FACTORIAL ANALYSIS

F4-222

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Title: Factorial Analysis (Fixed Point)

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Abstract

The program performs the analysis of variance for data from complete factorial experiments with one to five main factors and 'r' observations per cell. The program is in fixed point and it uses double precision arithmetic. Since the effects to be computed are completely arbitrary, the program may be used for hierarchial designs with equal numbers of observations per cell, split plot designs and others.

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3. Description

The program, which operates in the fixed point mode with double precision arithmetic, computes the analysis of variance of complete factorial designs. There may be from 1 to 5 factors labeled a, b, c, d and e with r observations per cell. The number of levels for the factors may be of any magnitude provided that the number of data and the maximum number of partial sums to be generated are, together, less than 2369 (2497 if the logarithmic transformation is not used). If r is greater than one and the highest order interaction is desired, the restriction becomes abcde(r+1) < 2369 (or 2497). The number of data, abcder, may not exceed 2048. The total sum of squares (corrected for the mean) must be less than 2^{30}.

The program requires the use of the flexowriter for input and output. It uses constants as delays. The α-numeric code word in location 0105 will function only with the flexowriter.

The program contains its own data input routine. Since all data are entered at a q of 30, scaling of the numbers is generally required. The program provides for two kinds of scaling.

Prescaling: The factor by which data must be multiplied in order to make all numbers integers. In some cases, it may be necessary to reduce the size of the data numbers by a power of 10 in order to satisfy the restriction on the total sum of squares.

Postscaling: Usually it is possible to have four digits or more per datum without encountering difficulty with the size of the total sum of squares. The program provides for the internal multiplication of the entered data by 10 or 100 in order to avoid the typing of additional zeroes on the data tape. It is desirable to have the numbers as large as possible in order to minimize the effect of rounding errors.

The choice of effects to be computed is completely arbitrary. The program computes only those effects which have positive codewords (effect selectors). The adjustment of the effect selectors to positive or negative is done during data tape input (see Input). The effect selectors (locations 1500-1530 of the program) have the additional feature of being codewords for a special five character per word α-numeric routine which is included in the program.

By use of this selection, it is possible to perform the analysis of hierarchial designs with equal numbers of observations per cell at each level. For example, for a design with four levels of hierarchy, the selection of the a, ab and abc effects only (exclude b, c, ac and bc) will give the desired analysis. The "error" line will give the lowest level effect.

The table of means is printed if and only if the sum of squares for the effect is selected for computation. The printing of the means may be omitted by depressing the Transfer Control switch. The heading for the means will not be excluded by this procedure.

If r is 1, it is recommended that the highest order interaction be omitted from computation so that the error line is non zero. If the recommendation is not followed two stops will occur; the first at 0908 when it is attempted to obtain abcder/abcder at 0; the second at 1301 when it is attempted to compute 1/ems (error mean square) = 1/0 at 0. If the recommendation is followed, the "error" line will contain the highest order interaction.

The input routine provides for an optional transformation of the data to 1000 log (scaled datum). Branching to the log routine is accomplished if the transformation read from tape after the printing of "TRANSFORM:" leaves at least a 25 at 29 in the accumulator. If this information is "y" for untransformed and "1000 log y" for transformation the input will function correctly.

Input:

The data tape should contain:

1. A carriage return (optional) and the Job Number, problem description or the like followed by a conditional stop.

2. A carriage return, the number of levels of each factor a, b, c, d and e and the number of observations for each cell, r, as: a'b'c'd'e'r'. If all five factors are not present a 1 is used for those not present. Those present appear first. If possible, it is suggested that factors be ordered so that those with the fewest (non-singular) levels appear first, since the operating time will be minimized in this way (e.g., less time is required to compute the analysis of a 2 x 3 x 4 factorial than for a 4 x 3 x 2 factorial). However, if this will make the typing of the data more difficult, the suggestion should be disregarded.

3. A carriage return and a 0 or 1 followed by a conditional stop. A 0 is used if the effect selectors are to be altered. A 1 is used if the selected effects are not altered from the previous computation. The program tape contains the code words such that all effects are computed.

   If the previous character is 0, the tape should contain 2^F-1 effect selectors with a condition stop after each selector (F is the number of non-singular factors). The selectors should be entered for the standard order of effects, namely, a, b, ab, c, ac, bc, abc, etc. The selector should be 1 if the effect is desired, 0 if it is not. If r is 1, the last selector should always be 0.

4. A carriage return followed by:

   a. Lo data, conditional stop (provide abcder consecutive locations)
   b. Lo partial sums, conditional stop (provide consecutive locations as required by design)
   c. Prescaling factor (e.g. 100x where x is the original datum), conditional stop
   d. Post scaling factor (1, 10 or 100), conditional stop
   e. Transformation (y or 1000 log y), conditional stop.

5. A carriage return followed by the data in standard factorial order, that is, for a 2^3 experiment enter $a_1b_1c_1$, $a_1b_1c_2$, $a_1b_2c_1$, $a_1b_2c_2$, $a_2b_1c_1$, $a_2b_1c_2$, $a_2b_2c_1$ and $a_2b_2c_2$. For most problems the majority of the final scaled numbers should contain four decimal digits. Negative numbers must be entered with a minus sign and seven digits. Leading zeroes are required for negative numbers only.

Output:

1. Means: The program prints 10 times the scaled mean for each level of each selected effect. The means for each effect are preceded by the designation of the effect. The means are printed in the standard factorial order (see Input 5). If the Transfer Control switch is depressed the means will not be printed but the effect designation will be printed. If any selected effect contains more levels than are printable on one line an automatic carriage return (ACR) must be used. The ACR should be placed to allow at least 5 entries per line and preferably more. (If only 5 entries per line are provided, the analysis of variance will be double spaced.)

2. Analysis of Variance: Under the appropriate headings of "Effect", "d.f." (degrees of freedom), "S O S" (Sum of Squares), "M S" (Mean Square) and "100 ms/ems" (scaled mean square divided by error mean square), the program prints:

   a. total, total d.f. and total S O S.

   b. For each selected effect, the effect designation, d.f., S O S, M S as well as 100 ms/ems unless the M S exceeds 5,368,709, in which case the latter will be omitted.

   c. The word "error" (residual), d.f., S O S, M S. This line will contain the effects of all interactions of order higher than the highest computed as well as the variation within individual cells.

Method:

A standard computational procedure is used by the program [1].
In particular, for any effect the S O S is computed as:

$$\Sigma\,[(P\Sigma)^2/n] - (\text{Tot}\ \Sigma)^2/abcder - (\text{S O S for Main Effects and Lower ordered interactions in effect})$$

where $P\Sigma$ is the partial sum for a level
and n is the number of observations in the partial sum.

Determination of the S O S for other effects to be subtracted from the first two terms of the above expression is made by the masks contained in 1532-1562 of the program. If any of these effects have not been computed, a zero is subtracted in place of them. For example, if the S O S for a is computed and the S O S for b is omitted, the S O S for ab contains the effect of b as well as ab. In this case the ab represents a "b within a" effect.

Since each $(\Sigma)^2/n$ may be subject to a round-off error of 1 in the last place, the accuracy of the output is limited only by these errors.

4. Operating Procedure

With the Program Input routine (10.4) in 0000-0263, store the subroutines as follows:

Routine	Location
Log_k x (18.0) if required	1700 - 1857
α-numeric (19.0)	1900 - 1957
Integer Printout (J4-172)	1000 - 1058
Data Output 30 (J4-173)	2500 - 2651
Double Precision Sum of Squares or Products (F1-164)	6000 - 6263
Factorial Analysis	Lo - Lo + 1662

If it is desired to relocate the subroutines 18.0, 19.0, J4-172 and J4-173 because of space requirements for data and partial sums or because of other storage requirements of the user, fill the appendix program in Lo + 1663 to Lo + 1739 by pressing "start compute" at the completion of the filling of the program tape. At the completion of filling the appendix program, depress the manual input switch on the flexowriter and press "start compute". Type and fill:

xz (Lo Output 30)	J4-173
xz (Lo Integer Printout)	J4-172
xz (Lo α-numeric)	19.0
xz (Lo Log_k x)	18.0 if required.

(Note that provision is not made for the change of location of F1-164.) Halt and transfer to Lo + 1700. When the computer stops at Lo + 1737 the appendix program may be destroyed.

In addition to the storage requirements of the program (17 tracks) and the subroutines (less than 9 tracks) the program also uses 6300 - 6331 for the storage of d.f. for the analysis of variance and 6332 - 6363 for the storage of Sums of Squares. The order of storage is the same as that of the codewords (1500 - 1531). The program uses the binarization routine of 10.4 to binarize Lo (data) and Lo (PΣ) (see 0055 and 0062 of the program).

The Transfer Control switch should be up unless the means are not desired.

The Breakpoint 16 switch should be up unless more than one problem is to be run. If Breakpoint 16 is depressed, the program automatically returns to Lo of the program to receive another problem.

To perform an analysis, place the data tape in the reader and halt and transfer to Lo of the program.

Tab stops should be placed at intervals of at least 6 with an ACR at the end if the problem requires it (see Output).

