP 59.41.0        03  08054 4 10129 #1B9    COMPARE TO BLANKS
     55.26.0 TRE 56.69.0        00  08059 L  8759 8759    ONLY TWO CONTROL FIELDS
     55.27.0 ADM 80.24.0        03  08064 6 10914 #9A4
     55.28.0 ADM 80.35.0        03  08069 6 10969 #9F9
     55.29.0 ADM 80.47.0        03  08074 6 11029 /0B9
     55.30.0 ADM 80.59.0        03  08079 6 11089 /0H9
     55.31.0 ADM 80.71.0        03  08084 6 11149 /1D9
     55.32.0 ADM  6.77.0        03  08089 6  1634 16C4
     55.33.0 ADM  6.96.0        03  08094 6  1729 17B9
     55.34.0 ADM 30.42.0        03  08099 6  5419 54A9
     55.35.0 ADM  7.11.0        03  08104 6  1804 18&4
     55.36.0 ADM 20.58.0        03  08109 6  4939 49C9
     55.37.0 ST   2.07.0        03  08114 F  0169 01F9
     55.38.0 RAD  2.06.0        04  08119 H  0167 0/67    LOAD P3
     55.39.0 SUB  2.07.0        04  08124 P  0169 0/69
     55.41.0 ADM 80.25.0        04  08129 6 10919 #Z19
     55.42.0 ADM 80.36.0        04  08134 6 10974 #Z74
     55.43.0 ADM 80.48.0        04  08139 6 11034 /#34
     55.44.0 ADM 80.60.0        04  08144 6 11094 /#94
     55.45.0 ADM 80.72.0        04  08149 6 11154 //54
     55.46.0 ADM  6.78.0        04  08154 6  1639 1W39
     55.47.0 ADM  6.97.0        04  08159 6  1734 1X34
     55.48.0 ADM  7.12.0        04  08164 6  1809 1Y09
     55.49.0 ADM 20.59.0        04  08169 6  4944 4Z44
     55.50.0 ADM 30.43.0        04  08174 6  5424 5U24
     55.51.0 LOD  2.09.0        03  08179 8  0175 01G5    LOAD L4
     55.52.0 CMP 59.41.0        03  08184 4 10129 #1B9    COMPARE TO BLANKS
     55.53.0 TRE 56.63.0        03  08189 L  8729 87B9    THREE CONTROL FIELSS
     55.54.0 ADM 80.26.0        03  08194 6 10924 #9B4
     55.55.0 ADM 80.37.0        03  08199 6 10979 #9G9
     55.56.0 ADM 80.49.0        03  08204 6 11039 /0C9
     55.57.0 ADM 80.61.0        03  08209 6 11099 /0I9
     55.58.0 ADM 80.73.0        03  08214 6 11159 /1E9
     55.59.0 ADM  6.79.0        03  08219 6  1644 16D4
     55.60.0 ADM  6.98.0        03  08224 6  1739 17C9
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C LNG       SYMBOLIC          INCR          ACTUAL          S       DATA OR DESCRIPTION
L       LOC   OP   ADDR          ASU  LOC  OP ADDR ADDR  N

      55.61.0 ADM  7.13.0        03  08229 6  1814 18A4
      55.62.0 ADM 20.60.0        03  08234 6  4949 49D9
      55.63.0 ADM 30.44.0        03  08239 6  5429 54B9
      55.64.0 ST   2.09.0        03  08244 F  0175 01G5
      55.65.0 RAD  2.08.0        04  08249 H  0173 0/73    LOAD P4
      55.66.0 SUB  2.09.0        04  08254 P  0175 0/75
      55.68.0 ADM 80.27.0        04  08259 6 10929 #Z29
      55.69.0 ADM 80.38.0        04  08264 6 10984 #Z84
      55.70.0 ADM 80.50.0        04  08269 6 11044 /#44
      55.71.0 ADM 80.62.0        04  08274 6 11104 //04
      55.72.0 ADM 80.74.0        04  08279 6 11164 //64
      55.73.0 ADM  6.80.0        04  08284 6  1649 1W49
      55.74.0 ADM  6.99.0        04  08289 6  1744 1X44
      55.75.0 ADM  7.14.0        04  08294 6  1819 1Y19
      55.76.0 ADM 20.61.0        04  08299 6  4954 4Z54
      55.77.0 ADM 30.45.0        04  08304 6  5434 5U34
      55.78.0 LOD  2.11.0        03  08309 8  0181 01H1    LOAD L5
      55.79.0 CMP 59.41.0        03  08314 4 10129 #1B9    COMPARE TO BLANKS
      55.80.0 TRE 56.85.0        03  08319 L  8839 88C9    FOUR CONTROL FIELDS
      55.81.0 ADM 80.28.0        03  08324 6 10934 #9C4
      55.82.0 ADM 80.39.0        03  08329 6 10989 #9H9
      55.83.0 ADM 80.51.0        03  08334 6 11049 /0D9
      55.84.0 ADM 80.63.0        03  08339 6 11109 /1G9
      55.85.0 ADM 80.75.0        03  08344 6 11169 /1F9
      55.86.0 ADM  6.81.0        03  08349 6  1654 16E4
      55.87.0 ADM  7.00.0        03  08354 6  1749 17D9
      55.88.0 ADM  7.15.0        03  08359 6  1824 18B4
      55.89.0 ADM 20.62.0        03  08364 6  4959 49E9
      55.90.0 ADM 30.46.0        03  08369 6  5439 54C9
      55.91.0 ST   2.11.0        03  08374 F  0181 01H1
      55.92.0 RAD  2.10.0        04  08379 H  0179 0/79    LOAD P5
      55.93.0 SUB  2.11.0        04  08384 P  0181 0/81
      55.95.0 ADM 80.29.0        04  08389 6 10939 #Z39
      55.96.0 ADM 80.40.0        04  08394 6 10994 #Z94
      55.97.0 ADM 80.52.0        04  08399 6 11054 /#54
      55.98.0 ADM 80.64.0        04  08404 6 11114 //14
      55.99.0 ADM 80.76.0        04  08409 6 11174 //74
      56.00.0 ADM  6.82.0        04  08414 6  1659 1W59
      56.01.0 ADM  7.01.0        04  08419 6  1754 1X54
      56.02.0 ADM  7.16.0        04  08424 6  1829 1Y29
      56.03.0 ADM 20.63.0        04  08429 6  4964 4Z64
      56.04.0 ADM 30.47.0        04  08434 6  5444 5U44
      56.05.0 TR  56.88.0        00  08439 1  8854 8854    HAVE SET INSTR TO PULL CONTROL WORDS
7     56.05.1                                               ONLY ONE CONTROL FIELD
1     56.06.0 SET    0005        05  08444 B  0005 0#*5    INSERT TRANSFER INSTRUCTIONS
      56.07.0 RCV  6.72.0 -004   00  08449 U  1605 1605
      56.08.0 TMT 59.71.0 -004   05  08454 9 10201 #S#1
      56.09.0 RCV  6.69.0 -003   00  08459 U  1591 1591
      56.10.0 TMT 59.72.0 -003   04  08464 9 10206 #S06
      56.11.0 RCV  6.70.0 -003   00  08469 U  1596 1596
      56.12.0 TMT 59.73.0 -003   04  08474 9 10210 #S10
      56.13.0 RCV 80.19.0 -004   00  08479 U 10885 #885
      56.14.0 TMT 60.00.0        05  08484 9 10310 #T/0
      56.15.0 UNL  5.66.0        04  08489 7  1084 1#84
      56.16.0 UNL  6.88.0        04  08494 7  1689 1W89
