

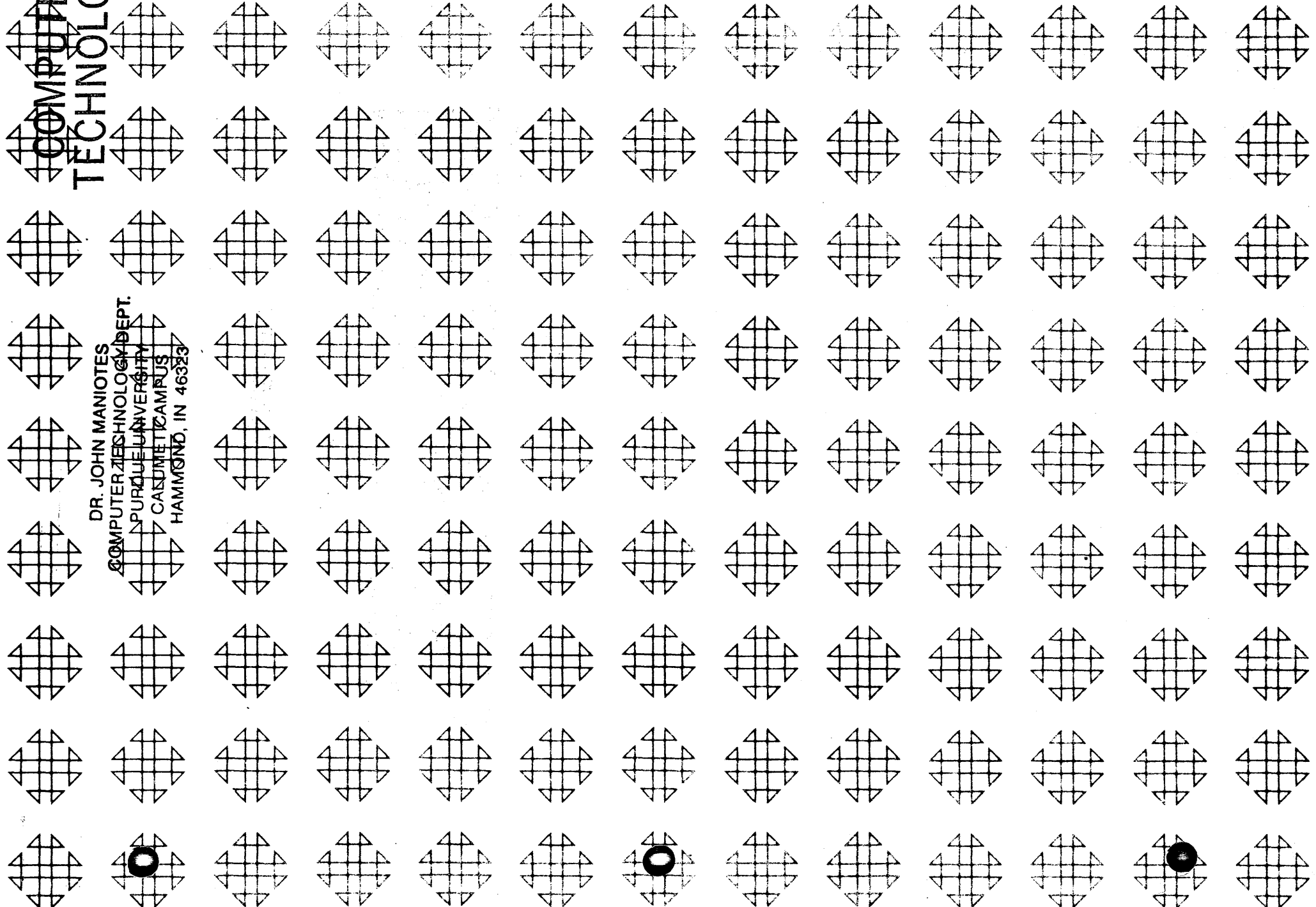
1620 GENERAL PROGRAM LIBRARY

REPRODUCER (or RESCUE, from the phrase
Reproduce, Emit, and Sequence on CUE)

1. 6. 119

COMPUTER
TECHNOLOGY

DR. JOHN MANIOTES
COMPUTER TECHNOLOGY DEPT.
PURDUE UNIVERSITY
CASCAMET CAMPUS
HAMMOND, IN 46323



217011AM WHOL. 80
1981 YOCOROMHBT 810 1100
YH810101 810101
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1620 USERS GROUP PROGRAM REVIEW AND EVALUATION

(fill out in typewriter or pencil, do not use ink)

Program No. _____

Date _____

Program Name: _____

1. Does the abstract adequately describe what the program is and what it does? Yes ___ No ___
Comment _____
2. Does the program do what the abstract says? Yes ___ No ___
Comment _____
3. Is the Description clear, understandable, and adequate? Yes ___ No ___
Comment _____
4. Are the Operating Instructions understandable and in sufficient detail? Yes ___ No ___
Comment _____
Are the Sense Switch options adequately described (if applicable)? Yes ___ No ___
Are the mnemonic labels identified or sufficiently understandable? Yes ___ No ___
Comment _____
5. Does the source program compile satisfactorily (if applicable)? Yes ___ No ___
Comment _____
6. Does the object program run satisfactorily? Yes ___ No ___
Comment _____
7. Number of test cases run _____. Are any restrictions as to data, size, range, etc. covered adequately in description? Yes ___ No ___
Comment _____
8. Does the Program Meet the minimal standards of the 1620 Users Group? Yes ___ No ___
Comment _____
9. Were all necessary parts of the program received? Yes ___ No ___
Comment _____
10. Please list on the back any suggestions to improve the usefulness of the program. These will be passed onto the author for his consideration.

Please return to:

Mr. Richard L. Pratt
Data Corporation
7500 Old Xenia Pike
Dayton, Ohio 45432

Your Name _____

Company _____

Address _____

User Group Code _____

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11/09/64



1620 USERS GROUP LIBRARY
PROGRAM ABSTRACT

TITLE OF PROGRAM
REPRODUCER (OR RESCUE, FROM THE PHRASE REPRODUCE, EMIT, AND
SEQUENCE ON CUE)

AUTHOR
MARILYN SUE WILSON

ADDRESS
UNIVERSITY COMPUTING CENTER
UNIVERSITY OF MAINE
ORONO, MAINE

1620 USERS GROUP MEMBERSHIP CODE
1108

DATE
OCTOBER 22, 1964

Modifications or revisions to this program, as they occur,
will be announced in the appropriate Catalog of Programs
for IBM Data Processing Systems. When such an announce-
ment occurs, users should order a complete new program
from the Program Information Department.

