IBM

705 GENERALIZED SORTING PROGRAM

SORT 51

A 705 UTILITY PROGRAM

705 GENERALIZED SORTING PROGRAM

Sort 51

This is a general sorting routine to sort unblocked records. The records may be of variable length (maximum of 2494 characters), but they cannot include any group mark or record mark characters. The program performs a two-way merge operation and produces a sorted file of unblocked records as the final output. The program uses a control card to specify the following four variables which define a given sort problem:

1. Number of control fields making up the control word.
2. Length of the control word.
3. Position and length of each control field.
4. The sequence of the control fields making up the control word.

The control word must not exceed 100 characters or five control fields placed anywhere and in any order in the record. A deck of 151 program cards to run this program on the 705 can be ordered from Stationery Stores, Endicott, Form No. 32-6835

There are four phases to the program. All four are stored in memory at the same time.

1. Assignment Routine
2. Phase I - 1st Pass
3. Phase II - 2nd and Subsequent Passes
4. Phase III - Last Pass

ASSIGNMENT ROUTINE

This section is located in position 00244 through position 03034 and accomplishes the following details:

1. Checks the control card to insure the following:
   - A. There is a control card.
   - B. There has not been a card reader error.
   - C. The sum of the individual control field lengths equals the total control word length.
   - D. The control fields do not overlap or extend beyond the beginning of the record.

2. Sets up the first pass to pick the control fields out of the records, stores them at the beginning of the records in their proper sequence, and transfers the information displaced by them to the original control field locations.

3. Sets up the final pass to restore the records to their original form.

4. Interrogates the alteration switches and changes the program accordingly.

5. Provides a listing similar to MEPR 51 of the instructions in the sort program after they have been set up by the assignment section if alteration switch 0916 is off.

6. A manual transfer to 02999 prepares a listing of the assignment program in the event something goes wrong.

7. Sets up housekeeping for the first pass.

PHASE I

During Phase I the master file is read in, rearranged, and written out on the two output tapes in sequence of at least two records.

PHASE II

In Phase II the file is passed through the 705 in successive runs, each run merging two tapes onto two tapes. Successively, larger sequences are produced. For each pass the number of sequences on the output tapes is not more than half the number on the input tapes (rounded to the higher integer). When the number of sequences produced is not more than two, the program goes into Phase III.

PHASE III

During Phase III a final pass merges the file into one sequence. The records are rearranged into their original form and the sorted file is written out on tape. A check for correct sequence is made and an optional check for equal control fields is made.

Description of Control Card

Columns 1-4	Not used by General Sort 51
Columns 5-8	Total control field length (L1+ L2+ L3+ L4+L5). This must be less than or equal to 100 characters.

Columns 9-15	Not used by General Sort 51
Columns 16-18	Length of major control field--L1
Columns 19-22	Units position of major control field within the individual record
Columns 23-25	Length of intermediate control field--L2
Columns 26-29	Units position of intermediate control field within the individual record
Columns 30-32	Length of minor control field--L3
Columns 33-36	Units position of minor control field within the individual record
Columns 37-39	Length of fourth order control field--L4
Columns 40-43	Units position of fourth order control field within the individual record
Columns 44-46	Length of fifth order control field--L5
Columns 47-50	Units position of fifth order control field within the individual record
Columns 51-80	Title or description of master file

NOTE: Any of the columns 23-50 which are not used must be left blank.

OPERATION

1. Prepare control card as described above.

2. Place control card at the end of the program deck immediately following the transfer control card (zeros in column 14 and 15). Placing three blank cards following the control card will make it unnecessary to press the start button on the card reader to load the last three program cards.

3. Set the tape units and alteration switches 0911, 0912, and 0913 according to the following table. If nine or ten tapes are used, the program will save the input tapes for each pass until the output tapes from that pass have been read successfully. This permits the operator to return to the beginning of a previous pass if an unreadable record is encountered.

Tape Units Available		Tapes Used	Master File	Checkpoint	0911	0912	0913
A	3 Even 2 Odd	0200-0204	0200	0204	On	Off	Off
B	2 Even 3 Odd	0200-0203 0205	0200	0205	Off	On	Off

Tape Units Available		Tapes Used	Master File	Checkpoint	0911	0912	0913
C	3 Even 3 Odd	0200-0205	0204	0205	On	On	Off
D	5 Even 4 Odd	0200-0204 0206-0209	0200	0204	On	Off	On
E	4 Even 5 Odd	0200-0203 0205-0209	0200	0205	Off	On	On
F	5 Even 5 Odd	0200-0209	0204	0205	On	On	On

If the master file is on 0200, the program will halt at the conclusion of the first pass to allow the master file to be replaced by an erasable tape for sorting. In this case, and if 9 tapes are being used for the sort (D and E above), tape 0200 will not be addressed again until pass No. 4. The operator, therefore, may elect to continue the sorting while 0200 is being changed unless, of course, the file is too short to allow this.

If the master file is on 0204, the program will not halt but will continue on to the next pass.

Alteration Switches

0911, 0912, and 0913		Set as required for tape combination.
0914	ON	A printer, 0400, is available for printing out records that cannot be read correctly and for printing out records with identical control fields in the last pass (checking of the latter condition is controlled by 0915 below).
	OFF	A printer is not available for these purposes. Messages will be typed giving the control fields of such records.
0915	ON	In the last pass records with identical control fields will be identified (printing or typing is controlled by 0914 above).
	OFF	No check for identical control fields will be made.
0916	ON	No print out of the sorting program will be given.
	OFF	A print out of the sorting program will be given.

Memory Positions Required

Entire Memory

Check Switches

0900 - Automatic

Check Switches (continued)

0901 - Automatic
0902 - Program
0903 - Program
0904 - Program
0905 - Program

Units Required

Card Reader 0100
Tapes as indicated above
Printer, 717 with carriage control at program
(Printer optional)

Loading Instructions

Clear Memory	
2 - 00100	Select Card Reader
Y - 00000	Read into 00000
START	

Program Stops

0001	Repeated write error on first checkpoint. . reload and restart.
0002	Error in loading program--reload.
0003	No control card--put one in card reader and press start key.
0004	Control card read error--replace it and press start key.
0005	Control card punching error--sum of control field lengths is not equal to total length, or total control length is greater than 100, or there are more than five control fields--put in correct card and press start key.
0006	Control card error--the fields overlap or run over the beginning of the record--rewind checkpoint tape, read into 00000, put corrected card into card reader and transfer to 00244.
0007	Repeated tape write errors--press start key.
0008	Remove master file on 0200, replace with erasable tape, and press start key.
0009	Master file has no records (wrong master file reel)--replace reel on master file tape unit by correct master file reel and press start key.
0010	Master file has one record (wrong master file reel)--replace reel on master file tape unit by correct master file reel and press start key.
0011	Output tape too short--replace with a longer one and press start key.
0012	Master file is already in sequence--press start key if pass for duplicate checking is desired.

Program Stops (continued)

0013	Middle pass hash total or record count unequal--press start key to restart pass--if error recurs, and nine or ten tapes are being used, transfer to 04219 to restart previous pass; otherwise, restart sort.
0014	Checkpoint unreadable--change tape and reload program.
0015	Records out of sequence in last pass--press start key.
0016	Last pass hash total or record count error--see stop 0013
0017	Repeated checkpoint write error--press start key.
9999	FINAL STOP

REMARKS

Checking

1. Read-Write (0902) Errors

   There is only one read error procedure and one write error procedure for the entire program. This is accomplished because all records are read into one section and all records are written from another section. In the event of an unreadable record, the action is determined by the number of tapes being used. If less than 9 are being used, the record will be dumped on the printer, or the control typed on the typewriter and the program will continue. If 9 or 10 tapes are in use, the program will restart at the beginning of the previous pass, except when the unreadable record is on the master file. In this case, the record will be dumped.

2. Immediately after a RWW operation 0901, 0904, and 0905 are checked. If a signal is received, a restart procedure is executed. During the restart procedure the checkpoint is read and both accumulator and ASU's are cleared and reset. The pass is started over.

3. Overflow check--this determines if an output tape gets to a reflective spot before the input tapes get to EOF. The procedure is to have the 705 stop to give the operator a chance to put a larger erasable tape on the unit indicated by the message.

4. On the final pass a sequence check is made. If a low record is found, a restart is made.

5. Sort 51 provides two different hash total checks. Between the first and last pass a check of the total of the numerical parts of characters 2 through 10 of the original format of the records is made. This check is bypassed if any records had to be dropped because

of unreadability. Between every pair of consecutive passes a similar check is made of the rearranged record format, except when a record has been dropped in the second of the pair. Between each pass, regardless of record dropping, a record count check is made. A failure of one of these checks will result in a restart of the pass in which the error is discovered.

Checkpoint

Sort 51 takes a checkpoint immediately following the reading of the control card. It also takes a checkpoint at the beginning of every subsequent pass. The program is designed to return automatically to the previous checkpoint if it discovers the 901, the 904, or the 905 indicator on.

Certain special situations may occur which should be resolved as follows:

1. If the machine stops on an 0900 or 0901 check, or gets in a loop, the operator should stop the machine, reset, and transfer manually to 06919.

2. Should this fail, manually backspace the checkpoint tape, read into 00000, and transfer to 07054.

3. The checkpoint tape may be unreadable. If so, backspace it twice, read into 00000, and transfer to 07054.

4. If even this procedure fails the only course is to restart. Proceed as follows:

   Rewind the checkpoint tape.
   Read into 00000.
   Mount a new checkpoint tape.
   Remount the master (if necessary).
   Transfer to 07054.

Sorting More Than One File

After Sort 51 is loaded, it is not necessary to reload it in order to sort another file. The faster procedure is to place the new master file on the correct tape unit, replace the sorted tape with another tape, and read the first record on the checkpoint tape into 00000. If the new file requires the same control card, transfer to 07054; if the new file requires a different control card, place it in the card reader and transfer to 00244.

SORTING LOGIC

PHASE I

Sort 51 uses four areas in memory for holding records: A, B, C, and D. All reading is done into area B and all writing from area C. At the beginning of the first pass, the first record from the master file is read into area B, rearranged, and sent to area A. The second record is read into B, rearranged, and its control field is compared to that in area A. The lower record is sent to the output area C, and the higher, if it is B, is sent to the comparison area A. The program then enters its major cycle on a simultaneous read/write sequence, with the record in C going to the output tape, and the next record on the master coming into B. The B record is now rearranged and its control word is compared to the one in the output area C. A low comparison indicates a step-down. If there is no step-down, the B field is compared to the A field, the lower record being sent to the output area and the higher to A. The program now returns to the read/write sequence and continues. When a step-down record is read, it is sent to area D, the program reads the next record into B, and continues until a second step-down is met. At this point, the record in A which belongs to the current sequence is written out, and the output tape address is changed. The lower of B and D is then sent to area C, the higher to A, and the program returns to the read/write sequence. When end of file is signaled, the program writes the A record on the current output tape. If a D record is present it is written on the alternate tape.

PHASE II

The logic of the middle passes is very similar to that of the first pass. At the beginning of the pass, the input and output tapes are alternated. The first record from input tape one is read into area A, and the first from tape two is read into B. The control fields at A and B are compared. If B is lower, it is sent to C; if A is lower, it is sent to C, and B is sent to A, and the input tape address is alternated. The tape which had the record with the lower control field then continues as input tape until a record read from it has a higher control field than the record in area A (which had been read from other input tape). Next the program goes through a read/write sequence. The newly read record is now checked for step-down; if no step-down is encountered, the program returns to the point where A and B are compared. When a step-down is encountered, the new record is sent to D. A switch is set which prevents the reading of the step-down tape until the second step-down occurs on the other input tape. The next record from the alternate tape is read into B. The program now returns to the step-down test comparison. At the second step-down, the record in A is written, the output tape address is changed, and the records in B and D are compared. If B is low it is sent to C, and D is sent to A. If D is low it is sent to C, B is sent to A, and the input address tape is changed.

When the first end of file is reached, a new record from the alternate tape is read into B, and a switch is set which prevents the further reading of the end of file tape. Sorting then is continued using only one input tape. When the

second end of file is reached, the record in A is written out, and the record in D, if any, is written on the alternate output tape. At this point (the end of the pass) a counter is tested to see if the output has been written in more than two sequences. If so, the program proceeds to the next pass of Phase II. If not, the program enters Phase III.

PHASE III

Phase III is identical to Phase II except that after a record is sent to C it is returned to its original arrangement before being written out. The test for step-down is replaced by a sequence check made before the record is re-arranged. If a record is discovered out of sequence, a restart is made with the program in Phase II.

NOTE: A step-down may be defined as a break in sequence on either one of the input tapes.

DETAILED PROGRAM LISTING

C L	LNG	SYMBOLIC LOC	OP	ADDR	INCR	ASU	ACTUAL LOC	OP	ADDR	ADDR	S N	DATA OR DESCRIPTION	SORT51
7		.00.0										SORT 51 TITLE CARD	
7		.01.0										ASSIGNMENT SECTION	
7		.02.0										CHECKING CONTROL CARD	
6		.02.5		00240									
1		.03.0	SEL	0902		00	00244	2	0902	0902	0	TEST IF PROGRAM LOADED PROPERLY	
		.04.0	TRS	1.04.0		00	00249	0	0789	0789			
1		.04.1	SET	0001		00	00254	B	0001	0001			
		.04.2	LOD	71.02.0		00	00259	8	8973	8973		A BLANK	
		.04.3	UNL	75.09.0		00	00264	7	12499	S499		INTO POSITION BEFORE B AREA	
		.04.4	UNL	75.16.0		00	00269	7	14999	U999		INTO POSITION BEFORE C AREA	
		.04.5	UNL	75.26.0		00	00274	7	17499	X499		INTO POSITION BEFORE D AREA	
1		.05.0	SEL	0100		00	00279	2	0100	0100		GET CONTROL CARD	
		.06.0	RD	73.06.0	&001	00	00284	Y	9412	9412			
		.06.5	TRS	1.09.0		00	00289	0	0819	0819		NO CONTROL CARD	
1		.07.0	SEL	0902		00	00294	2	0902	0902			
		.08.0	TRS	1.14.0		00	00299	0	0839	0839		TO RELOAD CONTROL CARD	
		.08.5	TR	.51.0		00	00304	1	0484	0484		TO ALT SW INTEROGATION	
		.09.0	RAD	71.06.0		00	00309	H	8979	8979		GET 3 ZEROS	
1		.09.1	SET	0000		12	00314	B	0000	0&00		SET ASU 12 AND ASU 13 TO ZEROS	
1		.09.2	SET	0032		12	00319	B	0032	0&32			
1		.10.0	SET	0004		04	00324	B	0004	0 04		TO SAVE FIRST FOUR CHARACTERS OF CONTROL CARD	
		.10.5	LOD	73.06.0	&004	04	00329	8	9415	9U15		X	
		.11.0	UNL	73.06.0	&003	00	00334	7	9414	9414			
		.12.0	LOD	73.06.0	&018	00	00339	8	9429	9429		GET LENGTH OF MAJOR CONTROL WORD	
		.13.0	CMP	71.02.0		00	00344	4	8973	8973		CHECK IF BLANK	
		.14.0	TRE	1.19.0		00	00349	L	0859	0859		CONTROL CARD ERROR	
		.15.0	CMP	73.06.0	&008	00	00354	4	9419	9419			
		.16.0	TRE	4.02.0		00	00359	L	1984	1984		TO SINGLE CONTROL FIELD ROUTINE	
		.17.0	TRH	1.19.0		00	00364	K	0859	0859		CONTROL CARD ERROR	
		.19.0	ADM	73.06.0	&003	00	00369	6	9414	9414			
		.20.0	LOD	73.06.0	&025	00	00374	8	9436	9436		2ND CONTROL LENGTH	
		.21.0	CMP	71.02.0		00	00379	4	8973	8973			
		.22.0	TRE	1.19.0		00	00384	L	0859	0859		CONTROL CARD ERROR	
		.24.0	ADM	73.06.0	&003	00	00389	6	9414	9414			
		.25.0	LOD	73.06.0	&032	00	00394	8	9443	9443		3RD CONTROL LENGTH	
		.26.0	CMP	71.02.0		00	00399	4	8973	8973			
		.27.0	TRE	.40.0		00	00404	L	0454	0454			
		.29.0	ADM	73.06.0	&003	00	00409	6	9414	9414			
		.30.0	LOD	73.06.0	&039	00	00414	8	9450	9450		4TH CONTROL LENGTH	
		.31.0	CMP	71.02.0		00	00419	4	8973	8973			
		.32.0	TRE	.40.0		00	00424	L	0454	0454			
		.34.0	ADM	73.06.0	&003	00	00429	6	9414	9414			
		.35.0	LOD	73.06.0	&046	00	00434	8	9457	9457		5TH CONTROL LENGTH	
		.36.0	CMP	71.02.0		00	00439	4	8973	8973			
		.37.0	TRE	.40.0		00	00444	L	0454	0454			
		.39.0	ADM	73.06.0	&003	00	00449	6	9414	9414			
		.40.0	LOD	73.06.0	&008	00	00454	8	9419	9419		GET TOTAL LENGTH FROM CARD	
		.40.5	CMP	72.12.0		00	00459	4	9089	9089			
		.40.7	TRH	1.19.0		00	00464	K	0859	0859			
		.41.0	CMP	73.06.0	&003	00	00469	4	9414	9414		CHECK IF EQUAL TO CALCULATED LENGTH	
		.42.0	TRE	3.02.0		00	00474	L	1679	1679		YES	
		.44.0	TR	1.19.0		00	00479	1	0859	0859		CONTROL CARD ERROR	
7		.50.0										ALTERATION SW INTERROGATION AND FIRST CHECK POINT	
1		.51.0	SEL	0911		00	00484	2	0911	0911			
		.52.0	TRS	.56.0		00	00489	0	0509	0509			
1		.53.0	SEL	0912		00	00494	2	0912	0912			
		.54.0	TRS	.63.0		00	00499	0	0549	0549		FOR TAPE COMBINATION 3	
		.55.0	TR	.59.0		00	00504	1	0524	0524		FOR TAPE COMBINATION 1	
1		.56.0	SEL	0912		00	00509	2	0912	0912			
		.57.0	TRS	.65.0		00	00514	0	0559	0559		FOR COMBINATION 4	
		.58.0	TR	.70.5		00	00519	1	0589	0589		FOR COMBINATION 2	
		.59.0	SGN	19.01.5	-004	01	00524	T	5315	53/5			

C L	LNG	SYMBOLIC LOC	OP	ADDR	INCR	ASU	ACTUAL LOC	OP	ADDR	ADDR	S N	DATA OR DESCRIPTION
		•60•0	SGN	25•11•0	-004	01	00529	T	7015	70/5		
		•61•0	SGN	5•20•0	-004	01	00534	T	2180	21Y0		
		•61•5	SGN	36•24•1	-004	01	00539	T	8065	80W5		CHECK PT REWIND SW TO TR
		•62•0	TR	•09•0		00	00544	1	0309	0309		
		•63•0	SGN	5•20•0	-004	01	00549	T	2180	21Y0		
		•64•0	TR	•68•0		00	00554	1	0574	0574		
		•65•0	SGN	5•05•0	-004	01	00559	T	2130	21T0		
		•66•0	SGN	13•31•0	-004	01	00564	T	4545	45U5		SET END OF FIRST PASS SW TO TR
		•67•0	TR	•63•0		00	00569	1	0549	0549		
		•68•0	LOD	•86•0	-002	01	00574	8	0677	06X7		A 5
		•69•0	UNL	•71•0		01	00579	7	0599	05Z9		
		•69•5	UNL	•95•0		01	00584	7	0729	07S9		
		•70•5	RAD	71•08•0		02	00589	H	8983	89Q3		RESET ERROR COUNTER
		•70•6	TRA	•71•0		00	00594	I	0599	0599		TURN OFF ANY INDICATOR
1		•71•0	SEL	0204		00	00599	2	0204	0204		
1		•72•0	IOF	0000		00	00604	3	0000	0000		
1		•73•0	RWD	0002		00	00609	3	0002	0002		
1		•74•0	WR	0000		01	00614	R	0000	00 0		WRITE CHECK POINT
		•74•5	TRA	•94•0		00	00619	I	0719	0719		
		•74•6	RAD	71•08•0•		02	00624	H	8983	89Q3		RESET ERROR COUNTER
1		•75•0	BSP	0004		00	00629	3	0004	0004		
1		•76•0	RD	0000		00	00634	Y	0000	0000		
1		•77•0	SEL	0901		00	00639	2	0901	0901		
		•78•0	TRS	1•04•0		00	00644	O	0789	0789		
1		•79•0	SEL	0902		00	00649	2	0902	0902		
		•80•0	TRS	•95•6		00	00654	O	0739	0739		
		•81•0	TR	•09•0		00	00659	1	0309	0309		
		•82•0	SUB	71•04•0		02	00664	P	8975	89P5		DECREASE ERROR CTR
		•83•0	TRZ	•86•0		02	00669	N	0679	06P9		
		•84•0	TR	•70•6		00	00674	1	0594	0594		
1		•86•0	SEL	0500		00	00679	2	0500	0500		
		•87•0	WR	70•77•0	&001	00	00684	R	8773	8773		
1		•88•0	HLT	0001		00	00689	J	0001	0001		REPEATED WRITE ERROR FIRST CHECK POINT
		•89•0	RAD	71•08•0		02	00694	H	8983	89Q3		RESET ERROR COUNTER
		•90•0	TR	•84•0		00	00699	1	0674	0674		
1		•91•0	SET	0001		03	00704	B	0001	00&1		
		•92•0	LOD	•71•0		03	00709	8	0599	05I9		ADDRESS CHECK PT TAPE
		•93•0	TR	14•14•0		00	00714	1	4684	4684		
1		•94•0	SEL	0902		00	00719	2	0902	0902		
		•94•5	TRS	•82•0		00	00724	O	0664	0664		
1		•95•0	SEL	0204		00	00729	2	0204	0204		
		•95•5	TR	•75•0		00	00734	1	0629	0629		
1		•95•6	SEL	0500		00	00739	2	0500	0500		
		•95•7	WR	70•87•0	&001	00	00744	R	8855	8855		CHECK POINT TAPE READ ERROR MESSAGE
1		•95•8	SEL	0902		00	00749	2	0902	0902		TURN OFF 0902 IND
		•95•9	TRS	•96•0		00	00754	O	0759	0759		
		•96•0	SUB	71•04•0		02	00759	P	8975	89P5		DECREASE ERROR CTR
		•96•1	TRZ	•96•3		02	00764	N	0774	07P4		
		•96•2	TR	•95•0		00	00769	1	0729	0729		
1		•96•3	HLT	0014		00	00774	J	0014	0014		REPEATED CHECK POINT READ ERRORS
		•96•4	ADD	71•04•0		02	00779	G	8975	89P5		
		•96•5	TR	•95•0		00	00784	1	0729	0729		
7		1•00•0										
7		1•01•0										ERROR ROUTINES FOR ASSIGNMENT
7		1•02•0										
7		1•03•0										PROGRAM NOT LOADED CORRECTLY
1		1•04•0	SEL	0500		00	00789	2	0500	0500		
		1•05•0	WR	70•39•0	&001	00	00794	R	8493	8493		MESSAGE #9
1		1•06•0	HLT	0002		00	00799	J	0002	0002		ERROR IN LOADING PROGRAM
1		1•06•5	SEL	0100		00	00804	2	0100	0100		TO RELOAD ENTIRE PROGRAM
1		1•07•0	RD	0000		00	00809	Y	0000	0000		X
1		1•07•5	TR	0004		00	00814	1	0004	0004		X

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C LNG      SYMBOLIC        INCR            ACTUAL        S         DATA OR DESCRIPTION                              SORT51
L        LOC   OP   ADDR          ASU  LOC   OP ADDR ADDR N

7        1.08.0                                                  NO CONTROL CARD
1        1.09.0 SEL     0500       00  00819 2  0500 0500
         1.10.0 WR  70.43.0 &001 00  00824 R  8520 8520         MESSAGE #10
1        1.11.0 HLT     0003       00  00829 J  0003 0003         NO CTRL CARD--LOAD ONE AND RESTART
         1.12.0 TR     .05.0       00  00834 1  0279 0279
7        1.13.0                                                  902 CHECK FOR CONTROL CARD
1        1.14.0 SEL     0500       00  00839 2  0500 0500
         1.15.0 WR  70.51.0 &001 00  00844 R  8537 8537         MESSAGE #11
1        1.16.0 HLT     0004       00  00849 J  0004 0004         ERROR IN READING CTRL CARD--RELOAD IT AND RESTART
         1.17.0 TR     .05.0       00  00854 1  0279 0279
7        1.18.0                                                  CONTROL CARD IN ERROR
1        1.19.0 SEL     0500       00  00859 2  0500 0500
         1.20.0 WR  70.55.0 &001 00  00864 R  8569 8569         MESSAGE #12
         1.20.5 UNL 73.06.0 &004 04  00869 7  9415 9U15         REPLACE
         1.21.0 WR  73.06.0 &001 00  00874 R  9412 9412         CONTROL CARD
1        1.22.0 HLT     0005       00  00879 J  0005 0005         CTRL CARD ERROR--SUM RULE OR MORE THAN 5 FIELDS
         1.23.0 TR     .05.0       00  00884 1  0279 0279
7        2.00.0
7        2.01.0                                                  SAVING BEGINNING OF RECORD
7        2.02.0
7        2.03.0                                                  BUILDING UP TABLES
7        2.04.0                                                  HOUSEKEEPING
1        2.04.5 SET     0035       00  00889 B  0035 0035
         2.04.6 LOD 73.06.0 &050 00  00894 8  9461 9461         LOAD CTRL FIELD INFORMATION
         2.04.7 UNL 73.09.0        00  00899 7  9527 9527
1        2.04.8 SET     0007       07  00904 B  0007 0 &7
1        2.04.9 SET     0007       11  00909 B  0007 0-&7
         2.05.0 UNL 73.57.0        02  00914 7  9751 97N1         FIELD COUNT
1        2.05.1 SET     0004       03  00919 B  0004 00&4
1        2.05.2 SET     0004       15  00924 B  0004 0&&4
         2.05.3 LOD 72.14.0        03  00929 8  9097 90I7         ZONE INCREMENT 4 TO 7
         2.05.4 LOD 72.13.0        15  00934 8  9093 9&I3         ZONE INCREMENT 4 TO 11
         2.05.8 SUB 71.58.0        02  00939 P  9019 90J9         SUB 1 FROM FIELD COUNT
         2.06.0 UNL 73.53.0        02  00944 7  9720 97K0
         2.06.2 TRZ  2.30.0        02  00949 N  1114 11J4         LAST CTRL FIRELD
         2.06.4 LOD 73.08.0 &007 04  00954 8  9499 9U99         LOAD ITH CTRL FIELD POSITION
         2.06.6 RCV  2.07.2 -003 00  00959 U  0971 0971         TO CMP INSTR
         2.06.8 TMT  2.06.4 -003 04  00964 9  0951 0Z51         TMT ADDR OF ITH CTRL FIELD
         2.07.0 ADM  2.07.2        06  00969 6  0974 0ZP4         ADD 0007 TO CMP INSTR
1        2.07.2 CMP                00  00974 4                    CMP PI TO PJ IN ASU 04
         2.07.4 TRH  2.09.0        00  00979 K  1014 1014         TO INTER CHANGE ROUTINE
         2.07.6 SUB 71.58.0        02  00984 P  9019 90J9         SUB 1 FROM FIELD COUNTER
         2.07.8 TRZ  2.08.2        02  00989 N  0999 09R9         TR TO SIFT NEXT ENTRY
         2.08.0 TR   2.07.0        00  00994 1  0969 0969
         2.08.2 LOD 73.53.0        02  00999 8  9720 97K0         I - 1
         2.08.4 ADM  2.06.4        06  01004 6  0954 0ZN4         ADD 0007 TO LOD INSTR
         2.08.6 TR   2.05.8        00  01009 1  0939 0939
         2.09.0 RCV  2.19.0 -003 00  01014 U  1071 1071         LOD ITH ENTRY INSTR
         2.10.0 TMT  2.06.4 -003 04  01019 9  0951 0Z51         ITH ENTRY ADDRESS
         2.11.0 RCV  2.20.0 -003 00  01024 U  1076 1076         LOAD JTH ENTRY INSTR
         2.12.0 TMT  2.07.2 -003 04  01029 9  0971 0Z71         JTH ENTRY ADDRESS
         2.13.0 ADM  2.19.0        03  01034 6  1074 10G4         MAKE ASU 07 ZONING
         2.14.0 ADM  2.20.0        15  01039 6  1079 1&G9         MAKE ASU 11 ZONING
         2.15.0 RCV  2.21.0 -003 00  01044 U  1081 1081         UNL ITH ENTRY INSTR
         2.16.0 TMT  2.07.2 -003 04  01049 9  0971 0Z71         JTH ENTRY ADDRESS
         2.17.0 RCV  2.22.0 -003 00  01054 U  1086 1086         UNL JTH ENTRY INSTR
         2.18.0 TMT  2.06.4 -003 04  01059 9  0951 0Z51         ITH ENTRY ADDRESS
         2.18.1 ADM  2.21.0        03  01064 6  1084 10H4         MAKE ASU 07 ZONING
         2.18.2 ADM  2.22.0        15  01069 6  1089 1&H9         MAKE ASU 11 ZONING
1        2.19.0 LOD                00  01074 8                    LOD ITH ENTRY IN ASU 07
1        2.20.0 LOD                00  01079 8                    LOD JTH ENTRY IN ASU 11
1        2.21.0 UNL                00  01084 7                    UNL ITH ENTRY IN JTH POSITION
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C LNG      SYMBOLIC          INCR          ACTUAL          S      DATA OR DESCRIPTION
L      LOC   OP   ADDR              ASU  LOC   OP ADDR ADDR N