      56.17.0 UNL  5.93.0        04  08499 7  1219 1S19
      56.18.0 UNL  5.68.0        04  08504 7  1094 1#94
      56.19.0 UNL  5.95.0        04  08509 7  1229 1S29
      56.20.0 UNL  5.71.0        04  08514 7  1109 1/09
      56.21.0 UNL  6.17.0        04  08519 7  1339 1T39
      56.22.0 UNL 20.22.0        04  08524 7  4759 4X59
      56.23.0 UNL 20.33.0        04  08529 7  4814 4Y14
      56.24.0 UNL 30.53.0        04  08534 7  5474 5U74
      56.25.0 UNL 30.14.0        04  08539 7  5279 5S79
      56.26.0 UNL 30.17.0        04  08544 7  5294 5S94
      56.27.0 UNL 30.54.0        04  08549 7  5479 5U79
      56.28.0 UNL 80.79.0        04  08554 7 11189 //89
      56.29.0 UNL 80.80.0        04  08559 7 11194 //94
      56.30.0 UNL 20.72.0        04  08564 7  5009 5#09
      56.31.0 UNL 20.74.0        04  08569 7  5019 5#19
      56.32.0 UNL 20.76.0        04  08574 7  5029 5#29
      56.33.0 LOD 59.74.0        04  08579 8 10217 #S17
      56.34.0 ADM  5.66.0        04  08584 6  1084 1#84
      56.35.0 ADM  6.88.0        04  08589 6  1689 1W89
      56.36.0 ADM 20.72.0        04  08594 6  5009 5#09
      56.37.0 LOD 59.75.0        04  08599 8 10221 #S21
      56.38.0 ADM  5.93.0        04  08604 6  1219 1S19
      56.39.0 ADM  5.68.0        04  08609 6  1094 1#94
      56.40.0 ADM 20.76.0        04  08614 6  5029 5#29
      56.41.0 LOD 59.76.0        04  08619 8 10225 #S25
      56.42.0 ADM  5.95.0        04  08624 6  1229 1S29
      56.43.0 ADM  5.71.0        04  08629 6  1109 1/09
      56.44.0 ADM  6.17.0        04  08634 6  1339 1T39
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C LNG      SYMBOLIC          INCR          ACTUAL          S      DATA OR DESCRIPTION
L      LOC   OP   ADDR              ASU  LOC  OP ADDR ADDR N

       56.45.0 ADM 20.74.0           04  08639 6  5019 5#19
       56.46.0 NOP 56.62.0           00  08644 A  8724 8724    TR FOR 3 WAY MERGE
       56.47.0 LOD 59.77.0           04  08649 8 10229 #S29
       56.48.0 ADM 20.22.0           04  08654 6  4759 4X59
       56.49.0 ADM 20.33.0           04  08659 6  4814 4Y14
       56.50.0 ADM 30.53.0           04  08664 6  5474 5U74
       56.51.0 ADM 80.79.0           04  08669 6 11189 //89
       56.52.0 RCV 20.53.0 -004      00  08674 U  4910 4910
       56.53.0 TMT 60.03.0           05  08679 9 10320 #TS0
       56.54.0 NOP 56.62.0           00  08684 A  8724 8724    TR IF FOUR WAY MERGE
       56.55.0 LOD 59.78.0           04  08689 8 10233 #S33
       56.56.0 ADM 30.14.0           04  08694 6  5279 5S79
       56.57.0 ADM 30.17.0           04  08699 6  5294 5S94
       56.58.0 ADM 30.54.0           04  08704 6  5479 5U79
       56.59.0 ADM 80.80.0           04  08709 6 11194 //94
       56.60.0 RCV 30.37.0 -004      00  08714 U  5390 5390
       56.61.0 TMT 60.05.0           05  08719 9 10325 #TS5
       56.62.0 TR  56.88.0           00  08724 1  8854 8854    HAVE AVOIDED PULLING CONTROL WORD
       56.63.0 RAD 59.44.0           06  08729 H 10135 #/L5    60010
       56.64.0 ADM 56.70.0           06  08734 6  8764 8XO4    CHANGE ADDRESSES TO MODIFY
       56.65.0 ADM 56.72.0           06  08739 6  8774 8XP4    RECEIVE INSTRUCTIONS
       56.66.0 ADM 56.74.0           06  08744 6  8784 8XQ4
       56.67.0 ADM 56.76.0           06  08749 6  8794 8XR4
       56.68.0 ADM 56.78.0           06  08754 6  8804 8Y=4
1      56.69.0 SET    0005           05  08759 B  0005 0#=5
       56.70.0 RCV  6.77.0 -004      00  08764 U  1630 1630
       56.71.0 TMT 59.94.0           05  08769 9 10295 #SZ5
       56.72.0 RCV  6.96.0 -004      00  08774 U  1725 1725
       56.73.0 TMT 59.96.0           05  08779 9 10300 #T#0
       56.74.0 RCV  7.11.0 -004      00  08784 U  1800 1800
       56.75.0 TMT 59.98.0           05  08789 9 10305 #T#5
       56.76.0 RCV 20.58.0 -004      00  08794 U  4935 4935
       56.77.0 TMT 60.03.0           05  08799 9 10320 #TS0
       56.78.0 RCV 30.42.0 -004      00  08804 U  5415 5415
       56.79.0 TMT 60.05.0           05  08809 9 10325 #TS5
       56.80.0 TR  56.88.0           00  08814 1  8854 8854
1      56.81.0 SEL    0500           00  08819 2  0500 0500
       56.82.0 WR  60.46.0 -021      00  08824 R 10514 #514
1      56.83.0 HLT    0004           00  08829 J  0004 0004    BLOCK LENGTH TOO LARGE
       56.84.0 TR  56.83.0           00  08834 1  8829 8829
       56.85.0 RAD 59.44.0           06  08839 H 10135 #/L5
       56.86.0 ADD 59.44.0           06  08844 G 10135 #/L5    ADD 20 TO RECEIVE INSTRUCTIONS
       56.87.0 TR  56.64.0           00  08849 1  8734 8734
7      56.87.1                                                 ADD LENGTH OF CONTROL WORDS TO INSTRUCTIONS
1      56.88.0 SET    0002           04  08854 B  0002 0#02
       56.89.0 LOD  2.23.0           04  08859 8  0217 0S17
1      56.90.0 SET    0004           04  08864 B  0004 0#04
       56.91.0 UNL  5.20.0           04  08869 7  0844 0Y44
       56.92.0 UNL  8.89.0           04  08874 7  2699 2W99    INTO SET AFTER DETER PROPER EOF
       56.93.0 ST  12.23.0           04  08879 F  4214 4S14
       56.94.0 SUB 12.14.0           04  08884 P  4185 4/85
       56.95.0 ADM 30.53.0           04  08889 6  5474 5U74
       56.96.0 ADM 30.54.0           04  08894 6  5479 5U79
       56.97.0 ADM 20.72.0           04  08899 6  5009 5#09
       56.98.0 ADM 20.74.0           04  08904 6  5019 5#19
       56.99.0 ADM 20.76.0           04  08909 6  5029 5#29
       57.00.0 ADM  5.66.0           04  08914 6  1084 1#84
       57.01.0 ADM  5.93.0           04  08919 6  1219 1S19