1. TITLE (If subroutine, state in Title): REPRODUCER (or RESCUE, i.e., Reproduce, Emit, and Sequence on CUE).
2. Author; Organization: Marilyn Sue Wilson, University Computing Center, University of Maine, Orono, Maine
Date: October 22, 1964 Users Group Membership Code: 1108
3. Direct Inquiries to Name: Russell A. Altenberger, University Computing Center, University of Maine, Orono, Maine Phone: 866-7471
4. Description/Purpose: (5. Method; 6. Restriction/Range; When Applicable) This program simulates the card reproducing, emitting, and sequencing functions of an IBM 519 reproducer. Up to six functions may be performed at the same time, specified by control cards - (1) Move fields (up to 48 fields, each of any length), (2) Emit characters, (3) Set to blank, (4) Clear flags, (5) Set flags, and (6) Sequence (from a specified initial number and by a specified increment). The control card format is simple (simple enough to be punched from memory) and the number of control cards is low (1, 2, or 3 per function used), despite the versatility of the program.
7. Specifications (Check or fill in appropriate spaces):
 - a. Storage used by program: 20,000 minimum (program uses 00401-12809)
 - b. Equipment required by program:
Card System X ; Magnetic Tape System _____ ; No. of Tapes _____ ;
Paper Tape System _____ ; Disk File System _____ ; No. of Packs _____ ;
TNS, TNF, MF X ; Auto divide X ; Indirect addressing X ; Floating point hardware _____ ;
Other (specify) None
 - Can program be used on lesser Machine? No . Specify which requirements can be easily removed None
 - c. Programming type (Check appropriate spaces):
Fortran without Format _____ ; Fortran with Format _____ ;
Fortran II _____ ; Mainline, Complete _____ ; Subroutine or function subprogram(S or F) _____ ;
Is the program a library (ie, SPS) function to the Fortran system checked? _____ ;
SPS _____ ; SPS - 1620/1710 X ;
Mainline, Complete _____ ; Macro _____ ; Subroutine _____ ;
Other programming language: _____ ; Give details _____
 - d. Language used in the writeup: English
8. Additional Remarks: Subject classification - 1.6

DECK KEY

DECK NUMBER	DECK NAME	SEQUENCE NUMBERS
1	SOURCE DECK	10000-10421
2	CONDENSED OBJECT DECK	00000-00108
3	SAMPLE DATA	

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REPRODUCER

TABLE OF CONTENTS

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I. DESCRIPTION

THE REPRODUCER PROGRAM SIMULATES THE CARD REPRODUCING, EMITTING, AND SEQUENCING FUNCTIONS OF THE IBM 519 REPRODUCER. UP TO SIX DIFFERENT FUNCTIONS MAY BE PERFORMED AT THE SAME TIME AS SPECIFIED BY CONTROL CARDS - (1) MOVE FIELDS, (2) EMIT CHARACTERS, (3) SET TO BLANK, (4) CLEAR FLAGS, (5) SET FLAGS, AND (6) SEQUENCE.

ONE CONTROL CARD SPECIFIES WHETHER THE 1620 IS TO REPRODUCE CARDS OR IS TO PUNCH ONLY (WITHOUT READING).

SETS OF TWO OR THREE CONTROL CARDS EACH SPECIFY DETAILS OF THOSE OF THE SIX ABOVE-MENTIONED FUNCTIONS THAT ARE TO BE USED. IF A FUNCTION IS NOT TO BE USED, NO CONTROL CARDS ARE ENTERED FOR IT.

THE PROGRAM IS INTENDED TO BE VERSATILE, BUT AT THE SAME TIME CONVENIENT AND EASY TO USE. CONTROL CARD FORMAT HAS BEEN KEPT SIMPLE AND BRIEF, AND THE NUMBER OF CONTROL CARDS HAS BEEN KEPT LOW.

II. CONTROL CARDS

A. CONTROL CARD USE AND FORMATS

1. \$ CARD

THE \$ CARD SPECIFIES ONE OF THREE BASIC OPERATING MODES FOR THE PROGRAM-

1. REPRODUCE 80-80, EXCEPT AS OTHERWISE SPECIFIED BY THE VARIABLE CONTROL CARDS.
2. REPRODUCE ONLY AS SPECIFIED BY THE VARIABLE CONTROL CARDS.
3. PUNCH ONLY (I.E., WITHOUT READING).

THE \$ CARD IS PUNCHED WITH A \$ IN COLUMN 1 AND THE NUMBER OF THE BASIC OPERATING MODE IN COLUMN 2. (COMMENTS IDENTIFYING THE CARD MAY BE PUNCHED IN THE REST OF IT.)

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FOR EXAMPLE-

\$1 REPRODUCE 80-80
\$2 REPRODUCE ONLY AS SPECIFIED
\$3 PUNCH ONLY

ONE, AND ONLY ONE, \$ CARD MUST BE USED.

2. VARIABLE CONTROL CARDS

THE VARIABLE CONTROL CARDS SPECIFY THE DETAIL OPERATING FUNCTIONS OF THE REPRODUCER PROGRAM. TWO OR THREE CONTROL CARDS ARE REQUIRED FOR EACH FUNCTION. THE FIRST CARD SPECIFIES THE FUNCTION AND THE NEXT ONE OR TWO CARDS SPECIFY THE COLUMNS TO BE OPERATED UPON. EXCEPT FOR SEQUENCING, THERE IS NO LIMIT TO THE LENGTH OR NUMBER OF FIELDS. ANY ALPHAMERIC CHARACTER MAY BE USED TO DESIGNATE A FIELD. SEE THE SAMPLE CONTROL CARDS IN SECTION IIC.

1. REPRODUCE

- CARD 1 - COL. 1-9 REPRODUCE
CARD 2 - SPECIFIES WHICH FIELDS ARE TO BE MOVED. THESE FIELDS ARE SET BLANK UNLESS FILLED BY FURTHER OPERATIONS.
CARD 3 - SPECIFIES WHERE THE FIELDS ARE TO BE MOVED TO. FIELDS ARE MATCHED BY CHARACTER AND LENGTH. A FIELD DEFINED IN CARD 2 MAY BE MOVED TO MORE THAN ONE NON-ADJACENT FIELD DEFINED IN CARD 3.