1      2.22.0 UNL                   00  01089 7                  UNL JTH ENTRY IN ITH POSITION
       2.23.0 RCV  2.25.0 -003      00  01094 U  1101 1101
       2.24.0 TMT  2.06.4 -003      04  01099 9  0951 0Z51
1      2.25.0 LOD                   00  01104 8                  LOD NEW ITH ENTRY IN ASU 04
       2.26.0 TR   2.07.6           00  01109 1  0984 0984
       2.30.0 LOD 73.57.0           02  01114 8  9751 97N1     FIELD COUNT
       2.30.1 SGN  2.30.1           01  01119 T  1119 11/9     PUT & IN ASU 01
       2.30.2 RCV 72.77.0 -003      00  01124 U  9133 9133     COMPARISON AREA
       2.30.3 TMT 71.65.0 -004      04  01129 9  9038 9 38     4 ZEROS
       2.30.4 RAD 71.04.0           03  01134 H  8975 89G5     ASU 03 -- &1
       2.32.0 LOD 73.08.0 &007      07  01139 8  9499 9UI9     LOD ITH ENTRY IN IN ORDERED CTRL FIELD LISTING
       2.32.5 UNL 73.12.0           07  01144 7  9605 9W&5     UNL TO WORK SPACE
       2.33.0 ADM 73.12.0 -004      01  01149 6  9601 96 1     PUT SIGN ON LI
       2.33.5 ADM 73.12.0           01  01154 6  9605 96 5     PUT SIGN ON PI
       2.34.0 RAD 73.12.0           08  01159 H  9605 9005     PI
       2.34.5 RAD 73.12.0           14  01164 H  9605 9F-5     PI
       2.35.0 SUB 73.12.0 -004      08  01169 P  9601 9001     COMPUTE PI - LI
       2.35.5 TRP  2.36.5           08  01174 M  1184 1J84
       2.36.0 TR   2.54.5           00  01179 1  1339 1339     TO ERROR ROUTINE
       2.36.5 CMP 72.77.0           08  01184 4  9136 9J36     TO PREVIOUS PI
       2.37.0 TRH  2.38.0           00  01189 K  1204 1204
       2.37.5 TRE  2.38.0           00  01194 L  1204 1204
       2.37.6 TR   2.54.5           00  01199 1  1339 1339     TO ERROR ROUTINE
       2.38.0 CMP 73.06.0 &008      14  01204 4  9419 9DJ9     TO SIGMA LI
       2.38.5 TRH  2.48.0           00  01209 K  1274 1274
       2.39.0 TRE  2.42.5           00  01214 L  1249 1249
       2.39.5 UNL 73.12.0           08  01219 7  9605 9005     UNL PI - LI TO WORK SPACE
       2.40.0 SGN 73.12.0 -004      01  01224 T  9601 96 1     REMOVE SIGN FROM LI
       2.40.5 LOD 73.12.0           07  01229 8  9605 9W&5     LOD  ENTRY
       2.41.0 ADM  2.41.5           06  01234 6  1239 1SL9     RAISE UNLOAD ADDRES BY 0007
       2.41.5 UNL 73.11.0 -035      07  01239 7  9562 9VF2     UNL ENTRY TO TABLE 2
       2.42.0 ADM  2.71.7           03  01244 6  1364 13F4     RAISE TABLE 2 COUNT      .
       2.42.5 SUB 71.04.0           02  01249 P  8975 89P5     REDUCE FIELD COUNTER BY 1
       2.43.0 TRZ  2.71.5           02  01254 N  1359 13N9     TABLE BUILD UP COMPLETE
       2.43.5 UNL 72.77.0           14  01259 7  9136 9AL6     UNLOAD PI TO COMPARISON AREA
       2.44.0 ADM  2.32.0           06  01264 6  1139 1/L9     RAISE I ADDRESS BY 0007
       2.44.5 TR   2.32.0           00  01269 1  1139 1139
       2.48.0 CMP 73.06.0 &008      08  01274 4  9419 9M19     CMP PI - LI TO SIGMA LI
       2.48.5 TRH  2.52.0           00  01279 K  1314 1314
       2.49.0 TRE  2.52.0           00  01284 L  1314 1314
       2.49.5 LOD 73.06.0 &008      08  01289 8  9419 9M19     SIGMA LI
       2.50.0 SUB 73.12.0           08  01294 P  9605 9005     LESS PI
       2.50.5 SGN  2.50.5           01  01299 T  1299 12Z9     MAKE ASU TRIGGER PLUS
1      2.51.0 SET     0003          08  01304 B  0003 0-03     SET ASU 08 TO 3 PLACES
       2.51.5 ST  73.12.0 -004      08  01309 F  9601 9001     STORE PI - SIGMA LI IN WORK SPACE
       2.52.0 LOD 73.12.0           07  01314 8  9605 9W&5     LOAD ENTRY
       2.52.5 ADM  2.53.0           06  01319 6  1324 1TK4     RAISE UNLOAD ADDRESS BY 0007
       2.53.0 UNL 73.10.0 -035      07  01324 7  9527 9VB7     UNL ENTRY TO TABLE 1
       2.53.5 ADM  2.71.5           03  01329 6  1359 13E9     RAISE TABLE 1 COUNT
       2.54.0 TR   2.42.5           00  01334 1  1249 1249
1      2.54.5 SEL     0500          00  01339 2  0500 0500
       2.55.0 WR  70.55.0 &001      00  01344 R  8569 8569     ERROR MESSAGE
1      2.55.5 HLT     0006          00  01349 J  0006 0006     CTRL CARD ERROR --OVERLAPPING FIELDS
       2.56.0 TR   2.54.5           00  01354 1  1339 1339
1      2.71.5 SET     0001          12  01359 B  0001 0&01     TABLE 1 COUNTER
1      2.71.7 SET     0001          13  01364 B  0001 0& 1     TABLE 2 COUNTER
       2.72.0 RAD 71.06.0           04  01369 H  8979 8Z79     PLACE 3 ZEROS IN L1-I WORK SPACE
       2.72.3 ST  73.13.0           04  01374 F  9609 9W09     X
1      2.72.5 SET     0003          08  01379 B  0003 0-03
7      2.72.7                                                  INTERROGATING TABLES
       2.73.0 NTR  2.73.5           12  01384 X  1394 1C94     MORE TABLE 1 ENTRIES
       2.73.3 TR   5.02.0           00  01389 1  2129 2129     NO MORE TABLE 1 ENTRIES
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C LNG      SYMBOLIC         INCR            ACTUAL       S        DATA OR DESCRIPTION                                  SORT51
L        LOC   OP   ADDR          ASU  LOC   OP ADDR ADDR N

         2.73.5 LOD 73.10.0 -028 07   01394 8   9534 9VC4    TABLE 1 ENTRY TO WORK SPACE
         2.73.7 UNL 73.12.0      07   01399 7   9605 9W&5    X
         2.74.0 RAD 73.13.0      04   01404 H   9609 9W09    GET PREVIOUS SUM OF L1-I
         2.75.0 LOD 73.11.0 -028 07   01409 8   9569 9VF9    TABLE 2 ENTRY TO WORK SPACE
         2.75.2 UNL 73.14.0      07   01414 7   9617 9WA7    PLACE TABLE 2 ENTRY INTO WORK SPACE
         2.75.3 ADD 73.12.0 -004 04   01419 G   9601 9W01    INC BY NEXT L1-I
         2.75.5 CMP 73.14.0      04   01424 4   9617 9W17    SUM OF L1-I WITH P2-I
1        2.75.7 SET    0004      04   01429 B   0004 0 04
         2.76.0 TRH  2.85.0      00   01434 K   1549 1549
         2.76.2 ADM 10.85.0      04   01439 6   3469 3U69    INC LOD INST-FIRST PASS
         2.76.3 ADM 32.08.0      04   01444 6   7484 7U84    INC UNL INST-FINAL PASS
         2.76.5 SUB 73.13.0      04   01449 P   9609 9W09    OLD SUM OF L1-I
         2.76.7 ADM 73.13.0      04   01454 6   9609 9W09    NEW SUM OF L1-I
         2.77.0 ADM 10.84.5      04   01459 6   3464 3U64    INC SET INST-FIRST PASS
         2.77.3 ADM 32.06.0      04   01464 6   7474 7U74    INC SET INST - FINAL PASS
         2.77.5 RAD 73.12.0      04   01469 H   9605 9W05    GET P1-I
         2.77.7 ADM 10.85.5      04   01474 6   3474 3U74    INC UNL INST-FIRST PASS
         2.78.0 ADM 32.07.0      04   01479 6   7479 7U79    INC LOD INST FINAL PASS
         2.78.2 ADM 10.84.0 -004 01   01484 6   3455 34V5    SET SAVING SW TO NOP
         2.78.4 ADM 32.05.0 -004 01   01489 6   7465 74W5    SET REPLACING SW TO NOP
7        2.78.5
7        2.78.7                                              MODIFYING ASSIGNMENT PROG
         2.79.0 ADM  2.76.2      05   01494 6   1439 1UT9    INST SPECIFYING SORT INST
         2.79.3 ADM  2.76.3      05   01499 6   1444 1UU4    X
         2.79,5 ADM  2.77.0      05   01504 6   1459 1UV9    X
         2.79.7 ADM  2.77.3      05   01509 6   1464 1UW4    X
         2.80.0 ADM  2.77.7      05   01514 6   1474 1UX4    X
         2.80.3 ADM  2.78.0      05   01519 6   1479 1UX9    X
         2.80.5 ADM  2.78.2      05   01524 6   1484 1UY4    X
         2.80.6 ADM  2.78.4      05   01529 6   1489 1UY9    X
         2.80.7 NOP  2.87.6      00   01534 A   1604 1604    SWITCH #25
         2.81.3 ADM  2.73.5      06   01539 6   1394 1TR4    TO PICK UP NEXT TABLE 1 ENTRY
         2.81.5 TR   2.73.0      00   01544 1   1384 1384
7        2.84.0
7        2.84.5                                              NEW SUM OF L1-I CROSSES A CONTROL FIELD
         2.85.0 NTR  2.85.6      13   01549 X   1559 1EV9    MORE TABLE 2 ENTRIES
         2.85.3 TR   2.76.2      00   01554 1   1439 1439    NO MORE TABLE 2 ENTRIES
         2.85.6 LOD 73.14.0      08   01559 8   9617 9017    GET P2-I
         2.85.9 SUB 73.13.0      08   01564 P   9609 9009    DEC BY PREVIOUS SUM OF L1-I
         2.86.0 TRZ  2.89.6      08   01569 N   1649 1049
         2.86.1 RAD 73.12.0 -004 09   01574 H   9601 90 1    FOR STORAGE IN L1-I WORK SPACE
         2.86.2 ST  73.12.0 -004 08   01579 F   9601 9001
         2.86.3 SGN  2.80.7 -004 01   01584 T   1530 15T0    SWITCH #25 TO TR
         2.86.9 LOD 73.14.0      04   01589 8   9617 9W17    P2-I INTO ASU 04
         2.87.0 ST  73.14.0      04   01594 F   9617 9W17
         2.87.3 TR   2.76.2      00   01599 1   1439 1439    TO SET UP ROUTINE
         2.87.6 SUB 73.12.0 -004 09   01604 P   9601 90 1    NEW L1-I
         2.87.9 RAD 73.12.0      04   01609 H   9605 9W05    GET P1-I
         2.88.0 SUB 73.12.0 -004 04   01614 P   9601 9W01    NEW P1-I
         2.88.3 ST  73.12.0 -004 09   01619 F   9601 90 1    INTO L1-I WORK SPACE
         2.88.6 ST  73.12.0      04   01624 F   9605 9W05    INTO P1-I WORK SPACE
         2.88.9 ADM  2.80.7 -004 01   01629 6   1530 15T0    SWITCH #25 TO NOP
         2.89.0 RAD 73.14.0 -004 04   01634 H   9613 9W13    L2-2
         2.89.2 ADD 73.14.0      04   01639 G   9617 9W17    INC BY P2-I
         2.89.3 TR   2.90.0      00   01644 1   1659 1659
         2.89.6 LOD 73.14.0 -004 04   01649 8   9613 9W13    SUM OF L1-I PLUS L2-I
         2.89.9 ADD 73.13.0      04   01654 G   9609 9W09    X
1        2.90.0 SET    0003      04   01659 B   0003 0 03
         2.90.1 ST  73.13.0      04   01664 F   9609 9W09    FOR NEW SUM OF L1-I
         2.90.3 ADM  2.75.0      06   01669 6   1409 1U-9    TO PICK UP NEXT TABLE 2 ENTRY
         2.90.6 TR   2.74.0      00   01674 1   1404 1404    TO TEST AGAINST NEXT TABLE 2 ENTRY
7        3.00.0
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C LNG      SYMBOLIC         INCR              ACTUAL       S          DATA OR DESCRIPTION                    SORT51
L        LOC    OP    ADDR         ASU   LOC   OP ADDR ADDR N

7        3.01.0                                                     MORE THAN ONE CONTROL FIELD
         3.02.0 RAD 71.12.0         05   01679 H   9001 9  1        GET A PLUS 0025
         3.02.5 RAD 71.03.0         02   01684 H   8974 89P4        ASU 02 - FIELD COUNTER
         3.03.0 RAD 71.13.0         06   01689 H   9005 9 -5        GET A PLUS 0007
1        3.04.0 SET    0004         04   01694 B   0004 0 04        FOR POSTION P-N
         3.05.0 RAD 71.06.0         00   01699 H   8979 8979        FOR LENGTH L-N
         3.06.0 ST  73.06.0 &003    00   01704 F   9414 9414        STORE 3 ZEROS
         3.07.0 RAD 71.17.0         03   01709 H   9010 90A0        GET A 5
7        3.09.0
         3.10.0 LOD 73.06.0 &018    00   01714 8   9429 9429        GET LENGTH
         3.11.0 CMP 71.02.0         00   01719 4   8973 8973        CHECK IF BLANK
         3.12.0 TRE   3.51.0        00   01724 L   1844 1844        CHECK IF LESS THAN 5 CONT. FIELDS
         3.13.0 ADM 10.58.0         00   01729 6   3364 3364        FIRST PASS
         3.14.0 ADM 32.26.0         00   01734 6   7574 7574        FINAL PASS
         3.15.0 ADD 73.06.0 &003    00   01739 G   9414 9414        INCREASE BY PREVIOUS SUM OF LENGTHS
         3.16.0 ST  73.06.0 &003    00   01744 F   9414 9414
         3.17.0 ADM 10.60.0         00   01749 6   3374 3374        FIRST PASS
         3.18.0 ADM 32.27.0         00   01754 6   7579 7579
         3.23.0 LOD 73.06.0 &022    04   01759 8   9433 9U33        GET POSITION
         3.24.0 ADM 10.59.0         04   01764 6   3369 3T69        FIRST PASS
         3.25.0 ADM 32.28.0         04   01769 6   7584 7V84        LAST PASS
         3.26.0 ADD 71.04.0         02   01774 G   8975 89P5        INC FIELD COUNTER
         3.27.0 SUB 71.04.0         03   01779 P   8975 89G5        DEC BY 1
         3.28.0 TRZ   3.52.0        03   01784 N   1854 18E4        CHECK IF 5TH CONTROL FIELD
7        3.30.0                                                     INC. CYCLE INSTRUCTIONS
         3.31.0 ADM   3.13.0        05   01789 6   1729 1XS9        PROGRAM ADDRESSES
         3.32.0 ADM   3.17.0        05   01794 6   1749 1XU9        X
         3.33.0 ADM   3.14.0        05   01799 6   1734 1XT4        X
         3.34.0 ADM   3.24.0        05   01804 6   1764 1XW4        X
         3.35.0 ADM   3.18.0        05   01809 6   1754 1XV4        X
         3.35.5 ADM   3.25.0        05   01814 6   1769 1XW9        X
         3.36.0 ADM   3.51.0        05   01819 6   1844 1YU4        FOR SKIPPING OTHER SET UPS
         3.39.0 ADM   3.51.7        05   01824 6   1849 1YU9        X
         3.41.0 ADM   3.10.0        06   01829 6   1714 1XJ4        CONTROL CARD ADDRESSES
         3.42.0 ADM   3.23.0        06   01834 6   1759 1XN9        X
         3.49.0 TR    3.10.0        00   01839 1   1714 1714        REPEAT CYCLE
7        3.50.0                                                     GET TOTAL LENGTH
         3.51.0 SGN 10.57.0 -004    01   01844 T   3355 33V5        SWITCH 5, 6, 8, OR 9 TO TR
         3.51.7 SGN 32.25.0 -004    01   01849 T   7565 75W5
         3.52.0 RAD 73.06.0 &003    00   01854 H   9414 9414        GET TOTAL LENGTH
1        3.53.0 SET    0004         00   01859 B   0004 0004
         3.54.0 ADM 11.02.5         00   01864 6   3564 3564
         3.55.0 ADM 11.03.0         00   01869 6   3569 3569
         3.56.0 ADM 11.04.0         00   01874 6   3584 3584
         3.57.0 ADM 11.52.0         00   01879 6   3809 3809
         3.58.0 ADM 11.37.0         00   01884 6   3739 3739
         3.61.0 ADM 21.03.0         00   01889 6   5984 5984
         3.61.5 ADM 22.01.5         00   01894 6   6199 6199
         3.62.0 ADM 21.04.0         00   01899 6   5994 5994
         3.63.0 ADM 21.30.0         00   01904 6   6134 6134
         3.64.0 ADM 22.02.0         00   01909 6   6204 6204
         3.66.0 ADM 31.03.0         00   01914 6   7379 7379        X
         3.68.0 ADM 12.57.0         00   01919 6   4104 4104
         3.70.0 NOP   5.02.0        00   01924 A   2129 2129        TO SW INTERROGATION IF ONE CTRL FIELD
         3.71.0 ADM 31.04.0         00   01929 6   7389 7389
         3.72.0 ADM 32.02.0         00   01934 6   7464 7464
         3.73.0 ADM 19.24.8         00   01939 6   5514 5514
         3.74.1 ADM 33.05.5         00   01944 6   7689 7689
         3.74.2 ADM 33.10.5         00   01949 6   7714 7714
         3.75.0 ADM 11.02.0         00   01954 6   3559 3559
         3.77.0 ADM 12.55.0         00   01959 6   4099 4099
         3.78.0 ADM 12.60.0         00   01964 6   4109 4109
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C LNG      SYMBOLIC        INCR              ACTUAL        S        DATA OR DESCRIPTION
L       LOC   OP   ADDR          ASU  LOC   OP ADDR ADDR N

        3.79.0 ADM   8.07.5       00  01969 6  2909 2909
        3.80.0 ADM   8.07.7       00  01974 6  2914 2914
        3.81.0 TR    2.04.5       00  01979 1  0889 0889
7       4.00.0
7       4.01.0                                                IF ONLY ONE CONTROL FIELD
        4.02.0 LOD 73.06.0 &025 00  01984 8  9436 9436     GET L2
        4.03.0 CMP 71.02.0        00  01989 4  8973 8973     CHECK IF BLANK
        4.04.0 TRE   4.06.0       00  01994 L  2004 2004     OK
        4.05.0 TR    1.19.0       00  01999 1  0859 0859     CONTROL CARD ERROR
        4.06.0 RAD 71.14.0        01  02004 H  9006 90 6     GET AN 8
        4.06.3 LOD 73.06.0 &018 00  02009 8  9429 9429     LENGTH OF CONTROL WORD
        4.06.5 CMP 72.12.0        00  02014 4  9089 9089
1       4.06.6 SET     0004       00  02019 B  0004 0004
        4.06.7 TRH   1.19.0       00  02024 K  0859 0859
        4.06.8 CMP 73.06.0 &022 00  02029 4  9433 9433     TO CTRL FIELD POSITION
        4.06.9 TRH   2.54.5       00  02034 K  1339 1339     CTRL FIELD OVERLAPS BEGINNING OF RECORD
        4.07.0 UNL 11.03.0 -004 01  02039 7  3565 35W5     CHANGE UNL TO LOD
        4.10.0 SGN   3.70.0 -004 01  02044 T  1920 19S0     TO SKIP RECORD REARRANGEMENT
        4.11.0 LOD 72.07.0        01  02049 8  9070 90X0     GET AN A
        4.12.0 UNL 11.02.5 -004 01  02054 7  3560 35W0     CHANGE LOD TO NOP
        4.18.0 ADM 11.02.0        00  02059 6  3559 3559     FIRST PASS
        4.19.0 ADM 19.24.8        00  02064 6  5514 5514
        4.21.0 ADM 31.04.0        00  02069 6  7389 7389
        4.21.1 ADM 33.05.5        00  02074 6  7689 7689
        4.21.2 ADM 33.10.5        00  02079 6  7714 7714
        4.22.0 ADM 32.02.0        00  02084 6  7464 7464
        4.23.0 ADM 12.55.0        00  02089 6  4099 4099
        4.24.0 ADM 12.60.0        00  02094 6  4109 4109
        4.24.3 ADM   8.07.5       00  02099 6  2909 2909
        4.24.5 ADM   8.07.7       00  02104 6  2914 2914
1       4.25.0 SET     0004       00  02109 B  0004 0004     GET P1
        4.26.0 LOD 73.06.0 &022 00  02114 8  9433 9433     X
        4.27.0 ST  73.06.0 &003 00  02119 F  9414 9414     PLACE INSTEAD OF LENGTH
        4.28.0 TR    3.51.0       00  02124 1  1844 1844
7       5.00.0
7       5.01.0                                                INTERROGATING SWITCHES
        5.02.0 RAD 71.03.0        04  02129 H  8974 8Z74     GET A ZERO
        5.05.0 NOP   5.20.0       00  02134 A  2184 2184     TR IF MASTER ON 0204
        5.07.0 UNL 10.19.0        04  02139 7  3129 3/29     ADD OF UNIT CONTAINING MASTER FILE
        5.08.0 UNL 10.28.0        04  02144 7  3184 3/84     X
        5.09.0 UNL 10.38.0        04  02149 7  3234 3S34     X
        5.10.0 UNL 10.43.0        04  02154 7  3274 3S74     X
        5.11.0 UNL 11.12.0        04  02159 7  3629 3W29     X
        5.12.0 UNL 12.02.0        04  02164 7  3889 3Y89     X
        5.15.0 UNL 70.06.0        04  02169 7  8202 8S02     X
        5.16.0 UNL 70.26.0        04  02174 7  8400 8U00     X
        5.17.0 SGN 10.15.0 -004 01  02179 T  3105 31 5     SET SW #1 TO TR
        5.20.0 NOP   5.32.0       00  02184 A  2234 2234     TR IF CHECK PT ON 0205
        5.22.0 LOD   5.56.0 -002 04  02189 8  2262 2S62     GET A 4
        5.23.0 UNL 19.02.0        04  02194 7  5334 5T34
        5.24.0 UNL 25.12.5        04  02199 7  7039 7 39
        5.24.5 UNL 19.02.0        04  02204 7  5334 5T34
        5.25.0 UNL 19.07.0        04  02209 7  5404 5U04
        5.26.0 UNL 19.10.0        04  02214 7  5434 5U34
        5.27.0 UNL 19.12.0        04  02219 7  5454 5U54
        5.28.0 UNL 25.34.0        04  02224 7  7159 7/59
        5.29.0 UNL 25.36.0        04  02229 7  7179 7/79
1       5.32.0 SEL     0916       00  02234 2  0916 0916     CHECK IF PRINT OUT IS DESIRED
        5.33.0 TRS   8.02.0       00  02239 0  2874 2874     NO
7       5.50.0
7       5.51.0                                                SET UP FOR PRINT OUT
7       5.51.5                                                TITLE, IDENTIFICATION, AND TOP INDEX
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C LNG      SYMBOLIC          INCR              ACTUAL          S        DATA OR DESCRIPTION
L        LOC    OP    ADDR        ASU   LOC   OP ADDR ADDR N