Program Stops:

0238 - α + 5 of DPSOSOP (F1-164) calling sequence. The total sum of squares exceeds 2^{30}-1. Do not continue. If the start is pressed, the program will continue with an incorrect total S O S and hence an incorrect error sum of squares. If this stop does occur, enter

the modification (see below) and continue by transfering to Lo + 0238.

0908 - Divide check - abcder/abcder at 0. The recommendation for effect selection was not followed. Action: go to manual input on the console, type 7wwwwwwq and return to normal operation and start.

1301 - Following stop at 0908: error mean square is 0. Press start to continue. 100 ms/ems will be incorrect. Other: error mean square is 0 or 1. Press start to continue. If error mean square is 1, the results will be correct. If 0, 100 ms/ems will be incorrect.

1454 - Breakpoint 16. The problem is completed.

Modification

If the program stops at Lo + 0238 because the total S O S exceeds $2^{30}-1$ or to guard against this stop, make the following modifications. (Lo = initial location of program; Mo = initial location of modification.)

1. Change Lo + 0238 to xu(Mo)

2. Add:

Location	Program Input Code	Instruction	Note
Mo	/0000000	b(Lo + 0236)	Lo data
Mo + 1		y(Mo + 5)	
Mo + 2		y(Mo + 8)	
Mo + 3		a(Lo + 0237)	abcder at 29
Mo + 4		y(Mo + 26)	
Mo + 5		b[ ]	datum at 30

Location	Program Input Code	Instruction	Note
Mo + 6		a(Mo + 23)	5 at 30
Mo + 7		m(Mo + 24)	1/10 at C
Mo + 8		c[ ]	datum
Mo + 9		b(Mo + 5)	
Mo + 10		a(Mo + 25)	1 at 29
Mo + 11		y(Mo + 5)	
Mo + 12		y(Mo + 8)	
Mo + 13		s(Mo + 26)	
Mo + 14		t(Mo + 5)	
Mo + 15		r{ 19.0 }	
Mo + 16		u{ }	
Mo + 17	,0000005'	201f4f7f	Print:
Mo + 18		6f720j4f	"rescale y by 1/10"
Mo + 19		0612060f	
Mo + 20		12060j26	
Mo + 21		0j0420vq	
Mo + 22		u(Lo + 0233)	
Mo + 23	,0000004'	0000000f	5 at 30
Mo + 24		0jjjjjjj	1/10 at 0
Mo + 25		00000004	1 at 29
Mo + 26		000b0000	Test for Loop

Descaling Output

If the data have not been transformed and they have been prescaled by 10^p and postscaled by 10^q, then the output is descaled by dividing by 10^n where

n	
p + q + 1	for means
2(p + q)	for S O S, M S
0	for d.f. and
2	for ms/ems (F)

If the logarithmic transformation is used

divide by	and subtract	
10,000	p + q	for means
1,000,000	0	for S O S, M S
1	0	for d.f.
100	0	ms/ems

Timing:

The sample problem (3 x 3 x 3) required 4 minutes 20 seconds.

Reference

[1] Snedecor, George. Statistical Methods 5th Ed. Iowa State University Press, Ames, Iowa (1957). Sections 12.6, 12.11

Sample Problem

The sample problem is a 3 x 3 x 3 factorial for which the complete analysis is desired. The data is:

		A_1	A_2	A_3
B_1	C_1	1.59	2.60	1.46
	C_2	3.95	4.54	4.17
	C_3	1.49	1.12	1.50
B_2	C_1	0.25	0.98	1.03
	C_2	2.55	4.22	4.55
	C_3	2.51	2.70	1.72
B_3	C_1	1.84	2.37	1.95
	C_2	3.63	3.62	4.92
	C_3	3.78	3.63	2.78

Since r is 1, it is necessary to alter the effect selectors. In order to eliminate the decimal places, it is necessary to prescale by 100, and since it is desirable to have at least four digit numbers, the data may be postscaled by 10. If the data is to be stored from 3000 on, and the partial sums from 3100 on, the data tape contains:

```
Sample Problem'
3'3'3'1'1'1'
0'1'1'1'1'1'1'0'
3000'3100'100x'10'y'
159'395'149'25'255' ... 195'492'278'
```

The results are as shown on page 14.

If, in the same data, it is assumed that the B's are subclasses within A_i and the C's are multiple observations within the B's, the appropriate analysis is a hierarchial as shown on page 15.

For this example the data tape contains:

```
Sample Problem'
3'3'1'1'1'3'
0'1'0'1'
3000'3100'100x'10'y'
159'395'  ...  492'278'
```

ANOVA

Sample Problem'
3'3'3'1'1'1'
0'1'1'1'1'1'1'0'
3000'3100'

y = [100x'] x 10'

TRANSFORM: y'
159'395'149'25'255'251'184'363'378'260'454'112'98'422'270'237'362'363'
146'417'150'103'455'172'195'492'278'

SCAIED MEANS x 10

a

23988	28644	26755

b

24911	22788	31688

ab

23433	17699	30833	27533	26333	32066
23766	24333	32166			

c

15633	40166	23588

ac

12266	33766	25933	19833	41266	24833
14799	45466	19999			

bc

18833	42199	13699	7533	37733	23099
20533	40566	33966			

ANOVA

Effect	d.f.	S O S	M S	100.ms/ems
total	26	43801430		
a	2	986895	493447	203
b	2	3889563	1944781	798
ab	4	582635	145658	60
c	2	28199939	14099969	
ac	4	2608725	652181	268
bc	4	5584523	1396130	573
error	8	1949150	243643	

ANOVA

Sample Problem'
3'3'1'1'1'3'
0'1'0'1'
3000'3100'

y = [100x'] x 10'

TRANSFORM: y'
159'395'149'25'255'251'184'363'378'260'454'112'98'422'270'237'362'363'
146'417'150'103'455'172'195'492'278'

SCALED MEANS x 10

a

23988	28644	26755

ab

23433	17699	30833	27533	26333	32066
23766	24333	32166			

ANOVA

Effect	d.f.	S O S	M S	100.ms/ems
total	26	43801430		
a	2	986895	493447	23
ab	6	4472198	745366	35
error	18	38342337	2130129	