2. EMIT

- CARD 1 - COL. 1-4 EMIT
CARD 2 - ALL NON-BLANK CHARACTERS IN THIS CARD WILL BE PUNCHED IN THE OUTPUT CARD. (DOES NOT EMIT BLANKS. USE VARIABLE CONTROL CARD 3. BLANKS, TO SET COLUMNS BLANK.)

3. SET TO BLANK

- CARD 1 - COL. 1-5 BLANK
CARD 2 - ALL NON-BLANK COLUMNS IN THIS CARD WILL BE SET BLANK IN THE OUTPUT CARD.

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- 4. CLEAR FLAG
 CARD 1 - COL. 1-10 CLEAR FLAG
 CARD 2 - ALL NON-BLANK COLUMNS WILL HAVE FLAGS (ANY ZONE PUNCH) REMOVED (I.E., HIGH ORDER POSITION OF ALPHAMERIC CHARACTER IS SET TO 7).
- 5. SET FLAG
 CARD 1 - COL. 1-8 SET FLAG
 CARD 2 - ALL NON-BLANK COLUMNS WILL HAVE FLAGS (11-PUNCH) INSERTED (I.E., HIGH ORDER POSITION OF ALPHAMERIC CHARACTER IS SET TO 5).
- 6. SEQUENCE
 CARD 1 - COL. 1-8 SEQUENCE
 10-14 BY XX
 COLUMNS 10-14 MAY BE LEFT BLANK IF SEQUENCE INCREMENTING IS TO BE BY ONES. IF OTHER THAN BY ONES, XX SHOULD EQUAL THE DESIRED INCREMENT. EMIT ZEROS IF INCREMENTING BY HUNDREDS.
 CARD 2 - NON-BLANK FIELD SPECIFIES LOCATION, LENGTH, AND FIRST SEQUENCE NUMBER TO BE PUNCHED. LEADING ZEROS MUST BE PUNCHED IN ESTABLISH LENGTH AND WILL BE PUNCHED IN OUTPUT CARD. THE SEQUENCE FIELD MAY RANGE IN LENGTH FROM 2 TO 10 COLUMNS, INCLUSIVE. ONLY ONE SEQUENCE FIELD IS PERMITTED.

3. GO CARD

THE GO CARD IS PUNCHED WITH THE WORD GO IN COLUMNS 1-2 AND INDICATES THAT ALL CONTROL CARDS HAVE BEEN READ. PROCESSING WILL BEGIN AFTER THE GO CARD HAS BEEN READ.

C. SAMPLE CONTROL CARDS

```

$1 REPRODUCE 80-80
$2 REPRODUCE ONLY AS SPECIFIED
$3 PUNCH ONLY
REPRODUCE
AAA BBB 22
BBB AAA 22
EMIT
A12345Z
BLANK
AA 11
CLEAR FLAG
*** 55
SET FLAG
AA A
SEQUENCE BY 25
GO
  
```

0000050

III. OPERATING INSTRUCTIONS

A. DECK PREPARATION

THE INPUT MUST BE ASSEMBLED IN THE FOLLOWING ORDER-

1. PROGRAM DECK
2. ONE \$ CARD AND THE VARIABLE CONTROL CARDS. NO ORDER IS REQUIRED FOR THESE CARDS.
3. GO CARD
4. DATA CARDS (NONE, IF \$3 CARD IS USED)

B. MACHINE OPERATION

1. PLACE ASSEMBLED PROGRAM AND DATA IN READ HOPPER.
2. READY PUNCH.
3. PRESS RESET AND LOAD, START AFTER PROGRAM IS LOADED.
NOTE- IF ANY CONTROL CARD ERRORS ARE DETECTED, THE PROGRAM WILL STOP AFTER PRINTING THIS MESSAGE-
ERROR IN CONTROLS.
AFTER MAKING PROPER CORRECTIONS, PLACE CORRECTED CONTROL CARDS IN READ HOPPER.
PRESS START. PROGRAM WILL AUTOMATICALLY RESTART.
4. PROGRAM WILL RUN UNTIL ALL DATA CARDS HAVE BEEN PROCESSED AND WILL STOP WITH READER NO FEED FOR \$1 AND \$2 CARDS AND PUNCH NO FEED FOR \$3 CONTROL CARD.

C. RESTART PROCEDURE

TO RESTART THE PROGRAM FOR A NEW SET OF CONTROL CARDS, PERFORM THE FOLLOWING OPERATIONS-

1. PRESS - RESET, INSERT, RELEASE, START.
2. IF STEP 1 DOES NOT FUNCTION CORRECTLY, PRESS - RESET, INSERT, TYPE 4900409 (FLAG OVER 9), RELEASE, START.

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D. ERROR MESSAGES

THE FOLLOWING MESSAGES MAY APPEAR IF AN ERROR IS DETECTED. EXCEPT FOR THE SEQUENCE OVERFLOW MESSAGE, PROCESSING WILL STOP IF ANY ERROR IS FOUND.

1. NO \$1, \$2, OR \$3 CARD.
2. OTHER THAN EMIT OR SEQ WITH \$3 CONTROL.
3. UNDEFINED CONTROL CARD.
4. SEQUENCE FIELD NOT IN 2-10 COL RANGE.
5. UNMATCHED CODES OR LENGTHS IN REPRO CARD.
6. SEQUENCE OVERFLOW. (IF INCREMENTING OF SEQUENCE FIELD CAUSES AN OVERFLOW CONDITION, THIS MESSAGE WILL BE PRINTED ONCE. INCREMENTING WILL CONTINUE, BUT HIGH ORDER OVERFLOW CHARACTERS WILL BE LOST.)

IV. EQUIPMENT REQUIRED AND PROGRAMMING SYSTEM USED

THE REPRODUCER PROGRAM REQUIRES THE FOLLOWING MACHINE SPECIFICATIONS-

IBM 1620 WITH MINIMUM 20,000 CORE
CARD SYSTEM
TNS, TNF, MF
AUTO DIVIDE
INDIRECT ADDRESSING

THE PROGRAM WAS ASSEMBLED USING SPS-1620/1720.