1       5.52.0 SET     0001        01  02244 B   0001 00 1     TO SAVE DIGIT BEFORE IDENTIFICATION
        5.53.0 LOD 73.06.0 &050 01  02249 8   9461 94W1     X
        5.54.0 RCV 73.06.0 &050 00  02254 U   9461 9461     PUT BLANK BEFORE CONTROL
        5.55.0 TMT 71.52.0         01  02259 9   9012 90/2             CARD INFORMATION
1       5.56.0 SEL     0400        00  02264 2   0400 0400
        5.57.0 WR  70.21.0         00  02269 R   8335 8335     TITLE OF PRINT OUT
        5.58.0 WR  73.06.0 &050 00  02274 R   9461 9461     IDENTIFICATION
        5.59.0 WRE 72.92.0         00  02279 Z   9147 9147     TOP INDEX
        5.61.0 UNL 73.06.0 &050 01  02284 7   9461 94W1     REPLACE DIGIT BEFORE IDENTIFICATION
7       5.63.0
7       5.64.0                                                 HOUSEKEEPING
1       5.65.0 SET     0001        01  02289 B   0001 00 1     ASU 1 - OPERATION AND ZONE CHECKING
1       5.66.0 SET     0002        02  02294 B   0002 00-2     ASU 2 - ASU VALUE
1       5.67.0 SET     0004        04  02299 B   0004 0 04     ASU 4 - ADD OF LAST INSTRUCTION
        5.68.0 LOD 72.57.0         04  02304 8   9115 9/15
        5.69.0 RAD 71.68.0         05  02309 H   9062 9 W2     ASU 5 PRINT INDEX--SORT
1       5.70.0 SET     0000        06  02314 B   0000 0 -0     ASU 6 - 10 BLANKS
1       5.71.0 SET     0010        06  02319 B   0010 0 J0     X
        5.72.0 SPR 72.86.0         06  02324 5   9146 9/M6     X
        5.73.0 LOD 72.86.0         06  02329 8   9146 9/M6     X
1       5.74.0 SET     0005        07  02334 B   0005 0 &5     ASU 7 - 5 BLANKS
        5.75.0 LOD 72.86.0         07  02339 8   9146 9/D6     X
        5.76.0 RAD 71.64.0         08  02344 H   9037 9-37     ASU 8 - PLUS 0005
1       5.77.0 SET     0004        09  02349 B   0004 0- 4     ASU 9 - LAST PRINT ADD
        5.78.0 LOD 72.56.0         09  02354 8   9111 9J/1     X
        5.79.0 RAD 71.63.0         10  02359 H   9033 9-L3     ASU 10 - PRINT ADD INCREMENT
1       5.80.0 SET     0001        11  02364 B   0001 0-&1     ASU 11 - GROUP MARK
        5.81.0 LOD 70.31.0         11  02369 8   8446 8MD6     X
        5.82.0 UNL 72.98.0         11  02374 7   9265 9KF5     REPLACE GROUP MARK
7       5.89.0                                                 IF SORT PROGRAM DESIRED
        5.90.0 TR   5.98.0         00  02379 1   2414 2414     SWITCH #20 - NOP FOR PRINT OUT OF ASSIGNMENT
        5.91.0 RAD 71.66.0         05  02384 H   9053 9 V3     PRINT INDEX FOR ASSIGNMENT
        5.92.0 LOD 72.60.0         04  02389 8   9127 9/27     ADD OF FIRST ASSIGNMENT INSTRUCTION
        5.93.0 UNL  6.05.0         04  02394 7   2424 2U24     PLACE IN PROGRAM
        5.94.0 LOD 72.61.0         04  02399 8   9131 9/31     INITIAL PRINT LINE ADDRESS
        5.95.0 UNL  7.01.0         04  02404 7   2654 2W54     X
        5.96.0 LOD 72.58.0         04  02409 8   9119 9/19     LAST PRINT ADD
        5.98.0 UNL 72.93.0         05  02414 7   9152 9/V2     PLACE INITIAL INDEX IN PRINT FIELD
7       6.00.0
7       6.01.0                                                 ANALYSIS OF SORT OR ASSIGNMENT PROGRAM
        6.04.0 RCV 72.73.0         00  02419 U   9132 9132     INSTRUCTION WORK AREA
        6.05.0 TMT 10.03.0 -004 05  02424 9   3035 3 T5     GET INSTRUCTION
        6.06.0 LOD 72.73.0         01  02429 8   9132 91T2     GET OPERATION DIGIT
        6.07.0 CMP 71.02.0         01  02434 4   8973 89X3     CHECK IF BLANK
        6.08.0 TRE  7.01.0         00  02439 L   2654 2654     YES
        6.09.0 UNL 72.80.0         01  02444 7   9137 91T7     PLACE IN ASSEMBLY WORK SPACE
        6.10.0 LOD 72.74.0         01  02449 8   9133 91T3     GET 4TH ORDER DIGIT
        6.11.0 CMP 72.53.0         01  02454 4   9105 91 5     CHECK ZONING
        6.12.0 TRH  6.14.0         00  02459 K   2469 2469
        6.13.0 ADD 71.62.0         01  02464 G   9029 90S9     DEZONE AND PLACE 1
        6.14.0 UNL 72.82.0         01  02469 7   9139 91T9     PLACE IN ASSEMBLY WORK SPACE
1       6.15.0 SET     0001        01  02474 B   0001 00 1
7       6.16.0                                                 DECODING ASU DESIGNATION
        6.17.0 RAD 71.59.0         02  02479 H   9021 90K1     PLACE 00 IN ASU 2
        6.18.0 LOD 72.75.0         01  02484 8   9134 91T4     GET 3RD ORDER DIGIT
        6.19.0 CMP 72.52.0         01  02489 4   9104 91 4     CHECK IF SLASH
        6.20.0 TRE  6.31.0         00  02494 L   2549 2549     ZERO ZONE
        6.21.0 CMP 72.53.0         01  02499 4   9105 91 5     CHECK IF GREATER THAN Z
        6.22.0 TRH  6.32.0         00  02504 K   2554 2554     NO ZONE
        6.23.0 CMP 72.54.0         01  02509 4   9106 91 6     CHECK IF GREATER THAN R
        6.24.0 TRH  6.31.0         00  02514 K   2549 2549     ZERO ZONE
        6.25.0 CMP 72.55.0         01  02519 4   9107 91 7     CHECK IF GREATER THAN I
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C L	LNG	SYMBOLIC LOC	OP	ADDR	INCR	ASU	ACTUAL LOC	OP	ADDR	ADDR	S N	DATA OR DESCRIPTION
		6.26.0	TRH	6.29.0		00	02524	K	2539	2539		11 ZONE
		6.27.0	ADD	71.53.0		02	02529	G	9014	90J4		12 ZONE
		6.28.0	TR	6.32.0		00	02534	1	2554	2554		X
		6.29.0	ADD	71.54.0		02	02539	G	9015	90J5		11 ZONE
		6.30.0	TR	6.32.0		00	02544	1	2554	2554		X
		6.31.0	ADD	71.55.0		02	02549	G	9016	90J6		ZERO ZONE
		6.32.0	LOD	72.76.0		01	02554	8	9135	91T5		GET 2ND ORDER DIGIT
		6.33.0	CMP	72.52.0		01	02559	4	9104	91 4		CHECK IF SLASH
		6.34.0	TRE	6.45.0		00	02564	L	2619	2619		ZERO ZONE
		6.35.0	CMP	72.53.0		01	02569	4	9105	91 5		CHECK IF GREATER THAN Z
		6.36.0	TRH	6.46.0		00	02574	K	2624	2624		NO ZONE
		6.37.0	CMP	72.54.0		01	02579	4	9106	91 6		CHECK IF GREATER THAN R
		6.38.0	TRH	6.45.0		00	02584	K	2619	2619		ZERO ZONE
		6.39.0	CMP	72.55.0		01	02589	4	9107	91 7		CHECK IF GREATER THAN I
		6.40.0	TRH	6.43.0		00	02594	K	2609	2609		11 ZONE
		6.41.0	ADD	71.56.0		02	02599	G	9017	90J7		12 ZONE
		6.42.0	TR	6.46.0		00	02604	1	2624	2624		X
		6.43.0	ADD	71.57.0		02	02609	G	9018	90J8		11 ZONE
		6.44.0	TR	6.46.0		00	02614	1	2624	2624		X
		6.45.0	ADD	71.58.0		02	02619	G	9019	90J9		ZERO ZONE
		6.46.0	UNL	72.85.0		02	02624	7	9145	91M5		ASU DESIGNATION IN ASSEMBLY AREA
		6.47.0	LOD	72.76.0		02	02629	8	9135	91L5		GET 2ND AND 3RD DIGITS
		6.48.0	ADD	71.60.0		02	02634	G	9022	90K2		GET RID OF ZONING
		6.49.0	UNL	72.83.0		02	02639	7	9141	91M1		PLACE IN ASSEMBLY AREA
		6.50.0	RCV	72.84.0		00	02644	U	9142	9142		1ST ORDER DIGIT IN ASSEMBLY AREA
		6.51.0	TMT	72.77.0		01	02649	9	9136	91T6		X
7		7.00.0										SETTING UP PRINT LINE
		7.01.0	RCV	72.93.0	&081	00	02654	U	9233	9233		ANALYSED INSTRUCION TO PRINT AREA
		7.02.0	TMT	72.80.0		06	02659	9	9137	9/L7		X
		7.03.0	UNL	72.86.0		06	02664	7	9146	9/M6		BLANK ASSEMBLY WORK AREA
		7.04.0	CMP	6.05.0		04	02669	4	2424	2U24		CHECK IF END OF PRINT
		7.05.0	TRE	7.20.0		00	02674	L	2764	2764		YES
		7.06.0	CMP	7.01.0		09	02679	4	2654	20V4		CHECK IF END OF PRINT LINE
		7.07.0	TRE	7.11.0		00	02684	L	2704	2704		YES
		7.08.0	ADM	7.01.0		10	02689	6	2654	20N4		INC PRINT ADD
		7.09.0	ADM	6.05.0		08	02694	6	2424	2M24		INC INST ADD
		7.10.0	TR	6.04.0		00	02699	1	2419	2419		REPEAT ON NEXT INSTRUCTION
1		7.11.0	SEL	0400		00	02704	2	0400	0400		WRITE LINE
		7.12.0	WRE	72.92.0		00	02709	Z	9147	9147		
1		7.12.5	SEL	0902		00	02714	2	0902	0902		
		7.13.0	TRS	7.30.0		00	02719	O	2814	2814		
1		7.13.5	SEL	0903		00	02724	2	0903	0903		
		7.13.7	TRS	7.33.0		00	02729	O	2829	2829		
		7.14.0	UNL	72.98.0		11	02734	7	9265	9KF5		REPLACE GROUP MARK
		7.15.0	ADD	71.61.0		05	02739	G	9027	9 S7		INC INDEX BY 50
		7.16.0	UNL	72.93.0		05	02744	7	9152	9/V2		PLACE IN PRINT FIELD
		7.17.0	RCV	7.01.0	-003	00	02749	U	2651	2651		RESET PRINT ADD
		7.18.0	TMT	72.59.0	-003	04	02754	9	9120	9/20		X
		7.19.0	TR	7.09.0		00	02759	1	2694	2694		
1		7.20.0	SEL	0400		00	02764	2	0400	0400		
		7.21.0	WRE	72.92.0		00	02769	Z	9147	9147		WRITE LAST LINE
		7.21.1	UNL	72.98.0		11	02774	7	9265	9KF5		REPLACE G/M
1		7.22.0	SEL	0902		00	02779	2	0902	0902		
		7.23.0	TRS	7.36.0		00	02784	O	2844	2844		
1		7.23.5	SEL	0903		00	02789	2	0903	0903		
		7.23.7	TRS	7.39.0		00	02794	O	2859	2859		
1		7.24.0	SEL	0500		00	02799	2	0500	0500		
		7.25.0	WR	70.59.0	&001	00	02804	R	8592	8592		END OF PRINT
		7.26.0	TR	8.02.0		00	02809	1	2874	2874		SET UP FOR SORT
1		7.30.0	SEL	0400		00	02814	2	0400	0400		902 CHECK - EXCEPT LAST LINE
		7.31.0	WR	70.63.0	&001	00	02819	R	8610	8610		X
		7.32.0	TR	7.13.5		00	02824	1	2724	2724		X

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C LNG      SYMBOLIC          INCR          ACTUAL        S        DATA OR DESCRIPTION                              SORT51
L        LOC   OP   ADDR            ASU  LOC   OP ADDR ADDR N

1       7.33.0 SEL     0400         00  02829 2   0400 0400    903 CHECK - EXCEPT LAST LINE
        7.34.0 WR   70.64.0 &001    00  02834 R   8641 8641    X
        7.35.0 TR     7.14.0        00  02839 1   2734 2734    X
1       7.36.0 SEL     0400         00  02844 2   0400 0400    902 CHECK LAST LINE
        7.37.0 WR   70.63.0 &001    00  02849 R   8610 8610    X
        7.38.0 TR     7.23.5        00  02854 1   2789 2789    X
1       7.39.0 SEL     0400         00  02859 2   0400 0400    903 CHECK LAST LINE
        7.40.0 WR   70.64.0 &001    00  02864 R   8641 8641    X
        7.41.0 TR     7.25.0        00  02869 1   2804 2804    X
7       8.00.0
7       8.01.0                                                 HOUSE KEEPING FOR FIRST PASS
        8.02.0 RAD 71.04.0          01  02874 H   8975 89X5    ASU 01 -  A 1 FOR SWITCH SETTIN
        8.03.0 RAD 71.09.0          02  02879 H   8989 89Q9    ASU 02 - ERROR COUNTER
        8.04.0 RAD 71.04.0          03  02884 H   8975 89G5    ASU  03  -  OUTPUT ADDRESS
1       8.05.0 SET     0001         04  02889 B   0001 0 01    ASU 04 - INPUT ADDRESS
        8.06.0 LOD 70.06.0          04  02894 8   8202 8S02
1       8.07.0 SET     0001         05  02899 B   0001 0  1    ASU  05  -  GETS AN A FOR SWITCH SETTING
        8.07.3 LOD 73.55.0          05  02904 8   9750 9XV0    FOR PLACING GROUP MARK
        8.07.5 UNL 73.04.0 &001     05  02909 7   9311 9T/1         IN CONTROL WORD WORK SPACES
        8.07.7 UNL 73.15.0 &001     05  02914 7   9619 9W/9           FOR TYPING CONTROL WORD
        8.08.0 LOD 72.07.0          05  02919 8   9070 9 X0
        8.09.0 RAD 71.65.5          06  02924 H   9048 9 M8    ASU 06 -- TAPE CHANGE COUNTER
        8.10.5 RAD 71.65.5          07  02929 H   9048 9 D8    ASU 07 -- RECORD COUNTER
1       8.11.0 SET     0010         13  02934 B   0010 0&/0    ASU - 13 FOR HASH TOTAL COMPUTATION
1       8.11.5 SET     0006         09  02939 B   0006 0- 6    ASU 09 -- TMT G/M AND R/MS
1       8.11.6 SET     0004         10  02944 B   0004 0--4    FOR 0902 RETURN ADDRESS
1       8.11.7 SET     0004         12  02949 B   0004 0&04    FOR 0902 RETURN ADDRESS
1       8.11.8 SET     0002         11  02954 B   0002 0-&2
        8.11.9 LOD 71.65.0 -001     11  02959 8   9041 9-D1    2 ZEROS FOR PASS COUNTER
1       8.12.0 SEL     0901         00  02964 2   0901 0901
        8.13.0 TRS 25.02.0          00  02969 0   6889 6889
1       8.14.0 SEL     0904         00  02974 2   0904 0904
        8.15.0 TRS 25.04.0          00  02979 0   6899 6899
1       8.16.0 SEL     0905         00  02984 2   0905 0905
        8.17.0 TRS 25.06.0          00  02989 0   6909 6909
        8.18.0 TR   10.03.0         00  02994 1   3039 3039
7       8.50.0                                                 IF IT IS DESIRED TO PRINT ASSIGNMENT PROGRAM
7       8.51.0                                                 GOTTEN TO ONLY BY MANUAL TRANSFER
        8.52.0 SGN   5.90.0 -004    01  02999 T   2375 23X5
        8.52.5 ADM   5.90.0 -004    01  03004 6   2375 23X5
        8.53.0 RAD 71.67.0          04  03009 H   9057 9 57    ADD OF ASSIGNMENT TITLE
        8.54.0 UNL   5.57.0         04  03014 7   2269 2S69    CHANGE PRINT ADD
1       8.54.1 SET     0076         00  03019 B   0076 0076
        8.54.2 LOD 73.06.0 &080     00  03024 8   9491 9491    CONTROL CARD
        8.54.3 UNL 72.92.0 &095     00  03029 7   9242 9242    TO PRINT AREA
        8.55.0 TR     5.52.0        00  03034 1   2244 2244    TO PRINT SET UP
7      10.00.0
7      10.01.0                                                 FIRST PASS
7      10.01.5
7      10.02.0                                                 RWD AND IOF TAPES
       10.03.0 RAD 71.13.0          08  03039 H   9005 9-05    SET FOR 3 REPEATS
1      10.03.5 SEL     0200         00  03044 2   0200 0200
1      10.04.0 RWD     0002         00  03049 3   0002 0002    REWIND ALL SORTING TAPES
1      10.04.5 IOF     0000         00  03054 3   0000 0000    IOF ALL SORTING TAPES
       10.05.0 ADM 10.03.5          03  03059 6   3044 30D4
       10.06.0 NTR 10.03.5          08  03064 X   3044 3-44
1      10.07.0 SEL     0913         00  03069 2   0913 0913    ARE THERE 4 TAPE PAIRS FOR SORTING
       10.08.0 TRS 10.10.0          00  03074 0   3084 3084    YES
       10.09.0 TR  10.15.0          00  03079 1   3109 3109    NO
       10.10.0 NOP 10.15.0          00  03084 A   3109 3109
       10.11.0 UNL 10.10.0 -004     01  03089 7   3080 30Y0
       10.12.0 RCV 10.03.5          00  03094 U   3044 3044
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C LNG      SYMBOLIC          INCR          ACTUAL          S      DATA OR DESCRIPTION
L       LOC   OP   ADDR          ASU  LOC   OP ADDR ADDR  N

      10.13.0 TMT  5.32.0        01  03099 9  2234 22T4     A 6
      10.14.0 TR  10.03.0        00  03104 1  3039 3039
      10.15.0 NOP 10.19.0        00  03109 A  3129 3129     SWITCH #1 - TR IF MASTER ON 200
1     10.16.0 SEL    0204        00  03114 2  0204 0204
1     10.17.0 RWD    0002        00  03119 3  0002 0002
1     10.18.0 IOF    0000        00  03124 3  0000 0000
1     10.19.0 SEL    0204        00  03129 2  0204 0204     MASTER FILE
      10.20.0 RWW 75.09.0 &001   00  03134 S 12500 S500     FIRST RECORD INTO B
      10.21.0 RD  75.09.0 &001   00  03139 Y 12500 S500
      10.22.0 TRS 14.02.0        00  03144 O  4644 4644     NO RECORDS ON MASTER
      10.23.0 TMT 72.04.0        09  03149 9  9064 9-W4     PLACE GM & 5 RMS
      10.24.0 ADD 71.04.0        07  03154 G  8975 8ZG5     INC RECORD COUNTER
1     10.25.0 SEL    0902        00  03159 2  0902 0902
      10.26.0 TRS 15.03.0        00  03164 O  4754 4754     0902 RETURN #1
      10.27.0 TR  10.53.0        00  03169 1  3344 3344     TO HASH TOTAL
      10.27.3 RCV 75.02.0 &005   00  03174 U 10004  004     PLACE FIRST RECORD INTO A
      10.27.5 TMT 75.09.0 &005   00  03179 9 12504 S504
1     10.28.0 SEL    0204        00  03184 2  0204 0204     MASTER FILE
      10.29.0 RWW 75.09.0 &001   00  03189 S 12500 S500     SECOND RECORD INTO B
      10.30.0 RD  75.09.0 &001   00  03194 Y 12500 S500
      10.31.0 TRS 14.08.0        00  03199 O  4664 4664     ONE RECORD ON MASTER
      10.32.0 TMT 72.04.0        09  03204 9  9064 9-W4     PLACE GM AND RMS
      10.33.0 ADD 71.04.0        07  03209 G  8975 8ZG5     INC RECORD COUNTER
1     10.34.0 SEL    0902        00  03214 2  0902 0902
      10.35.0 TRS 15.09.0        00  03219 O  4779 4779     0902 RETURN #2
      10.36.0 UNL 11.03.5 -004   05  03224 7  3570 3VX0     SWITCH 2 TO NOP
      10.37.0 TR  10.53.0        00  03229 1  3344 3344     TO HASH TOTAL
1     10.38.0 SEL    0204        00  03234 2  0204 0204     MASTER FILE
      10.39.0 RWW 75.09.0 &001   00  03239 S 12500 S500     B AREA
1     10.40.0 SEL    0201        00  03244 2  0201 0201     OUTPUT TAPE
      10.41.0 WR  75.16.0 &001   00  03249 R 15000 V000     C AREA
      10.42.0 TRS 14.14.0        00  03254 O  4684 4684     OUTPUT OVERFLOW CONDITION
      10.42.2 LOD 75.16.0 &010   13  03259 8 15009 V& 9     MIDDLE PASS HASH TOTAL INCREMENT
      10.42.3 ADD 71.60.0        13  03264 G  9022 9&S2
      10.42.4 ADM 73.02.0        13  03269 6  9276 9BX6
1     10.43.0 SEL    0204        00  03274 2  0204 0204     MASTER FILE
      10.44.0 TRS 13.02.0        00  03279 O  4329 4329     TEST MAJOR EOF
      10.45.0 TMT 72.04.0        09  03284 9  9064 9-W4     PLACE GM AND RMS
      10.45.1 ADD 71.04.0        07  03289 G  8975 8ZG5     INCREASE RECORD COUNT
      10.45.5 TRA 10.46.1        00  03294 I  3304 3304
      10.46.0 TR  10.53.0        00  03299 1  3344 3344
1     10.46.1 SEL    0901        00  03304 2  0901 0901     CHECK INDICATORS
      10.46.2 TRS 25.02.0        00  03309 O  6889 6889
1     10.46.3 SEL    0904        00  03314 2  0904 0904
      10.46.4 TRS 25.04.0        00  03319 O  6899 6899
1     10.46.5 SEL    0905        00  03324 2  0905 0905
      10.46.6 TRS 25.06.0        00  03329 O  6909 6909
1     10.47.0 SEL    0902        00  03334 2  0902 0902
      10.48.0 TRS 15.15.0        00  03339 O  4804 4804     0902 RETURN #3
7     10.50.0
7     10.51.0                                               HASH TOTAL
      10.53.0 LOD 75.09.0 &010   13  03344 8 12509 SE 9     LOD FIRST 10 CHARACTERS OF RECORD
      10.54.0 ADD 71.60.0        13  03349 G  9022 9&S2     DEZONE
      10.54.5 ADM 73.03.7        13  03354 6  9309 9C 9     INCREASE HASH TOTAL
7     10.55.0
7     10.56.0                                               SETTING UP CONTROL WORD
      10.57.0 NOP 11.02.0        00  03359 A  3559 3559     SWITCH #5=TR IF ONE CONTROL FIELD
1     10.58.0 SET    0000        00  03364 B  0000 0000     1ST CONTROL FIELD
      10.59.0 LOD 75.09.0        00  03369 8 12499 S499     INC BY P1
      10.60.0 UNL 73.04.0        00  03374 7  9310 9310     INC BY L1
      10.62.5 NOP 10.84.0        00  03379 A  3459 3459     SW #6
1     10.63.0 SET    0000        00  03384 B  0000 0000     2ND CONTROL FIELD
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C LNG      SYMBOLIC         INCR           ACTUAL        S        DATA OR DESCRIPTION
L       LOC    OP   ADDR          ASU  LOC   OP ADDR ADDR N

         10.64.0 LOD 75.09.0         00  03389 8 12499 S499    INC BY P2
         10.65.0 UNL 73.04.0         00  03394 7  9310 9310    INC BY L1 & L2
         10.67.5 NOP 10.84.0         00  03399 A  3459 3459    SW #7
1        10.68.0 SET    0000         00  03404 B  0000 0000    3RD CONTROL FIELD
         10.69.0 LOD 75.09.0         00  03409 8 12499 S499    INC BY P3
         10.70.0 UNL 73.04.0         00  03414 7  9310 9310    INC BY L1&L2&L3
         10.72.5 NOP 10.84.0         00  03419 A  3459 3459    SW #8
1        10.73.0 SET    0000         00  03424 B  0000 0000    4TH CONTROL FIELD
         10.74.0 LOD 75.09.0         00  03429 8 12499 S499    INC BY P4
         10.75.0 UNL 73.04.0         00  03434 7  9310 9310    INC BY L1&L2&L3&L4
         10.77.5 NOP 10.84.0         00  03439 A  3459 3459    SW #9
1        10.78.0 SET    0000         00  03444 B  0000 0000    5TH CONTROL FIELD
         10.79.0 LOD 75.09.0         00  03449 8 12499 S499    INC BY P5
         10.80.0 UNL 73.04.0         00  03454 7  9310 9310    INC BY L1&L2&L3&L4&L5
7        10.83.0                                               SAVING BEGINING OF RECORD
         10.84.0 TR  11.02.0         00  03459 1  3559 3559    SAVING SW #1
1        10.84.5 SET    0000         00  03464 B  0000 0000    GET NON-CONTROL WORD INFORMATION
         10.85.0 LOD 75.09.0         00  03469 8 12499 S499    WITHIN POSITIONS TO BE
         10.85.5 UNL 75.09.0         00  03474 7 12499 S499    OCCUPIED WITH THE CONTROL
         10.86.0 TR  11.02.0         00  03479 1  3559 3559    SAVING SW #2
1        10.86.5 SET    0000         00  03484 B  0000 0000    IN SPACES VACATED BY
         10.87.0 LOD 75.09.0         00  03489 8 12499 S499    CONTROL FIELDS OUTSIDE
         10.88.0 UNL 75.09.0         00  03494 7 12499 S499    THE CONTROL WORD AREA
         10.89.0 TR  11.02.0         00  03499 1  3559 3559    SAVING SW #3
1        10.90.0 SET    0000         00  03504 B  0000 0000
         10.91.0 LOD 75.09.0         00  03509 8 12499 S499
         10.92.0 UNL 75.09.0         00  03514 7 12499 S499
         10.93.0 TR  11.02.0         00  03519 1  3559 3559    SAVING SW #4
1        10.94.0 SET    0000         00  03524 B  0000 0000
         10.95.0 LOD 75.09.0         00  03529 8 12499 S499
         10.96.0 UNL 75.09.0         00  03534 7 12499 S499
         10.97.0 TR  11.02.0         00  03539 1  3559 3559    SAVING SW #5
1        10.97.5 SET    0000         00  03544 B  0000 0000
         10.98.0 LOD 75.09.0         00  03549 8 12499 S499
         10.98.5 UNL 75.09.0         00  03554 7 12499 S499
7        11.00.0
7        11.01.0                                               DETERMING LOW RECORD
7        11.01.5
1        11.02.0 SET    0000         00  03559 B  0000 0000    INC TO LENGTH OF CONTROL WORD
         11.02.5 LOD 73.04.0         00  03564 8  9310 9310    GET CONTROL WORD
         11.03.0 UNL 75.09.0         00  03569 7 12499 S499    PLACE IN BEGINNING OF RECORD
         11.03.5 TR  10.27.3         00  03574 1  3174 3174    SWITCH #2
         11.03.6 TR  11.51.5         00  03579 1  3804 3804    SW #2A
         11.04.0 CMP 75.16.0         00  03584 4 14999 U999    CHECK IF LOWER THAN LAST RECORD WRITTEN
         11.05.0 TRH 11.52.0         00  03589 K  3809 3809    NO
         11.05.5 TRE 11.52.0         00  03594 L  3809 3809    NO
         11.06.0 NOP 11.23.0         00  03599 A  3674 3674    SWITCH #10
7        11.06.3
7        11.06.5                                               SINGLE STEP-DOWN ROUTINE
         11.07.0 UNL 11.06.0 -004 01  03604 7  3595 35Z5    SWITCH #10 TO TR
         11.08.0 UNL 13.10.0 -004 05  03609 7  4395 4TZ5    SWITCH #12 TO NOP
         11.09.0 ADD 71.04.0         06  03614 G  8975 8ZP5    INC TAPE CHANGE COUNTER
         11.10.0 RCV 75.26.0 &005 00  03619 U 17504 X504    PLACE B INTO D
         11.11.0 TMT 75.09.0 &005 00  03624 9 12504 S504    X
1        11.12.0 SEL    0204         00  03629 2  0204 0204    MASTER FILE
         11.13.0 RWW 75.09.0 &001 00  03634 S 12500 S500    READ NEXT RECORD INTO B
         11.14.0 RD  75.09.0 &001 00  03639 Y 12500 S500
         11.15.0 TRS 13.02.0         00  03644 0  4329 4329    MAJOR EOF
         11.16.0 TMT 72.04.0         09  03649 9  9064 9-W4    PLACE GM AND RM
         11.17.0 ADD 71.04.0         07  03654 G  8975 8ZG5    INC RECORD COUNTER
1        11.18.0 SEL    0902         00  03659 2  0902 0902
         11.19.0 TRS 15.28.0         00  03664 0  4849 4849    0902 RETURN #4
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C LNG      SYMBOLIC        INCR              ACTUAL       S        DATA OR DESCRIPTION
L       LOC   OP   ADDR         ASU  LOC   OP ADDR ADDR N