       57.02.0 ADM  5.68.0           04  08924 6  1094 1#94
       57.03.0 ADM  5.95.0           04  08929 6  1229 1S29
       57.04.0 ADM  5.71.0           04  08934 6  1109 1/09
       57.05.0 ADM  6.17.0           04  08939 6  1339 1T39
       57.06.0 ADM  6.88.0           04  08944 6  1689 1W89
       57.07.0 ADM 11.97.0           04  08949 6  4007 4#07
       57.08.0 ADM 10.40.0           04  08954 6  3464 3U64
       57.09.0 ADM 20.22.0           04  08959 6  4759 4X59
       57.10.0 ADM 20.33.0           04  08964 6  4814 4Y14
       57.11.0 ADM 30.14.0           04  08969 6  5279 5S79
       57.12.0 ADM 30.17.0           04  08974 6  5294 5S94
       57.13.0 ADM 80.79.0           04  08979 6 11189 //89
       57.14.0 ADM 80.80.0           04  08984 6 11194 //94
       57.15.0 TR  57.53.0           00  08989 1  9164 9164    TRANSFER TO TEST PADDING
       57.17.0 UNL 57.85.0 -004      02  08994 7  9320 93K0
       57.18.0 UNL  2.13.0           01  08999 7  0188 01Y8    1 AS R/B
       57.19.0 UNL 58.45.0 -004      02  09004 7  9620 96K0    SET SWITCH TO MOVE INSTRUCTIONS
       57.20.0 UNL 80.90.0 -004      01  09009 7 11240 /2U0    SW 8 TO TR
       57.21.0 UNL 80.05.1 -004      01  09014 7 10815 #8/5    SW 1B TO TR
       57.22.0 UNL  5.36.2 -004      01  09019 7  0930 09T0    SW 2B TO TR
       57.23.0 UNL  7.37.1 -004      01  09024 7  1935 19T5    SW 23 TO TR
       57.24.0 UNL  9.89.2 -004      01  09029 7  3205 32#5    SW 57A TO TR
       57.25.0 UNL 10.31.0 -004      02  09034 7  3415 34J5    NOP INSTR TO REPLACE GROUP MARKS
       57.26.0 UNL 10.32.0 -004      02  09039 7  3420 34K0    AT END OF READ AREAS AFTER
       57.27.0 UNL 10.33.0 -004      02  09044 7  3425 34K5    WRITING UNREADABLE RECORD
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C LNG       SYMBOLIC          INCR          ACTUAL          S      DATA OR DESCRIPTION
L      LOC    OP   ADDR              ASU  LOC   OP ADDR  ADDR N

       57.28.0 UNL 10.34.0 -004 02  09049 7  3430 34L0
       57.29.0 UNL 10.35.0 -004 02  09054 7  3435 34L5
       57.30.0 UNL 10.36.0 -004 02  09059 7  3440 34M0
       57.31.0 UNL 10.37.0 -004 02  09064 7  3445 34M5
1      57.33.0 SET    0004      01  09069 B  0004 00#4
1      57.34.0 SET    0001      12  09074 B  0001 0&01
       57.35.0 LOD  2.12.0      12  09079 8  0185 0A85    LOW ORDER POSITION OF RECORD LENGTH
       57.36.0 CMP 59.44.0 &001 12  09084 4 10136 #A36    COMPARE TO 4
       57.37.0 TRE 57.42.0      00  09089 L  9114 9114
       57.38.0 CMP 59.68.0      12  09094 4 10196 #A96
       57.39.0 TRE 57.42.0      00  09099 L  9114 9114    COMPARE TO 9
       57.40.0 ADM  2.12.0      01  09104 6  0185 01Y5
       57.41.0 TR  57.35.0      00  09109 1  9079 9079    TRY AGAIN
       57.42.0 ADM  2.12.0      01  09114 6  0185 01Y5    ADD ONE TO RECORD LENGTH
1      57.44.0 SET    0001      01  09119 B  0001 00#1
       57.45.0 LOD  2.13.0      00  09124 8  0188 0188
       57.46.0 TR  52.11.0      00  09129 1  6594 6594    USING 001 AS REC PER BLOCK
1      57.47.0 LNG    0001      00  09134 D  0001 0001    MULTIPLY BY 10
       57.48.0 ADD 59.58.0      00  09139 G 10176 #176    PROGRAM LENGTH
       57.49.0 TR  52.36.0      00  09144 1  6719 6719
       57.50.0 MPY 59.50.0      00  09149 V 10151 #151    MULTIPLY BLOCK LEMGTH BY 8
       57.51.0 ADD 59.53.0      00  09154 G 10163 #163    ADD PROGRAM LENGTH PLUS 40
       57.52.0 TR  52.36.0      00  09159 1  6719 6719
7      57.52.1                                            COMPUTE COMPLEMENTS
       57.53.0 RAD 59.45.0      00  09164 H 10140 #140    40000
       57.54.0 SUB 59.46.0      00  09169 P 10144 #144    MINUS BLOCK LENGTH
       57.55.0 ADD 12.20.0      00  09174 G  4203 4203    PLUS RECORD LENGTH
       57.56.0 UNL 60.02.0      00  09179 7 10319 #319
       57.57.0 LOD 60.02.0 -004 01  09184 8 10315 #3/5
       57.58.0 TRZ 57.64.0      01  09189 N  9219 92/9
       57.59.0 CMP 59.62.0      01  09194 4 10186 #1Y6
       57.60.0 TRE 57.77.0      01  09199 L  9284 92Y4
       57.61.0 TRH 57.79.0      01  09204 K  9294 92Z4
       57.62.0 LOD 12.09.0      01  09209 8  4168 41W8
       57.63.0 ADM 60.02.0 -003 01  09214 6 10316 #3/6
       57.64.0 TR  57.69.0      00  09219 1  9244 9244
       57.65.0 RCV 12.80.0 -003 00  09224 U  4623 4623
       57.66.0 TMT 60.02.0 -003 08  09229 9 10316 #L16
       57.67.0 RAD 12.14.0      01  09234 H  4185 41Y5
       57.68.0 TR  57.81.0      00  09239 1  9304 9304
       57.69.0 RCV 12.79.0 -003 00  09244 U  4619 4619
       57.70.0 TMT 60.02.0 -003 08  09249 9 10316 #L16
       57.71.0 UNL 57.64.0 -004 02  09254 7  9215 92J5
       57.72.0 SUB 12.21.0      00  09259 P  4207 4207
       57.73.0 SUB 12.21.0      00  09264 P  4207 4207
       57.74.0 SUB 12.21.0      00  09269 P  4207 4207
       57.75.0 SUB 12.21.0      00  09274 P  4207 4207
       57.76.0 TR  57.56.0      00  09279 1  9179 9179
       57.77.0 LOD 59.57.0      01  09284 8 10172 #1X2    EQUAL TO TWO
       57.78.0 TR  57.63.0      00  09289 1  9214 9214
       57.79.0 LOD 59.56.0      01  09294 8 10171 #1X1    EQUAL TO THREE
       57.80.0 TR  57.63.0      00  09299 1  9214 9214
7      57.80.1                                            TEST PADDING
1      57.81.0 SET    0001      07  09304 B  0001 0#&1
       57.82.0 LOD  2.14.0      07  09309 8  0189 0/H9
       57.83.0 CMP 59.68.0      07  09314 4 10196 #/I6
       57.84.0 TRE 58.96.0      00  09319 L  9889 9889    NINES PADDING