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COMPUTER TECHNOLOGY

SAMPLE INPUT AND OUTPUT

CASE 3- PUNCH ONLY (NO REPRODUCING)

INPUT

\$3
EMIT *** UNIVERSITY OF MAINE ***
SEQUENCE BY 2
GO

02

OUTPUT

*** UNIVERSITY OF MAINE *** 02
*** UNIVERSITY OF MAINE *** 04
*** UNIVERSITY OF MAINE *** 06
*** UNIVERSITY OF MAINE *** 08
*** UNIVERSITY OF MAINE *** 10

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			01001 *		REPRODUCER
00405			01005	DORG 00405	
00409	00005	-1842	01006	DSA START	
00410	M9 0040R	00000	01007 RST1	B 409.,.06.	
00423	00002		01010 CT1	DC 2.00.,	ERROR=FLAG
00425	00002		01020 CT2	DC 2.00.,	NO SET FLAGS
00427	00002		01030 CT3	DC 2.00.,	NO CLEAR FLAGS
00429	00002		01040 CT4	DC 2.00.,	\$1,\$2,\$3 CODE
00431	00002		01050 CT5	DC 2.00.,	NO FROM FIELDS
00433	00002		01060 CT6	DC 2.00.,	NO BLANK FIELDS
00435	00002		01070 CT7	DC 2.00.,	NO EMIT FIELDS
00437	00002		01080 CT8	DC 2.00.,	NO TO FIELDS
00439	00002		01090 CT9	DC 2.00.,	NO FROM COLS TO BE CLEARED
00448	00009		01120 FTBL	DSB 9.20.,	CODE(2),LENGTH(2),RIGHT POSITION IN FROM(5)
00441			01130 FCD	DS +FTBL-7.,	
00443			01140 FLNG	DS +FTBL-5.,	
00448			01150 FRT	DS +FTBL.,	
00629	00010		01190 SQHLD	DC 10.0000000000.,	SEQUENCE FIELD
00631	00002		01200 SQCT	DC 2.00.,	SEQUENCE INCREMENT
00633	00002		02010 CCODE	DC 2.00.,	CONSTANTS FOR COLUMN SEARCH
00635	00002		02020 CLONG	DC 2.00.,	• LENGTH OF FIELD
00637	00002		02030 CLFT	DC 2.00.,	• LEFTMOST COLUMN NUMBER
00639	00002		02040 CRT	DC 2.00.,	• RIGHTMOST COLUMN NUMBER
00644	00005		02050 TEMP5A	DC 5.00000.,	• WORKING AREA
00649	00005		02060 TEMP5B	DC 5.00000.,	• WORKING AREA
00651	00002		02070 TEMP2	DC 2.00.,	• NEXT COL TO BE CHECKED(=81 AT END OF
00653	00002		02090 WORK2	DC 2.00.,	
00663	00010		02100 Z10	DC 10.0000000000.,	
00664	M9 07278	00000	03010 BR1	B E4A-11.,.0	
00676	M9 06246	00000	03020 BR2	B QUES1.,.0.	
00688	M9 08250	00000	03040 BR4	B E5A-11.,.0.	
00700	M9 09222	00000	03050 BR5	B E6A-11.,.0.	
00712	M9 10194	00000	03060 BR6	B E8A-11.,.0.	
00724	M9 11166	00000	03080 BR8	B E9A-11.,.0.	
00736	M9 12138	00000	03090 BR9	B E7A.,.0.	
00748	L2 00748	00000	04060 DUM4A	SF **.,.0.	
00760	K6 00760	00760	04100 DUM5A	TF **.,.0.	
00772	J6 00772	00772	04110 DUM6A	TFM **.,.0.	
00784	P3 00784	00629	04130 DUM7A	TNF **.,SQHLD.,0.	SEQUENCE
00796	K1 00629	00631	04140 DUM7B	A SQHLD.,SQCT.,0.	
00808	J5 00808	00005	04150 DUM8A	TDM **.,5.,0.	
00820	J5 00820	00007	04160 DUM9A	TDM **.,7.,0.	
00833	00050		05010 EMPTY	DAC 50.	
00933	00031		05020	DAC 31.	
00995	00091		05040 IN	DAS 81.,	