        11.20.0 TR  10.53.0      00  03669 1   3344 3344    TO HASH TOTAL
7       11.21.0
7       11.22.0                                             DOUBLE STEP-DOWN ROUTINE
        11.23.0 UNL 11.06.0 -004 05  03674 7   3595 3VZ5    SWITCH 10 TO NOP
        11.24.0 UNL 13.10.0 -004 01  03679 7   4395 43Z5    SWITCH 12 TO TR
1       11.25.0 SEL    0201      00  03684 2   0201 0201    OUTPUT TAPE
        11.26.0 WR  75.02.0 &001 00  03689 R 10000  000     WRITE RECORD IN A
        11.27.0 TRS 14.14.0      00  03694 O   4684 4684    OVERFLOW CONDITION
        11.27.2 LOD 75.02.0 &010 13  03699 8 10009  & 9     MIDDLE PASS HASH TOTAL INCREMENT
        11.27.3 ADD 71.60.0      13  03704 G   9022 9&S2
        11.27.4 ADM 73.02.0      13  03709 6   9276 9BX6
1       11.28.0 SEL    0902      00  03714 2   0902 0902
        11.29.0 TRS 15.34.0      00  03719 O   4874 4874    0902 RETURN #5
        11.30.0 SUB 71.08.0      03  03724 P   8983 89H3    SWITCH OUTPUT TAPES
        11.31.0 UNL 10.40.0      03  03729 7   3244 32D4
        11.32.0 UNL 11.25.0      03  03734 7   3684 36H4
        11.37.0 CMP 75.26.0      00  03739 4 17499 X499     CMP B TO D
        11.38.0 TRH 11.45.0      00  03744 K   3774 3774
        11.39.0 RCV 75.16.0 &005 00  03749 U 15004 V004     PLACE B INTO C
        11.40.0 TMT 75.09.0 &005 00  03754 9 12504 S504     X
        11.41.0 RCV 75.02.0 &005 00  03759 U 10004  004     PLACE D INTO A
        11.42.0 TMT 75.26.0 &005 00  03764 9 17504 X504     X
        11.43.0 TR  11.48.5      00  03769 1   3794 3794
        11.45.0 RCV 75.02.0 &005 00  03774 U 10004  004     PLACE B INTO A
        11.46.0 TMT 75.09.0 &005 00  03779 9 12504 S504     X
        11.47.0 RCV 75.16.0 &005 00  03784 U 15004 V004     PLACE D INTO C
        11.48.0 TMT 75.26.0 &005 00  03789 9 17504 X504
        11.48.5 RAD 71.09.0      02  03794 H   8989 89Q9    TO SET ASU INDICATOR TO &
        11.49.0 TR  10.38.0      00  03799 1   3234 3234    TO MAJOR CYCLE
7       11.50.0
7       11.51.0                                             IF B IS HIGHER OR EQUAL TO C
        11.51.5 UNL 11.03.6 -004 05  03804 7   3575 3VX5    SET SW #2A TO NOP
        11.52.0 CMP 75.02.0      00  03809 4   9999 9999    CMP B TO A
        11.53.0 TRH 11.58.0      00  03814 K   3844 3844    X
        11.54.0 TRE 11.58.0      00  03819 L   3844 3844    X
        11.55.0 RCV 75.16.0 &005 00  03824 U 15004 V004     PLACE B INTO C
        11.56.0 TMT 75.09.0 &005 00  03829 9 12504 S504
        11.56.5 UNL 13.27.0 -004 05  03834 7   4535 4VT5    SET TRZ TO NOP. MASTERFILE NOT IN SEQUENCE
        11.57.0 TR  10.38.0      00  03839 1   3234 3234    TO MAJOR CYCLE
        11.58.0 RCV 75.16.0 &005 00  03844 U 15004 V004     PLACE A INTO C
        11.59.0 TMT 75.02.0 &005 00  03849 9 10004  004     X
        11.60.0 RCV 75.02.0 &005 00  03854 U 10004  004     PLACE B INTO A
        11.61.0 TMT 75.09.0 &005 00  03859 9 12504 S504     X
        11.62.0 TR  10.38.0      00  03864 1   3234 3234    TO MAJOR CYCLE
7       12.00.0
7       12.01.0                                             0902 ERROR CORRECTION FOR READING
        12.01.3 UNL 12.02.0      04  03869 7   3889 3Y89    CORRECT INPUT TAPE
        12.01.4 UNL 70.06.0      04  03874 7   8202 8S02    SET UP ERROR MESSAGE #1
        12.01.5 UNL 12.06.7      10  03879 7   3919 3RJ9
        12.01.6 SPR 70.05.0      07  03884 5   8188 8/H8    RECORD NUMBER TO MESSAGE
1       12.02.0 SEL    0204      00  03889 2   0204 0204    MASTER FILE
1       12.03.0 BSP    0004      00  03894 3   0004 0004
        12.04.0 RD  75.09.0 &001 00  03899 Y 12500 S500     READ INTO B
1       12.05.0 SEL    0902      00  03904 2   0902 0902
        12.06.0 TRS 12.07.0      00  03909 O   3924 3924
        12.06.5 RAD 71.09.0      02  03914 H   8989 89Q9    RESET COUNTER
1       12.06.7 TR               00  03919 1                TO BE SET BY PROGRAM
1       12.07.0 SEL    0500      00  03924 2   0500 0500
        12.07.5 WR  70.04.0 &001 00  03929 R   8161 8161    MESSAGE #1
1       12.07.6 SEL    0902      00  03934 2   0902 0902
        12.07.7 SUB 71.57.0      02  03939 P   9018 90J8    DECREASE ERROR CTR
        12.07.8 TRS 12.08.0      00  03944 O   3949 3949    TURN OFF 0902 INDICATOR
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C LNG      SYMBOLIC         INCR           ACTUAL         S        DATA OR DESCRIPTION
L       LOC    OP   ADDR          ASU  LOC   OP ADDR ADDR N

        12.08.0 TRZ 12.13.0        02  03949 N   3959 39N9
        12.09.0 TR  12.02.0        00  03954 1   3889 3889    NEXT TRY
        12.13.0 RAD 71.09.0        02  03959 H   8989 89Q9    RESET COUNTER
        12.15.0 TR  12.52.0        00  03964 1   4079 4079
7       12.30.0
7       12.31.0                                               0902 ERROR CORRECTION FOR WRITING
        12.31.5 UNL 12.39.0        10  03969 7   4024 4-K4
        12.32.0 UNL 12.33.0        03  03974 7   3994 3914    SET CORRECT OUTPUT TAPE
1       12.32.1 SEL     0901       00  03979 2   0901 0901
        12.32.3 TRS 25.02.0        00  03984 0   6889 6889
        12.32.5 UNL 70.10.0        03  03989 7   8235 82C5    SET UP ERROR MESS #2
1       12.33.0 SEL     0201       00  03994 2   0201 0201
1       12.34.0 BSP     0004       00  03999 3   0004 0004
        12.35.0 WR  75.16.0 &001   00  04004 R 15000 V000
1       12.36.0 SEL     0902       00  04009 2   0902 0902
        12.37.0 TRS 12.40.0        00  04014 0   4029 4029
        12.38.0 RAD 71.09.0        02  04019 H   8989 89Q9    RESET COUNTER
1       12.39.0 TR                 00  04024 1                TO BE SET BY PROGRAM
1       12.40.0 SEL     0500       00  04029 2   0500 0500
        12.40.5 WR  70.09.0 &001   00  04034 R   8205 8205    MESSAGE #2
1       12.40.6 SEL     0902       00  04039 2   0902 0902
        12.40.7 SUB 71.57.0        02  04044 P   9018 90J8    DECREASE ERROR COUNTER
        12.40.8 TRS 12.41.0        00  04049 0   4054 4054    TURN OFF 0902 INDICATOR
        12.41.0 TRZ 12.48.0        02  04054 N   4064 4004
        12.42.0 TR  12.33.0        00  04059 1   3994 3994    NEXT TRY
1       12.48.0 HLT     0007       00  04064 J   0007 0007    REPEATED TAPE WRITE ERRORS
        12.48.5 RAD 71.09.0        02  04069 H   8989 89Q9    RESET ERROR COUNTER
        12.49.0 TR  12.33.0        00  04074 1   3994 3994
7       12.50.0
7       12.51.0                                               30 ERRORS DUMP RECORD
        12.52.0 NOP 12.83.0        00  04079 A   4214 4214    SET TO TR WHEN 4 TAPE PAIRS
1       12.52.4 SEL     0914       00  04084 2   0914 0914
        12.53.0 TRS 12.64.0        00  04089 0   4124 4124    PRINTER IS AVAILABLE
1       12.54.0 SEL     0500       00  04094 2   0500 0500
1       12.55.0 SET     0000       00  04099 B   0000 0000
        12.57.0 LOD 75.09.0        00  04104 8 12499 S499     ERROR IN READING
        12.60.0 UNL 73.15.0        00  04109 7   9618 9618
        12.61.0 WR  73.15.0 &001   00  04114 R   9619 9619    CONTROL WORD
        12.63.0 TR  12.70.0        00  04119 1   4139 4139
1       12.64.0 SEL     0400       00  04124 2   0400 0400
        12.66.0 WRE 75.09.0        00  04129 Z 12499 S499     RECORD IN C
1       12.69.0 SEL     0500       00  04134 2   0500 0500
        12.70.0 WR  73.70.0 &001   00  04139 R   9831 9831    MESS #25
        12.74.0 LOD 70.18.0        09  04144 8   8298 8KZ8    SET PREVIOUS RECORD COUNT
        12.75.0 SUB 71.04.0        09  04149 P   8975 8RX5    DECREASE BY 1
        12.76.0 SUB 71.04.0        07  04154 P   8975 8ZG5    DEC PRESENT RECORD COUNT
        12.77.0 UNL 70.18.0        09  04159 7   8298 8KZ8    REPLACE RECORD COUNT
        12.77.5 TR  12.79.0        00  04164 1   4179 4179    HASH TOTAL CHECK SW-- SET TO NOP AFTER FIRST PASS
        12.78.0 UNL 36.07.5 -004   01  04169 7   7975 79X5    TO ELIMINATE HASH TOTAL CHECK
        12.78.5 UNL 23.14.5 -004   01  04174 7   6395 63Z5    ELIMINATE HASH TOTAL CHECK AT END OF PASS
        12.79.0 RAD 71.09.0        02  04179 H   8989 89Q9    RESET ERROR COUNTER
        12.81.0 UNL 12.82.0        12  04184 7   4209 4B09
1       12.81.1 SEL     0901       00  04189 2   0901 0901
        12.81.2 TRS 12.81.3        00  04194 0   4199 4199
1       12.81.3 SEL     0902       00  04199 2   0902 0902
        12.81.4 TRS 12.82.0        00  04204 0   4209 4209
1       12.82.0 TR                 00  04209 1                TO BE SET BY PROGRAM
7       12.82.5                                               RETURN TO PREVIOUS PASS
        12.83.0 TR  12.52.4        00  04214 1   4084 4084    NOP AFTER FIRST PASS
        12.83.3 RAD 71.04.0        01  04219 H   8975 89X5    GET A 1
        12.83.6 RAD 71.03.0        04  04224 H   8974 8Z74    GET A ZERO
        12.84.0 UNL 12.84.6        04  04229 7   4239 4S39
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C LNG      SYMBOLIC         INCR           ACTUAL          S        DATA OR DESCRIPTION
L       LOC   OP   ADDR           ASU  LOC   OP ADDR ADDR N

        12.84.3 RAD 71.13.0        02  04234 H  9005 90-5    SET FOR 3 REPEATS
1       12.84.6 SEL    0200        00  04239 2  0200 0200
1       12.85.0 IOF    0000        00  04244 3  0000 0000
1       12.85.3 RWD    0002        00  04249 3  0002 0002
        12.85.6 ADM 12.84.6        01  04254 6  4239 42T9
        12.86.0 NTR 12.84.6        02  04259 X  4239 42L9
        12.86.3 NOP 12.87.3        00  04264 A  4284 4284
        12.86.6 SGN 12.86.3 -004   03  04269 T  4260 42F0
        12.86.8 LOD  5.32.0        04  04274 8  2234 2S34    GET A 6
        12.87.0 TR  12.84.0        00  04279 1  4229 4229
        12.87.3 ADM 12.86.3 -004   03  04284 6  4260 42F0
        12.87.6 RCV 12.88.0        00  04289 U  4299 4299    GET CHECK POINT TAPE ADDRESS
        12.87.8 TMT 25.12.5        01  04294 9  7039 70T9
1       12.88.0 SEL    0200        00  04299 2  0200 0200    CHECK PT TAPE
1       12.88.3 BSP    0004        00  04304 3  0004 0004
1       12.88.6 BSP    0004        00  04309 3  0004 0004
1       12.88.8 SEL    0500        00  04314 2  0500 0500
        12.90.0 WR  73.84.0 -020   00  04319 R  9928 9928    MESSAGE # 28
        12.90.3 TR  25.11.0        00  04324 1  7019 7019
7       13.00.0
7       13.01.0                                              MAJOR EOF PROCEDURE
1       13.02.0 RWD    0002        00  04329 3  0002 0002    RWD & IOF MASTER FILE
1       13.03.0 IOF    0000        00  04334 3  0000 0000    X
1       13.03.2 SEL    0902        00  04339 2  0902 0902
        13.03.4 TRS 16.12.0        00  04344 0  4999 4999
        13.04.0 UNL 13.05.0        03  04349 7  4354 43E4
1       13.05.0 SEL    0201        00  04354 2  0201 0201    OUTPUT TAPE
        13.06.0 WR  75.02.0 &001   00  04359 R 10000  000    WR RECORD IN A
        13.07.0 TRS 14.14.0        00  04364 0  4684 4684    OVERFLOW CONDITION
1       13.07.1 SET    0010        00  04369 B  0010 0010    MIDDLE PASS HASH TOTAL INCREMENT
        13.07.2 LOD 75.02.0 &010   00  04374 8 10009  009    MIDDLE PASS HASH TOTAL INCREMENT
        13.07.3 ADD 71.60.0        00  04379 G  9022 9022    X
        13.07.4 ADM 73.02.0        00  04384 6  9276 9276    X
1       13.08.0 SEL    0902        00  04389 2  0902 0902
        13.09.0 TRS 15.42.0        00  04394 0  4899 4899    0902 RETURN #6
        13.10.0 TR  13.18.0        00  04399 1  4464 4464    SWITCH #12
        13.11.0 SUB 71.08.0        03  04404 P  8983 89H3    SWITCH OUTPUT TAPES
        13.12.0 UNL 13.14.0        03  04409 7  4419 44A9    X
        13.13.0 RAD 71.09.0        02  04414 H  8989 8909    RESET ERROR COUNTER
1       13.14.0 SEL    0201        00  04419 2  0201 0201
        13.15.0 WR  75.26.0 &001   00  04424 R 17500 X500    WRITE RECORD IND
        13.15.5 TRS 14.14.0        00  04429 0  4684 4684    OVERFLOW CONDITION
        13.15.6 LOD 75.26.0 &010   00  04434 8 17509 X509    MIDDLE PASS HASH TOTAL INCREMENT
        13.15.7 ADD 71.60.0        00  04439 G  9022 9022    X
        13.15.8 ADM 73.02.0        00  04444 6  9276 9276    X
1       13.16.0 SEL    0902        00  04449 2  0902 0902
        13.17.0 TRS 15.50.0        00  04454 0  4924 4924    0902 RETURN #7
        13.17.5 TRA 13.18.0        00  04459 I  4464 4464    TURN OFF ANY INDICATOR
1       13.18.0 SEL    0201        00  04464 2  0201 0201    WTM, IOF, AND RWD OUTPUT TAPES
1       13.19.0 WTM    0001        00  04469 3  0001 0001    X
        13.19.5 TRA 13.35.0        00  04474 I  4574 4574
1       13.20.0 IOF    0000        00  04479 3  0000 0000    X
1       13.21.0 RWD    0002        00  04484 3  0002 0002    X
1       13.22.0 SEL    0203        00  04489 2  0203 0203    X
1       13.23.0 IOF    0000        00  04494 3  0000 0000    X
1       13.24.0 WTM    0001        00  04499 3  0001 0001    X
        13.24.5 TRA 13.37.0        00  04504 I  4589 4589
1       13.25.0 RWD    0002        00  04509 3  0002 0002    X
        13.25.1 UNL 12.77.5 -004   05  04514 7  4160 4/W0    HASH TOTAL CHECK SW TO NOP
1       13.25.2 SEL    0902        00  04519 2  0902 0902    TURN OFF 0902
        13.25.3 TRS 13.26.0        00  04524 0  4534 4534    X
        13.25.4 UNL 12.83.0 -004   05  04529 7  4210 4S/0    PREVIOUS PASS CHECK SW TO NOP
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C LNG      SYMBOLIC         INCR            ACTUAL         S        DATA OR DESCRIPTION
L       LOC    OP   ADDR           ASU   LOC   OP ADDR ADDR N

        13.26.0 ADD 71.03.0         06  04534 G  8974 8ZP4    TEST TAPE SWITCH COUNTER
        13.27.0 TRZ 14.24.0         06  04539 N  4734 4XL4    MASTER FILE IN SEQUENCE
        13.28.0 TR  23.38.0         00  04544 1  6579 6579    TO END OF PASS MESSAGE
        13.31.0 NOP 18.03.0         00  04549 A  5014 5014    TR IF MASTER IS ON 0204 AND AFTER FIRST PASS
        13.32.0 WR  70.25.0         00  04554 R  8374 8374    WRITE MESSAGE #6
1       13.33.0 HLT     0008        00  04559 J  0008 0008    TO REMOVE MASTER FILE IF ON 0200
        13.33.5 UNL 13.31.0 -004 01     04564 7  4545 45U5    TURN OFF REMOVE MASTER FILE STOP SW
        13.34.0 TR  18.03.0         00  04569 1  5014 5014    TO NEXT PASS
1       13.35.0 BSP     0004        00  04574 3  0004 0004
        13.35.1 TRS 13.39.0         00  04579 0  4604 4604
        13.36.0 TR  13.19.0         00  04584 1  4469 4469
1       13.37.0 BSP     0004        00  04589 3  0004 0004
        13.37.1 TRS 13.40.0         00  04594 0  4624 4624
        13.38.0 TR  13.24.0         00  04599 1  4499 4499
1       13.39.0 SEL     0902        00  04604 2  0902 0902
        13.39.1 TRS 13.18.0         00  04609 0  4464 4464
1       13.39.2 SEL     0201        00  04614 2  0201 0201
        13.39.4 TR  13.21.0         00  04619 1  4484 4484
1       13.40.0 SEL     0902        00  04624 2  0902 0902
        13.40.1 TRS 13.22.0         00  04629 0  4489 4489
1       13.40.2 SEL     0203        00  04634 2  0203 0203
        13.40.4 TR  13.25.0         00  04639 1  4509 4509
7       14.00.0
7       14.01.0                                               NO RECORDS ON MASTER
1       14.02.0 SEL     0500        00  04644 2  0500 0500
        14.03.0 WR  70.69.0 &001 00     04649 R  8676 8676    MESSAGE #14
1       14.04.0 HLT     0009        00  04654 J  0009 0009    MASTER FILE HAS NO RECORDS
        14.05.0 TR  10.03.0         00  04659 1  3039 3039
7       14.06.0
7       14.07.0                                               ONE RECORD ON MASTER
1       14.08.0 SEL     0500        00  04664 2  0500 0500
        14.09.0 WR  70.13.0 &001 00     04669 R  8238 8238    MESSAGE #3
1       14.10.0 HLT     0010        00  04674 J  0010 0010    MASTER FILE HAS ONLY ONE RECORD
        14.11.0 TR   8.02.0         00  04679 1  2874 2874
7       14.12.0
7       14.13.0                                               OVERFLOW ON OUTPUT TAPE
        14.14.0 UNL 70.30.0         03  04684 7  8425 84B5
1       14.14.6 RWD     0002        00  04689 3  0002 0002
1       14.15.0 SEL     0500        00  04694 2  0500 0500
        14.16.0 WR  70.29.0         00  04699 R  8402 8402    MESSAGE #7
1       14.17.0 HLT     0011        00  04704 J  0011 0011    EOF ON OUTPUT TAPE
        14.18.0 UNL 11.03.5 -004 01     04709 7  3570 35X0    SW 2 TO TR
        14.19.0 UNL 11.03.6 -004 01     04714 7  3575 35X5    SW 2A TO TR
        14.19.5 UNL 11.23.0 -004 05     04719 7  3670 3WX0    SW 10 TO NOP
        14.20.0 UNL 13.10.0 -004 01     04724 7  4395 43Z5    SW 12 TO TR
        14.21.0 TR   8.02.0         00  04729 1  2874 2874    INTO SETUP PROCEDDURE
7       14.22.0
7       14.23.0                                               MASTER FILE IN CORRECT SEQUENCE
1       14.24.0 SEL     0500        00  04734 2  0500 0500
        14.25.0 WR  70.73.0 &001 00     04739 R  8703 8703    MESSAGE #15
1       14.26.0 HLT     0012        00  04744 J  0012 0012    ORIGINAL MASTER FILE IN CORRECT SEQUENCE
        14.27.0 TR  28.04.0         00  04749 1  7314 7314    TO OPTIONAL DUPLICATE CHECKING IN FINAL PASS
7       15.00.0
7       15.01.0                                               0902 ERROR RETURN SET UP
7       15.02.0                                               #1-RD
        15.03.0 LOD 15.06.0         10  04754 8  4769 4P09
        15.04.0 LOD 15.07.0         12  04759 8  4774 4G74
        15.05.0 TR  12.01.5         00  04764 1  3879 3879
        15.06.0 NOP 10.53.0         00  04769 A  3344 3344
        15.07.0 NOP 10.19.0         00  04774 A  3129 3129
7       15.08.0                                               #2-RD
        15.09.0 LOD 15.12.0         10  04779 8  4794 4PR4
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C LNG       SYMBOLIC         INCR             ACTUAL        S        DATA OR DESCRIPTION
L        LOC    OP   ADDR          ASU   LOC   OP ADDR ADDR N

         15.10.0 LOD 15.13.0        12  04784 8   4799 4G99
         15.11.0 TR  12.01.5        00  04789 1   3879 3879
         15.12.0 NOP 10.36.0        00  04794 A   3224 3224
         15.13.0 NOP 10.28.0        00  04799 A   3184 3184
7        15.14.0                                                 #3-RD
         15.15.0 LOD 15.18.0        10  04804 8   4819 4QJ9
         15.16.0 LOD 15.19.0        12  04809 8   4824 4H24
         15.17.0 TR  12.01.5        00  04814 1   3879 3879
         15.18.0 NOP 15.21.0        00  04819 A   4829 4829
         15.19.0 NOP 16.03.0        00  04824 A   4949 4949
7        15.20.0                                                 #3-WR
         15.21.0 LOD 15.25.0        10  04829 8   4844 4QM4
         15.23.0 RAD 71.09.0        02  04834 H   8989 89Q9
         15.24.0 TR  12.31.5        00  04839 1   3969 3969
         15.25.0 NOP 10.53.0        00  04844 A   3344 3344
7        15.27.0                                                 #4-RD
         15.28.0 LOD 15.31.0        10  04849 8   4864 4Q04
         15.29.0 LOD 15.32.0        12  04854 8   4869 4H69
         15.30.0 TR  12.01.5        00  04859 1   3879 3879
         15.31.0 NOP 10.53.0        00  04864 A   3344 3344
         15.32.0 NOP 11.12.0        00  04869 A   3629 3629
7        15.33.0                                                 #5-W
         15.34.0 RCV 75.16.0 &005 00  04874 U 15004 V004         PLACE A INTO C
         15.35.0 TMT 75.02.0 &005 00  04879 9 10004  004
         15.36.0 LOD 15.39.0        10  04884 8   4894 4QR4
         15.38.0 TR  12.31.5        00  04889 1   3969 3969
         15.39.0 NOP 11.30.0        00  04894 A   3724 3724
7        15.41.0                                                 #6-WR
         15.42.0 RCV 75.16.0 &005 00  04899 U 15004 V004         PLACE A INTO C
         15.43.0 TMT 75.02.0 &005 00  04904 9 10004  004
         15.44.0 LOD 15.47.0        10  04909 8   4919 4RJ9
         15.46.0 TR  12.31.5        00  04914 1   3969 3969
         15.47.0 NOP 13.10.0        00  04919 A   4399 4399
7        15.49.0                                                 #7-WR
         15.50.0 RCV 75.16.0 &005 00  04924 U 15004 V004         PLACE D INTO C
         15.51.0 TMT 75.26.0 &005 00  04929 9 17504 X504
         15.52.0 LOD 15.55.0        10  04934 8   4944 4RM4
         15.54.0 TR  12.31.5        00  04939 1   3969 3969
         15.55.0 NOP 13.17.5        00  04944 A   4459 4459
7        16.00.0
7        16.01.0                                                 ERROR ROUTINE
7        16.02.0                                                 RD ERROR #3-30 ERRORS
         16.03.0 UNL 16.04.0        04  04949 7   4954 4Z54
1        16.04.0 SEL    0200        00  04954 2   0200 0200      INPUT TAPE
         16.05.0 RWW 75.09.0 &001 00  04959 S 12500 S500
         16.06.0 RD  75.09.0 &001 00  04964 Y 12500 S500
         16.06.5 TRS 13.02.0        00  04969 0   4329 4329
         16.07.0 TMT 72.04.0        09  04974 9   9064 9-W4
         16.08.0 ADD 71.04.0        07  04979 G   8975 8ZG5
1        16.09.0 SEL    0902        00  04984 2   0902 0902
         16.10.0 TRS 12.01.5        00  04989 0   3879 3879
         16.11.0 TR  15.21.0        00  04994 1   4829 4829
         16.12.0 LOD 16.13.5        10  04999 8   5009 5--9
         16.13.0 TR  12.31.5        00  05004 1   3969 3969
         16.13.5 NOP 13.04.0        00  05009 A   4349 4349
7        16.15.0
7        16.16.0                                                 WR ERROR #3 - 30 ERRORS
7        18.00.0
7        18.01.0                                                 SET UP FOR 2ND AND SUBSEQUENT PASSES
7        18.02.0                                                 EXCHANGE TAPE CHANGING CONSTANTS
1        18.03.0 SEL    0913        00  05014 2   0913 0913      ARE THERE 4 TAPE PAIRS
         18.03.1 TRS 18.50.0        00  05019 0   5259 5259      YES
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C LNG      SYMBOLIC          INCR          ACTUAL         S        DATA OR DESCRIPTION                                    SORT51
L       LOC    OP    ADDR          ASU  LOC   OP ADDR ADDR N