FLOW CHART

FACTORIAL ANALYSIS

R. A. LAMM

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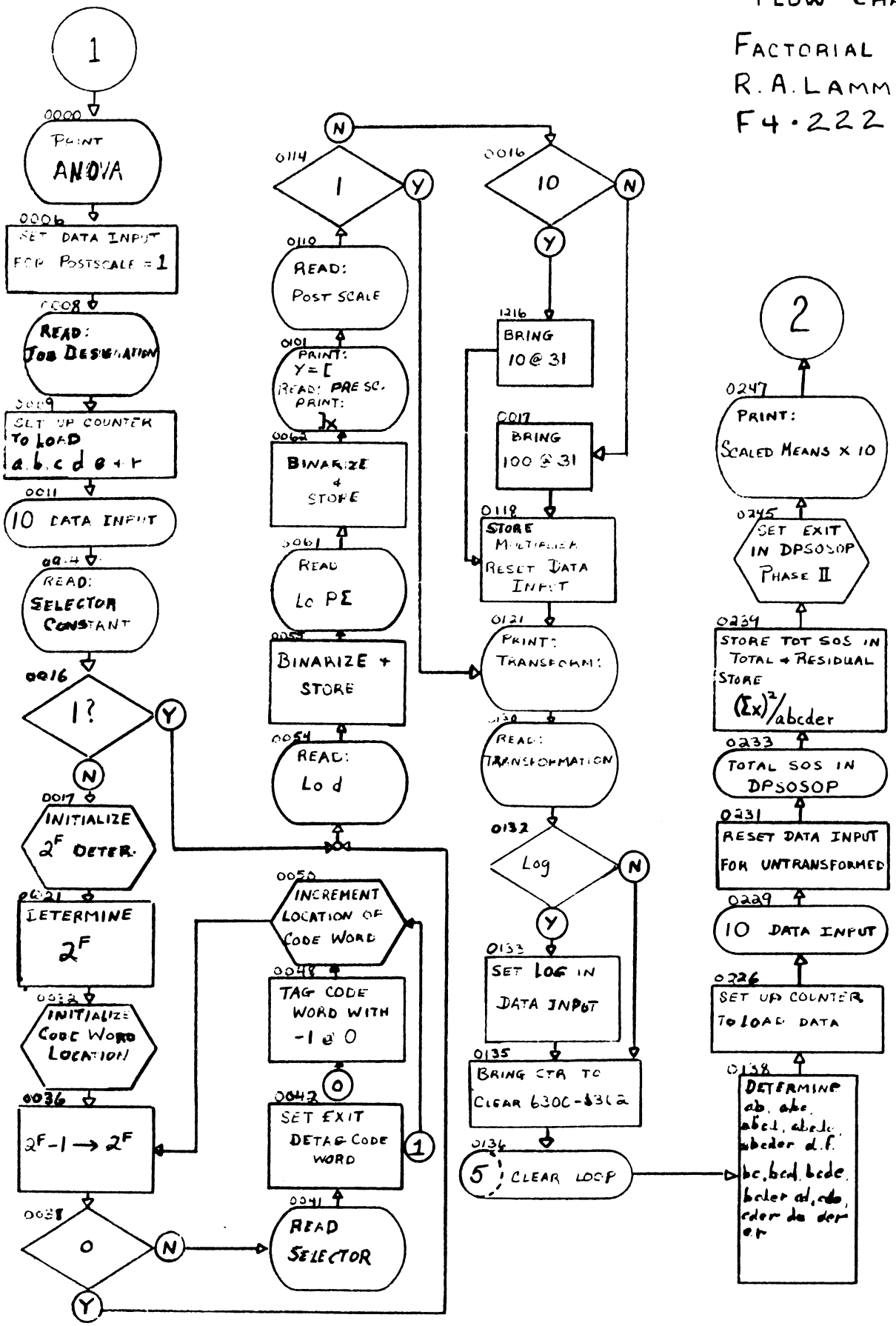
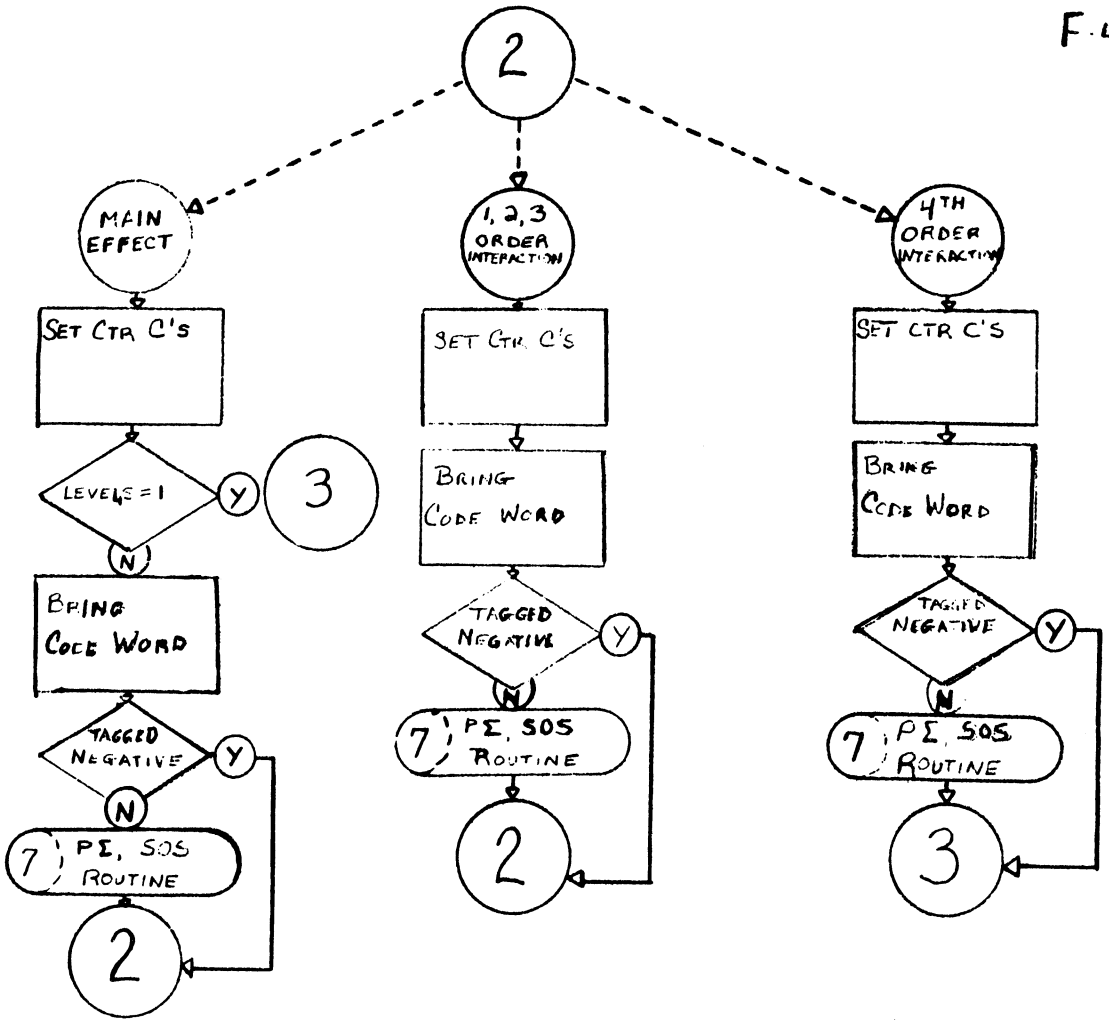