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01157	00081	05050	OUT	DAS	81,,		
00995		05060	CARD	DS	.IN,,		
01319	00002	07010	IS1	DAC	2,\$1		
01323	00002	07020	IS2	DAC	2,\$2		
01327	00002	07030	IS3	DAC	2,\$3		
01331	00009	07040	IS4	DAC	9,REPRODUCE		
01349	00005	07050	IS5	DAC	5,BLANK		
01359	00004	07060	IS6	DAC	4,EMIT		
01367	00008	07070	IS7	DAC	8,SEQUENCE		
01383	00003	07080	IS8	DAC	3,SET		
01389	00005	07090	IS9	DAC	5,CLEAR		
01399	00002	07100	IS10	DAC	2,GO		
01403	00021	07110	ERR1	DAC	21.NO \$1,\$2, OR \$3 CARDe.		
01445	00039	07120	ERR2	DAC	39.OTHER THAN EMIT OR SEQ WITH \$3 CONTROL@.		
01523	00023	07140	ERR4	DAC	23.UNDEFINED CONTROL CARDe.		
01569	00037	07180	ERR8	DAC	37.SEQUENCE FIELD NOT IN 2-10 COL RANGE@.		
01643	00018	07190	ERR9	DAC	18.SEQUENCE OVERFLOW@.		
01679	00041	07210	ERR11	DAC	41.UNMATCHED CODES OR LENGTHS IN REPRO CARDe.		
01761	00041	07290	ERR	DAC	41.ERROR IN CONTROLS. CORRECT + PRESS START@.		
		08001	*		BEGIN PROGRAM OPERATION		
01842	33	00932	00000	08010	START	CF	EMPTY+2*51-3
01854	16	01884	-0423	08020		TFM	8A+6,CT1,,
01866	16	00653	000-9	08030		TFM	WORK2,09,10.
01878	16	01878	000-0	08040	BA	TFM	** ,00,10.
01890	11	01884	-0002	08050		AM	8A+6,2.,
01902	12	00653	000-1	08060		SM	WORK2,01,10.
01914	47	01878	01200	08070		BNZ	8A
01926	26	00006	00416	08080		TF	6,RST1+6
01938	16	06252	-6258	08090		TFM	QUES1+6,QUES1+12,,
01950	16	06276	-6282	08100		TFM	QUES2+6,QUES2+12,,
01962	16	12216	-6246	08110		TFM	QUES3+6,QUES1,,
01974	16	00631	000-1	08125		TFM	SQCT,01,10.
01986	16	12139	000M1	08130		TFM	E7A+1,41,10.
01998	16	12151	000M1	08140		TFM	E7B+1,41,10.
02010	16	02700	-0441	08142		TFM	17C+6,FCD,,
02022	16	02712	-0443	08144		TFM	17D+6,FLNG,,
02034	16	02736	-0448	08146		TFM	17E+6,FRT,,
02046	16	02844	-5285	08148		TFM	17F+6,SF,,
02058	16	02880	-6295	08150		TFM	18A+6,CLFRM-10,,
02070	16	02892	-6305	08160		TFM	18B+6,CLFRM,,
02082	16	02904	-6300	08170		TFM	18C+6,CLFRM-5,,
02094	16	03336	-7289	08180		TFM	21C+6,E4A,,
02106	16	03480	-8251	08190		TFM	30C+6,F5A-10,,
02118	16	03492	-8261	08200		TFM	30D+6,E5A,,
02130	16	03504	-8256	09010		TFM	30E+6,E5A-5,,
02142	16	03660	-0994	09020		TFM	33A+6,CARD-1,,
02154	16	03672	-0995	09030		TFM	33B+6,CARD,,
02166	16	03696	-9233	09040		TFM	33C+6,E6A,,
02178	16	03701	-0995	09050		TFM	33C+11,CARD,,
02190	16	03768	-9228	09060		TFM	33D+6,E6A-5,,
02202	16	04176	-0629	09065		TFM	42F+6,SQHLD,,
02214	26	00629	00663	09066		TF	SQHLD,Z10,,
02226	16	04356	J0205	09070		TFM	50C+6,E8A,,
02238	16	04368	J0200	09080		TFM	50D+6,E8A-5,,
02250	16	04560	J1177	09090		TFM	52C+6,E9A,,
02262	16	04572	J1172	09100		TFM	52D+6,E9A-5,,
02274	26	01153	00991	10010	CNTRL	TF	CARD+2*80-2,EMPTY+2*80-2,,
02286	37	00995	00500	10020		RACD	CARD
02298	24	00997	01321	10030		C	CARD+2,IS1+2,, DETERMINE TYPE OF CONTROL CARD
02310	46	02562	01200	10040		BE	ONE
02322	24	00997	01325	10050		C	CARD+2,IS2+2
02334	46	02586	01200	10060		BE	TWO
02346	24	00997	01329	10070		C	CARD+2,IS3+2
02358	46	02610	01200	10080		BE	THREE
02370	24	01011	01347	10090		C	CARD+16,IS4+16
02382	46	02634	01200	10100		BE	REPRO
02394	24	01003	01357	10110		C	CARD+8,IS5+8
02406	46	03390	01200	10120		BE	BLANK
02418	24	01001	01365	10130		C	CARD+6,IS6+6
02430	46	03618	01200	10140		BE	EMIT
02442	24	01009	01381	10150		C	CARD+14,IS7+14
02454	46	03882	01200	10160		BE	SEQ
02466	24	00999	01387	10170		C	CARD+4,IS8+4
02478	46	04266	01200	10180		BE	SETFL
02490	24	01003	01397	10190		C	CARD+8,IS9+8
02502	46	04470	01200	10200		BE	CLRFL
02514	24	00997	01401	11010		C	CARD+2,IS10+2
02526	46	04674	01200	11020		BE	GO
02538	17	12750	-1523	11040		BTM	PRINT,ERR4,,
02550	49	02274	00000	11050		B	CNTRL
02562	16	00429	000-1	12010	ONE	TFM	CT4,01,10.
02574	49	02274	00000	12020		B	CNTRL
02586	16	00429	000-2	12030	TWO	TFM	CT4,02,10.
02598	49	02274	00000	12040		B	CNTRL
02610	16	00429	000-3	12060	THREE	TFM	CT4,03,10.
02622	49	02274	00000	12070		B	CNTRL
02634	17	12360	-0000	17010	REPRO	BTM	COLA,,, FROM/TO
02646	49	02670	00000	17020		B	17B,,, PROCESS FROM CARD
02658	17	12432	-0000	17030	17A	BTM	COLB,,,
02670	14	00635	000-0	17040	17B	CM	CLONG,00,10.
02682	46	03006	01200	17050		BE	19A
02694	26	02694	00633	17100	17C	TF	** ,CCODE,, (P = FCD)
02706	26	02706	00635	17110	17D	TF	** ,CLONG,, (P = FLNG)
02718	17	12294	-0995	17120		BTM	RIGHT,IN.
02730	26	02730	12293	17130	17E	TF	** ,RIGHT-1,, (P = FRT)
02742	11	02700	-0009	17140		AM	17C+6,9,,
02754	11	02712	-0009	17150		AM	17D+6,9,,
02766	11	02736	-0009	17160		AM	17E+6,9,,
02778	11	00431	000-1	17170		AM	CT5,01,10
02790	21	00439	00635	18010		A	CT9,CLONG,,
02802	17	12228	-0995	18020		BTM	LEFT,IN.,
02814	26	00754	12227	18022		TF	DUM4A+6,LEFT-1,,