1       18.03.2 SET      0002        01   05024 B   0002 00 2
        18.03.3 LOD 71.08.0          01   05029 8   8983 89Y3
        18.03.6 RCV 71.08.0 -001 00   05034 U   8982 8982
        18.03.8 TMT 71.07.0 -001 01   05039 9   8980 89Y0
        18.04.0 UNL 71.07.0          01   05044 7   8981 89Y1
        18.05.0 LOD 71.10.0          01   05049 8   8991 89Z1     EXCHANGE INTITIAL TAPE ADDRESS
        18.06.0 RCV 71.10.0 -001 00   05054 U   8990 8990
        18.07.0 TMT 71.11.0 -001 01   05059 9   8992 89Z2
        18.08.0 UNL 71.11.0          01   05064 7   8993 89Z3
7       18.09.0
        18.10.0 LOD 71.08.2          01   05069 8   8985 89Y5
        18.11.0 RCV 71.08.2 -001 00   05074 U   8984 8984
        18.12.0 TMT 71.08.4 -001 01   05079 9   8986 89Y6
        18.13.0 UNL 71.08.4          01   05084 7   8987 89Y7
7       18.13.5
        18.14.0 LOD 71.11.2          01   05089 8   8995 89Z5
        18.15.0 RCV 71.11.2 -001 00   05094 U   8994 8994
        18.16.0 TMT 71.11.4 -001 01   05099 9   8996 89Z6
        18.17.0 UNL 71.11.4          01   05104 7   8997 89Z7
        18.17.2 SGN 12.52.0 -004 01   05109 T   4075 40X5     TO PREVENT ROLLBACK ON UNREADABLE TAPE
        18.17.4 ADM 12.52.0 -004 01   05114 6   4075 40X5     X
7       18.19.0                                               CHANGE PROGRAM INSTRUCTIONS
        18.20.0 RAD 71.11.0          03   05119 H   8993 89I3     NEW INITIAL OUTPUT ADDRESS
        18.21.0 UNL 20.35.0          03   05124 7   5839 58C9     OUTPUT INSTRUCTIONS
        18.22.0 UNL 21.17.0          03   05129 7   6089 60H9     X
        18.22.3 UNL 20.04.0          03   05134 7   5634 56C4     X
        18.22.4 UNL 23.36.1          03   05139 7   6554 65E4     X
        18.23.6 SUB 71.08.0          03   05144 P   8983 89H3     CHANGE OUTPUT ADDRESS
        18.24.0 UNL 20.07.0          03   05149 7   5649 56D9     X
        18.24.5 UNL 23.36.3          03   05154 7   6564 65F4     X
        18.25.0 RAD 71.10.0          04   05159 H   8991 8Z91     NEW INITIAL INPUT ADDRESS
        18.27.0 UNL 20.23.0          04   05164 7   5759 5X59     INPUT INSTRUCTIONS
        18.27.5 UNL 20.10.0          04   05169 7   5664 5W64     X
        18.28.0 UNL 20.33.0          04   05174 7   5829 5Y29     X
        18.29.0 UNL 20.38.0          04   05179 7   5899 5Y99     X
        18.30.0 UNL 21.12.0          04   05184 7   6049 6 49     X
        18.31.0 SUB 71.07.0          04   05189 P   8981 8Z81     CHANGE INPUT ADDRESS
        18.32.0 UNL 20.16.0          04   05194 7   5694 5W94     FIRST RECORD INPUT
        18.33.0 UNL 12.02.0          04   05199 7   3889 3Y89     INTO 902 ERROR ROUTINE
        18.33.1 UNL 70.06.0          04   05204 7   8202 8S02     TO 0902 MESSAGE
        18.33.2 UNL 20.13.0          04   05209 7   5679 5W79     FOR INITIAL RWD
        18.34.0 ADD 71.07.0          04   05214 G   8981 8Z81     RESET INPUT TAPE ADDR
        18.35.0 UNL 23.14.5 -004 05   05219 7   6395 6TZ5     HASH TOTAL CMP SWITCH TO NOP
1       18.36.0 SEL      0901        00   05224 2   0901 0901
        18.37.0 TRS 25.02.0          00   05229 0   6889 6889
1       18.38.0 SEL      0904        00   05234 2   0904 0904
        18.39.0 TRS 25.04.0          00   05239 0   6899 6899
1       18.40.0 SEL      0905        00   05244 2   0905 0905
        18.41.0 TRS 25.06.0          00   05249 0   6909 6909
        18.42.0 TR  19.01.5          00   05254 1   5319 5319
7       18.49.5                                               ROTATE 4 TAPE PAIRS
1       18.50.0 SET      0006        01   05259 B   0006 00 6
1       18.51.0 SET      0002        02   05264 B   0002 00-2
        18.52.0 LOD 71.08.4          01   05269 8   8987 89Y7
        18.53.0 LOD 71.07.0          02   05274 8   8981 89Q1
        18.54.0 UNL 71.08.2          01   05279 7   8985 89Y5
        18.55.0 UNL 71.08.4          02   05284 7   8987 89Q7
7       18.56.0
        18.57.0 LOD 71.11.4          01   05289 8   8997 89Z7
        18.58.0 LOD 71.10.0          02   05294 8   8991 89R1
        18.59.0 UNL 71.11.2          01   05299 7   8995 89Z5
        18.60.0 UNL 71.11.4          02   05304 7   8997 89R7
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C LNG      SYMBOLIC         INCR            ACTUAL        S        DATA OR DESCRIPTION                                SORT51
L       LOC   OP   ADDR           ASU  LOC   OP ADDR ADDR N

        18.60.4 SGN 12.52.0 -004 01  05309 T  4075 40X5     FOR UNREADABLE RECORD RESTART
        18.61.0 TR  18.20.0      00  05314 1  5119 5119
7       19.00.0
7       19.01.0                                             CHECK POINT
        19.01.5 NOP 19.22.0      00  05319 A  5474 5474     TR IF CHECK PTS ARE NOT WANTED
        19.01.6 RAD 71.15.0      02  05324 H  9009 90-9     FOR WRITE ERROR COUNTING
        19.01.8 UNL 25.16.2 -004 05  05329 7  7090 7 Z0     SET SW Z TO NOP
1       19.02.0 SEL     0205     00  05334 2  0205 0205
1       19.02.5 WR      0000     01  05339 R  0000 00 0
1       19.03.0 WR      0000     01  05344 R  0000 00 0
        19.03.2 TRS 19.09.0      00  05349 0  5424 5424     END OF CHECK TAPE
1       19.03.5 SEL     0901     00  05354 2  0901 0901
        19.04.0 TRS 19.12.0      00  05359 0  5454 5454     TO PREVIOUS CHECK POINT
1       19.04.5 SEL     0902     00  05364 2  0902 0902
        19.05.0 TRS 19.05.7      00  05369 0  5379 5379
        19.05.5 TR  19.22.0      00  05374 1  5474 5474
        19.05.7 NTR 19.06.0      02  05379 X  5394 53R4
1       19.05.8 HLT     0017     00  05384 J  0017 0017     REPEATED WRITE ERROR CHECK POINT
        19.05.9 RAD 71.15.0      02  05389 H  9009 90-9
1       19.06.0 SEL     0500     00  05394 2  0500 0500
        19.06.5 WR  70.77.0 &001 00  05399 R  8773 8773
1       19.07.0 SEL     0205     00  05404 2  0205 0205
1       19.07.5 BSP     0004     00  05409 3  0004 0004
1       19.08.0 BSP     0004     00  05414 3  0004 0004
        19.08.5 TR  19.02.5      00  05419 1  5339 5339
1       19.09.0 SEL     0901     00  05424 2  0901 0901
        19.09.5 TRS 19.12.0      00  05429 0  5454 5454     TO PREVIOUS CHECK POINT
1       19.10.0 SEL     0205     00  05434 2  0205 0205
1       19.10.5 IOF     0000     00  05439 3  0000 0000
1       19.11.0 RWD     0002     00  05444 3  0002 0002
        19.11.5 TR  19.02.5      00  05449 1  5339 5339
1       19.12.0 SEL     0205     00  05454 2  0205 0205
1       19.12.5 BSP     0004     00  05459 3  0004 0004
1       19.13.0 BSP     0004     00  05464 3  0004 0004
        19.13.5 TR  25.02.0      00  05469 1  6889 6889
7       19.20.0
7       19.21.0                                             GENERAL SET UP
1       19.22.0 SET     0000     01  05474 B  0000 00 0
1       19.23.0 SET     0256     01  05479 B  0256 02V6
1       19.24.0 LNG     0256     00  05484 D  0256 0256
1       19.24.1 SEL     0901     00  05489 2  0901 0901     TURN OFF 0901 INDICATOR
        19.24.2 TRS 19.24.5      00  05494 0  5499 5499
1       19.24.5 SET     0011     00  05499 B  0011 0011     RESET HASH TOTAL WORK SPACE
        19.24.6 UNL 73.03.0      00  05504 7  9287 9287
        19.24.7 UNL 73.03.5      00  05509 7  9298 9298
1       19.24.8 SET     0000     00  05514 B  0000 0000     SET ACC TO L PLACES
        19.25.0 RAD 71.04.0      01  05519 H  8975 89X5     ASU 01-A 1 FOR SWITCH SETTING
        19.26.0 RAD 71.09.0      02  05524 H  8989 89Q9     ASU 02-A 10 FOR ERROR COUNTING
        19.27.0 RAD 71.11.0      03  05529 H  8993 89I3     FOR CHANGING OUTPUT ADDRESS
        19.28.0 RAD 71.10.0      04  05534 H  8991 8Z91     FOR INPUT ADDRESS CHANGING
1       19.29.0 SET     0001     05  05539 B  0001 0  1     ASU 05- AN A FOR SWITCH SETTING
        19.30.0 LOD 72.07.0      05  05544 8  9070 9 X0
        19.31.0 RAD 71.65.0      06  05549 H  9042 9 M2     ASU 06-OUTPUT TAPE CHANGE COUNTER
        19.31.1 RAD 71.65.5      06  05554 H  9048 9 M8     ASU 06 - OUTPUT TAPE CHANGE COUNTER
        19.32.0 RAD 71.65.5      07  05559 H  9048 9 D8     ASU 07 -- RECORD COUNTER
1       19.34.0 SET     0006     09  05564 B  0006 0- 6     ASU 09-TMT GROUP AND RECORD MARK
1       19.35.0 SET     0004     10  05569 B  0004 0--4     ASU 10-0902 ERROR ROUTINE
1       19.36.0 SET     0002     11  05574 B  0002 0-&2     ASU 11  - PASS COUNTER
        19.37.0 LOD 70.17.0 &015 11  05579 8  8285 8KH5
1       19.38.0 SET     0004     12  05584 B  0004 0&04     ASU 12-0902 ERROR ROUTINE
1       19.38.1 SET     0010     13  05589 B  0010 0&/0     SET FOR HASH TOTAL COMPUTATION
        19.39.0 RAD 71.65.5      14  05594 H  9048 9&M8     ASU 14 - LAST PASS OUTPUT RECORD COUNTER
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C LNG      SYMBOLIC        INCR            ACTUAL         S       DATA OR DESCRIPTION                              SORT51
L       LOC     OP   ADDR          ASU  LOC   OP ADDR ADDR N

      19.49.0 TRA 19.52.0          00  05599 I   5604 5604     TURN OFF ANY INDICATOR
7     19.50.0
7     19.51.0                                                  RESETTING SWITCHES
      19.52.0 UNL 21.07.0 -004 05  05604 7   6005 6  5     SWITCH #20 TO NOP
      19.53.0 UNL 22.16.0 -004 05  05609 7   6250 6SV0     SWITCH #21 TO NOP
      19.54.0 UNL 21.11.5 -004 01  05614 7   6040 60U0     SET SW #22 TO TR
      19.55.0 UNL 23.02.0 -004 05  05619 7   6310 6T/0     SWITCH #24 TO NOP
      19.56.0 UNL 23.26.0 -004 01  05624 7   6470 64X0     SWITCH #25 TO TR
      19.57.0 UNL 22.17.0 -004 05  05629 7   6255 6SV5     SET SW #21A TO NOP
7     20.00.0
7     20.01.0                                                  2ND AND SUB SEQUENT PASSES
7     20.02.0
7     20.03.0                                                  RWD AND IOF ALL TAPES
1     20.04.0 SEL     0200         00  05634 2   0200 0200
1     20.05.0 RWD     0002         00  05639 3   0002 0002
1     20.06.0 IOF     0000         00  05644 3   0000 0000
1     20.07.0 SEL     0201         00  05649 2   0201 0201
1     20.08.0 RWD     0002         00  05654 3   0002 0002
1     20.09.0 IOF     0000         00  05659 3   0000 0000
1     20.10.0 SEL     0202         00  05664 2   0202 0202
1     20.11.0 RWD     0002         00  05669 3   0002 0002
1     20.12.0 IOF     0000         00  05674 3   0000 0000
1     20.13.0 SEL     0203         00  05679 2   0203 0203
1     20.14.0 RWD     0002         00  05684 3   0002 0002
1     20.15.0 IOF     0000         00  05689 3   0000 0000
1     20.16.0 SEL     0203         00  05694 2   0203 0203     FIRST RECORD FROM 0202 OR 0203
      20.17.0 RWW 75.09.0 &001 00  05699 S 12500 S500     INTO SECTION B
      20.18.0 RD  75.09.0 &001 00  05704 Y 12500 S500     X
      20.18.5 TRS 20.50.0          00  05709 0   5929 5929     SECOND TAPE HAS NO RECORDS
      20.19.0 TMT 72.04.0          09  05714 9   9064 9-W4     GM AND RMS
      20.20.0 ADD 71.04.0          07  05719 G   8975 8ZG5     INC RECORD COUNTER
1     20.21.0 SEL     0902         00  05724 2   0902 0902
      20.22.0 TRS 24.03.0          00  05729 0   6724 6724     0902 RETURN # 11
      20.22.1 LOD 75.09.0 &010 13  05734 8 12509 SE 9
      20.22.2 ADD 71.05.0          13  05739 G   8976 8IX6
      20.22.3 ADM 73.03.5          13  05744 6   9298 9BZ8     HASH TOTAL INCREASE
      20.22.5 RCV 75.02.0 &005 00  05749 U 10004  004     PLACE FIRST RECORD INTO A
      20.22.7 TMT 75.09.0 &005 00  05754 9 12504 S504     X
1     20.23.0 SEL     0201         00  05759 2   0201 0201     ALTERNATE INPUT
      20.24.0 RWW 75.09.0 &001 00  05764 S 12500 S500     SECOND RECORD INTO B
      20.25.0 RD  75.09.0 &001 00  05769 Y 12500 S500     X
      20.26.0 TMT 72.04.0          09  05774 9   9064 9-W4     GM AND RMS
      20.27.0 ADD 71.04.0          07  05779 G   8975 8ZG5     INC RECORD COUNTER
1     20.27.5 SEL     0901         00  05784 2   0901 0901
      20.27.7 TRS 25.02.0          00  05789 0   6889 6889     TO RESTART PROCEDURE
1     20.28.0 SEL     0902         00  05794 2   0902 0902
      20.29.0 TRS 24.09.0          00  05799 0   6749 6749     0902 RETURN #12
      20.29.1 LOD 75.09.0 &010 13  05804 8 12509 SE 9     LOD 10 CHARACTERS FOR MIDDLE PASS HASH TOTAL
      20.29.2 ADD 71.05.0          13  05809 G   8976 8IX6
      20.29.3 ADM 73.03.5          13  05814 6   9298 9BZ8     INCREASE HASH TOTAL
      20.30.0 TR  22.01.5          00  05819 1   6199 6199
7     20.31.0
7     20.32.0                                                  MAJOR CYCLE
      20.32.5 NOP 31.02.5          00  05824 A   7374 7374     SW X1, SET TO TR ON LAST PASS
1     20.33.0 SEL     0201         00  05829 2   0201 0201     INPUT TAPE
      20.34.0 RWW 75.09.0 &001 00  05834 S 12500 S500
1     20.35.0 SEL     0200         00  05839 2   0200 0200     OUTPUT TAPE
      20.36.0 WR  75.16.0 &001 00  05844 R 15000 V000
      20.36.2 TMT 72.04.0          09  05849 9   9064 9-W4     GM AND RMS
      20.36.3 TRA 20.37.0          00  05854 I   5864 5864
      20.36.4 TR  20.40.0          00  05859 1   5909 5909
      20.37.0 TRS 26.02.0          00  05864 0   7219 7219     OVERFLOW CONDITION
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C LNG      SYMBOLIC          INCR          ACTUAL          S      DATA OR DESCRIPTION
L      LOC   OP   ADDR          ASU  LOC   OP ADDR ADDR N

1     20.37.1 SEL     0901       00  05869 2  0901 0901
      20.37.2 TRS 25.02.0        00  05874 O  6889 6889     TO RESTART PROCEDURE
1     20.37.3 SEL     0904       00  05879 2  0904 0904
      20.37.4 TRS 25.04.0        00  05884 O  6899 6899
1     20.37.5 SEL     0905       00  05889 2  0905 0905
      20.37.6 TRS 25.06.0        00  05894 O  6909 6909
1     20.38.0 SEL     0201       00  05899 2  0201 0201     INPUT TAPE
      20.39.0 TRS 23.01.5        00  05904 O  6294 6294
      20.40.0 ADD 71.04.0        07  05909 G  8975 8ZG5     INCREASE RECORD COUNT
1     20.42.0 SEL     0902       00  05914 2  0902 0902
      20.43.0 TRS 24.15.0        00  05919 O  6774 6774     0902 RETURN #13
      20.44.0 TR  21.00.3        00  05924 1  5969 5969
1     20.50.0 IOF     0000       00  05929 3  0000 0000
1     20.51.0 RWD     0002       00  05934 3  0002 0002
      20.52.0 UNL 20.16.0        04  05939 7  5694 5W94     1ST TAPE ADDRESS
      20.53.0 UNL 12.02.0        04  05944 7  3889 3Y89     1ST TAPE ADDRESS
      20.53.1 UNL 70.06.0        04  05949 7  8202 8S02     TO 0902 MESSAGE
      20.54.0 UNL 23.02.0 -004   01  05954 7  6310 63/0     SW #24 TO TR
      20.55.0 UNL 22.16.0 -004   01  05959 7  6250 62V0     SW #21 TO TR
      20.56.0 TR  20.16.0        00  05964 1  5694 5694
7     21.00.0
7     21.00.1                                               HASH TOTAL #3
      21.00.3 LOD 75.09.0 &010   13  05969 8 12509 SE 9     GET FIRST 10 CHARACTERS
      21.00.4 ADD 71.05.0        13  05974 G  8976 8IX6     DEZONE
      21.00.5 ADM 73.03.5        13  05979 6  9298 9BZ8     INC HASH TOTAL
7     21.00.9
      21.03.0 LOD 75.09.0        00  05984 8 12499 S499     GET CONTROL WORD
      21.03.5 NOP 22.02.0        00  05989 A  6204 6204     SW X2 -- SET TO TR ON LAST PASS
      21.04.0 CMP 75.16.0        00  05994 4 14999 U999     WITH C
      21.05.0 TRH 22.02.0        00  05999 K  6204 6204
      21.06.0 TRE 22.02.0        00  06004 L  6204 6204
      21.07.0 NOP 21.16.0        00  06009 A  6074 6074     SWITCH # 20
7     21.07.3
7     21.07.5                                               SINGLE STEP-DOWN ROUTINE
      21.08.0 UNL 21.07.0 -004   01  06014 7  6005 60 5     SWITCH # 20 TO TR
      21.08.5 UNL 23.26.0 -004   05  06019 7  6470 6UX0     SWITCH # 25 TO NOP
      21.08.6 UNL 22.17.0 -004   01  06024 7  6255 62V5     SET SW #21A TO TR
      21.09.0 RCV 75.26.0 &005   00  06029 U 17504 X504     PLACE B INTO D
      21.10.0 TMT 75.09.0 &005   00  06034 9 12504 S504     X
      21.11.0 ADD 71.04.0        06  06039 G  8975 8ZP5     INC TAPE CHANGE COUNTER
      21.11.5 TR  23.05.0        00  06044 1  6334 6334     SW 22 SET TO NOP ON FIRST EOF
1     21.12.0 SEL     0201       00  06049 2  0201 0201     INPUT TAPE
      21.13.0 RWW 75.09.0 &001   00  06054 S 12500 S500     NEXT RECORD INTO B
      21.14.0 RD  75.09.0 &001   00  06059 Y 12500 S500     X
      21.14.5 TRS 23.01.5        00  06064 O  6294 6294
      21.15.0 TR  20.36.2        00  06069 1  5849 5849     TO MAJOR CYCLE
7     21.15.3
7     21.15.5                                               DOUBLE STEP DOWN ROUTINE
      21.16.0 UNL 21.07.0 -004   05  06074 7  6005 6  5     SWITCH # 20 TO NOP
      21.16.5 UNL 23.26.0 -004   01  06079 7  6470 64X0     SWITCH # 25 TO TR
      21.16.6 UNL 22.17.0 -004   05  06084 7  6255 6SV5     SET SW#21A TO NOP
1     21.17.0 SEL     0200       00  06089 2  0200 0200     OUTPUT TAPE
      21.18.0 WR  75.02.0 &001   00  06094 R 10000  000     A
      21.19.0 TRS 26.02.0        00  06099 O  7219 7219     OVERFLOW CONDITION
1     21.20.0 SEL     0902       00  06104 2  0902 0902
      21.21.0 TRS 24.27.0        00  06109 O  6814 6814     0902 RETURN #14
      21.25.0 SUB 71.08.0        03  06114 P  8983 89H3     CHANGE OUTPUT TAPES
      21.26.0 UNL 20.35.0        03  06119 7  5839 58C9     X
      21.27.0 UNL 21.17.0        03  06124 7  6089 60H9     X
      21.29.0 RAD 71.09.0        02  06129 H  8989 89Q9     TURN ON ASU PLUS INDICATOR
      21.30.0 CMP 75.26.0        00  06134 4 17499 X499     WITH D
      21.31.0 TRH 21.38.0        00  06139 K  6174 6174
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C LNG      SYMBOLIC          INCR               ACTUAL         S        DATA OR DESCRIPTION
L      LOC   OP   ADDR             ASU   LOC   OP ADDR ADDR N