       57.85.0 UNL  7.29.0 -004 01  09324 7  1890 18Z0    SW 36 TO TR FOR BLANK PADDING
1      57.86.0 SET    0010      07  09329 B  0010 0#A0
       57.87.0 LOD 59.41.0      07  09334 8 10129 #/B9
       57.88.0 UNL 11.99.0 -040 07  09339 7  4067 4#F7    SET CONSTANT TO BLANKS
       57.89.0 UNL 11.99.0 -030 07  09344 7  4077 4#G7
       57.90.0 UNL 11.99.0 -020 07  09349 7  4087 4#H7
       57.91.0 UNL 11.99.0 -010 07  09354 7  4097 4#I7
       57.92.0 UNL 11.99.0      07  09359 7  4107 4/&7
1      57.93.0 SET    0001      00  09364 B  0001 0001    LOAD HASH INDICATOR
       57.94.0 LOD  2.17.0      00  09369 8  0205 0205
       57.95.0 CMP 59.42.0      00  09374 4 10130 #130    COMPARE TO H
       57.96.0 TRE 57.98.0      00  09379 L  9389 9389
       57.97.0 TR  58.99.0      00  09384 1  9904 9904
1      57.98.0 SET    0010      00  09389 B  0010 0010    LOAD # INPUT RECORDS
       57.99.0 LOD  2.16.0      00  09394 8  0204 0204
       58.00.0 CMP 59.41.0      00  09399 4 10129 #129
       58.01.0 TRE 59.02.0      00  09404 L  9924 9924
       58.02.0 UNL 12.03.0      00  09409 7  4138 4138
7      58.02.1                                            REWIND TAPES
1      58.03.0 SEL    0201      00  09414 2  0201 0201
1      58.04.0 IOF    0000      00  09419 3  0000 0000
1      58.05.0 RWD    0002      00  09424 3  0002 0002
1      58.06.0 SEL    0203      00  09429 2  0203 0203
1      58.07.0 IOF    0000      00  09434 3  0000 0000
1      58.08.0 RWD    0002      00  09439 3  0002 0002
1      58.09.0 SEL    0205      00  09444 2  0205 0205
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C LNG      SYMBOLIC          INCR          ACTUAL        S      DATA OR DESCRIPTION
L      LOC    OP   ADDR          ASU  LOC  OP ADDR ADDR N

1      58.10.0 IOF     0000       00  09449 3  0000 0000
1      58.11.0 RWD     0002       00  09454 3  0002 0002
1      58.12.0 RD      0000       01  09459 Y  0000 00#0
       58.13.0 ADM 12.65.0        01  09464 6  4585 45Y5    ADD 1 TO CTR U FOR PROGRAM LOADED ON TAPE 0205
1      58.14.0 SEL     0207       00  09469 2  0207 0207
1      58.15.0 IOF     0000       00  09474 3  0000 0000
1      58.16.0 RWD     0002       00  09479 3  0002 0002
1      58.17.0 SEL     0200       00  09484 2  0200 0200
1      58.18.0 IOF     0000       00  09489 3  0000 0000
1      58.19.0 RWD     0002       00  09494 3  0002 0002
1      58.20.0 SEL     0202       00  09499 2  0202 0202
1      58.21.0 IOF     0000       00  09504 3  0000 0000
1      58.22.0 RWD     0002       00  09509 3  0002 0002
       58.23.0 NOP 58.35.0        00  09514 A  9574 9574    TRANSFER FOR 2 WAY MERGE
1      58.24.0 SEL     0204       00  09519 2  0204 0204
1      58.25.0 IOF     0000       00  09524 3  0000 0000
1      58.26.0 RWD     0002       00  09529 3  0002 0002
       58.27.0 NOP 58.35.0        00  09534 A  9574 9574    TRANSFER FOR 3 WAY MERGE
1      58.28.0 SEL     0206       00  09539 2  0206 0206
1      58.29.0 IOF     0000       00  09544 3  0000 0000
1      58.30.0 RWD     0002       00  09549 3  0002 0002
       58.31.0 NOP 58.35.0        00  09554 A  9574 9574    TR FOR 4 WAY MERGE
1      58.32.0 SEL     0208       00  09559 2  0208 0208
       58.33.0 UNL   5.21.0 -004  02  09564 7  0845 08M5    SW 1A TO NOP
1      58.34.0 RWD     0002       00  09569 3  0002 0002
1      58.35.0 SET     0004       08  09574 B  0004 0-04
       58.36.0 RAD 12.73.0        03  09579 H  4607 46&7
       58.37.0 RAD 12.24.0        04  09584 H  4215 4S15
       58.38.0 RAD 12.22.0        06  09589 H  4210 4SJ0
       58.39.0 RAD 12.22.0        07  09594 H  4210 4SA0
       58.40.0 RAD 12.22.0        08  09599 H  4210 4K10
       58.41.0 RAD 12.22.0        09  09604 H  4210 4K/0
       58.42.0 RAD 12.22.0        10  09609 H  4210 4KJ0
       58.43.0 RAD 12.24.0        12  09614 H  4215 4B15
1      58.44.0 SET     0004       13  09619 B  0004 0&#4
       58.45.0 TR  58.52.0        00  09624 1  9669 9669    SW 64 NOP FOR SINGLE RECORDS NOT ENDING IN R/M
       58.46.0 RCV 10.39.0        00  09629 U  3459 3459    MOVE SPECIAL INSTRUCTIONS FOR SINGLE
       58.47.0 TMT 75.01.0        00  09634 9 10744 #744    REC NOT ENDING IN R/M
       58.49.0 TR  58.52.0        00  09639 1  9669 9669    SWITCH 62 NOOP IF NINES PADDING
       58.50.0 RCV 10.39.0        00  09644 U  3459 3459
       58.51.0 TMT 70.01.0        00  09649 9 10634 #634
1      58.51.1 SET     0015       15  09654 B  0015 0&A5
       58.51.2 LOD 70.23.0        15  09659 8 10739 #GC9
       58.51.3 UNL 11.70.0        15  09664 7  3899 3HI9
       58.52.0 TR  58.57.0        00  09669 1  9694 9694    SWITCH 63 TR FOR TAPE LABEL ON OUTPUT
       58.53.0 UNL   5.21.0 -004  02  09674 7  0845 08M5    SW 1 TO NOP
       58.54.0 RCV   4.19.0 -003  00  09679 U  0336 0336
       58.55.0 TMT 59.83.0 -003   13  09684 9 10250 #BV0
       58.56.0 TR  50.01.0        00  09689 1  5569 5569
1      58.57.0 SEL     0100       00  09694 2  0100 0100    TAPE LABEL
       58.58.0 RWW   2.25.0 -080  00  09699 S  0151 0151
       58.59.0 RD    2.25.0 -080  00  09704 Y  0151 0151
       58.60.0 TRA 58.71.0        00  09709 I  9764 9764
       58.61.0 TMT 60.29.0        01  09714 9 10373 #3X3    TMT G/M
       58.62.0 RCV   4.19.0 -003  00  09719 U  0336 0336    SWITCH 9 TO RETURN TO WRITE TAPE LABEL
       58.63.0 TMT 59.69.0 -003   13  09724 9 10197 #AZ7
       58.64.0 TR    4.01.0       00  09729 1  0249 0249    TO CHECKPOINT
       58.65.0 ADM 12.64.0        01  09734 6  4580 45Y0    ADD 1 TO CTR R