02826	33	00750	00000	18024	CF	DUM4A+2	
02838	26	02838	00759	18026	TF	**DUM4A+11..	(P = SF)
02850	11	02844	-0012	18028	AM	17F+6.12..	
02862	17	12204	-1157	18030	BTM	RIGHT,OUT..	
02874	26	02874	00773	18040	TF	**DUM6A+1..	(P = CLFRM-10)
02886	16	02886	000-0	18050	TFM	**00.10.	(P = CLFRM)
02898	26	02898	12293	18060	TF	**RIGHT-1..	(P = CLFRM-5)
02910	11	02880	-0012	18070	AM	18A+6.12..	
02922	11	02892	-0012	18080	AM	18B+6.12..	
02934	11	02904	-0012	18090	AM	18C+6.12..	
02946	12	12293	-0002	18100	SM	RIGHT-1.2..	
02958	12	00635	000-1	18110	SM	CLONG.01.10.	
02970	47	02874	01200	18120	BNZ	18A	
02982	14	00651	00001	18160	CM	TEMP2.81.10.	
02994	47	02658	01200	18170	BNE	17A	
03006	17	12360	-0000	19010	BTM	COLA...	PROCESS TO CARD
03018	49	03042	00000	19020	B	19C	
03030	17	12432	-0000	19030	BTM	COLB	
03042	14	00635	000-0	19040	CM	CLONG.00.10	
03054	46	02274	01200	19050	BE	CNTRL	
03066	16	03125	-0441	19110	TFM	20A+11.FCD..	
03078	16	03257	-0443	19120	TFM	21A+11.FLNG..	
03090	16	03281	-0448	19130	TFM	21B+11.FRT..	
03102	16	03197	000-1	19140	TFM	20B+11.01.10.	
03114	24	00633	03114	20020	C	CCODE,***.	
03126	46	03234	01200	20030	BE	20D	
03138	11	03125	-0009	20050	AM	20A+11.9..	
03150	11	03257	-0009	20060	AM	21A+11.9..	
03162	11	03281	-0009	20070	AM	21B+11.9..	
03174	11	03197	000-1	20080	AM	20B+11.01.10.	
03186	14	00431	-3186	20090	CM	CT5,***.	
03198	46	03114	01300	20100	BNN	20A	
03210	17	12750	-1679	20110	BTM	PRINT,ERR11	
03222	49	02274	00000	20120	B	CNTRL	
03234	11	00437	000-1	20140	AM	CT8.01.10	
03246	24	00635	03246	21010	C	CLONG,***.	
03258	47	03210	01200	21020	BNE	20C	
03270	26	00771	03270	21040	TF	DUM5A+11,***	
03282	33	00767	00000	21050	CF	DUM5A+7	
03294	17	12294	-1157	21070	BTM	RIGHT,OUT	
03306	26	00766	12293	21080	TF	DUM5A+6,RIGHT-1	
03318	33	00762	00000	21090	CF	DUM5A+2	
03330	26	03330	00771	21110	TF	**DUM5A+11..	(P = E4A)
03342	11	03336	-0012	21120	AM	21C+6.12..	
03354	14	00651	00001	21140	CM	TEMP2.81.10.	
03366	47	03030	01200	21150	BNE	19B	
03378	49	02274	00000	21160	B	CNTRL	
03390	17	12360	-0000	30020	BTM	COLA...	BLANKS
03402	49	03426	00000	30030	B	30B	
03414	17	12432	-0000	30040	BTM	COLB	15
03426	14	00635	000-0	30060	CM	CLONG.00.10.	
03438	46	02274	01200	30070	BE	CNTRL	
03450	17	12294	-1157	30080	BTM	RIGHT,OUT	
03462	21	00433	00635	30090	A	CT6,CLONG..	
03474	26	03474	00773	30100	TF	**DUM6A+1..	(P = E5A-10)
03486	16	03486	000-0	30110	TFM	**00.10.	(P = E5A)
03498	26	03498	12293	30120	TF	**RIGHT-1..	(P = E5A-5)
03510	11	03480	-0012	30130	AM	30C+6.12..	
03522	11	03492	-0012	30140	AM	30D+6.12..	
03534	11	03504	-0012	30150	AM	30E+6.12..	
03546	12	12293	-0002	30160	SM	RIGHT-1.2..	
03558	12	00635	000-1	30170	SM	CLONG.01.10.	
03570	47	03474	01200	30180	BNZ	30C	
03582	14	00651	00001	31160	CM	TEMP2.81.10	
03594	46	02274	01200	31170	BE	CNTRL	
03606	49	03414	00000	31180	B	30A	
03618	26	01153	00991	33010	TF	CARD+2*80-2,EMPTY+2*80-2..	
03630	37	00995	00500	33020	RACD	CARD...	EMIT
03642	16	00653	000-1	33030	TFM	WORK2.01.10.	
03654	32	03654	00000	33040	SF	***.	(P = CARD-1)
03666	14	03666	000-0	33050	CM	**00.10.	(P = CARD)
03678	46	03798	01200	33060	BE	34A	
03690	26	03690	03690	33080	TF	***.	(P = E6A, Q = CARD)
03702	11	03696	-0012	33090	AM	33C+6.12..	
03714	13	00653	00-02	33110	MM	WORK2.002.9.	
03726	11	00099	-1155	33120	AM	00099,OUT-2..	
03738	26	00778	00099	33130	TF	DUM6A+6,00099	
03750	33	00774	00000	33140	CF	DUM6A+2	
03762	26	03762	00778	33150	TF	**DUM6A+6..	(P = E6A-5)
03774	11	03768	-0012	33160	AM	33D+6.12.	
03786	11	00435	000-1	33180	AM	CT7.01.10.	
03798	11	03660	-0002	34020	AM	33A+6.2..	
03810	11	03672	-0002	34030	AM	33B+6.2..	
03822	11	03701	-0002	34040	AM	33C+11.2..	
03834	11	00653	000-1	34050	AM	WORK2.01.10.	
03846	14	00653	00001	34060	CM	WORK2.81.10.	
03858	47	03654	01200	34070	BNE	33A	
03870	49	02274	00000	34080	B	CNTRL	
03882	43	03906	01018	41020	BD	41A,CARD+2*13-3..	SEQUENCE CONTROL
03894	49	03978	00000	41030	B	41C	
03906	43	03942	01020	41040	BD	41B,CARD+2*14-3..	
03918	25	00631	01019	41050	TD	SQCT,CARD+2*13-2..	
03930	49	03978	00000	41060	R	41C	
03942	25	00631	01021	41070	TD	SQCT,CARD+2*14-2	
03954	25	00630	01019	41080	TD	SQCT-1,CARD+2*13-2	
03966	32	00630	00000	41090	SF	SQCT-1	
03978	17	12360	-0000	41110	BTM	COLA	
03990	26	00653	00637	41120	TF	WORK2,CLFT..	
04002	26	04169	00639	41140	TF	42E+11,CRT..	
04014	14	00651	00001	41142	CM	TEMP2.81.10..	
04026	46	04074	01200	41144	BE	41E	
04038	17	12432	-0000	41150	BTM	COLB	16