       21.32.0 TRE 21.38.0         00   06144 L  6174 6174
       21.33.0 RCV 75.16.0 &005 00   06149 U 15004 V004     PLACE B INTO C
       21.34.0 TMT 75.09.0 &005 00   06154 9 12504 S504     X
       21.35.0 RCV 75.02.0 &005 00   06159 U 10004  004     PLACE D INTO A
       21.36.0 TMT 75.26.0 &005 00   06164 9 17504 X504
       21.37.0 TR  20.33.0         00   06169 1  5829 5829     TO MAJOR CYCLE
       21.38.0 RCV 75.16.0 &005 00   06174 U 15004 V004     PLACE D INTO C
       21.39.0 TMT 75.26.0 &005 00   06179 9 17504 X504     X
       21.40.0 RCV 75.02.0 &005 00   06184 U 10004  004     PLACE B INTO A
       21.41.0 TMT 75.09.0 &005 00   06189 9 12504 S504     X
       21.42.0 TR  22.16.0         00   06194 1  6254 6254     TO CHANGE INPUT TAPES
7      22.00.0
7      22.01.0                                                TO STEP DOWN
       22.01.5 LOD 75.09.0         00   06199 8 12499 S499     GET CTRL WORD
       22.02.0 CMP 75.02.0         00   06204 4  9999 9999     INC BY C.W. LENGTH
       22.03.0 TRH 22.12.0         00   06209 K  6234 6234
       22.04.0 TRE 22.12.0         00   06214 L  6234 6234
7      22.05.0
       22.07.0 RCV 75.16.0 &005 00   06219 U 15004 V004     PLACE B INTO C
       22.08.0 TMT 75.09.0 &005 00   06224 9 12504 S504     X
       22.09.0 TR  20.32.5         00   06229 1  5824 5824
7      22.10.0
       22.12.0 RCV 75.16.0 &005 00   06234 U 15004 V004     PLACE A INTO C
       22.13.0 TMT 75.02.0 &005 00   06239 9 10004  004     X
       22.14.0 RCV 75.02.0 &005 00   06244 U 10004  004     PLACE B INTO A
       22.15.0 TMT 75.09.0 &005 00   06249 9 12504 S504     X
       22.16.0 NOP 20.32.5         00   06254 A  5824 5824     SW#21---TR AFTER ONE EOF
       22.17.0 NOP 20.33.0         00   06259 A  5829 5829     SW #21A SET TO TR ON SINGLE STEP DOWN
       22.20.0 SUB 71.07.0         04   06264 P  8981 8Z81     CHANGE INPUT TAPES
       22.21.0 UNL 20.33.0         04   06269 7  5829 5Y29
       22.22.0 UNL 20.38.0         04   06274 7  5899 5Y99
       22.23.0 UNL 21.12.0         04   06279 7  6049 6 49
       22.24.0 RAD 71.09.0         02   06284 H  8989 89Q9     ACTIVATE ASU PLUS INDICATOR
       22.25.0 TR  20.32.5         00   06289 1  5824 5824
7      23.00.0
7      23.01.0                                                FIRST INPUT EOF
1      23.01.5 RWD    0002         00   06294 3  0002 0002
1      23.01.6 IOF    0000         00   06299 3  0000 0000
1      23.01.7 SEL    0902         00   06304 2  0902 0902
       23.01.8 TRS 26.30.0         00   06309 0  7299 7299
       23.02.0 NOP 23.12.0         00   06314 A  6364 6364     SWITCH # 24
       23.03.0 UNL 23.02.0 -004 01   06319 7  6310 63/0     SWITCH # 24 TO TR
       23.04.0 UNL 22.16.0 -004 01   06324 7  6250 62V0     SWITCH # 21 TO TR
       23.04.5 UNL 21.11.5 -004 05   06329 7  6040 6 U0     SET SW#22 TO NOP
       23.05.0 SUB 71.07.0         04   06334 P  8981 8Z81     CHANGE INPUT TAPES
       23.06.0 UNL 20.33.0         04   06339 7  5829 5Y29     X
       23.07.0 UNL 20.38.0         04   06344 7  5899 5Y99     X
       23.08.0 UNL 21.12.0         04   06349 7  6049 6 49     X
       23.10.0 RAD 71.09.0         02   06354 H  8989 89Q9     REACTIVATE ASU PLUS INDICATOR
       23.10.5 TR  21.12.0         00   06359 1  6049 6049
7      23.11.0
7      23.11.5                                                SECOND INPUT END OF FILE
       23.12.0 CMP 70.18.0         07   06364 4  8298 8SI8     SAME NUMBER OF RECORDS
       23.13.0 TRE 23.14.3         00   06369 L  6389 6389
1      23.14.0 SEL    0500         00   06374 2  0500 0500
       23.14.1 WR  73.53.0 &001 00   06379 R  9721 9721     MESS #21
       23.14.2 TR  23.53.0         00   06384 1  6714 6714
1      23.14.3 SET    0009         00   06389 B  0009 0009     HASH TOTAL COMPARISON
       23.14.4 LOD 73.03.5         00   06394 8  9298 9298
       23.14.5 NOP 23.14.9         00   06399 A  6419 6419     TR IF RECORD WAS ELIMINATED DURING THIS PASS
       23.14.6 CMP 73.02.0         00   06404 4  9276 9276
       23.14.7 TRE 23.15.0         00   06409 L  6424 6424
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C L	LNG	SYMBOLIC LOC	OP	ADDR	INCR	ASU	ACTUAL LOC	OP	ADDR	ADDR	S N	DATA OR DESCRIPTION
		23.14.8	TR	23.51.0		00	06414	1	6704	6704		
		23.14.9	UNL	73.02.0		00	06419	7	9276	9276		
		23.15.0	NOP	33.10.0		00	06424	A	7709	7709		SW X3. SET TO TR ON LAST PASS
		23.15.1	UNL	23.16.0		03	06429	7	6439	64C9		PROPER OUTPUT TAPE
		23.15.5	UNL	23.33.0		03	06434	7	6514	65A4		X
1		23.16.0	SEL	0202		00	06439	2	0202	0202		OUTPUT TAPE
		23.17.0	WR	75.02.0	&001	00	06444	R	10000	000		A
		23.18.0	TRS	26.02.0		00	06449	O	7219	7219		OVERFLOW CONDITION
1		23.19.0	SEL	0902		00	06454	2	0902	0902		
		23.20.0	TRS	24.34.0		00	06459	O	6839	6839		0902 RETURN #15
		23.24.0	SUB	71.08.0		03	06464	P	8983	89H3		CHANGING OUTPUT TAPES
		23.25.0	UNL	23.35.0		03	06469	7	6529	65B9		
		23.26.0	TR	23.33.0		00	06474	1	6514	6514		SWITCH # 25
		23.27.0	UNL	23.28.0		03	06479	7	6484	64H4		
1		23.28.0	SEL	0200		00	06484	2	0200	0200		ALTERNATE OUTPUT TAPE
		23.29.0	WR	75.26.0	&001	00	06489	R	17500	X500		D
		23.30.0	TRS	26.02.0		00	06494	O	7219	7219		OVERFLOW CONDITION
1		23.31.0	SEL	0902		00	06499	2	0902	0902		
		23.32.0	TRS	24.41.0		00	06504	O	6864	6864		0902 RETURN #16
		23.32.5	TRA	23.33.0		00	06509	I	6514	6514		TURN OFF ANY INDICATOR
1		23.33.0	SEL	0200		00	06514	2	0200	0200		OUTPUT TAPE
1		23.34.0	WTM	0001		00	06519	3	0001	0001		
		23.34.5	TRA	23.45.0		00	06524	I	6644	6644		
1		23.35.0	SEL	0202		00	06529	2	0202	0202		ALTERNATE OUTPUT TAPE
1		23.35.5	WTM	0001		00	06534	3	0001	0001		
		23.35.6	TRA	23.47.0		00	06539	I	6659	6659		
1		23.35.9	SEL	0902		00	06544	2	0902	0902		TURN OFF 0902
		23.36.0	TRS	23.36.1		00	06549	O	6554	6554		X
1		23.36.1	SEL	0200		00	06554	2	0200	0200		
1		23.36.2	RWD	0002		00	06559	3	0002	0002		
1		23.36.3	SEL	0201		00	06564	2	0201	0201		
1		23.36.4	RWD	0002		00	06569	3	0002	0002		
		23.37.0	RAD	71.09.0		02	06574	H	8989	89Q9		ACTIVATE ASU PLUS INDICATOR
		23.38.0	CMP	72.15.0		06	06579	4	9103	9/-3		HAS THERE BEEN MORE THAN 1 TAPE CHANGE
		23.38.1	TRH	23.39.5		00	06584	K	6594	6594		YES
		23.38.2	TR	28.04.0		00	06589	1	7314	7314		NO----TO FINAL PASS
		23.39.5	SPR	70.18.0		07	06594	5	8298	8SI8		RECORD COUNT TO MESSAGE
		23.40.0	ADD	71.04.0		11	06599	G	8975	8RG5		INC PASS COUNTER
		23.41.0	SPR	70.17.0	&016	11	06604	5	8286	8KH6		PLACE IN MESSAGE
		23.41.2	ADD	71.04.0		06	06609	G	8975	8ZP5		SET SEQUENCE COUNT
		23.41.4	SPR	70.19.0		06	06614	5	8324	8TK4		PLACE IN MESSAGE
1		23.42.0	SEL	0500		00	06619	2	0500	0500		
		23.43.0	WR	70.17.0	&001	00	06624	R	8271	8271		MESSAGE # 4
		23.43.1	UNL	70.18.0		07	06629	7	8298	8SI8		
		23.43.2	UNL	70.17.0	&015	11	06634	7	8285	8KH5		
		23.44.0	TR	13.31.0		00	06639	1	4549	4549		
1		23.45.0	BSP	0004		00	06644	3	0004	0004		
		23.45.1	TRS	23.49.0		00	06649	O	6674	6674		
		23.46.0	TR	23.34.0		00	06654	1	6519	6519		
1		23.47.0	BSP	0004		00	06659	3	0004	0004		
		23.47.1	TRS	23.50.0		00	06664	O	6689	6689		
		23.48.0	TR	23.35.5		00	06669	1	6534	6534		
1		23.49.0	SEL	0902		00	06674	2	0902	0902		
		23.49.1	TRS	23.33.0		00	06679	O	6514	6514		
		23.49.2	TR	23.35.0		00	06684	1	6529	6529		
1		23.50.0	SEL	0902		00	06689	2	0902	0902		
		23.50.1	TRS	23.35.0		00	06694	O	6529	6529		
		23.50.2	TR	23.36.1		00	06699	1	6554	6554		
7		23.50.5										HASH TOTAL IS NOT EQUAL
1		23.51.0	SEL	0500		00	06704	2	0500	0500		
		23.52.0	WR	73.57.0	&001	00	06709	R	9752	9752		MESS #II
1		23.53.0	HLT	0013		00	06714	J	0013	0013		MIDDLE PASS HASH TOTAL OR RECORD COUNT CHECK

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

        23.54.0 TR   25.11.0           00   06719 1   7019 7019
7       24.00.0
7       24.01.0                                                     RETURN ADDRESSES FOR 0902 ERRORS
7       24.02.0                                                     # 11 - RD
        24.03.0 LOD 24.06.0            10   06724 8   6739 6PL9
        24.04.0 LOD 24.07.0            12   06729 8   6744 6G44
        24.05.0 TR   12.01.5           00   06734 1   3879 3879     SKIP UNLOADING TAPE ADD
        24.06.0 NOP 20.22.1            00   06739 A   5734 5734
        24.07.0 NOP 20.16.0            00   06744 A   5694 5694
7       24.08.0                                                     #12 - RD
        24.09.0 LOD 24.12.0            10   06749 8   6764 6P04
        24.10.0 LOD 24.13.0            12   06754 8   6769 6G69
        24.11.0 TR   12.01.3           00   06759 1   3869 3869
        24.12.0 NOP 20.29.1            00   06764 A   5804 5804
        24.13.0 NOP 20.23.0            00   06769 A   5759 5759
7       24.14.0                                                     #13 - RD
        24.15.0 LOD 24.18.0            10   06774 8   6789 6PQ9
        24.16.0 LOD 24.19.0            12   06779 8   6794 6G94
        24.17.0 TR   12.01.3           00   06784 1   3869 3869
        24.18.0 NOP 24.21.0            00   06789 A   6799 6799
        24.19.0 NOP 26.21.0            00   06794 A   7249 7249
7       24.20.0                                                     #13 - WR
        24.21.0 LOD 24.24.0            10   06799 8   6809 6Q-9
        24.23.0 TR   12.31.5           00   06804 1   3969 3969
        24.24.0 NOP 21.00.3            00   06809 A   5969 5969
7       24.26.0                                                     #14 - WR
        24.27.0 RCV 75.16.0 &005 00         06814 U 15004 V004     PLACE A INTO C
        24.28.0 TMT 75.02.0 &005 00         06819 9 10004  004     X
        24.29.0 LOD 24.32.0            10   06824 8   6834 6QL4
        24.31.0 TR   12.31.5           00   06829 1   3969 3969
        24.32.0 NOP 21.25.0            00   06834 A   6114 6114
7       24.33.0                                                     #15 - WR
        24.34.0 RCV 75.16.0 &005 00         06839 U 15004 V004     PLACE A INTO C
        24.35.0 TMT 75.02.0 &005 00         06844 9 10004  004     X
        24.36.0 LOD 24.39.0            10   06849 8   6859 6QN9
        24.38.0 TR   12.31.5           00   06854 1   3969 3969
        24.39.0 NOP 23.24.0            00   06859 A   6464 6464
7       24.40.0                                                     #16 - WR
        24.41.0 RCV 75.16.0 &005 00         06864 U 15004 V004
        24.42.0 TMT 75.26.0 &005 00         06869 9 17504 X504
        24.43.0 LOD 24.46.0            10   06874 8   6884 6QQ4
        24.45.0 TR   12.31.5           00   06879 1   3969 3969
        24.46.0 NOP 23.32.5            00   06884 A   6509 6509
7       25.00.0
7       25.01.0                                                     RESTART PROCEDURE
7       25.01.5                                                     SETUP MESSAGE
        25.02.0 RAD 71.04.0            01   06889 H   8975 89X5     GET A 1
        25.03.0 TR   25.07.0           00   06894 1   6914 6914
        25.04.0 RAD 71.18.0            01   06899 H   9011 90/1     GET A 4
        25.05.0 TR   25.07.0           00   06904 1   6914 6914
        25.06.0 RAD 71.17.0            01   06909 H   9010 90/0     GET A 5
        25.07.0 UNL 73.61.0 &015 01         06914 7   9795 97Z5     CHECK INDICATOR INTO MESS
        25.08.0 SPR 73.63.0            07   06919 5   9828 9YB8     RECORD # TO MESSAGE
        25.08.1 RAD 71.04.0            01   06924 H   8975 89X5     GET A 1
        25.08.2 RCV 25.08.5            00   06929 U   6944 6944
        25.08.3 TMT 25.08.5 -001 01         06934 9   6943 69U3     A ZERO
1       25.08.4 SET      0004          08   06939 B   0004 0-04     SET FOR 3 REPEATS
1       25.08.5 SEL      0200          00   06944 2   0200 0200     REWIND SORTING TAPES
1       25.08.6 RWD      0002          00   06949 3   0002 0002
        25.08.7 ADM 25.08.5            01   06954 6   6944 69U4
        25.08.8 NTR 25.08.5            08   06959 X   6944 6R44
1       25.08.9 SEL      0913          00   06964 2   0913 0913     ARE THERE 4 TAPE PAIRS
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C LNG      SYMBOLIC        INCR            ACTUAL         S        DATA OR DESCRIPTION
L        LOC    OP   ADDR        ASU  LOC    OP ADDR ADDR N

         25.09.0 TRS 25.09.2       00  06969 0  6979 6979
         25.09.1 TR  25.09.8       00  06974 1  7009 7009
         25.09.2 NOP 25.09.7       00  06979 A  7004 7004
         25.09.3 UNL 25.09.2 -004  01  06984 7  6975 69X5
         25.09.4 RCV 25.08.5       00  06989 U  6944 6944
         25.09.5 TMT  5.32.0       01  06994 9  2234 22T4        SEND A 6 TO THE FIRST TAPE ADDRESS
         25.09.6 TR  25.08.4       00  06999 1  6939 6939
         25.09.7 UNL 25.09.2 -004  05  07004 7  6975 6ZX5
1        25.09.8 SEL    0500       00  07009 2  0500 0500
         25.10.0 WR  73.61.0 &001  00  07014 R  9781 9781        MESSAGE #23
         25.11.0 NOP 25.42.0       00  07019 A  7209 7209        TR IF CHECK POINTS NOT WANTED
1        25.11.1 SEL    0902       00  07024 2  0902 0902        TURN OFF 0902 IND
         25.11.2 TRS 25.12.3       00  07029 O  7034 7034
1        25.12.3 SET    0003       02  07034 B  0003 00-3
1        25.12.5 SEL    0205       00  07039 2  0205 0205        CHECK POINT TAPE
1        25.13.0 BSP    0004       00  07044 3  0004 0004
1        25.14.0 RD     0000       00  07049 Y  0000 0000
1        25.14.1 SEL    0901       00  07054 2  0901 0901        TURN OFF 0901
         25.14.2 TRS 25.14.3       00  07059 O  7064 7064
1        25.14.3 SEL    0904       00  07064 2  0904 0904        TURN OFF 0904
         25.14.4 TRS 25.14.5       00  07069 O  7074 7074
1        25.14.5 SEL    0905       00  07074 2  0905 0905        TURN OFF 0905
         25.14.6 TRS 25.15.0       00  07079 O  7084 7084
1        25.15.0 SEL    0902       00  07084 2  0902 0902
         25.16.0 TRS 25.27.0       00  07089 O  7104 7104        TO REREAD CHECK POINT
         25.16.2 TR  25.39.0       00  07094 1  7194 7194        SW Z. SET TO NOP WHEN 2ND CH PT IS WRITTEN
         25.26.0 TR  19.22.0       00  07099 1  5474 5474
         25.27.0 SUB 71.57.0       02  07104 P  9018 90J8        DECREASE ERROR CTR
1        25.27.1 SEL    0500       00  07109 2  0500 0500
         25.27.2 WR  70.87.0 &001  00  07114 R  8855 8855
1        25.27.3 SEL    0902       00  07119 2  0902 0902
         25.27.4 TRS 25.28.0       00  07124 O  7129 7129        TURN OFF 0902 IND
         25.28.0 TRZ 25.30.0       02  07129 N  7139 71L9
         25.29.0 TR  25.36.0       00  07134 1  7179 7179
         25.30.0 ADD 71.09.0       02  07139 G  8989 89Q9
         25.31.0 NTR 25.34.0       02  07144 X  7159 71N9
1        25.32.0 HLT    0014       00  07149 J  0014 0014        CHECK POINT UNREADABLE
         25.33.0 TR  25.32.0       00  07154 1  7149 7149
1        25.34.0 SEL    0205       00  07159 2  0205 0205
1        25.34.1 BSP    0004       00  07164 3  0004 0004
1        25.34.2 BSP    0004       00  07169 3  0004 0004
         25.35.0 TR  25.14.0       00  07174 1  7049 7049
1        25.36.0 SEL    0205       00  07179 2  0205 0205
1        25.37.0 BSP    0004       00  07184 3  0004 0004
         25.38.0 TR  25.14.0       00  07189 1  7049 7049
         25.39.0 RAD 71.04.0       01  07194 H  8975 89X5        GET A 1
         25.40.0 UNL  5.33.0 -004  01  07199 7  2235 22T5        TO SUPPRESS REPRINT OF PROGRAM
         25.41.0 TR     .09.0      00  07204 1  0309 0309        TO FIRST CHECK POINT
1        25.42.0 HLT    1234       00  07209 J  1234 1234
         25.43.0 TR  25.42.0       00  07214 1  7209 7209
7        26.00.0
7        26.01.0                                                 OVERFLOW CONDITION
         26.02.0 UNL 70.30.0       03  07219 7  8425 84B5        OUTPUT TAPE TO MESSAGE
1        26.02.2 RWD    0002       00  07224 3  0002 0002
1        26.03.0 SEL    0500       00  07229 2  0500 0500
         26.04.0 WR  70.29.0 &001  00  07234 R  8403 8403        MESSAGE #7
1        26.05.0 HLT    0011       00  07239 J  0011 0011
         26.06.0 TR  19.22.0       00  07244 1  5474 5474
7        26.20.0                                                 RD ERROR #13 - 30 ERRORS
         26.21.0 UNL 26.22.0       04  07249 7  7254 7S54        TAPE ADDRESS TO SEL INSTR
1        26.22.0 SEL    0200       00  07254 2  0200 0200
         26.23.0 RWW 75.09.0 &001  00  07259 S 12500 S500
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C L	LNG	SYMBOLIC LOC	OP	ADDR	INCR	ASU	ACTUAL LOC	OP	ADDR	ADDR	S N	DATA OR DESCRIPTION
		26.24.0	RD	75.09.0	&001	00	07264	Y	12500	S500		
		26.24.5	TRS	23.01.5		00	07269	O	6294	6294		
		26.25.0	TMT	72.04.0		09	07274	9	9064	9-W4		
		26.26.0	ADD	71.04.0		07	07279	G	8975	8ZG5		
1		26.27.0	SEL	0902		00	07284	2	0902	0902		
		26.28.0	TRS	12.01.5		00	07289	O	3879	3879		
		26.29.0	TR	24.21.0		00	07294	1	6799	6799		
		26.30.0	LOD	26.32.0		10	07299	8	7309	7L-9		
		26.31.0	TR	12.31.5		00	07304	1	3969	3969		
		26.32.0	NOP	23.02.0		00	07309	A	6314	6314		
7		28.00.0										
7		28.01.0										SET UP FOR FINAL PASS
1		28.04.0	SEL	0500		00	07314	2	0500	0500		
		28.04.5	WR	73.74.0	&001	00	07319	R	9850	9850		NEXT TO LAST PASS MESSAGE
1		28.04.9	SEL	0901		00	07324	2	0901	0901		
		28.05.0	TRS	25.02.0		00	07329	O	6889	6889		
1		28.06.0	SEL	0904		00	07334	2	0904	0904		
		28.07.0	TRS	25.04.0		00	07339	O	6899	6899		
1		28.08.0	SEL	0905		00	07344	2	0905	0905		
		28.09.0	TRS	25.06.0		00	07349	O	6909	6909		
		28.10.0	UNL	20.32.5	-004	01	07354	7	5820	58S0		SW #X1 TO TR
		28.11.0	UNL	21.03.5	-004	01	07359	7	5985	59Y5		SW #X2 TO TR
		28.12.0	UNL	23.15.0	-004	01	07364	7	6420	64S0		SW #X3 TO TR
		28.13.0	TR	23.39.5		00	07369	1	6594	6594		
7		31.00.0										
7		31.01.0										COMPARING RECORDS
		31.02.5	ADD	71.04.0		14	07374	G	8975	8IP5		INCREASE LAST PASS RECORD COUNT
		31.03.0	LOD	75.16.0		00	07379	8	14999	U999		LOD C CTRL WORD
		31.03.5	TR	32.01.7		00	07384	1	7459	7459		SW #Y. SET TO NOP FIRSRT TIME THROUGH
		31.04.0	CMP	73.04.0		00	07389	4	9310	9310		
		31.05.0	TRH	32.02.0		00	07394	K	7464	7464		RECORDS IN SEQUENCE
		31.06.0	TRE	32.01.0		00	07399	L	7449	7449		TO TEST IF DUPLICATES ARE DESIRED
1		31.07.0	SEL	0500		00	07404	2	0500	0500		
		31.08.0	WR	70.91.0	&001	00	07409	R	8884	8884		
1		31.09.0	HLT	0015		00	07414	J	0015	0015		RECORD OUT OF SEQUENCE IN LAST PASS
		31.10.0	UNL	20.32.5	-004	05	07419	7	5820	5YS0		X1 TO NOP
		31.11.0	UNL	21.03.5	-004	05	07424	7	5985	5ZY5		X2 TO NOP
		31.12.0	UNL	23.15.0	-004	05	07429	7	6420	6US0		X3 TO NOP
		31.13.0	UNL	33.06.0	-004	01	07434	7	7695	76Z5		X4 TO TR
		31.14.0	UNL	31.03.5	-004	01	07439	7	7380	73Y0		Y TO TR
		31.15.0	TR	18.20.0		00	07444	1	5119	5119		
7		32.00.5										RECORDS ARE IN SEQUENCE
1		32.01.0	SEL	0915		00	07449	2	0915	0915		
		32.01.5	TRS	34.02.0		00	07454	O	7759	7759		DUPLICATES ARE NOT DESIRED
		32.01.7	UNL	31.03.5	-004	05	07459	7	7380	7TY0		SET SW #Y TO NOP
		32.02.0	UNL	73.04.0		00	07464	7	9310	9310		
		32.05.0	TR	32.25.0		00	07469	1	7569	7569		REPLACING SW #1
1		32.06.0	SET	0000		00	07474	B	0000	0000		WORD INFORMATION BACK
		32.07.0	LOD	75.16.0		00	07479	8	14999	U999		INTO THE LOER PART OF
		32.08.0	UNL	75.16.0		00	07484	7	14999	U999		THE RECORD
		32.09.0	TR	32.25.0		00	07489	1	7569	7569		REPLACING SW #2
1		32.10.0	SET	0000		00	07494	B	0000	0000		
		32.11.0	LOD	75.16.0		00	07499	8	14999	U999		
		32.12.0	UNL	75.16.0		00	07504	7	14999	U999		
		32.13.0	TR	32.25.0		00	07509	1	7569	7569		REPLACING SW #3
1		32.14.0	SET	0000		00	07514	B	0000	0000		
		32.15.0	LOD	75.16.0		00	07519	8	14999	U999		
		32.16.0	UNL	75.16.0		00	07524	7	14999	U999		
		32.17.0	TR	32.25.0		00	07529	1	7569	7569		REPLACING SW #4
1		32.18.0	SET	0000		00	07534	B	0000	0000		
		32.19.0	LOD	75.16.0		00	07539	8	14999	U999		
		32.20.0	UNL	75.16.0		00	07544	7	14999	U999		

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

        32.21.0 TR   32.25.0         00  07549 1  7569 7569    REPLACING SW #5
1       32.22.0 SET     0000         00  07554 B  0000 0000
        32.23.0 LOD  75.16.0         00  07559 8 14999 U999
        32.24.0 UNL  75.16.0         00  07564 7 14999 U999
        32.25.0 NOP  33.02.0         00  07569 A  7669 7669    REPLACING THE CONTROL
1       32.26.0 SET     0000         00  07574 B  0000 0000         FIELDS INTO THEIR
        32.27.0 LOD  73.04.0         00  07579 8  9310 9310         PROPER POSITIONS IN THE
        32.28.0 UNL  75.16.0         00  07584 7 14999 U999         RECORD
        32.29.0 NOP  33.02.0         00  07589 A  7669 7669
1       32.30.0 SET     0000         00  07594 B  0000 0000
        32.31.0 LOD  73.04.0         00  07599 8  9310 9310
        32.32.0 UNL  75.16.0         00  07604 7 14999 U999
        32.33.0 NOP  33.02.0         00  07609 A  7669 7669
1       32.34.0 SET     0000         00  07614 B  0000 0000
        32.35.0 LOD  73.04.0         00  07619 8  9310 9310
        32.36.0 UNL  75.16.0         00  07624 7 14999 U999
        32.37.0 NOP  33.02.0         00  07629 A  7669 7669
1       32.38.0 SET     0000         00  07634 B  0000 0000
        32.39.0 LOD  73.04.0         00  07639 8  9310 9310
        32.40.0 UNL  75.16.0         00  07644 7 14999 U999
        32.41.0 NOP  33.02.0         00  07649 A  7669 7669
1       32.42.0 SET     0000         00  07654 B  0000 0000
        32.43.0 LOD  73.04.0         00  07659 8  9310 9310
        32.44.0 UNL  75.16.0         00  07664 7 14999 U999
7       33.00.0                                                HASH TOTAL
1       33.02.0 SET     0010         00  07669 B  0010 0010
        33.03.0 LOD  75.16.0 &010    00  07674 8 15009 V009    1ST 10 CHARACTERS OF RECORD
        33.04.0 ADD  71.60.0         00. 07679 G  9022 9022    STRIP ZONES
        33.05.0 ADM  73.03.0         00  07684 6  9287 9287
1       33.05.5 SET     0000         00  07689 B  0000 0000    SET ACC TO CTRL WORD LENGTH
        33.05.6 NOP  34.41.0         00  07694 A  7904 7904    SW X5 -- SET TO TR TO PRINT 2ND DUP RECORD
        33.06.0 TR   20.33.0         00  07699 1  5829 5829    SW #X-4 SET TO NOP ON EOF
        33.07.0 TR   33.20.0         00  07704 1  7724 7724
        33.10.0 UNL  33.06.0 -004    05  07709 7  7695 7WZ5    SET SW#X-4 TO NOP
1       33.10.5 SET     0000         00  07714 B  0000 0000    SET ACC TO LENGHT OF CTRL WORD
        33.11.0 TR   22.12.0         00  07719 1  6234 6234    TO TMT RECORD FROM A TO C
        33.20.0 UNL  33.21.0         03  07724 7  7729 77B9    PROPER OUTPUT TAPE ADDRESS
1       33.21.0 SEL     0200         00  07729 2  0200 0200
        33.22.0 WR   75.16.0 &001    00  07734 R 15000 V000    WRITE RECORD IN AREA C
        33.23.0 TRS  26.02.0         00  07739 0  7219 7219    TO OVER FLOW ROUTINE
1       33.24.0 SEL     0902         00  07744 2  0902 0902
        33.25.0 TRS  35.14.0         00  07749 0  7934 7934    0902 RETURN 22
        33.26.0 TR   36.03.2         00  07754 1  7949 7949
7       34.00.0
7       34.01.0                                                IF CHECKING FOR DUPLICATES IS DESIRED
1       34.02.0 SEL     0914         00  07759 2  0914 0914    IS PRINTER AVAILABLE
        34.03.0 TRS  34.10.0         00  07764 0  7794 7794    YES
        34.04.0 SPR  70.96.0         14  07769 5  8968 8I08    RECORD # TO MESSAGE
1       34.05.0 SEL     0500         00  07774 2  0500 0500    WRITE MESSAGE AND CONTROL WORD
        34.06.0 WR   70.95.0 &001    00  07779 R  8928 8928
        34.07.0 WR   73.04.0 &001    00  07784 R  9311 9311
        34.08.0 TR   32.02.0         00  07789 1  7464 7464
        34.10.0 SPR  73.80.0         14  07794 5  9897 9HR7
        34.11.0 SUB  71.04.0         14  07799 P  8975 8IP5
        34.12.0 SPR  73.79.0         14  07804 5  9885 9HQ5
        34.13.0 ADD  71.04.0         14  07809 G  8975 8IP5
1       34.14.0 SEL     0400         00  07814 2  0400 0400
        34.15.0 WR   73.78.0 -001    00  07819 R  9868 9868
        34.16.0 UNL  34.17.0         03  07824 7  7829 78B9    OUTPUT TAPE ADDRESS
1       34.17.0 SEL     0200         00  07829 2  0200 0200
1       34.18.0 BSP     0004         00  07834 3  0004 0004
        34.19.0 RWW  75.26.0 &001    00  07839 S 17500 X500
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C LNG      SYMBOLIC          INCR          ACTUAL          S      DATA OR DESCRIPTION
L      LOC   OP   ADDR              ASU  LOC  OP ADDR ADDR  N