       58.66.0 RAD 12.13.0        14  09739 H  4184 4AQ4
1      58.67.0 SEL     0201       00  09744 2  0201 0201
       58.68.0 WR    2.25.0 -080  00  09749 R  0151 0151    WRITE TAPE LABEL
       58.69.0 TRA 58.79.0        00  09754 I  9804 9804
       58.70.0 TR  58.53.0        00  09759 1  9674 9674
1      58.71.0 SEL     0902       00  09764 2  0902 0902    TRA READING TAPE LABEL CARD
       58.72.0 TRS 58.77.0        00  09769 O  9794 9794
1      58.73.0 SEL     0100       00  09774 2  0100 0100
       58.74.0 TRS 58.77.0        00  09779 O  9794 9794
1      58.75.0 HLT     0005       00  09784 J  0005 0005    FALSE TRA READING TAPE LABEL CARD
       58.76.0 TR  58.57.0        00  09789 1  9694 9694
1      58.77.0 HLT     0006       00  09794 J  0006 0006    902 OR EOF READING TAPE LABEL CARD
       58.78.0 TR  58.57.0        00  09799 1  9694 9694
1      58.79.0 SEL     0901       00  09804 2  0901 0901
       58.80.0 TRS   8.70.0       00  09809 O  2604 2604
1      58.81.0 SEL     0902       00  09814 2  0902 0902
       58.82.0 TRS 58.89.0        00  09819 O  9854 9854
1      58.83.0 SEL     0201       00  09824 2  0201 0201
       58.84.0 TRS 58.87.0        00  09829 O  9844 9844
1      58.85.0 HLT     0007       00  09834 J  0007 0007    FALSE TRA WRITING TAPE LABEL ON FIRST TAPE
       58.86.0 TR    4.43.0       00  09839 1  0459 0459    TRANSFER TO RESTART
1      58.87.0 HLT     0008       00  09844 J  0008 0008    EOF ON O/P WRITING TAPE LABEL  USE LONGER TAPE
       58.88.0 TR  58.66.0        00  09849 1  9739 9739
1      58.89.0 SEL     0500       00  09854 2  0500 0500
       58.90.0 WR  60.44.0 -009   00  09859 R 10503 #503
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C LNG       SYMBOLIC          INCR                ACTUAL          S       DATA OR DESCRIPTION
L       LOC    OP   ADDR              ASU   LOC   OP ADDR  ADDR   N

1      58.91.0 SEL     0201          00  09864  2   0201 0201
1      58.92.0 BSP     0004          00  09869  3   0004 0004
       58.93.0 NTR  58.67.0          14  09874  X   9744 9GM4
1      58.94.0 HLT     0009          00  09879  J   0009 0009    902 WRITING TAPE LABEL  HAVE TRIED 3 TIMES
       58.95.0 TR   58.66.0          00  09884  1   9739 9739
       58.96.0 UNL  58.49.0 -004     02  09889  7   9635 96L5    NINES PADDING
       58.97.0 UNL   6.52.0 -004     02  09894  7   1510 15J0    SW 22 TO NOP
       58.98.0 TR   57.93.0          00  09899  1   9364 9364
       58.99.0 UNL  11.19.0 -004     01  09904  7   3635 36T5    SW 59A TO TR
       58.99.1 UNL  11.43.0 -004     01  09909  7   3765 37W5    SW 59B TO TR
       59.00.0 UNL   9.07.0 -004     01  09914  7   2785 27Y5    SW 45 TO TR SINCE NO HASH TOTAL ON INPUT
       59.01.0 TR   57.98.0          00  09919  1   9389 9389
       59.02.0 UNL  11.38.0 -004     01  09924  7   3740 37U0    MAKE TRE A TR
       59.03.0 TR   58.03.0          00  09929  1   9414 9414
       59.04.0 UNL   5.23.0 -004     01  09934  7   0855 08V5    SW 2A TO TR SINCE NO TAPE LABEL ON INPUT
       59.05.0 TR   54.69.0          00  09939  1   7784 7784
       59.06.0 UNL   8.38.0 -004     01  09944  7   2440 24U0    SW 55 TO TR SINCE NO TAPE LABEL ON OUTPUT
       59.07.0 UNL  58.52.0 -004     02  09949  7   9665 96O5    SWITCH 63 TO NOOP
       59.07.1 UNL  11.68.0 -004     02  09954  7   3885 38Q5    NOP READ OVER TAPE LABEL
       59.08.0 TR   54.71.0          00  09959  1   7794 7794
       59.09.0 LOD   2.10.0          06  09964  8    0179 0/P9   P5
       59.10.0 CMP  59.67.0          06  09969  4  10195 #/R5    COMPARE TO 0000
       59.11.0 TRH  59.15.0          06  09974  K   9994 9ZR4
1      59.12.0 SEL     0500          00  09979  2   0500 0500
       59.13.0 WR   60.50.0 -011     00  09984  R  10561 #561    P5 INCORRECT
       59.14.0 UNL  59.39.0 -004     02  09989  7  10110 #1J0
       59.15.0 LOD   2.08.0          06  09994  8    0173 0/P3   P4
       59.16.0 CMP  59.67.0          06  09999  4  10195 #/R5
       59.17.0 TRH  59.21.0          06  10004  K  10024 ##K4
1      59.18.0 SEL     0500          00  10009  2   0500 0500
       59.19.0 WR   60.52.0 -011     00  10014  R  10574 #574    P4 INCORRECT
       59.20.0 UNL  59.39.0 -004     02  10019  7  10110 #1J0
       59.21.0 LOD   2.06.0          06  10024  8    0167 0/07   P3
       59.22.0 CMP  59.67.0          06  10029  4  10195 #/R5
       59.23.0 TRH  59.27.0          06  10034  K  10054 ##N4
1      59.24.0 SEL     0500          00  10039  2   0500 0500
       59.25.0 WR   60.54.0 -011     00  10044  R  10587 #587    P3 INCORRECT
       59.26.0 UNL  59.39.0 -004     02  10049  7  10110 #1J0
       59.27.0 LOD   2.04.0          06  10054  8    0161 0/01   P2
       59.28.0 CMP  59.67.0          06  10059  4  10195 #/R5
       59.29.0 TRH  59.33.0          06  10064  K  10084 ##Q4
1      59.30.0 SEL     0500          00  10069  2   0500 0500
       59.31.0 WR   60.56.0 -011     00  10074  R  10600 #600    P2 INCORRECT
       59.32.0 UNL  59.39.0 -004     02  10079  7  10110 #1J0
       59.33.0 LOD   2.02.0          06  10084  8    0155 0/N5   P1
       59.34.0 CMP  59.67.0          06  10089  4  10195 #/R5
       59.35.0 TRH  59.39.0          06  10094  K  10114 #/J4
1      59.36.0 SEL     0500          00  10099  2   0500 0500
       59.37.0 WR   60.58.0 -011     00  10104  R  10613 #613    P1 INCORRECT
       59.38.0 UNL  59.39.0 -004     02  10109  7  10110 #1J0
       59.39.0 TR   50.37.0          00  10114  1   5754 5754