04050	14	00635	000-0	41160	CM	CLONG,00,10,	
04062	47	04002	01200	41170	BNE	41D	
04074	26	00639	04169	41180	41E	TF CRT,42E+11,,	
04086	22	04169	00653	42010	S	42E+11,WORK2	
04098	46	04134	01100	42030	BH	42B	
04110	17	12750	-1569	42050	42A	BTM PRINT,ERR8,,	
04122	49	02274	00000	42060	B	CNTRL	
04134	14	04169	000-9	42070	42B	CM 42E+11,09,10,	
04146	46	04110	01100	42080	BH	42A	
04158	12	04176	-4158	42100	42E	SM 42F+6,***,	
04170	32	04170	00000	42120	42F	SF ***,,	(P = SQHLD)
04182	17	12294	-0995	42130	BTM	RIGHT,CARD,,	
04194	72	1229L	00629	42150	TNS	RIGHT-1,SQHLD,6,	
04206	26	12149	00795	43060	TF	E7A+11,DUM7A+11,,	
04218	26	12161	00807	43070	TF	E7B+11,DUM7B+11,,	
04230	17	12294	-1157	43080	BTM	RIGHT,OUT,,	
04242	26	12144	12293	43090	TF	E7A+6,RIGHT-1,,	
04254	49	02274	00000	43100	B	CNTRL,,,	
04266	17	12360	-0000	50020	SETFL	BTM COLA,,,	SET FLAG
04278	49	04302	00000	50030	B	50B	
04290	17	12432	-0000	50050	50A	BTM COLB,,,	
04302	14	00635	000-0	50070	50B	CM CLONG,00,10,	
04314	46	02274	01200	50080	BE	CNTRL	
04326	17	12228	-1157	50090	BTM	LEFT,OUT,,	
04338	21	00425	00635	50100	A	CT2,CLONG,,	
04350	26	04350	00819	50120	50C	TF **,DUMBA+11,,	(P = EBA)
04362	26	04362	12227	50130	50D	TF **,LEFT-1,,	(P = EBA-5)
04374	11	04356	-0012	50140	AM	50C+6,12,,	
04386	11	04368	-0012	50150	AM	50D+6,12,,	
04398	11	12227	-0002	50160	AM	LEFT-1,2,,	
04410	12	00635	000-1	50170	SM	CLONG,01,10,	
04422	47	04350	01200	50180	BNZ	50C	
04434	14	00651	00001	50200	CM	TEMP2,81,10,	
04446	47	04290	01200	50210	BNE	50A	
04458	49	02274	00000	50220	B	CNTRL	
04470	17	12360	-0000	52010	CLRFL	BTM COLA,,,	CLEAR FLAG
04482	49	04506	00000	52020	B	52B	
04494	17	12432	-0000	52030	52A	BTM COLB,,,	
04506	14	00635	000-0	52040	52B	CM CLONG,00,10,	
04518	46	02274	01200	52050	BE	CNTRL	
04530	17	12228	-1157	52060	BTM	LEFT,OUT,,	
04542	21	00427	00635	52070	A	CT3,CLONG,,	
04554	26	04554	00831	52080	52C	TF **,DUM9A+11,,	(P = E9A)
04566	26	04566	12227	52100	52D	TF **,LEFT-1,,	(P = E9A-5)
04578	11	04560	-0012	52110	AM	52C+6,12,,	
04590	11	04572	-0012	52120	AM	52D+6,12,,	
04602	11	12227	-0002	52130	AM	LEFT-1,2,,	
04614	12	00635	000-1	52140	SM	CLONG,1,10,	
04626	47	04554	01200	52150	BNZ	52C	
04638	14	00651	00001	52170	CM	TEMP2,81,10,	
04650	47	04494	01200	52180	BNE	52A	
04662	49	02274	00000	52190	B	CNTRL	
04674	14	00429	000-3	60020	GO	CM CT4,03,10,	
04686	47	0 318	01200	60030	BNE	60B	
04698	14	0 425	000-0	60040	CM	CT2,00,10,	IF \$3, ONLY EMIT + SEQ ALLOWED
04710	47	04794	01200	60050	BNE	60A	
04722	14	00427	000-0	60060	CM	CT3,00,10,	
04734	47	04794	01200	60070	BNE	60A	
04746	14	00431	000-0	60080	CM	CT5,00,10,	
04758	47	04794	01200	60090	BNE	60A	
04770	14	00433	000-0	60100	CM	CT6,00,10	
04782	46	04866	01200	60110	BE	61A	
04794	17	12750	-1445	60120	60A	BTM PRINT,ERR2,,	
04806	49	04878	00000	60130	B	61C	
04818	14	00429	000-0	60150	60B	CM CT4,00,10,	
04830	47	04866	01200	60160	BNE	61A	
04842	17	12750	-1403	60170	BTM	PRINT,ERR1,,	NO \$1,\$2,\$3 CARD
04854	49	04878	00000	60180	B	61C	
04866	44	04914	00423	61010	61A	BNF 61D,CT1,,	
04878	17	12750	-1761	61020	61C	BTM PRINT,ERR	
04890	48	00000	00000	61030	H		
04902	49	01842	00000	61040	B	START	
04914	14	00429	000-2	61060	61D	CM CT4,02,10,	SET TRANSFERS FOR \$2 + \$3
04926	47	04962	01200	61070	BNE	61E	
04938	16	06276	-7266	61080	TFM	QUES2+6,NOTR,,	
04950	49	05010	00000	61090	B	61F	
04962	14	00429	000-3	61100	61E	CM CT4,03,10,	
04974	47	05010	01200	61110	BNE	61F	
04986	16	06252	-7266	61120	TFM	QUES1+6,NOTR,,	
04998	16	12216	J2138	61130	TFM	QUES3+6,E7A,,	
05010	13	00431	00-12	61150	61F	MM CT5,12,9,	INSERT BRANCHES
05022	11	00099	-5285	61160	AM	00099,SF,,	
05034	26	0009R	00687	61170	TF	00099,BR2+11,6,	
05046	13	00439	00-12	61180	MM	CT9,12,9,	
05058	11	00099	-6305	61190	AM	00099,CLFRM,,	
05070	26	0009R	00675	61200	TF	00099,BR1+11,6,	
05082	13	00437	00-12	61210	MM	CT8,12,9,	
05094	11	00099	-7289	61220	AM	00099,E4A	
05106	26	0009R	00699	61230	TF	00099,BR4+11,6,	
05118	13	00433	00-12	62010	MM	CT6,12,9,	
05130	11	00099	-8261	62020	AM	00099,E5A,,	
05142	26	0009R	00711	62030	TF	00099,BR5+11,6,	
05154	13	00435	00-12	62040	MM	CT7,12,9,	
05166	11	00099	-9233	62050	AM	00099,E6A,,	
05178	26	0009R	00723	62060	TF	00099,BR6+11,6,	
05190	13	00425	00-12	62070	MM	CT2,12,9,	
05202	11	00099	J0205	62080	AM	00099,E8A,,	
05214	26	0009R	00735	62090	TF	00099,BR8+11,6,	
05226	13	00427	00-12	62100	MM	CT3,12,9,	
05238	11	00099	J1177	62110	AM	00099,E9A,,	
05250	26	0009R	00747	62120	TF	00099,BR9+11,6,	
05262	26	01155	00993	62150	TF	1N+2*81-2,EMPTY+2*81-2,,	