       34.20.0 RD  75.26.0 &001 00  07844 Y 17500 X500     READ LAST RECORD INTO AREA D
       34.21.0 TMT 72.04.0       09  07849 9  9064 9-W4    G.M. AND R.M.S
1      34.22.0 SEL    0901       00  07854 2  0901 0901
       34.23.0 TRS 25.02.0       00  07859 O  6889 6889
1      34.24.0 SEL    0400       00  07864 2  0400 0400
       34.25.0 WR  75.26.0       00  07869 R 17499 X499
1      34.26.0 SEL    0902       00  07874 2  0902 0902
       34.27.0 TRS 34.28.0       00  07879 O  7884 7884
1      34.28.0 SEL    0901       00  07884 2  0901 0901
       34.29.0 TRS 34.30.0       00  07889 O  7894 7894
       34.30.0 UNL 33.05.6 -004  01  07894 7  7690 76Z0     SET SW X5 TO TR
       34.31.0 TR  32.02.0       00  07899 1  7464 7464
       34.41.0 UNL 33.05.6 -004  05  07904 7  7690 7WZ0     SET SW X5 TO NOP
1      34.42.0 SEL    0400       00  07909 2  0400 0400
       34.43.0 WR  75.16.0       00  07914 R 14999 U999
1      34.44.0 SEL    0902       00  07919 2  0902 0902
       34.45.0 TRS 33.06.0       00  07924 O  7699 7699
       34.46.0 TR  33.06.0       00  07929 1  7699 7699
7      35.00.0
7      35.01.0                                            902 ERROR RETURN SETUP
7      35.13.0                                            #22-WR
       35.14.0 LOD 35.17.0       10  07934 8  7944 7RM4
       35.16.0 TR  12.31.5       00  07939 1  3969 3969
       35.17.0 NOP 36.03.2       00  07944 A  7949 7949     RETURN ADDRESS
7      36.00.0
7      36.01.0                                            END OF FILE PROCEDURE
       36.03.2 CMP 70.18.0       14  07949 4  8298 8BR8     CMP LAST PASS RECORD COUNT
       36.03.3 TRE 36.07.0       00  07954 L  7974 7974
1      36.04.0 SEL    0500       00  07959 2  0500 0500     ERROR
       36.05.0 WR  73.53.0 &001  00  07964 R  9721 9721     MESS #21
       36.06.0 TR  36.12.5       00  07969 1  8009 8009
1      36.07.0 SET    0009       00  07974 B  0009 0009     GET HASH TOTAL #1
       36.07.5 NOP 36.14.0       00  07979 A  8029 8029     HASH TOTAL NOT VALID
       36.08.0 LOD 73.03.7       00  07984 8  9309 9309     GET FIRST PASS HASH TOTAL
       36.09.0 CMP 73.03.0       00  07989 4  9287 9287     CHECK IF EQUAL TO LAST PASS
       36.10.0 TRE 36.14.0       00  07994 L  8029 8029     OK
1      36.11.0 SEL    0500       00  07999 2  0500 0500     ERROR
       36.12.0 WR  73.57.0 &001  00  08004 R  9752 9752     MESS #22
1      36.12.5 HLT    0016       00  08009 J  0016 0016     LAST PASS RECORD COUNT OR HASH TOTAL CHECK
       36.13.0 UNL 33.06.0 -004  01  08014 7  7695 76Z5     SET SW X4 TO TR
       36.13.1 UNL 31.03.5 -004  01  08019 7  7380 73Y0     SET SW Y TO TR
       36.13.5 TR  25.11.0       00  08024 1  7019 7019
       36.14.0 UNL 36.15.0       03  08029 7  8039 80C9     OUTPUT TAPE
       36.14.5 TRA 36.15.0       00  08034 I  8039 8039     TURN OFF ANY
1      36.15.0 SEL    0201       00  08039 2  0201 0201     X
1      36.16.0 WTM    0001       00  08044 3  0001 0001     X
       36.16.5 TRA 36.29.0       00  08049 I  8149 8149
1      36.17.0 RWD    0002       00  08054 3  0002 0002
       36.23.0 UNL 70.84.0       03  08059 7  8852 88E2     TAPE WITH SORTED FILE
       36.24.0 SPR 70.83.0       07  08064 5  8837 8YC7     RECORD COUNT TO MESSAGE
       36.24.1 NOP 36.25.0       00  08069 A  8099 8099     CHK PT REWIND SW
       36.24.2 LOD 19.10.0       03  08074 8  5434 54C4
       36.24.3 UNL 36.24.4       03  08079 7  8084 80H4
1      36.24.4 SEL    0205       00  08084 2  0205 0205     CHECK PT TAPE
1      36.24.5 IOF    0000       00  08089 3  0000 0000
1      36.24.6 RWD    0002       00  08094 3  0002 0002
1      36.25.0 SEL    0500       00  08099 2  0500 0500
       36.26.0 WR  70.82.0       00  08104 R  8804 8804     MESS #17
1      36.27.0 HLT    9999       00  08109 J  9999 9999     FINAL STOP
       36.28.0 TR  36.25.0       00  08114 1  8099 8099
1      36.28.1 SEL    0902       00  08119 2  0902 0902
       36.28.2 TRS 36.15.0       00  08124 O  8039 8039
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C L	LNG	SYMBOLIC LOC	SYMBOLIC OP	SYMBOLIC ADDR	INCR	ASU	ACTUAL LOC	ACTUAL OP	ACTUAL ADDR	ACTUAL ADDR	S N	DATA OR DESCRIPTION
		36•28•3	UNL	36•28•4		03	08129	7	8134	81C4		
1		36•28•4	SEL	0200		00	08134	2	0200	0200		
1		36•28•5	IOF	0000		00	08139	3	0000	0000		
		36•28•6	TR	36•17•0		00	08144	1	8054	8054		
1		36•29•0	BSP	0004		00	08149	3	0004	0004		
		36•29•1	TRS	36•28•1		00	08154	0	8119	8119		
		36•30•0	TR	36•16•0		00	08159	1	8044	8044		
7		70•00•0										
7		70•01•0										MESSAGES
7		70•02•0										#1
2	001	70•04•0					08160					
2	028	70•05•0					08188					READ CHECK - RECORD #XXXXXX
2	014	70•06•0					08202					FROM TAPE 0204
2	001	70•07•0					08203					¤
7		70•08•0										#2
2	001	70•09•0					08204					
2	031	70•10•0					08235					0902 CHECK WRITING ON TAPE 020X
2	001	70•11•0					08236					¤
7		70•12•0										#3
2	001	70•13•0					08237					
2	031	70•14•0					08268					MASTER FILE CONTAINS ONE RECORD
2	001	70•15•0					08269					¤
7		70•16•0										#4
2	001	70•17•0					08270					
2	028	70•18•0					08298					END OF PASS #XX WITH XXXXXX
2	026	70•19•0					08324					RECORDS WRITTEN IN XXXXXX
2	009	70•19•5					08333					SEQUENCES
2	001	70•20•0					08334					¤
7		70•20•5										#5
2	001	70•21•0					08335					1
2	030	70•22•0					08365					PRINT OUT OF SORT 51 -- READY
2	007	70•23•0					08372					TO SORT
2	001	70•23•5					08373					¤
7		70•24•0										#6
2	001	70•25•0					08374					
2	026	70•26•0					08400					REMOVE MASTER FILE ON 0200
2	001	70•27•0					08401					¤
7		70•28•0										#7
2	001	70•29•0					08402					
2	023	70•30•0					08425					PUT LONGER TAPE ON 020X
2	020	70•30•1					08445					AND PRESS START KEY
2	001	70•31•0					08446					¤
7		70•33•0										#8
2	001	70•34•0					08447					1
2	032	70•35•0					08479					PRINT OUT OF ASSIGNMENT ROUTINE
2	011	70•36•0					08490					FOR SORT 51
2	001	70•37•0					08491					¤
7		70•38•0										#9
2	001	70•39•0					08492					
2	025	70•40•0					08517					0902 CHECK-RELOAD PROGRAM
2	001	70•41•0					08518					¤
7		70•42•0										#10
2	001	70•43•0					08519					
2	015	70•44•0					08534					NO CONTROL CARD
2	001	70•45•0					08535					¤
7		70•50•0										#11
2	001	70•51•0					08536					
2	030	70•52•0					08566					0902 CHECK-RELOAD CONTROL CARD
2	001	70•53•0					08567					¤
7		70•54•0										#12
2	001	70•55•0					08568					
2	021	70•56•0					08589					ERROR IN CONTROL CARD

```
C LNG      SYMBOLIC          INCR               ACTUAL          S         DATA OR DESCRIPTION                          SORT51
L        LOC    OP    ADDR          ASU   LOC   OP ADDR ADDR  N

2 001 70.57.0                             08590                     ¤
7     70.58.0                                                       #13
2 001 70.59.0                             08591
2 016 70.60.0                             08607                     END OF PRINT OUT
2 001 70.61.0                             08608                     ¤
7     70.62.0                                                       PRINTER ERRORS
2 001 70.63.0                             08609
2 031 70.64.0                             08640                     0902 CHECK FOR FIRST LINE ABOVE
2 001 70.65.0                             08641                     ¤
2 032 70.66.0                             08673                     0903 CHECK FOR SECOND LINE ABOVE
2 001 70.67.0                             08674                     ¤
7     70.68.0                                                       #14
2 001 70.69.0                             08675
2 025 70.70.0                             08700                     NO RECORDS ON MASTER TAPE
2 001 70.71.0                             08701                     ¤
7     70.72.0                                                       #15
2 001 70.73.0                             08702
2 028 70.74.0                             08730                     MASTER FILE IS IN SEQUENCE.
2 040 70.74.5                             08770                     PRESS START FOR OPTIONAL DUPLICATE CHECK
2 001 70.75.0                             08771                     ¤
7     70.76.0                                                       #16
2 001 70.77.0                             08772
2 030 70.78.0                             08802                     0902 CHECK WRITING CHECK POINT
2 001 70.80.0                             08803                     ¤
7     70.81.0                                                       #17
2 001 70.82.0                             08804
2 033 70.83.0                             08837                     FINAL PASS COMPLETED WITH XXXXXX
2 015 70.84.0                             08852                     RECORDS ON 020X
2 001 70.85.0                             08853                     ¤
7     70.86.0                                                       # 18
2 001 70.87.0                             08854
2 027 70.88.0                             08881                     0902 ON READING CHECK POINT
2 001 70.89.0                             08882                     ¤
7     70.90.0                                                       #19
2 001 70.91.0                             08883
2 042 70.92.0                             08925                     RECORD OUT OF SEQUENCE LAST PASS --RESTART
2 001 70.93.0                             08926                     ¤
7     70.94.0                                                       #20
2 001 70.95.0                             08927
2 041 70.96.0                             08968                     CONTROL WORD OF DUPLICATE RECORD #XXXXXX
2 001 70.97.0                             08969                     ¤
7     71.00.0
7     71.01.0                                                       SIGNED CONSTANTS
2 004 71.02.0                             08973
2 001 71.03.0                             08974                  &  0
2 001 71.04.0                             08975                  &  1
2 001 71.05.0                             08976                  -  0
2 003 71.06.0                             08979                  &  000
2 002 71.07.0                             08981                  &  02    FOR CHANGING INPUT TAPES
2 002 71.08.0                             08983                  &  04    FOR CHANGING OUTPUT TAPES
2 002 71.08.2                             08985                  &  14
2 002 71.08.4                             08987                  &  16
2 002 71.09.0                             08989                  &  10
2 002 71.10.0                             08991                  &  00    FOR INITIAL INPUT TAPE ADDRESS
2 002 71.11.0                             08993                  &  01    FOR INITIAL OUTPUT TAPE ADDRESS
2 002 71.11.2                             08995                  &  06
2 002 71.11.4                             08997                  &  07
2 004 71.12.0                             09001                  &  0020
2 004 71.13.0                             09005                  &  0007
2 001 71.14.0                             0900)                  &  8
2 003 71.15.0                             09009                  &  001
2 001 71.17.0                             09010                  &  5
```

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

2 001 71.18.0                            09011               &  4
7       71.50.0
7       71.51.0                                                 SIGNED CONSTANTS FOR PRINT OUT
2 001 71.52.0                            09012
2 002 71.53.0                            09014               &  12
2 001 71.54.0                            09015               &  8
2 001 71.55.0                            09016               &  4
2 001 71.56.0                            09017               &  3
2 001 71.57.0                            09018               &  2
2 001 71.58.0                            09019               &  1
2 002 71.59.0                            09021               &  00
2 001 71.60.0                            09022               -  0
2 005 71.61.0                            09027               &  00050
2 002 71.62.0                            09029               &  10
2 004 71.63.0                            09033               &  0011
2 004 71.64.0                            09037               &  0005
2 005 71.65.0                            09042               &  00000
2 006 71.65.5                            09048               &  000000
2 005 71.66.0                            09053               &  00200 INITIAL INDEX-ASSIGNMENT
3       71.67.0      70.34.0             09057      8447 8447 &
2 005 71.68.0                            09062               &  03000
7       72.00.0
7       72.01.0                                                 UNSIGNED CONSTANTS
7       72.02.0
2 001 72.03.0                            09063
2 001 72.04.0                            09064                  ¤
2 001 72.05.1                            09065                  #
2 001 72.05.2                            09066                  #
2 001 72.05.3                            09067                  #
2 001 72.05.4                            09068                  #
2 001 72.05.5                            09069                  #
2 001 72.07.0                            09070                  A
3       72.08.0      75.09.0             09074     12499 S499   ADD OF B SECTION
3       72.09.0      73.06.0 &050        09078      9461 9461   ADD OF UNITS POSITION OF P5
3       72.10.0      73.11.0 -035 07     09082      9562 9VF2
3       72.11.0      73.11.0 -035 04     09086      9562 9V62
2 003 72.12.0                            09089                  100
2 004 72.13.0                            09093                  0 &0   ZONE INCREMENT 4 TO 11
2 004 72.14.0                            09097                  00&0   ZONE INCREMENT 4 TO 7
2 006 72.15.0                            09103                  000001
7       72.50.0
7       72.51.0                                                 UNSIGNED CONSTANTS FOR PRINT OUT
2 001 72.52.0                            09104                  /
2 001 72.53.0                            09105                  Z
2 001 72.54.0                            09106                  R
2 001 72.55.0                            09107                  I
3       72.56.0      72.96.0 &003        09111      9255 9255   LAST PRINT ADD
3       72.57.0      36.30.0 -004 05     09115      8155 8/V5   LAST INSTRUCTION OF SORT 51
3       72.58.0       5.33.0 -004 05     09119      2235 2ST5   ENDING ADD OF ASSIGNMENT
3       72.59.0      72.93.0 &004        09123      9156 9156   FIRST PRINT ADD
3       72.60.0        .03.0 -004 05     09127      0240 0SU0   ADD OF FIRST ASSIGNMENT INSTRUCTION
3       72.61.0      72.93.0 &092        09131      9244 9244
7       72.70.0
7       72.71.0                                                 PRINT OUT WORK SPACES
7       72.72.0                                                 INSTRUCTION WORK SPACE
5 001 72.73.0                            09132                  OPERATION DIGIT
5 001 72.74.0                            09133                  4TH ORDER DIGIT
5 001 72.75.0                            09134                  3RD ORDER DIGIT
5 001 72.76.0                            09135                  2ND ORDER DIGIT
5 001 72.77.0                            09136                  1ST ORDER DIGIT
7       72.78.0
7       72.79.0                                                 ASSEMBLY WORK SPACE
```

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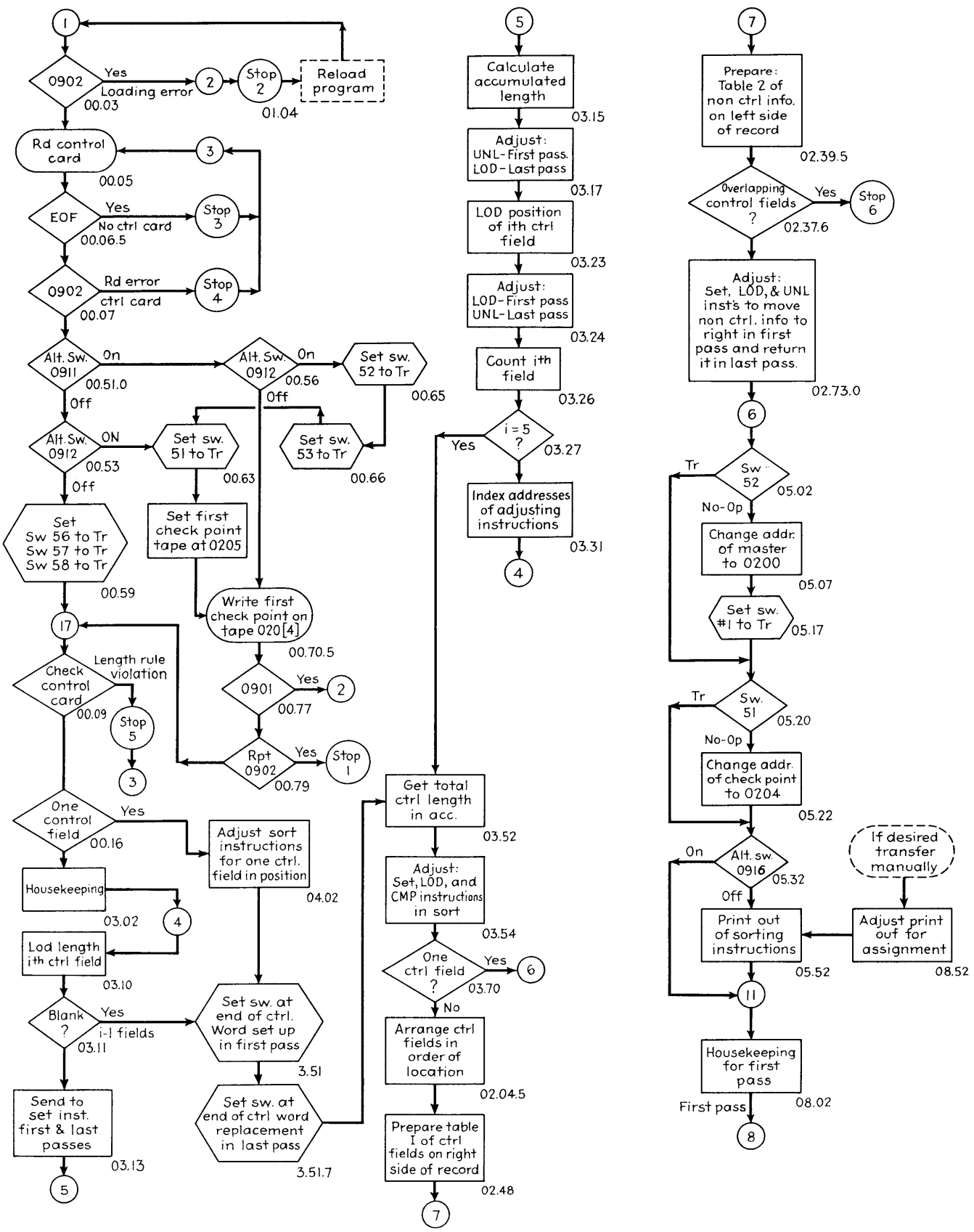
C LNG      SYMBOLIC        INCR          ACTUAL       S      DATA OR DESCRIPTION
L       LOC   OP   ADDR        ASU  LOC  OP ADDR ADDR N

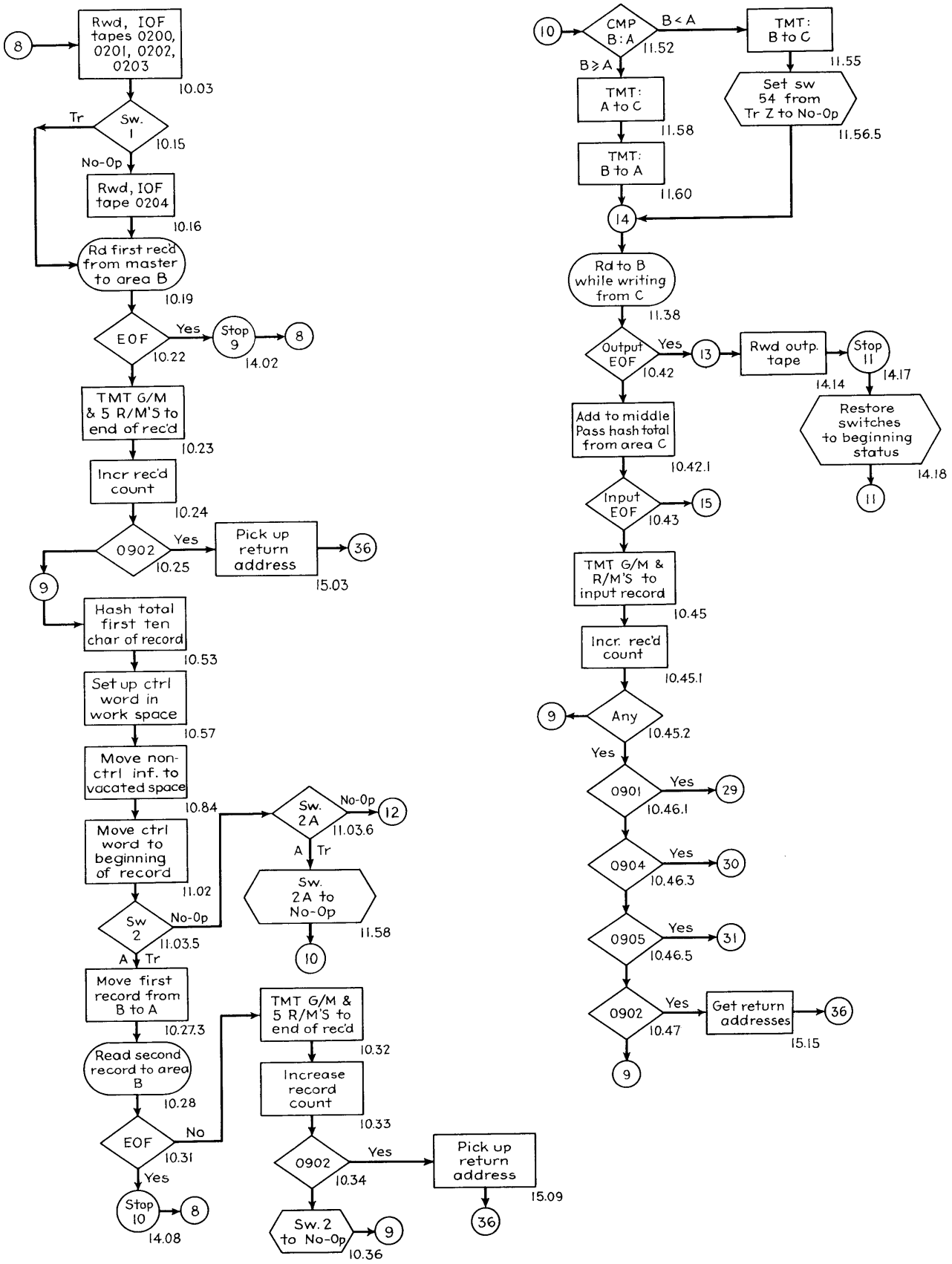
5 001 72.80.0                        09137                OPERATION DIGIT
5 001 72.81.0                        09138                UPPER MEMORY DESIGNATION
5 001 72.82.0                        09139                4TH ORDER DIGIT
5 002 72.83.0                        09141                2ND AND 3RD ORDER DIGIT
5 001 72.84.0                        09142                1ST ORDER DIGIT
5 003 72.85.0                        09145                ASU DESIGNATION
5 001 72.86.0                        09146
7     72.90.0
7     72.91.0                                             PRINT FIELD
2 001 72.92.0                        09147                0 FOR CARRIAGE CONTROL
2 005 72.93.0                        09152                        FOR VERTICLE INDEX
2 034 72.94.0                        09186                      04/54      09/59      14/64
2 033 72.95.0                        09219                     19/69      24/74      29/79
2 033 72.96.0                        09252                     34/84      39/89      44/94
2 011 72.97.0                        09263                     49/99
2 001 72.97.5                        09264                    1 BLANK
2 001 72.98.0                        09265                ¤
7     73.00.0
7     73.01.0                                             SHORT WORK SPACES
2 011 73.02.0                        09276                00000000000    HASH TOTAL #1
2 011 73.03.0                        09287                00000000000    HASH TOTAL #2
2 011 73.03.5                        09298                000000000000   HASH TOTL #3
2 011 73.03.7                        09309                00000000000    HASH TOTAL FOR FIRST PASS
5 001 73.04.0                        09310                FOR SETTING UP CONTROL WORD
5 100 73.05.0                        09410                X
5 001 73.06.0                        09411                FOR CONTROL CARD
5 080 73.07.0                        09491                X
2 001 73.08.0                        09492                ¤
5 035 73.09.0                        09527                SIFTED CONTROL CARD FIELDS
5 035 73.10.0                        09562                TABLE #1
5 035 73.11.0                        09597                TABLE #2
5 008 73.12.0                        09605                FOR TABLE BUILD UP AND TABLE #1 WS
5 004 73.13.0                        09609                FOR SUM OF TABLE #1 LENGTHS
5 008 73.14.0                        09617                TABLE #2 WORK SPACE
5 001 73.15.0                        09618                FOR ERROR ROUTINE
5 101 73.16.0                        09719
7     73.50.0
7     73.51.0                                             MORE MESSAGES
7     73.52.0                                             #21
2 001 73.53.0                        09720
2 029 73.54.0                        09749                RECORD COUNT IN ERROR=RESTART
2 001 73.55.0                        09750                ¤
7     73.56.0                                             #22
2 001 73.57.0                        09751
2 027 73.58.0                        09778                HASH TOTAL IN ERROR=RESTART
2 001 73.59.0                        09779                ¤
7     73.60.0                                             #23
2 001 73.61.0                        09780                ¤
2 022 73.62.0                        09802                RESTART ON 090X CHECK
2 026 73.63.0                        09828                PROCESSING RECORD #XXXXXX
2 001 73.64.0                        09829                ¤
7     73.69.0                                             #25
2 001 73.70.0                        09830
2 017 73.71.0                        09847                RECORD ELIMINATED
2 001 73.72.0                        09848                ¤
7     73.73.0                                             #26
2 001 73.74.0                        09849
2 017 73.75.0                        09866                NEXT TO LAST PASS
2 001 73.76.0                        09867                ¤
7     73.77.0                                              27
2 002 73.78.0                        09869
2 016 73.79.0                        09885                RECORDS #XXXXXX
```