       59.40.0 TR   50.98.0          00  10119  1   6059 6059
2 010  59.41.0                           10129                          10 BLANKS
2 001  59.42.0                           10130                      H
2 001  59.43.0                           10131                  &   1
2 004  59.44.0                           10135                  &   0010
2 005  59.45.0                           10140                  &   40000
2 004  59.46.0                           10144                  &   0000    BLOCK LENGTH
2 004  59.47.0                           10148                  &   4790
2 001  59.48.0                           10149                  &   6
2 001  59.49.0                           10150                  &   4
2 001  59.50.0                           10151                  &   8
2 004  59.51.0                           10155                  &   4660
2 004  59.52.0                           10159                  &   4630
2 004  59.53.0                           10163                  &   5220
2 004  59.54.0                           10167                  &   5180
2 003  59.55.0                           10170                  &   515
2 001  59.56.0                           10171                      &
2 001  59.57.0                           10172                      -
2 004  59.58.0                           10176                  &   5620
2 004  59.59.0                           10180                  &   5570
7      59.59.1                                                      UNSIGNED CONSTANTS
2 002  59.60.0                           10182                      50
2 003  59.61.0                           10185                      000
2 001  59.62.0                           10186                      2
2 001  59.63.0                           10187                      3
2 001  59.64.0                           10188                      4
2 001  59.65.0                           10189                      5
2 001  59.66.0                           10190                      1
2 005  59.67.0                           10195                      20000
2 001  59.68.0                           10196                      9
3      59.69.0      58.65.0              10200    9734 9734
2 001  59.70.0                           10201                      1
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C LNG      SYMBOLIC          INCR          ACTUAL          S      DATA OR DESCRIPTION
L       LOC   OP   ADDR          ASU  LOC   OP ADDR ADDR  N

3      59.71.0       6.84.0          10205     1669 1669
3      59.72.0       7.03.0          10209     1764 1764
3      59.73.0       7.18.0          10213     1839 1839
2 004  59.74.0                       10217                 0000  ADDR OF FIRST READ IN AREA
2 004  59.75.0                       10221                 0000 ADDR OF SECOND READ IN AREA
2 004  59.76.0                       10225                 0000 ADDR OF THIRD READ IN AREA
2 004  59.77.0                       10229                 0000
2 004  59.78.0                       10233                 0000
3      59.79.0       4.87.0          10237     0679 0679   FOR TRZ IN RESTART IN 3 WAY MERGE
3      59.80.0      59.59.0          10241    10180 #180
3      59.81.0      59.54.0          10245    10167 #167
3      59.82.0      59.52.0          10249    10159 #159
3      59.83.0       5.05.0          10253     0769 0769
3      59.84.0      20.07.0 &004     10257     4690 4690   WORK AREA FOR COMPUTING END OF RD A
2 005  59.85.0                       10262                 00000
3      59.86.0      53.69.0          10266     7319 7319
3      59.87.0      53.91.0          10270     7424 7424
3      59.88.0      54.12.0          10274     7524 7524
3      59.89.0      54.30.0          10278     7609 7609
3      59.90.0      54.37.0          10282     7634 7634
3      59.91.0      54.43.0          10286     7659 7659
3      59.92.0      54.48.0          10290     7679 7679
3      59.93.0      53.47.0          10294     7214 7214
2 001  59.94.0                       10295                 1
3      59.95.0       6.83.0          10299     1664 1664   TRANSFER FOR OMITTING INSTR WHILE PULLING CW
2 001  59.96.0                       10300                 1
3      59.97.0       7.02.0          10304     1759 1759
2 001  59.98.0                       10305                 1
3      59.99.0       7.17.0          10309     1834 1834
2 001  60.00.0                       10310                 1
2 004  60.01.0                       10314                 0379
5 005  60.02.0                       10319                 FOR COMPUTING COMPLEMENT
2 001  60.03.0                       10320                 1
3      60.04.0      20.64.0          10324     4969 4969
2 001  60.05.0                       10325                 1
3      60.06.0      30.48.0          10329     5449 5449
5 005  60.24.0                       10334                 TO PREVENT OVERFLOW WHEN COMPUTING END OF C
5 005  60.25.0                       10339                 TO DETER WHERE INSTR FOR PULLING CW SHOULD GO
5 005  60.26.0                       10344
5 003  60.27.0                       10347                 WORK AREA FOR CW LENGTH
2 025  60.28.0                       10372                 SUM L NOT EQ TOTAL LNG CW
2 001  60.29.0                       10373                 ¤ G/M
2 021  60.30.0                       10394                 NO REELS INPUT BLANK
2 001  60.31.0                       10395                 ¤ G/M