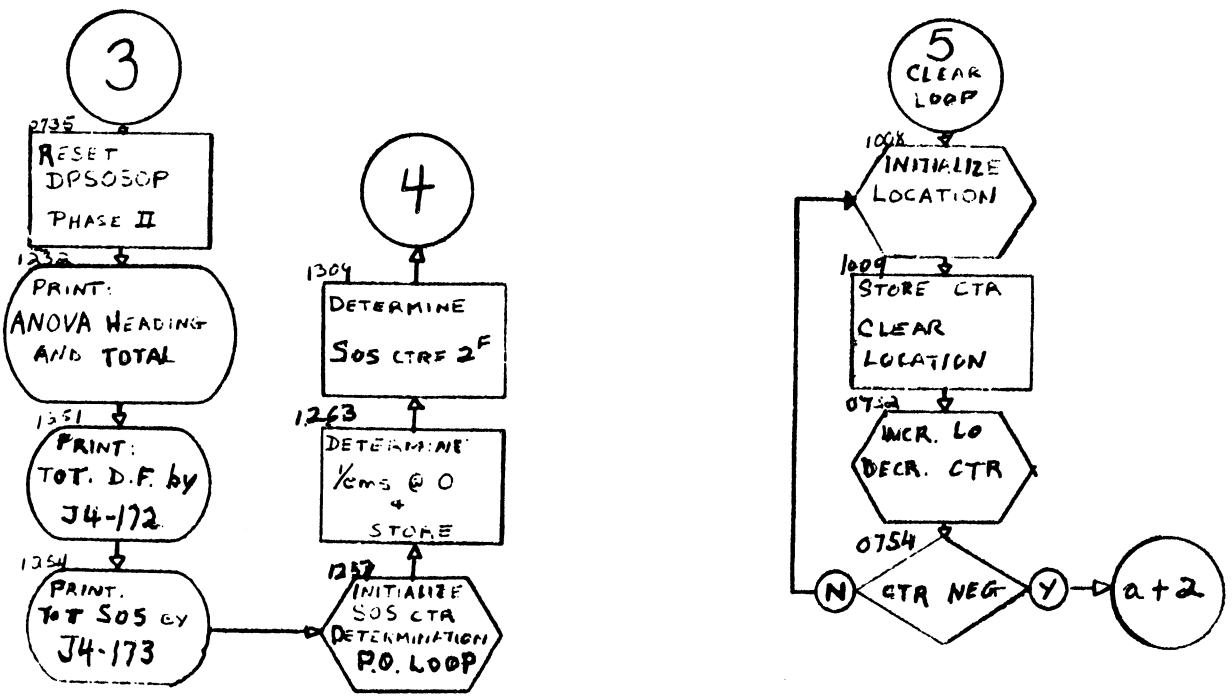
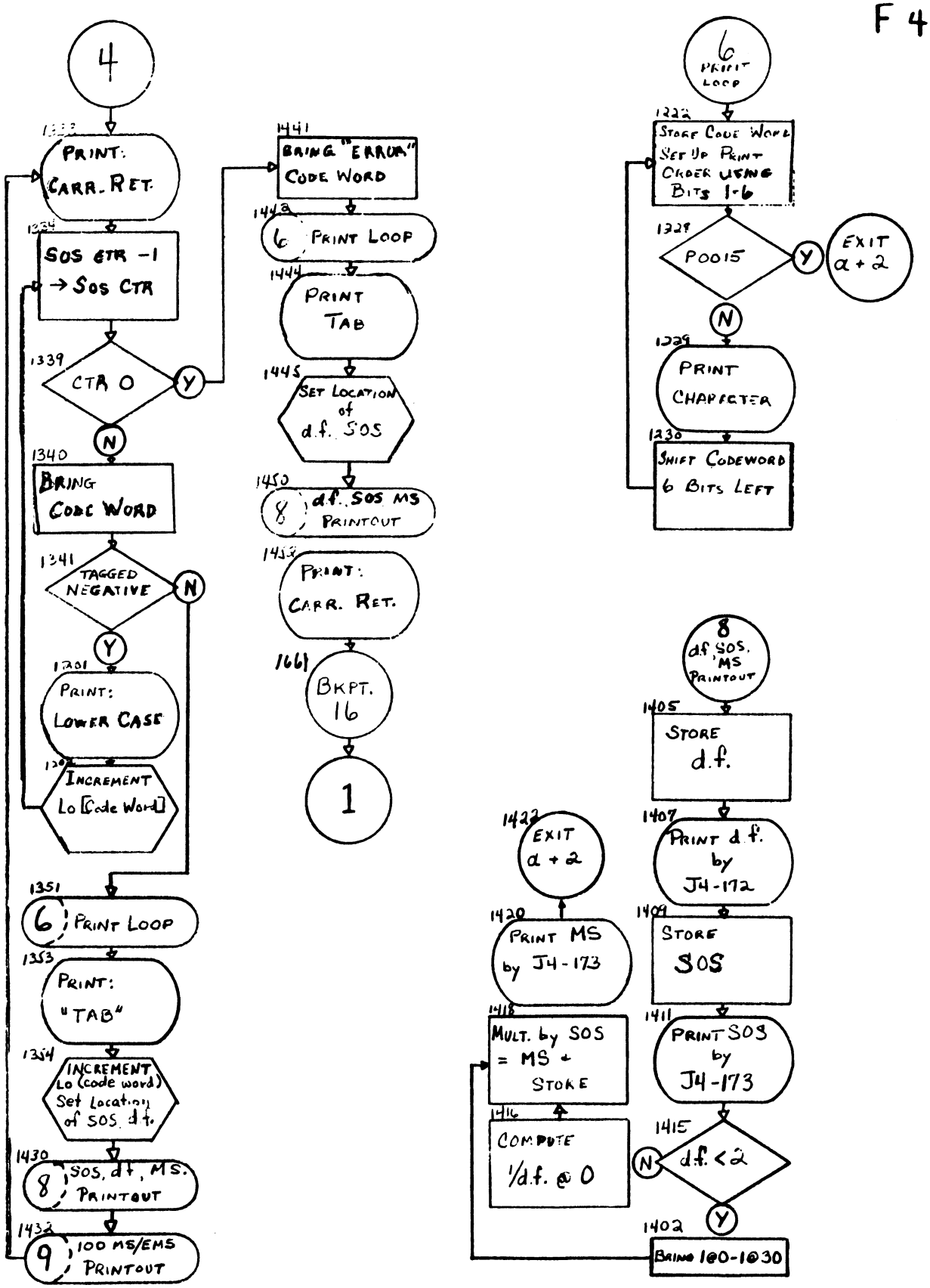
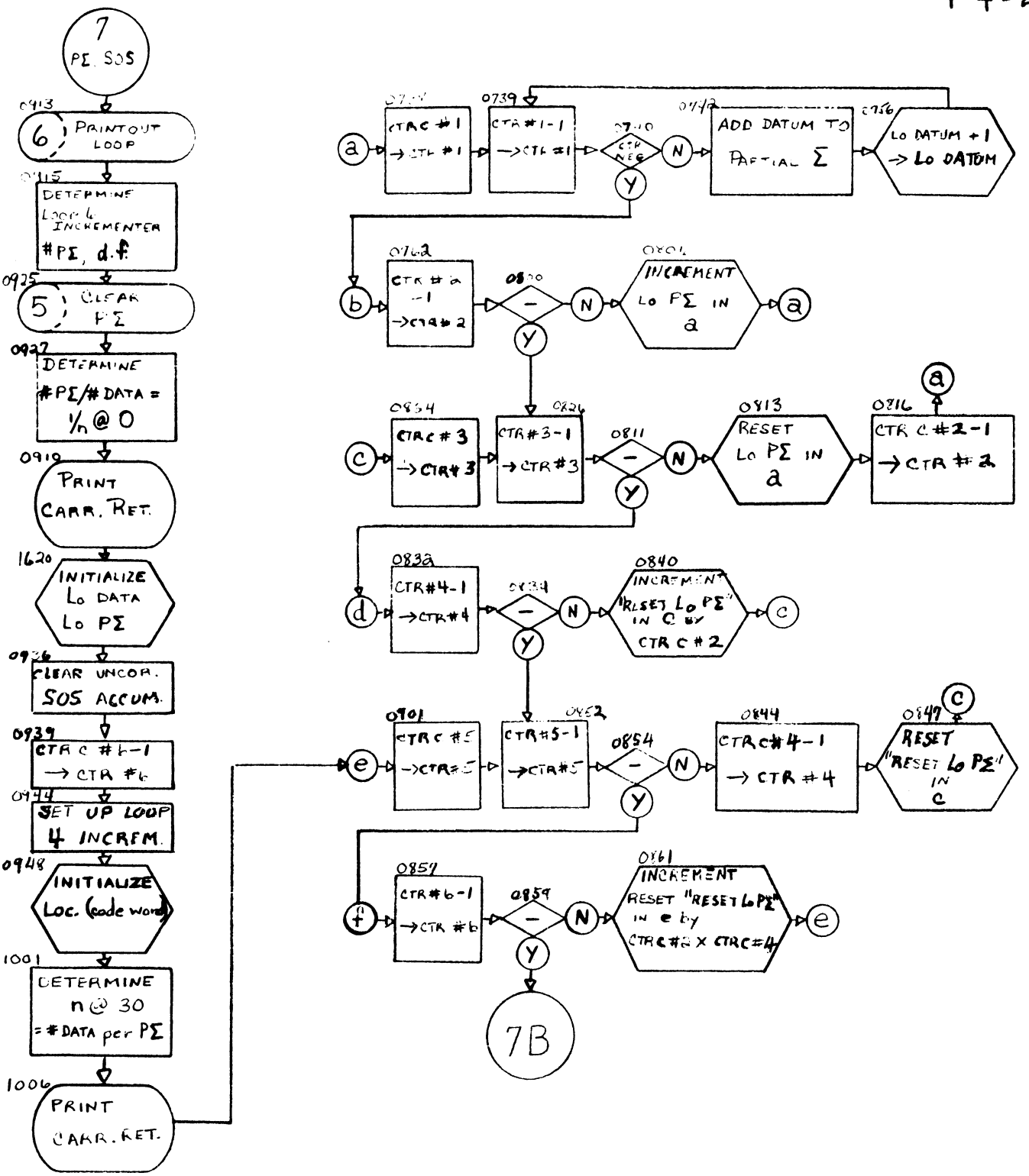
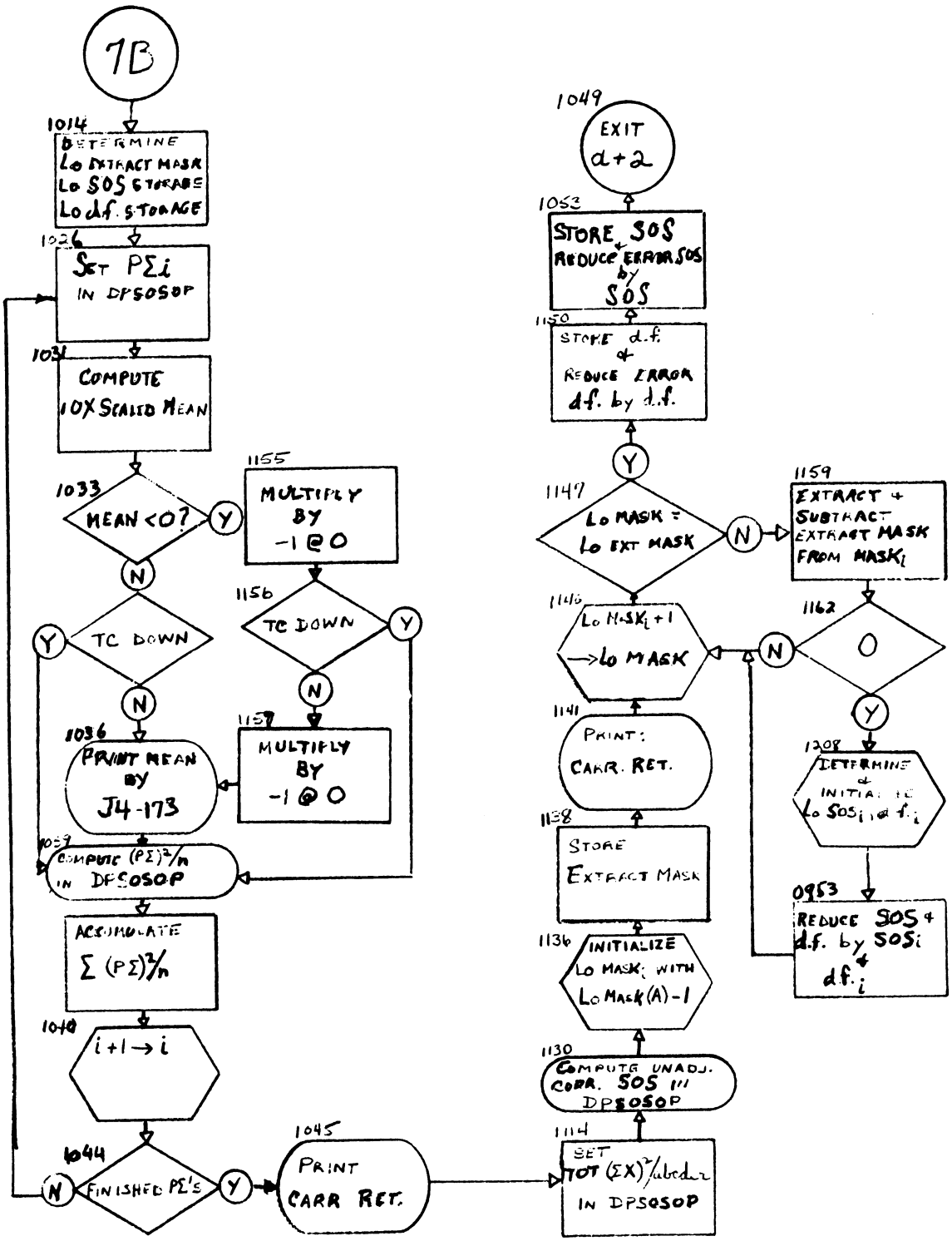