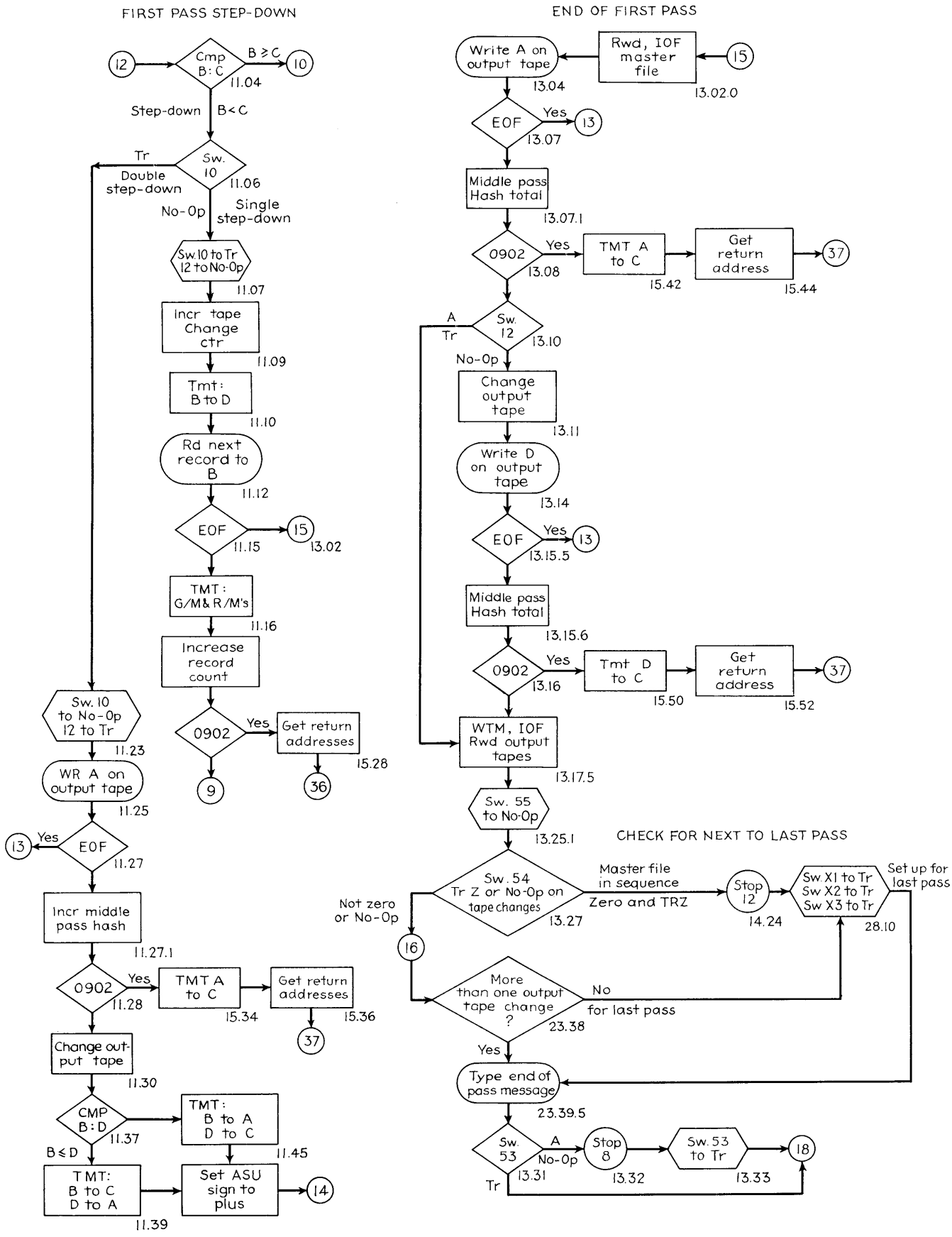
C L	LNG	SYMBOLIC LOC	OP	ADDR	INCR	ASU	ACTUAL LOC	OP	ADDR	ADDR	S N	DATA OR DESCRIPTION
2	012	73.80.0					09897					AND #XXXXXX
2	029	73.81.0					09926					WITH DUPLICATE CONTROL FIELDS
2	001	73.82.0					09927					¤
7		73.83.0										#28
2	021	73.84.0					09948					RESTART PREVIOUS PASS
2	001	73.85.0					09949					¤
7		75.00.0										
7		75.01.0										WORK AREA FOR RECORDS
6		75.01.5		09999								
5	001	75.02.0					09999					SECTION A - FOR STORAGE OF
5	900	75.03.0					10899					RECORD IN BETWEEN
5	900	75.04.0					11799					COMPARISONS
5	699	75.05.0					12498					
5	001	75.09.0					12499					SECTION B - READ IN AREA
5	900	75.10.0					13399					
5	900	75.11.0					14299					
5	699	75.12.0					14998					
5	001	75.16.0					14999					SECTION C - WRITE AREA
5	900	75.17.0					15899					
5	900	75.18.0					16799					
5	699	75.19.0					17498					
5	001	75.26.0					17499					SECTION D - FOR STORAGE OF
5	900	75.27.0					18399					SINGLE STEP-
5	900	75.28.0					19299					DOWN RECORD
5	699	75.29.0					19998					

ASSIGNMENT SECTION

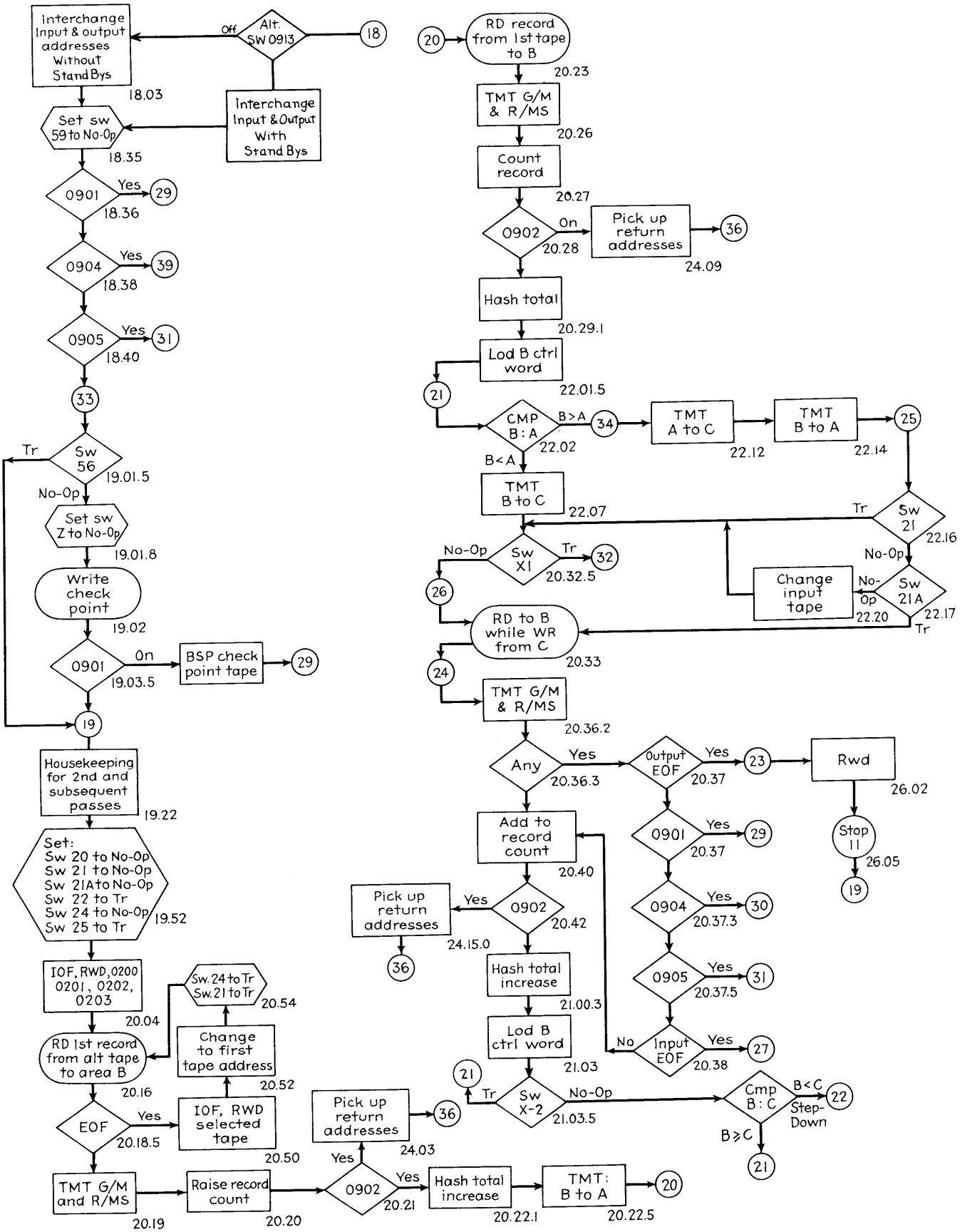


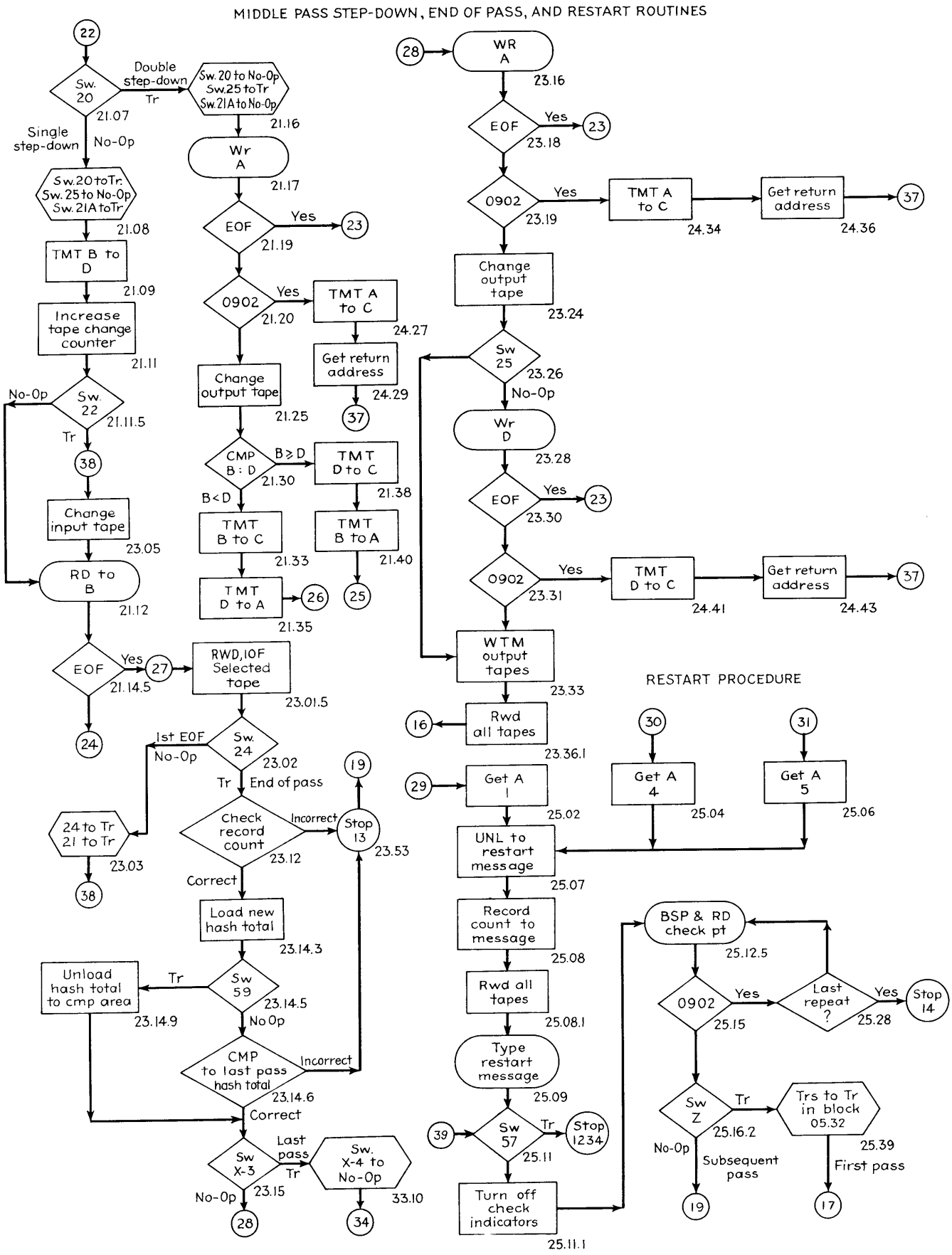
FIRST PASS

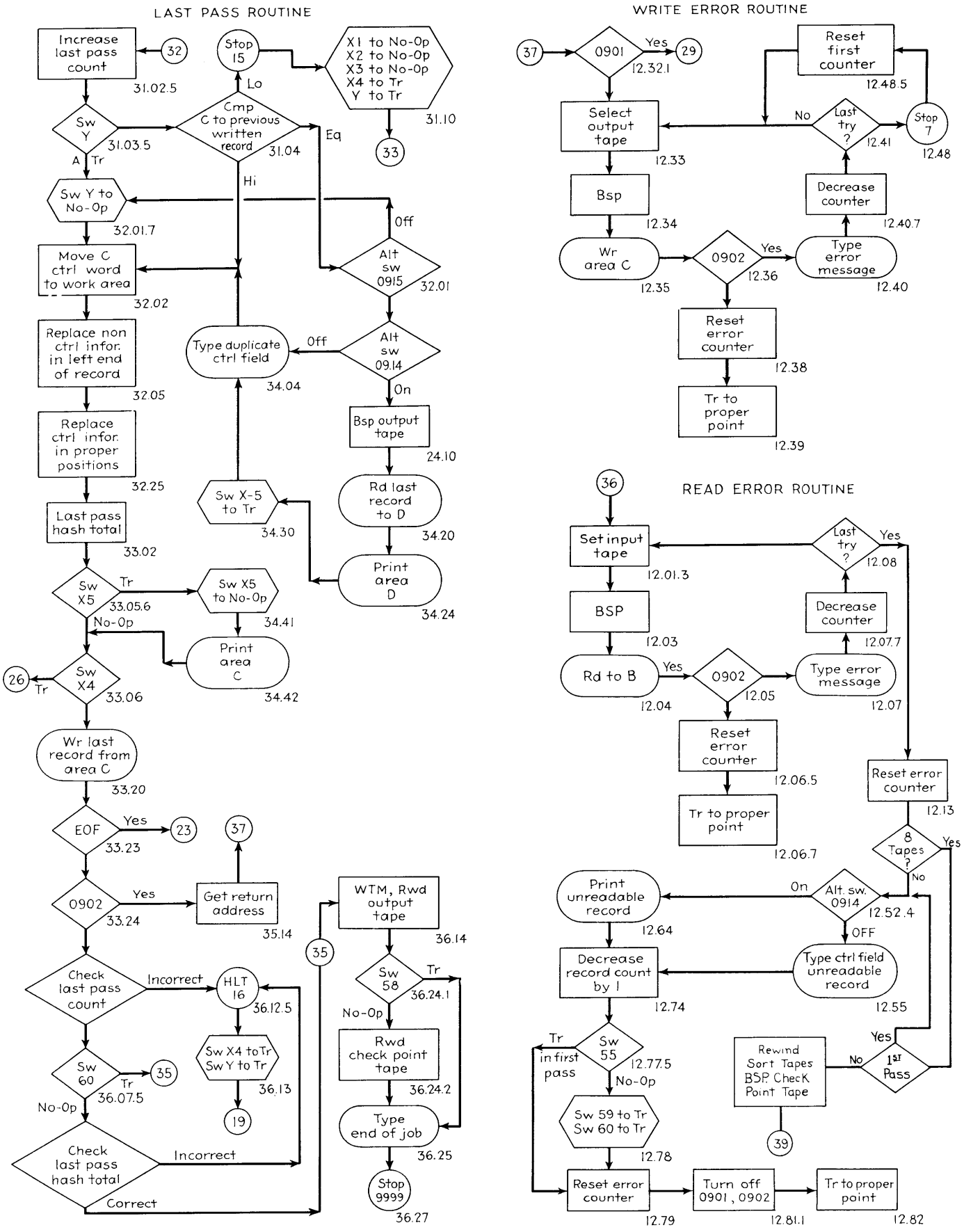

8
Rwd, IOF tapes 0200, 0201, 0202, 0203
10.03
Sw. 1
Tr
No-Op
10.15
Rwd, IOF tape 0204
10.16
Rd first rec'd from master to area B
10.19
EOF
Yes
10.22
Stop 9
14.02
8
TMT G/M & 5 R/M'S to end of rec'd
10.23
Incr rec'd count
10.24
0902
Yes
10.25
Pick up return address
15.03
36
9
Hash total first ten char of record
10.53
Set up ctrl word in work space
10.57
Move non-ctrl inf. to vacated space
10.84
Move ctrl word to beginning of record
11.02
Sw 2
No-Op
11.03.5
A Tr
Sw. 2A
No-Op
11.03.6
12
A Tr
Sw. 2A to No-Op
11.58
10
Move first record from B to A
10.27.3
Read second record to area B
10.28
EOF
No
10.31
Yes
Stop 10
14.08
8
TMT G/M & 5 R/M'S to end of rec'd
10.32
Increase record count
10.33
0902
Yes
10.34
Pick up return address
15.09
36
Sw. 2 to No-Op
10.36
9
10
CMP B:A
B < A
11.52
TMT: B to C
11.55
Set sw 54 from Tr Z to No-Op
11.56.5
B ≥ A
TMT: A to C
11.58
TMT: B to A
11.60
14
Rd to B while writing from C
11.38
Output EOF
Yes
10.42
13
Rwd outp. tape
14.14
Stop 11
14.17
Restore switches to beginning status
14.18
11
Add to middle Pass hash total from area C
10.42.1
Input EOF
Yes
10.43
15
TMT G/M & R/M'S to input record
10.45
Incr. rec'd count
10.45.1
9
Any
10.45.2
Yes
0901
Yes
10.46.1
29
0904
Yes
10.46.3
30
0905
Yes
10.46.5
31
0902
Yes
10.47
Get return addresses
15.15
36
9

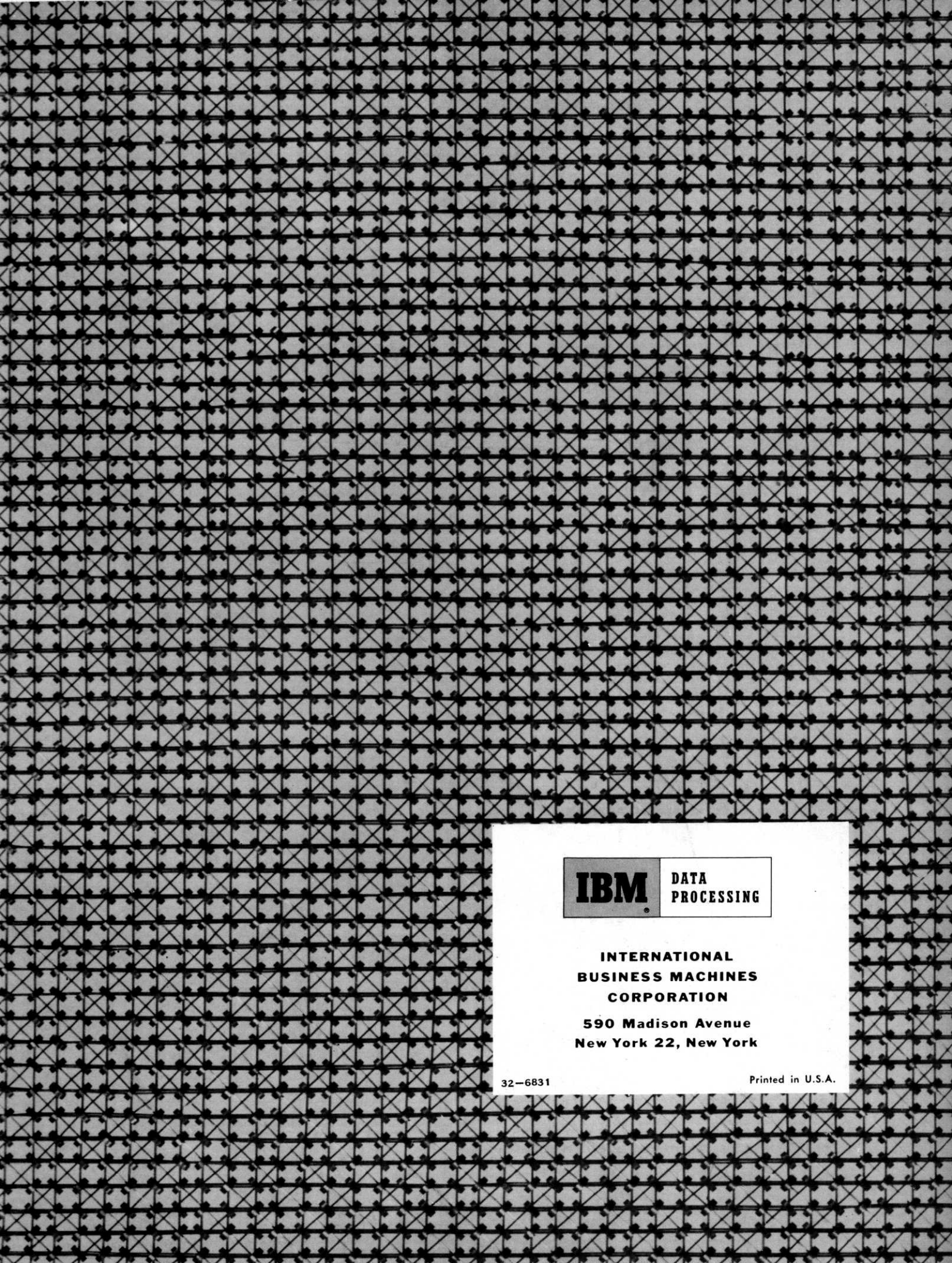

FIRST PASS STEP-DOWN
12
Cmp B:C
11.04
B ≥ C
10
Step-down
B < C
Sw. 10
11.06
Tr
Double step-down
No-Op
Single step-down
Sw.10 to Tr 12 to No-Op
11.07
Incr tape Change ctr
11.09
Tmt: B to D
11.10
Rd next record to B
11.12
EOF
11.15
15
13.02
TMT: G/M& R/M's
11.16
Increase record count
0902
Yes
Get return addresses
15.28
9
36
Sw. 10 to No-Op 12 to Tr
11.23
WR A on output tape
11.25
13
Yes
EOF
11.27
Incr middle pass hash
11.27.1
0902
11.28
Yes
TMT A to C
15.34
Get return addresses
15.36
37
Change output tape
11.30
CMP B:D
11.37
TMT: B to A D to C
11.45
B ≤ D
TMT: B to C D to A
11.39
Set ASU sign to plus
14
END OF FIRST PASS
Write A on output tape
13.04
Rwd, IOF master file
13.02.0
15
EOF
13.07
Yes
13
Middle pass Hash total
13.07.1
0902
13.08
Yes
TMT A to C
15.42
Get return address
15.44
37
A
Tr
Sw. 12
13.10
No-Op
Change output tape
13.11
Write D on output tape
13.14
EOF
13.15.5
Yes
13
Middle pass Hash total
13.15.6
0902
13.16
Yes
Tmt D to C
15.50
Get return address
15.52
37
WTM, IOF Rwd output tapes
13.17.5
Sw. 55 to No-Op
13.25.1
CHECK FOR NEXT TO LAST PASS
Sw. 54 Tr Z or No-Op on tape changes
13.27
Master file in sequence
Zero and TRZ
Stop 12
14.24
Sw X1 to Tr Sw X2 to Tr Sw X3 to Tr
28.10
Set up for last pass
Not zero or No-Op
16
More than one output tape change ?
23.38
No
for last pass
Yes
Type end of pass message
23.39.5
Sw. 53
13.31
A
No-Op
Tr
Stop 8
13.32
Sw. 53 to Tr
13.33
18

SECOND AND SUBSEQUENT PASSES




MIDDLE PASS STEP-DOWN, END OF PASS, AND RESTART ROUTINES
22
Sw. 20
21.07
Double step-down
Tr
Sw. 20 to No-Op
Sw. 25 to Tr
Sw. 21A to No-Op
21.16
Single step-down
No-Op
Sw. 20 to Tr.
Sw. 25 to No-Op
Sw. 21A to Tr
21.08
TMT B to D
21.09
Increase tape change counter
21.11
No-Op
Sw. 22
21.11.5
Tr
38
Change input tape
23.05
RD to B
21.12
EOF
21.14.5
Yes
27
RWD, IOF Selected tape
23.01.5
24
1st EOF
No-Op
Sw. 24
23.02
Tr
End of pass
24 to Tr
21 to Tr
23.03
38
Check record count
23.12
Incorrect
Stop 13
23.53
19
Correct
Load new hash total
23.14.3
Unload hash total to cmp area
23.14.9
Tr
Sw 59
23.14.5
No Op
CMP to last pass hash total
23.14.6
Incorrect
Correct
Sw X-3
23.15
Last pass
Tr
Sw. X-4 to No-Op
33.10
No-Op
28
34
Wr A
21.17
EOF
21.19
Yes
23
0902
21.20
Yes
TMT A to C
24.27
Get return address
24.29
37
Change output tape
21.25
CMP B : D
21.30
B ≥ D
TMT D to C
21.38
B < D
TMT B to C
21.33
TMT B to A
21.40
TMT D to A
21.35
26
25
28
WR A
23.16
EOF
23.18
Yes
23
0902
23.19
Yes
TMT A to C
24.34
Get return address
24.36
37
Change output tape
23.24
Sw 25
23.26
No-Op
Wr D
23.28
EOF
23.30
Yes
23
0902
23.31
Yes
TMT D to C
24.41
Get return address
24.43
37
WTM output tapes
23.33
16
Rwd all tapes
23.36.1
29
Get A 1
25.02
UNL to restart message
25.07
Record count to message
25.08
Rwd all tapes
25.08.1
Type restart message
25.09
39
Sw 57
25.11
Tr
Stop 1234
Turn off check indicators
25.11.1
RESTART PROCEDURE
30
Get A 4
25.04
31
Get A 5
25.06
BSP & RD check pt
25.12.5
0902
25.15
Yes
Last repeat ?
25.28
Yes
Stop 14
Sw Z
25.16.2
Tr
Trs to Tr in block 05.32
25.39
No-Op
Subsequent pass
First pass
19
17


LAST PASS ROUTINE
Increase last pass count
31.02.5
32
Stop 15
X1 to No-Op
X2 to No-Op
X3 to No-Op
X4 to Tr
Y to Tr
31.10
33
Lo
Cmp C to previous written record
31.04
Eq
Hi
Sw Y
31.03.5
A
Tr
Sw Y to No-Op
32.01.7
Move C ctrl word to work area
32.02
Alt sw 0915
32.01
Off
Replace non ctrl infor. in left end of record
32.05
Type duplicate ctrl field
34.04
Alt sw 09.14
Off
On
Bsp output tape
24.10
Replace ctrl infor. in proper positions
32.25
Sw X-5 to Tr
34.30
Rd last record to D
34.20
Last pass hash total
33.02
Print area D
34.24
Sw X5
33.05.6
Tr
Sw X5 to No-Op
34.41
No-Op
Print area C
34.42
26
Tr
Sw X4
33.06
Wr last record from area C
33.20
EOF
Yes
23
33.23
37
0902
Yes
Get return address
35.14
33.24
WTM, Rwd output tape
36.14
35
Check last pass count
Incorrect
HLT 16
36.12.5
Sw 58
Tr
36.24.1
No-Op
Sw X4 to Tr
Sw Y to Tr
36.13
Rwd check point tape
36.24.2
Sw 60
Tr
35
36.07.5
No-Op
19
Type end of job
36.25
Check last pass hash total
Incorrect
Correct
Stop 9999
36.27
WRITE ERROR ROUTINE
37
0901
Yes
29
12.32.1
Reset first counter
12.48.5
Select output tape
12.33
No
Last try ?
12.41
Stop 7
12.48
Bsp
12.34
Decrease counter
12.40.7
Wr area C
12.35
0902
12.36
Yes
Type error message
12.40
Reset error counter
12.38
Tr to proper point
12.39
READ ERROR ROUTINE
36
Set input tape
12.01.3
Last try ?
Yes
12.08
BSP
12.03
Decrease counter
12.07.7
Rd to B
12.04
Yes
0902
12.05
Type error message
12.07
Reset error counter
12.06.5
Tr to proper point
12.06.7
Reset error counter
12.13
8 Tapes ?
Yes
No
Print unreadable record
12.64
On
Alt. sw. 0914
12.52.4
OFF
Decrease record count by 1
12.74
Type ctrl field unreadable record
12.55
Tr in first pass
Sw 55
12.77.5
No-Op
Yes
No
1ST Pass
Rewind Sort Tapes BSP Check Point Tape
39
Sw 59 to Tr
Sw 60 to Tr
12.78
Reset error counter
12.79
Turn off 0901, 0902
12.81.1
Tr to proper point
12.82



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