2 022  60.32.0                       10417                 NO REELS INPUT A ZERO
2 001  60.33.0                       10418                 ¤ G/M
2 022  60.34.0                       10440                 NO REELS INPUT B ZERO
2 001  60.35.0                       10441                 ¤ G/M
2 008  60.36.0                       10449                 1G BLANK
2 001  60.37.0                       10450                 ¤ G/M
2 012  60.38.0                       10462                 LNG CW GR 50
2 001  60.39.0                       10463                 ¤ G/M
2 011  60.40.0                       10474                 L1 IS BLANK
2 001  60.41.0                       10475                 ¤ G/M
2 026  60.42.0                       10501                 WRONG ORDER OF MERGE GIVEN
2 001  60.43.0                       10502                 ¤ G/M
2 010  60.44.0                       10512                 902 ON 201
2 001  60.45.0                       10513                 ¤ G/M
2 022  60.46.0                       10535                 BLOCK LENGTH TOO LARGE
2 001  60.47.0                       10536                 ¤ G/M
2 023  60.48.0                       10559                 RECORD LENGTH TOO SMALL
2 001  60.49.0                       10560                 ¤ G/M
2 012  60.50.0                       10572                 P5 INCORRECT
2 001  60.51.0                       10573                 ¤ G/M
2 012  60.52.0                       10585                 P4 INCORRECT
2 001  60.53.0                       10586                 ¤ G/M
2 012  60.54.0                       10598                 P3 INCORRECT
2 001  60.55.0                       10599                 ¤ G/M
2 012  60.56.0                       10611                 P2 INCORRECT
2 001  60.57.0                       10612                 ¤ G/M
2 012  60.58.0                       10624                 P1 INCORRECT
2 001  60.59.0                       10625                 ¤ G/M
7      70.00.1                                             NINES PADDING INSTRUCTIONS
       70.01.0 CMP 12.08.0       03  10634 4   4167 41F7   IS OUTPUT BLOCK FILLED
       70.02.0 TRE 10.43.0       00  10639 L   3479 3479
       70.03.0 ADM 12.71.0       01  10644 6   4603 46#3   BLOCK NOT FILLED ADD 1 TO # OF PADDING RECORDS
       70.04.0 TR   6.56.0       00  10649 1   1529 1529
       70.05.0 RCV  6.58.0 -003  00  10654 U   1536 1536   ADD REMAINING PADDING TO
       70.06.0 TMT 11.96.0 -003  13  10659 9   4000 4&#0   ADDUMULATED HASH TOTAL
       70.07.0 SET     0003      14  10664 B   0003 0&-3
       70.08.0 LOD  5.74.0       14  10669 8   1124 1AK4   SET UP ADDR TO PLACE G/M IN WRITE AREA
       70.09.0 SUB 12.15.0       14  10674 P   4186 4AQ6
       70.10.0 UNL 11.68.0       14  10679 7   3889 3HQ9
```
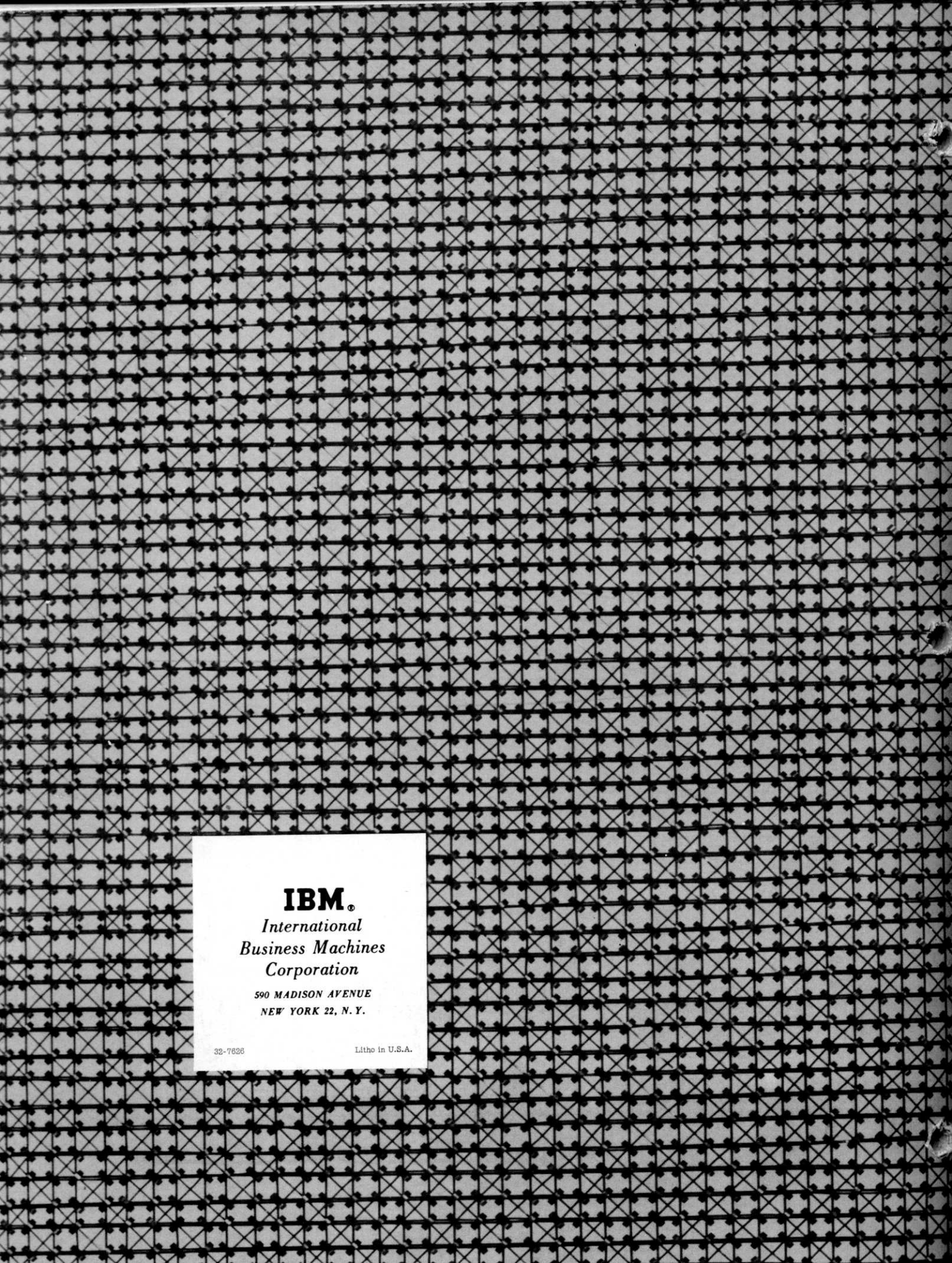

C L	LNG	SYMBOLIC LOC	OP	ADDR	INCR	ASU	ACTUAL LOC	OP	ADDR	ADDR	S N	DATA OR DESCRIPTION
		70.11.0	RCV	11.68.0	-003	00	10684	U	3886	3886		
		70.12.0	TMT	5.74.0	-003	01	10689	9	1121	11S1		
		70.13.0	UNL	7.30.0	-004	01	10694	7	1895	18Z5		SW 37 TO TR
		70.14.0	UNL	10.41.0	-004	02	10699	7	3465	3405		NOP ADM INSTR
1		70.15.0	NOP	0000		00	10704	A	0000	0000		
		70.16.0	UNL	9.84.0	-004	02	10709	7	3170	31P0		NOP WR TAPE BSP IN 902 ROUTINE
		70.17.0	ADM	12.72.0		01	10714	6	4604	46#4		ADD 1 TO PADDING BLOCKS DROPPED
		70.18.0	TR	6.56.0		00	10719	1	1529	1529		
2	004	70.19.0					10723					
2	001	70.20.0					10724					#
1		70.21.0	RCV			00	10729	U				
		70.22.0	TMT	12.34.0		01	10734	9	4288	42Y8		
		70.23.0	TR	7.32.0		00	10739	1	1909	1909		
7		75.00.1										SPECIAL INSTR FOR SINGLE REC NOT ENDING IN R/M
		75.01.0	TMT	12.01.0		01	10744	9	4118	41/8		PLACE G/M & 5 R/M BEHIND
		75.02.0	TMT	10.50.0	&001	01	10749	9	3515	35/5		SINGLE REC NOT ENDING IN R/M
		75.03.0	TMT	10.50.0	&002	13	10754	9	3516	3E/6		
		75.04.0	TR	5.37.0		00	10759	1	0939	0939		
		75.05.0	TMT	12.01.0		01	10764	9	4118	41/8		G/M & 5 R/M
		75.06.0	TMT	10.50.0	&001	01	10769	9	3515	35/5		
		75.07.0	TMT	10.50.0	&002	13	10774	9	3516	3E/6		
		75.08.0	TR	7.38.0		00	10779	1	1944	1944		
		75.09.0	TMT	12.01.0		01	10784	9	4118	41/8		G/M & 5 R/M
		75.10.0	TMT	10.50.0	&001	01	10789	9	3515	35/5		
		75.11.0	TMT	10.50.0	&002	13	10794	9	3516	3E/6		
		75.12.0	TR	9.90.0		00	10799	1	3214	3214		
2	001	75.13.0					10800					#
2	001	75.14.0					10801					#
2	001	75.15.0					10802					#
2	001	75.16.0					10803					#
2	001	75.17.0					10804					#
7		80.00.1										PULL CONTROL WORD INITIALLY
		80.04.0	UNL	5.21.0	-004	01	10809	7	0845	08U5		SW 1A TO TR
		80.05.0	RAD	12.25.0		04	10814	H	4220	4S20		
		80.05.1	NOP	5.23.0		00	10819	A	0859	0859		SWITCH 1B TR FOR SINGLE REC NOT ENDING IN R/M
		80.06.0	LOD	12.56.0		01	10824	8	4526	45S6		PLACE G/M AT END OF READ AREAS
1		80.07.0	UNL	0000		01	10829	7	0000	00#0		
1		80.08.0	UNL	0000		01	10834	7	0000	00#0		
1		80.09.0	UNL	0000		01	10839	7	0000	00#0		
1		80.10.0	UNL	0000		01	10844	7	0000	00#0		
1		80.11.0	UNL	0000		01	10849	7	0000	00#0		
1		80.12.0	UNL	0000		01	10854	7	0000	00#0		PLACE G/M AT END OF WRITE AREAS
1		80.13.0	UNL	0000		01	10859	7	0000	00#0		
1		80.14.0	UNL	0000		01	10864	7	0000	00#0		
1		80.15.0	UNL	0000		01	10869	7	0000	00#0		
		80.16.0	RAD	12.14.0		01	10874	H	4185	41Y5		RESTORE ASU 01 TO 1
		80.17.0	TR	5.23.0		00	10879	1	0859	0859		
1		80.18.0	NTR	0449		04	10884	X	0449	0U49		
7		80.18.1										HAVE READ IN ALL TAPES PULL CONTROL WORDS
1		80.19.0	SET	0000		14	10889	B	0000	06-0		PULL CW FOR A
		80.20.0	RCV	12.83.0		00	10894	U	0000	0000		