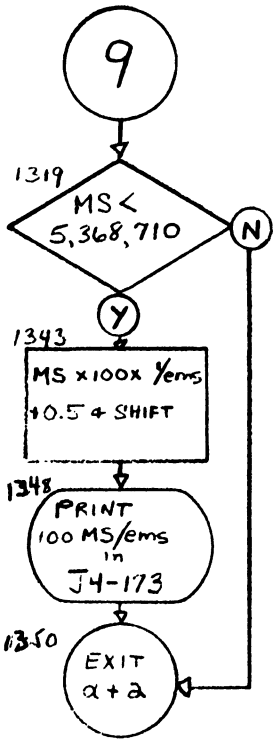

2
MAIN EFFECT
1, 2, 3 ORDER INTERACTION
4TH ORDER INTERACTION
SET CTR C'S
SET CTR C'S
SET CTR C'S
LEVELS = 1
Y
3
N
BRING CODE WORD
BRING CODE WORD
BRING CODE WORD
TAGGED NEGATIVE
Y
N
TAGGED NEGATIVE
Y
N
TAGGED NEGATIVE
Y
N
7 PΣ, SOS ROUTINE
7 PΣ, SOS ROUTINE
7 PΣ, SOS ROUTINE
2
2
3

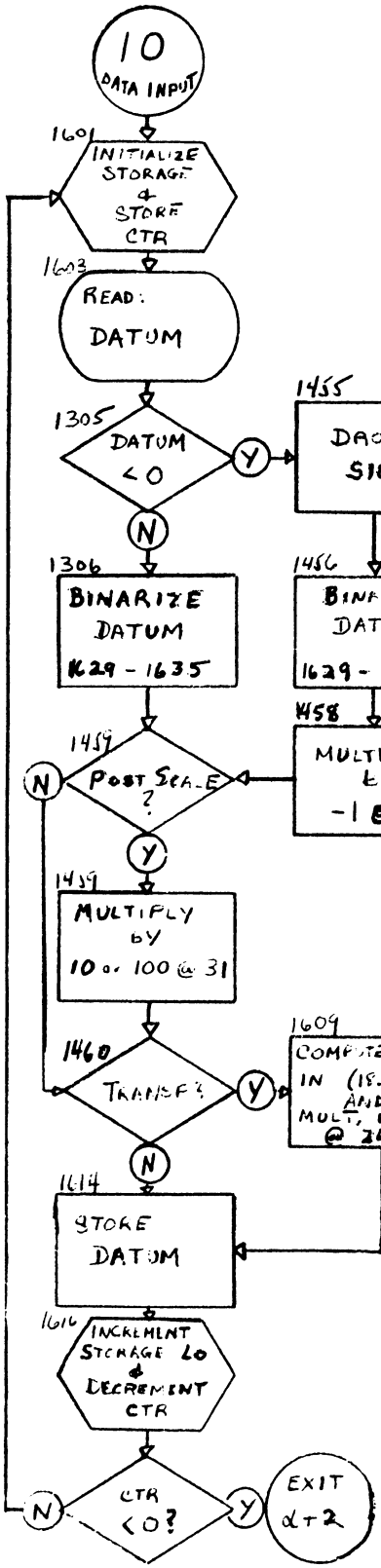

3
0735
RESET DPSOSOP PHASE II
1238
PRINT: ANOVA HEADING AND TOTAL
1351
PRINT: TOT. D.F. by J4-172
1354
PRINT. TOT SOS BY J4-173
4
1309
DETERMINE SOS CTR= 2^F
1263
DETERMINE 1/cms @ 0 + STORE
1257
INITIALIZE SOS CTR DETERMINATION P.O. LOOP
5
CLEAR LOOP
1008
INITIALIZE LOCATION
1009
STORE CTR CLEAR LOCATION
0754
INCR. LO DECR. CTR
0754
N
CTR NEG
Y
a+2


4
1333
PRINT: CARR. RET.
1334
SOS CTR -1 → SOS CTR
1339
CTR 0
Y
N
1340
BRING CODE WORD
1341
TAGGED NEGATIVE
N
Y
1201
PRINT: LOWER CASE
1202
INCREMENT Lo [Code Word]
1351
6 PRINT LOOP
1353
PRINT: "TAB"
1354
INCREMENT Lo (code word) Set Location of SOS df.
1430
8 SOS, df, MS. PRINTOUT
1432
9 100 MS/EMS PRINTOUT
1441
BRING "ERROR" CODE WORD
1443
6 PRINT LOOP
1444
PRINT TAB
1445
SET LOCATION of d.f. SOS
1450
8 df. SOS MS PRINTOUT
1453
PRINT: CARR. RET.
1661
BKPT. 16
1
6 PRINT LOOP
1222
STORE CODE WORD SET UP PRINT ORDER USING BITS 1-6
1329
P0015
Y
EXIT a+2
N
1229
PRINT CHARACTER
1230
SHIFT CODEWORD 6 BITS LEFT
8 df SOS. MS PRINTOUT
1405
STORE d.f.
1407
PRINT d.f. by J4-172
1409
STORE SOS
1411
PRINT SOS by J4-173
1415
d.f. < 2
N
Y
1402
BRING 1@0-1@30
1422
EXIT a+2
1420
PRINT MS by J4-173
1418
MULT. by SOS = MS + STORE
1416
COMPUTE 1/d.f. @ 0


7
PΣ SOS
0913
6
PRINTOUT LOOP
0915
DETERMINE Loop & INCREMENTER
#PΣ, d.f.
0925
5
CLEAR PΣ
0927
DETERMINE
#PΣ/# DATA =
1/n @ 0
0919
PRINT CARR. RET.
1620
INITIALIZE Lo DATA Lo PΣ
0936
CLEAR UNCOR. SOS ACCUM.
0939
CTR C #6-1
→ CTR #6
0944
SET UP LOOP 4 INCREM.
0948
INITIALIZE Loc. (code word)
1001
DETERMINE
n @ 30
= # DATA per PΣ
1006
PRINT CARR. RET.
0739
CTR #1-1
→CTR #1
0740
CTR NEG
N
Y
0748
ADD DATUM TO PARTIAL Σ
0756
Lo DATUM + 1
→ Lo DATUM
0762
CTR # a -1
→CTR # 2
0800
0801
INCREMENT Lo PΣ IN a
0826
CTR #3-1
→CTR #3
0811
0813
RESET Lo PΣ IN a
0816
CTR C #2-1
→ CTR # 2
0834
CTR #4-1
→CTR #4
0840
INCREMENT "RESET Lo PΣ" IN C BY CTR C #2
0852
CTR #5-1
→CTR #5
0854
0844
CTR C #4-1
→ CTR #4
0849
RESET "RESET Lo PΣ" IN C
0859
CTR #6-1
→CTR #6
0859
0861
INCREMENT RESET "RESET Lo PΣ" IN e by CTR C #2 X CTR C #4
7B


7B
1014
DETERMINE
Lo EXTRACT MASK
Lo SOS STORAGE
Lo df. STORAGE
1026
SET PΣi
IN DPSOSOP
1031
COMPUTE
10X SCALED MEAN
1033
MEAN <0?
Y
N
1155
MULTIPLY
BY
-1 @ 0
1156
TC DOWN
Y
N
1157
MULTIPLY
BY
-1 @ 0
TC DOWN
Y
N
1036
PRINT MEAN
BY
J4-173
1059
COMPUTE (PΣ)²/n
IN DPSOSOP
ACCUMULATE
Σ (PΣ)²/n
1040
i+1 → i
1044
FINISHED PΣ's
N
Y
1045
PRINT
CARR RET.
1114
SET
TOT (ΣX)²/subdr
IN DPSOSOP
1130
COMPUTE UNADJ.
CORR. SOS IN
DPSOSOP
1136
INITIALIZE
Lo MASK; WITH
Lo MASK(A)-1
1138
STORE
EXTRACT MASK
1141
PRINT:
CARR. RET.
1146
Lo MASK; +1
→ Lo MASK
1147
Lo MASK =
Lo EXT MASK
N
Y
1049
EXIT
d+2
1053
STORE SOS
REDUCE ERROR SOS
BY
SOS
1150
STORE d.f.
&
REDUCE ERROR
d.f. by d.f.
1159
EXTRACT &
SUBTRACT
EXTRACT MASK
FROM MASK;
1162
0
N
Y
1208
DETERMINE
&
INITIALIZE
Lo SOS; & d.f.;
0953
REDUCE SOS &
d.f. by
SOS;
d.f.;


9
1319
MS < 5,368,710
N
Y
1343
MS x100x ½ems
+0.5 & SHIFT
1348
PRINT 100 MS/ems in J4-173
1350
EXIT α+2


10
DATA INPUT
1601
INITIALIZE STORAGE & STORE CTR
1603
READ: DATUM
1305
DATUM < 0
Y
N
1455
DROP SIGN
1306
BINARIZE DATUM 1629 - 1635
1456
BINARIZE DATUM 1629 - 1635
1458
MULTIPLY BY -1 @ 0
1459
POST SCALE ?
N
Y
1459
MULTIPLY BY 10 or 100 @ 31
1460
TRANSF ?
Y
N
1609
COMPUTE LOG IN (18.0) AND MULT. BY 1000 @ 24
1614
STORE DATUM
1616
INCREMENT STORAGE LO & DECREMENT CTR
CTR < 0?
N
Y
EXIT α+2