05285	00012	62160	SF	DSR	12.81..	SET FLAGS FOR FROM/TO
06246	49 06246	00000	62180	QUES1	B **..	MODIFIED FOR \$3 (P = **12)
06258	37 00995	00500	62190	RACD	IN	
06270	49 06270	00000	63010	QUES2	B **..	MODIFIED FOR \$2 (P = **12)
06282	31 01156	00994	63020	TR	OUT-1,IN-1..	
06305	00012	63030	CLFRM	DSB	12.81..	CLEAR FROM FIELDS IN TO AREA
07266	31 01156	00832	63060	NOTR	TR	OUT-1,EMPTY-1
07289	00012	72020	E4A	DSR	12.81..	REPRODUCE FROM/TO
08261	00012	72040	E5A	DSR	12.81..	SET BLANK
09233	00012	72060	E6A	DSB	12.81..	EMIT
10205	00012	72110	E8A	DSR	12.81..	SET FLAGS
11177	00012	72130	E9A	DSB	12.81..	CLEAR FLAGS
12138	48 00000	00000	72132	E7A	H ...	SEQUENCE INFORMATION (OP = NOP)
12150	48 00000	00000	72134	E7B	H ...	(OP = NOP)
12162	47 12198	01400	72136	72A	BNV	PUNCH
12174	17 12750	-1643	72138		BTM	PRINT,ERR9..
12186	16 12163	000M9	72140		TFM	72A+1,49,10.
12198	39 01157	00400	72150	PUNCH	WACD	OUT
12210	49 12210	00000	72160	QUES3	B **..	MODIFIED FOR \$3 (P = QUES1)
12226	00005	96020		DC	5,00000..	CALCULATE LEFTMOST LOCATION
12228	13 00637	00-02	96030	LEFT	MM	CLFT,002,9,
12240	21 00099	12227	96040		A	00099,LEFT-1..
12252	12 00099	-0003	96050		SM	00099,00003..
12264	26 12227	00099	96060		TF	LEFT-1,00099..
12276	42 00000	00000	96070		BB	
12292	00005	96100		DC	5,00000..	CALCULATE RIGHTMOST LOCATION
12294	13 00639	00-02	96110	RIGHT	MM	CRT,002,9,
12306	21 00099	12293	96120		A	00099,RIGHT-1..
12318	12 00099	-0002	96130		SM	00099,00002..
12330	26 12293	00099	96140		TF	RIGHT-1,00099
12342	42 00000	00000	96150		BB	
12358	00005	97010		DC	5,00000..	COLUMN SEARCH SUBROUTINE
12360	26 01153	00991	97020	COLA	TF	CARD+2*80-2,EMPTY+2*80-2..
12372	37 00995	00500	97030		RACD	CARD..
12384	16 00644	-0994	97040		TFM	TEMP5A,CARD-1..
12396	16 00649	-0995	97050		TFM	TEMP5B,CARD..
12408	16 00651	000-1	97060		TFM	TEMP2,01,10.
12420	41 00000	00000	97070		NOP	
12432	16 00633	000-0	97080	COLB	TFM	CCODE,00,10.
12444	16 00637	000-0	97090		TFM	CLFT,00,10.
12456	16 00639	000-0	97100		TFM	CRT,00,10..
12468	16 00635	000-0	97110		TFM	CLONG,00,10.
12480	43 12516	0064M	97130	97A	BD	97B,TEMP5A,11.
12492	43 12516	0064R	97140		BD	97B,TEMP5B,11.
12504	49 12648	00000	97150		B	98G..
12516	32 0064M	00000	97160	97B	SF	TEMP5A..6.
12528	14 00633	000-0	97170		CM	CCODE,00,10.
12540	47 12576	01200	97180		BNE	98F..
12552	26 00633	0064R	97190		TF	CCODE,TEMP5B,11.
12564	26 00637	00651	97200		TF	CLFT,TEMP2..
12576	24 00633	0064R	98020	98F	C	CCODE,TEMP5B,11.
12588	47 12732	01200	98030		BNE	98J..
12600	26 00639	00651	98040		TF	CRT,TEMP2..
12612	3 0064M	00000	98050		CF	TEMP5A..6.
12624	1 00635	000-1	98060		AM	CLONG,01,10.
12636	49 12672	00000	98070		B	98H
12648	14 00633	000-0	98090	98G	CM	CCODE,00,10.
12660	47 12732	01200	98100		BNE	98J..
12672	11 00644	-0002	98120	98H	AM	TEMP5A,00002..
12684	11 00649	-0002	98130		AM	TEMP5B,00002..
12696	11 00651	000-1	98140		AM	TEMP2,01,10.
12708	14 00651	00000	98160		CM	TEMP2,80,10.
12720	47 12480	01100	98170		BNH	97A
12732	42 00000	00000	98190	98J	BB	
12748	00005	99020		DC	5,00000..	BTM PRINT,ERR9..
12750	34 00000	00102	99030	PRINT	RCTY	..
12762	39 1274R	00100	99040		WATY	PRINT-1..6.
12774	34 00000	00102	99050		RCTY	
12786	32 00423	00000	99060		SF	CT1
12798	42 00000	00000	99070		BB	
01842		99110		DEND	START	

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