1		80.21.0	TMT	0000		14	10899	9	0000	06-0		
1		80.22.0	SET	0000		14	10904	B	0000	06-0		
1		80.23.0	TMT	0000		14	10909	9	0000	06-0		
1		80.24.0	SET	0000		14	10914	B	0000	06-0		
1		80.25.0	TMT	0000		14	10919	9	0000	06-0		
1		80.26.0	SET	0000		14	10924	B	0000	06-0		
1		80.27.0	TMT	0000		14	10929	9	0000	06-0		
1		80.28.0	SET	0000		14	10934	B	0000	06-0		
1		80.29.0	TMT	0000		14	10939	9	0000	06-0		
1		80.30.0	SET	0000		14	10944	B	0000	06-0		PULL CONTROL WORD FOR B
		80.31.0	RCV	12.85.0		00	10949	U	0050	0050		
1		80.32.0	TMT	0000		14	10954	9	0000	06-0		
1		80.33.0	SET	0000		14	10959	B	0000	06-0		
1		80.34.0	TMT	0000		14	10964	9	0000	06-0		
1		80.35.0	SET	0000		14	10969	B	0000	06-0		
1		80.36.0	TMT	0000		14	10974	9	0000	06-0		
1		80.37.0	SET	0000		14	10979	B	0000	06-0		
1		80.38.0	TMT	0000		14	10984	9	0000	06-0		
1		80.39.0	SET	0000		14	10989	B	0000	06-0		
1		80.40.0	TMT	0000		14	10994	9	0000	06-0		
1		80.41.0	NOP	0414		00	10999	A	0414	0414		SW 4 TR IF 2 WAY MERGE
1		80.42.0	SET	0000		14	11004	B	0000	06-0		PULL CONTROL WORD FOR C
		80.43.0	RCV	12.87.0		00	11009	U	0100	0100		
1		80.44.0	TMT	0000		14	11014	9	0000	06-0		
1		80.45.0	SET	0000		14	11019	B	0000	06-0		
1		80.46.0	TMT	0000		14	11024	9	0000	06-0		
1		80.47.0	SET	0000		14	11029	B	0000	06-0		
1		80.48.0	TMT	0000		14	11034	9	0000	06-0		
1		80.49.0	SET	0000		14	11039	B	0000	06-0		
1		80.50.0	TMT	0000		14	11044	9	0000	06-0		
1		80.51.0	SET	0000		14	11049	B	0000	06-0		
1		80.52.0	TMT	0000		14	11054	9	0000	06-0		

```
C LNG      SYMBOLIC          INCR          ACTUAL          S      DATA OR DESCRIPTION
L      LOC    OP    ADDR          ASU  LOC  OP ADDR ADDR  N

1      80.53.0 NOP     0414        00  11059 A  0414 0414     SW 5 TR IF 3 WAY MERGE
1      80.54.0 SET     0000        14  11064 B  0000 0&-0     PULL CONTROL WORD FOR D
       80.55.0 RCV 20.02.0         00  11069 U  4627 4627
1      80.56.0 TMT     0000        14  11074 9  0000 0&-0
1      80.57.0 SET     0000        14  11079 B  0000 0&-0
1      80.58.0 TMT     0000        14  11084 9  0000 0&-0
1      80.59.0 SET     0000        14  11089 B  0000 0&-0
1      80.60.0 TMT     0000        14  11094 9  0000 0&-0
1      80.61.0 SET     0000        14  11099 B  0000 0&-0
1      80.62.0 TMT     0000        14  11104 9  0000 0&-0
1      80.63.0 SET     0000        14  11109 B  0000 0&-0
1      80.64.0 TMT     0000        14  11114 9  0000 0&-0
1      80.65.0 NOP     0414        00  11119 A  0414 0414     SW 6 TR IF 4 WAY MERGE
1      80.66.0 SET     0000        14  11124 B  0000 0&-0     PULL CONTROL WORD FOR E
       80.67.0 RCV 30.01.0         00  11129 U  5180 5180
1      80.68.0 TMT     0000        14  11134 9  0000 0&-0
1      80.69.0 SET     0000        14  11139 B  0000 0&-0
1      80.70.0 TMT     0000        14  11144 9  0000 0&-0
1      80.71.0 SET     0000        14  11149 B  0000 0&-0
1      80.72.0 TMT     0000        14  11154 9  0000 0&-0
1      80.73.0 SET     0000        14  11159 B  0000 0&-0
1      80.74.0 TMT     0000        14  11164 9  0000 0&-0
1      80.75.0 SET     0000        14  11169 B  0000 0&-0
1      80.76.0 TMT     0000        14  11174 9  0000 0&-0
       80.77.0 RAD 12.14.0         01  11179 H  4185 41Y5
1      80.78.0 TR      0414        00  11184 1  0414 0414     SW 7 NOP FOR 5 WAY MERGE
       80.79.0 LOD 20.02.0         00  11189 8  4627 4627     LOAD CWD
       80.80.0 CMP 30.01.0         00  11194 4  5180 5180
1      80.81.0 TRH     0409        00  11199 K  0409 0409
       80.82.0 UNL 20.21.0 -004    02  11204 7  4750 47N0     SW 19 TO NOP
1      80.83.0 TR      0414        00  11209 1  0414 0414
       80.84.0 UNL 20.21.0 -004    01  11214 7  4750 47V0     SW 19 TO TR
       80.85.0 RCV  4.19.0 -003    00  11219 U  0336 0336
       80.86.0 TMT 11.73.0 -003    13  11224 9  3908 3I#8     SW 9 TO GO TO MERGE
       80.87.0 RAD 12.14.0         01  11229 H  4185 41Y5
       80.88.0 RAD 12.24.0         04  11234 H  4215 4S15
       80.89.0 UNL  5.38.0 -004    02  11239 7  0940 09M0     SW 3 TO NOP
       80.90.0 NOP  4.01.0         00  11244 A  0249 0249     SWITCH 8 TR FOR SINGLE REC NOT ENDING IN R/M
       80.91.0 TR   3.91.0         00  11249 1  0239 0239     TO PLACE G/M AT END OF LAST WRITE AREA
7      81.11.0                                                 MODIFY ADDRESSES BEFORE READING NEXT TAPE
       81.12.0 RAD 12.10.0         14  11254 H  4172 4AP2     &0002 IN ASU 14
       81.13.0 ADM  5.24.0         14  11259 6  0864 0HO4     ADD TO SELECT FOR TAPE LABEL
       81.14.0 ADM  5.35.0         14  11264 6  0919 0IJ9     FOR READ
       81.15.0 ADM 12.33.0         14  11269 6  4287 4BQ7     FOR MESSAGE
       81.16.0 ADM  5.42.0         14  11274 6  0964 0IO4     TO TEST FOR EOF
       81.17.0 RAD 12.21.0         14  11279 H  4207 4B-7     BLOCK LENGTH PLUS 5
       81.18.0 ADM  5.25.0         14  11284 6  0869 0HO9     MODIFY READ AND WRITE ADDRESSEES
       81.19.0 ADM  5.30.0         14  11289 6  0894 0HR4     FOR TAPE LABEL AND READ IN AREA
       81.20.0 ADM  5.36.0         14  11294 6  0924 0IK4
       81.21.0 RAD 12.12.0         14  11299 H  4181 4AQ1     &0005
       81.22.0 ADM  5.34.0         14  11304 6  0914 0IJ4     FOR CTRS
       81.23.0 ADM  5.32.0         14  11309 6  0904 0I-4
       81.24.0 TR   5.23.0         00  11314 1  0859 0859     TRANSFER BACK TO READ NEXT TAPE
2 004  81.25.0                        11318
2 001  81.26.0                        11319                   #
```



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