Problem

For

Date 1/26/61

Track

By R. A. Lamm

Number F4-222

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization: Not UT		Okay		Not D	Not DM	N Only
	00	x r	1900	(19.0)	50	43	36	29	22	15	08
	01	x u	1900		51	44	37	30	23	16	09
0000003	02	2018	2010	ANOVA	52	45	38	31	24	17	10
	03	7232	463A		53	46	39	32	25	18	11
	04	7218	20vq		54	47	40	33	26	19	12
	05	x p	0055		55	48	41	34	27	20	13
	06	b	1135	ul410	56	49	42	35	28	21	14
	07	c	1459	input routine	57	50	43	36	29	22	15
	08	x i	0058	read job designation	58	51	44	37	30	23	16
	09	b	1652	c(Lo a) = c1654	59	52	45	38	31	24	17
	10	a	1625	5 at 11	60	53	46	39	32	25	18
	11	r	1618	data input	61	54	47	40	33	26	19
	12	u	1600	read and store a,b,c,d,e, r	62	55	48	41	34	27	20
	13	x p	0063	read 0 if masks are changing	63	56	49	42	35	28	21
	14	x i	0000	read 1 if masks unchanged	00	57	50	43	36	29	22
	15	n	1437	-1 at 0	01	58	51	44	37	30	23
	16	t	0052	do not alter masks	02	59	52	45	38	31	24
	17	b	1453	2 at 30	03	60	53	46	39	32	25
	18	c	1404	design ctr	04	61	54	47	40	33	26
	19	b	0455	b(Lo b)	05	62	55	48	41	34	27
	20	y	0021		06	63	56	49	42	35	28
	21	b	[Lo p]		07	00	57	50	43	36	29
	22	s	0750	2 at 30 = 1 at 29	08	01	58	51	44	37	30
	23	t	0032		09	02	59	52	45	38	31
	24	b	0260	1 at 30	10	03	60	53	46	39	32
	25	n	1404	design ctr = 2^F	11	04	61	54	47	40	33
	26	c	1404	design ctr	12	05	62	55	48	41	34
	27	b	0021		13	06	63	56	49	42	35
	28	a	0750	1 at 29	14	07	00	57	50	43	36
	29	y	0021		15	08	01	58	51	44	37
	30	s	0517	b(Lo r)	16	09	02	59	52	45	38
	31	t	0021		17	10	03	60	53	46	39

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	0,0,32	b	0,3,0,9	b(Lo a mask) b1500	18	11	04	61	54	47	40
	33	y	0,0,4,5	(1124)	19	12	05	62	55	48	41
	34	y	0,0,4,9		20	13	06	63	56	49	42
	35	x,p	0,0,2,1		21	14	07	00	57	50	43
	36	b	1,4,0,4	design ctr	22	15	08	01	58	51	44
	37	s	0,7,5,0	2 at 30 = 1 at 29	23	16	09	02	59	52	45
	38	t	0,0,5,3		24	17	10	03	60	53	46
	39	a	0,8,0,4	1 at 30	25	18	11	04	61	54	47
	40	c	1,4,0,4	design ctr	26	19	12	05	62	55	48
	41	x,i	0,0,2,7	read 0 = exclude or 1 = include	27	20	13	06	63	56	49
	42	n	0,7,5,0	1 at 29	28	21	14	07	00	57	50
	43	a	0,8,2,9	u0048	29	22	15	08	01	58	51
	44	c	0,0,4,7		30	23	16	09	02	59	52
	45	b	[ ]		31	24	17	10	03	60	53
	46	e	1,3,2,5	7wwwwwwq	32	25	18	11	04	61	54
	47	[u	]	0048 or 0049	33	26	19	12	05	62	55
	48	a	1,6,2,7	80000000	34	27	20	13	06	63	56
	49	c	[ ]		35	28	21	14	07	00	57
	50	b	0,0,4,5		36	29	22	15	08	01	58
	51	u	1,1,2,3		37	30	23	16	09	02	59
	52	x,p	0,0,3,8		38	31	24	17	10	03	60
	53	c	1,4,0,4	dump accumulator	39	32	25	18	11	04	61
	54	x,i	0,0,4,0	read in Lo d	40	33	26	19	12	05	62
	55	x,r	0,0,6,3	binarize Lo d	41	34	27	20	13	06	63
	56	x,u	0,0,5,0		42	35	28	21	14	07	00
	57	x,p	0,0,4,3		43	36	29	22	15	08	01
	58	y	0,2,3,5	dpsosop call seq	44	37	30	23	16	09	02
	59	y	0,2,3,6	" " "	45	38	31	24	17	10	03
	60	c	1,1,1,8	clear accumulator	46	39	32	25	18	11	04
	61	x,i	0,0,4,7	read in Lo part Σ	47	40	33	26	19	12	05
	62	x,r	0,0,6,3	binarize Lo pΣ	48	41	34	27	20	13	06
	63	x,u	0,0,5,0		49	42	35	28	21	14	07

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For — Date 1/26/61 — Track

By R. A. Lamm — Number F4-222

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization: Not UT		Okay		Not D	Not DM	N Only
	01 00	y	0746	Lo pΣ	50	43	36	29	22	15	08
	01	x r	1900	(19.0)	51	44	37	30	23	16	09
	02	x u	1900		52	45	38	31	24	17	10
,0000005'	03	2018	2012	y = [ ]x	53	46	39	32	25	18	11
	04	0610	1606		54	47	40	33	26	19	12
	05	3608	0010		55	48	41	34	27	20	13
	06	2a06	084a		56	49	42	35	28	21	14
	07	06vq	0000		57	50	43	36	29	22	15
	08	x p	0058		58	51	44	37	30	23	16
	09	c	0259	dump accumulator	59	52	45	38	31	24	17
	10	x i	0060	read in post scaling	60	53	46	39	32	25	18
	11	x p	1261	col. sh.	61	54	47	40	33	26	19
	12	s	1400	1 at 27	62	55	48	41	34	27	20
	13	x z	0000	delay	63	56	49	42	35	28	21
	14	t	0121	post scale = 1	00	57	50	43	36	29	22
	15	s	0260	1 at 30	01	58	51	44	37	30	23
	16	t	1216	post scale = 10	02	59	52	45	38	31	24
	17	b	0257	post scale = 100; 100 at 31	03	60	53	46	39	32	25
	18	c	1317	input routine	04	61	54	47	40	33	26
	19	b	1105	n1317	05	62	55	48	41	34	27
	20	c	1459	input routine	06	63	56	49	42	35	28
	21	x r	1900	(19.0)	07	00	57	50	43	36	29
	22	x u	1900		08	01	58	51	44	37	30
,0000005'	23	2018	2010		09	02	59	52	45	38	31
	24	5f1f	7232	transform	10	03	60	53	46	39	32
	25	7f54	461f		11	04	61	54	47	40	33
	26	3f1a	0818		12	05	62	55	48	41	34
	27	06vq	0000		13	06	63	56	49	42	35
	28	x p	0014		14	07	00	57	50	43	36
	29	c	1308	dump accumulator	15	08	01	58	51	44	37
	30	x i	0016	read: y' or 1000 log y'	16	09	02	59	52	45	38
	31	s	0257	25 at 29	17	10	03	60	53	46	39

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For Date 1/26/61 Track

By R. A. Lamm Number FA-22

Program Input Codes	Loc.	Instruction Op.	Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	01 32	t	0135		18	11	04	61	54	47	40
	33	b	1304	ul609 (for log transf.)	19	12	05	62	55	48	41
	34	c	1460	input routine	20	13	06	63	56	49	42
	35	b	1000	3qc3w00	21	14	07	00	57	50	43
	36	r	0754	"clear loop" to zero	22	15	08	01	58	51	44
	37	u	1008	6300 - 6362	23	16	09	02	59	52	45
	38	b	1655	b at 30	24	17	10	03	60	53	46
	39	n	1654	a at 30	25	18	11	04	61	54	47
	40	m	0962	1 at 1	26	19	12	05	62	55	48
	41	h	1013	ab at 30	27	20	13	06	63	56	49
	42	n	1656	c	28	21	14	07	00	57	50
	43	m	1425	1 at 1	29	22	15	08	01	58	51
	44	h	1316	abc at 30	30	23	16	09	02	59	52
	45	n	1657	d	31	24	17	10	03	60	53
	46	m	1425	1 at 1	32	25	18	11	04	61	54
	47	h	1326	abcd at 30	33	26	19	12	05	62	55
	48	n	1658	e	34	27	20	13	06	63	56
	49	m	1425	1 at 1	35	28	21	14	07	00	57
	50	h	1436	abcde at 30	36	29	22	15	08	01	58
	51	n	1659	r	37	30	23	16	09	02	59
	52	h	0237	abcder at 29	38	31	24	17	10	03	60
	53	s	0750	1 at 29	39	32	25	18	11	04	61
	54	x h	6331	error d.f.	40	33	26	19	12	05	62
	55	c	1113	total d.f.	41	34	27	20	13	06	63
	56	b	1655	b at 30	42	35	28	21	14	07	00
	57	n	1656	c at 30	43	36	29	22	15	08	01
	58	m	1425	1 at 1	44	37	30	23	16	09	02
	59	h	1424	bc at 30	45	38	31	24	17	10	03
	60	n	1657	d	46	39	32	25	18	11	04
	61	m	1425	1 at 1	47	40	33	26	19	12	05
	62	h	1628	bcd at 30	48	41	34	27	20	13	06
	63	n	1658	e	49	42	35	28	21	14	07

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By R. A. Lamm Number F4-222

Program Input Codes	Loc.	Instruction Op.	Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	02 00	m	1636	1 at 1	50	43	36	29	22	15	08
	01	h	1623	bcde at 30	51	44	37	30	23	16	09
	02	n	1659	r	52	45	38	31	24	17	10
	03	m	1425	1 at 1	53	46	39	32	25	18	11
	04	c	1626	bcder at 30	54	47	40	33	26	19	12
	05	b	1657	d	55	48	41	34	27	20	13
	06	n	1656	c	56	49	42	35	28	21	14
	07	m	1636	1 at 1	57	50	43	36	29	22	15
	08	h	0830	cd at 30	58	51	44	37	30	23	16
	09	n	1658	e	59	52	45	38	31	24	17
	10	m	1363	1 at 1	60	53	46	39	32	25	18
	11	h	0961	cde at 30	61	54	47	40	33	26	19
	12	n	1659	r	62	55	48	41	34	27	20
	13	m	1363	1 at 1	63	56	49	42	35	28	21
	14	c	0963	cder at 30	00	57	50	43	36	29	22
	15	b	1658	e	01	58	51	44	37	30	23
	16	n	1657	d	02	59	52	45	38	31	24
	17	m	1363	1 at 1	03	60	53	46	39	32	25
	18	h	1154	de at 30	04	61	54	47	40	33	26
	19	n	1659	r	05	62	55	48	41	34	27
	20	m	1363	1 at 1	06	63	56	49	42	35	28
	21	c	1107	der at 30	07	00	57	50	43	36	29
	22	b	1658	e	08	01	58	51	44	37	30
	23	n	1659	r	09	02	59	52	45	38	31
	24	m	1363	1 at 1	10	03	60	53	46	39	32
	25	c	1461	er at 30	11	04	61	54	47	40	33
	26	b	1113	d.f. at 29	12	05	62	55	48	41	34
	27	n	0831	1 at 13	13	06	63	56	49	42	35
	28	a	0236	m[Lo d]	14	07	00	57	50	43	36
	29	r	1618	data input	15	08	01	58	51	44	37
	30	u	1600		16	09	02	59	52	45	38
	31	b	1117	u1614	17	10	03	60	53	46	39

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	0,2, 32	c	1,4,6,0	input routine (reset for untrans.)	18	11	04	61	54	47	40
	33	x,r	6,0,0,0	DPSCSOP	19	12	05	62	55	48	41
	34	x,u	6,0,0,0		20	13	06	63	56	49	42
	35	m	[Lo,d,]		21	14	07	00	57	50	43
	36	m	[Lo,d,]		22	15	08	01	58	51	44
	37	[	]	abcder at 29	23	16	09	02	59	52	45
	38	x,z	0,0,0,0	error hlt SOS $\geq 2^{30}$	24	17	10	03	60	53	46
	39	h	1,0,2,5	store tot SOS	25	18	11	04	61	54	47
	40	x,c	6,3,6,3	res SOS	26	19	12	05	62	55	48
	41	x,b	6,2,5,0	R_L	27	20	13	06	63	56	49
	42	c	1,6,4,2		28	21	14	07	00	57	50
	43	x,b	6,2,5,1	R_H	29	22	15	08	01	58	51
	44	c	1,6,4,3		30	23	16	09	02	59	52
	45	b	1,1,3,1	u[ ]	31	24	17	10	03	60	53
	46	x,c	6,1,4,5		32	25	18	11	04	61	54
	47	x,r	1,9,0,0	(19.0)	33	26	19	12	05	62	55
	48	x,u	1,9,0,0		34	27	20	13	06	63	56
,0,0,0,0,0,0,7	49	2,0,1,0	2,0,1,8		35	28	21	14	07	00	57
	50	7,f,6,f	7,2,0,j	scaled means x 10	36	29	22	15	08	01	58
	51	4,f,2,f	0,6,3,f		37	30	23	16	09	02	59
	52	4,f,7,2	3,2,7,f		38	31	24	17	10	03	60
	53	0,8,0,6	4,a,0,6		39	32	25	18	11	04	61
	54	0,j,0,4	2,0,1,8		40	33	26	19	12	05	62
	55	2,0,v,q	0,0,0,0		41	34	27	20	13	06	63
	56	u	0,3,0,0		42	35	28	21	14	07	00
,0,0,0,0,0,0,7	57		6,4	100 at 31	43	36	29	22	15	08	01
	58	2,0,0,0	0,0,0,0	1 at 2	44	37	30	23	16	09	02
	59	[	]	ctr c #2	45	38	31	24	17	10	03
	60		2	1 at 30	46	39	32	25	18	11	04
	61	[	]	1/n at 0	47	40	33	26	19	12	05
	62	[	]	ctr #3	48	41	34	27	20	13	06
	63	[	]	Lo 3	49	42	35	28	21	14	07

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For — Date 1/26/61 — Track

By R. A. Lamm — Number F4-222

Program Input Codes	Loc.	Instruction Op.	Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	03 00	b	1626	bcder	50	43	36	29	22	15	08
	01	c	1653	ctr c #1	51	44	37	30	23	16	09
	02	b	1654	a	52	45	38	31	24	17	10
	03	c	0259	ctr c #2	53	46	39	32	25	18	11
	04	b	0260	1 at 30	54	47	40	33	26	19	12
	05	h	0960	ctr c #3	55	48	41	34	27	20	13
	06	h	0930	ctr c #4	56	49	42	35	28	21	14
	07	h	1644	ctr c #5	57	50	43	36	29	22	15
	08	c	1404	ctr c #6	58	51	44	37	30	23	16
	09	b	1500	A heading	59	52	45	38	31	24	17
	10	t	0313		60	53	46	39	32	25	18
	11	r	1049	pΣ, SOS loop	61	54	47	40	33	26	19
	12	u	0913		62	55	48	41	34	27	20
	13	b	0963	cder	63	56	49	42	35	28	21
	14	c	1653	ctr c #1	00	57	50	43	36	29	22
	15	b	1655	b	01	58	51	44	37	30	23
	16	h	0259	ctr c #2	02	59	52	45	38	31	24
	17	s	1453	2 at 30	03	60	53	46	39	32	25
	18	t	0735	finished factors	04	61	54	47	40	33	26
	19	b	1654	a	05	62	55	48	41	34	27
	20	c	0960	ctr c #3	06	63	56	49	42	35	28
	21	b	1501	B heading	07	00	57	50	43	36	29
	22	t	0325		08	01	58	51	44	37	30
	23	r	1049		09	02	59	52	45	38	31
	24	u	0913		10	03	60	53	46	39	32
	25	b	1013	ab	11	04	61	54	47	40	33
	26	c	0259	ctr c #2	12	05	62	55	48	41	34
	27	b	1149	1 at 30	13	06	63	56	49	42	35
	28	c	0960	ctr c #3	14	07	00	57	50	43	36
	29	b	1502	AB heading	15	08	01	58	51	44	37
	30	t	0333		16	09	02	59	52	45	38
	31	r	1049		17	10	03	60	53	46	39

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For Date 1/26/61 Track

By R. A. Lamm Number F4-222

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	03 32	u	0913		18	11	04	61	54	47	40
	33	b	1107	der	19	12	05	62	55	48	41
	34	c	1653	ctr c #1	20	13	06	63	56	49	42
	35	b	1656	c	21	14	07	00	57	50	43
	36	h	0259	ctr c #2	22	15	08	01	58	51	44
	37	s	0750	2 at 30	23	16	09	02	59	52	
	38	t	0735	finished factors	24	17	10	03	60	53	46
	39	b	1013	ab	25	18	11	04	61	54	47
	40	c	0960	ctr c #3	26	19	12	05	62	55	48
	41	b	1503	C heading	27	20	13	06	63	56	49
	42	t	0345		28	21	14	07	00	57	50
	43	r	1049		29	22	15	08	01	58	51
	44	u	0913		30	23	16	09	02	59	52
	45	b	1655	b	31	24	17	10	03	60	53
	46	c	0960	ctr c #3	32	25	18	11	04	61	54
	47	b	1654	a	33	26	19	12	05	62	55
	48	c	0930	ctr c #4	34	27	20	13	06	63	56
	49	b	1504	AC heading	35	28	21	14	07	00	57
	50	t	0353		36	29	22	15	08	01	58
	51	r	1049		37	30	23	16	09	02	59
	52	u	0913		38	31	24	17	10	03	60
	53	b	1424	bc	39	32	25	18	11	04	61
	54	c	0259	ctr c #2	40	33	26	19	12	05	62
	55	b	1654	a	41	34	27	20	13	06	63
	56	c	0960	ctr c #3	42	35	28	21	14	07	00
	57	b	0260	1 at 30	43	36	29	22	15	08	01
	58	c	0930	ctr c #4	44	37	30	23	16	09	02
	59	b	1505	BC heading	45	38	31	24	17	10	03
	60	t	0363		46	39	32	25	18	11	04
	61	r	1049		47	40	33	26	19	12	05
	62	u	0913		48	41	34	27	20	13	06
	63	b	1316	abc	49	42	35	28	21	14	07

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By R. A. Lamm Number F4-222

Program Input Codes	Loc.	Instruction Op.	Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N O
	04 00	c	0259	ctr c #2	50	43	36	29	22	15	08
	01	b	0823	1 at 30	51	44	37	30	23	16	09
	02	c	0960	ctr c #3	52	45	38	31	24	17	10
	03	b	1506	ABC heading	53	46	39	32	25	18	11
	04	t	0407		54	47	40	33	26	19	12
	05	r	1049		55	48	41	34	27	20	13
	06	u	0913		56	49	42	35	28	21	14
	07	b	1461	er	57	50	43	36	29	22	15
	08	c	1653	ctr c #1	58	51	44	37	30	23	16
	09	b	1657	d	59	52	45	38	31	24	17
	10	h	0259	ctr c #2	60	53	46	39	32	25	18
	11	s	0750	2 at 30	61	54	47	40	33	26	19
	12	t	0735	finished factors	62	55	48	41	34	27	20
	13	b	1316	abc	63	56	49	42	35	28	21
	14	c	0960	ctr c #3	00	57	50	43	36	29	22
	15	b	1507	D heading	01	58	51	44	37	30	23
	16	t	0419		02	59	52	45	38	31	24
	17	r	1049		03	60	53	46	39	32	25
	18	u	0913		04	61	54	47	40	33	26
	19	b	1424	bc	05	62	55	48	41	34	27
	20	c	0960	ctr c #3	06	63	56	49	42	35	28
	21	b	1654	a	07	00	57	50	43	36	29
	22	c	0930	ctr c #4	08	01	58	51	44	37	30
	23	b	1508	AD heading	09	02	59	52	45	38	31
	24	t	0427		10	03	60	53	46	39	32
	25	r	1049		11	04	61	54	47	40	33
	26	u	0913		12	05	62	55	48	41	34
	27	b	1656	c	13	06	63	56	49	42	35
	28	c	0960	ctr c #3	14	07	00	57	50	43	36
	29	b	1655	b	15	08	01	58	51	44	37
	30	c	0930	ctr c #4	16	09	02	59	52	45	38
	31	b	1654	*	17	10	03	60	53	46	39

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For Date 1/26/61 Track

By R. A. Lamm Number F4-22

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	0,4, 32	c	1,6,4,4	ctr c #5	18	11	04	61	54	47	40
	33	b	1,5,0,9	BD heading	19	12	05	62	55	48	41
	34	t	0,4,3,7		20	13	06	63	56	49	42
	35	r	1,0,4,9		21	14	07	00	57	50	43
	36	u	0,9,1,3		22	15	08	01	58	51	44
	37	b	1,0,1,3	ab	23	16	09	02	59	52	45
	38	c	0,9,3,0	ctr c #4	24	17	10	03	60	53	
	39	b	0,2,6,0	1 at 30	25	18	11	04	61	54	47
	40	c	1,6,4,4	ctr c #5	26	19	12	05	62	55	48
	41	b	1,5,1,0	ABD heading	27	20	13	06	63	56	49
	42	t	0,4,4,5		28	21	14	07	00	57	50
	43	r	1,0,4,9		29	22	15	08	01	58	51
	44	u	0,9,1,3		30	23	16	09	02	59	52
	45	b	0,8,3,0	cd	31	24	17	10	03	60	
	46	c	0,2,5,9	ctr c #2	32	25	18	11	04	61	54
	47	b	1,0,1,3	ab	33	26	19	12	05	62	55
	48	c	0,9,6,0	ctr c #3	34	27	20	13	06	63	56
	49	b	0,2,6,0	1 at 30	35	28	21	14	07	00	57
	50	c	0,9,3,0	ctr c #4	36	29	22	15	08	01	
	51	b	1,5,1,1	CD heading	37	30	23	16	09	02	59
	52	t	0,4,5,5		38	31	24	17	10	03	60
	53	r	1,0,4,9		39	32	25	18	11	04	61
	54	u	0,9,1,3		40	33	26	19	12	05	62
	55	b	1,6,5,5	b	41	34	27	20	13	06	63
	56	c	0,9,6,0	ctr c #3	42	35	28	21	14	07	00
	57	b	1,6,5,4	a	43	36	29	22	15	08	01
	58	c	0,9,3,0	ctr c #4	44	37	30	23	16	09	02
	59	b	1,5,1,2	ACD heading	45	38	31	24	17	10	03
	60	t	0,4,6,3		46	39	32	25	18	11	04
	61	r	1,0,4,9		47	40	33	26	19	12	05
	62	u	0,9,1,3		48	41	34	27	20	13	
	63	b	1,6,2,3	bcd	49	42	35	28	21	14	07

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Problem Factorial Analysis

For _____ Date 1/26/61 Track _____

By R. A. Lamm Number F4-222

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization: Not UT		Okay		Not D	Not DM	N Only
	05 00	c	0259	ctr c #2	50	43	36	29	22	15	08
	01	b	1654	a	51	44	37	30	23	16	09
	02	c	0960	ctr c #3	52	45	38	31	24	17	10
	03	b	0260	1 at 30	53	46	39	32	25	18	11
	04	c	0930	ctr c #4	54	47	40	33	26	19	12
	05	b	1513	BCD heading	55	48	41	34	27	20	13
	06	t	0509		56	49	42	35	28	21	14
	07	r	1049		57	50	43	36	29	22	15
	08	u	0913		58	51	44	37	30	23	16
	09	b	0260	1 at 30	59	52	45	38	31	24	17
	10	c	0960	ctr c #3	60	53	46	39	32	25	18
	11	b	1326	abcd	61	54	47	40	33	26	19
	12	c	0259	ctr c #2	62	55	48	41	34	27	20
	13	b	1514	ABCD heading	63	56	49	42	35	28	21
	14	t	0517		00	57	50	43	36	29	22
	15	r	1049		01	58	51	44	37	30	23
	16	u	0913		02	59	52	45	38	31	24
	17	b	1659	r	03	60	53	46	39	32	25
	18	c	1653	ctr c #1	04	61	54	47	40	33	26
	19	b	1658	e	05	62	55	48	41	34	27
	20	h	0259	ctr c #2	06	63	56	49	42	35	28
	21	s	0750	2	07	00	57	50	43	36	29
	22	t	0735	finished factors	08	01	58	51	44	37	30
	23	b	1326	abcd	09	02	59	52	45	38	31
	24	c	0960	ctr c #3	10	03	60	53	46	39	32
	25	b	1515	E heading	11	04	61	54	47	40	33
	26	t	0529		12	05	62	55	48	41	34
	27	r	1049		13	06	63	56	49	42	35
	28	u	0913		14	07	00	57	50	43	36
	29	b	1628	bcd	15	08	01	58	51	44	37
	30	c	0960	ctr c #3	16	09	02	59	52	45	38
	31	b	1654	a	17	10	03	60	53	46	39

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For Date 1/26/61 Track

By R. A. Lamm Number FA-22

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization: Not UT		Okay		Not D	Not DM	N Only
	05 32	c	0,9,3,0	ctr c #4	18	11	04	61	54	47	40
	33	b	1,5,1,6	AE heading	19	12	05	62	55	48	41
	34	t	0,5,3,7		20	13	06	63	56	49	42
	35	r	1,0,4,9		21	14	07	00	57	50	43
	36	u	0,9,1,3		22	15	08	01	58	51	44
	37	b	0,8,3,0	cd	23	16	09	02	59	52	45
	38	c	0,9,6,0	ctr c #3	24	17	10	03	60	53	46
	39	b	1,6,5,4	a	25	18	11	04	61	54	47
	40	c	1,6,4,4	ctr c #5	26	19	12	05	62	55	48
	41	b	1,6,5,5	b	27	20	13	06	63	56	49
	42	c	0,9,3,0	ctr c #4	28	21	14	07	00	57	50
	43	b	1,5,1,7	BE heading	29	22	15	08	01	58	51
	44	t	0,5,4,7		30	23	16	09	02	59	52
	45	r	1,0,4,9		31	24	17	10	03	60	53
	46	u	0,9,1,3		32	25	18	11	04	61	54
	47	b	1,0,1,3	ab	33	26	19	12	05	62	55
	48	c	0,9,3,0	ctr c #4	34	27	20	13	06	63	56
	49	b	1,3,0,7	1	35	28	21	14	07	00	57
	50	c	1,6,4,4	ctr c #5	36	29	22	15	08	01	58
	51	b	1,5,1,8	ABE heading	37	30	23	16	09	02	59
	52	t	0,5,5,5		38	31	24	17	10	03	60
	53	r	1,0,4,9		39	32	25	18	11	04	61
	54	u	0,9,1,3		40	33	26	19	12	05	62
	55	b	1,0,1,3	ab	41	34	27	20	13	06	63
	56	c	1,6,4,4	ctr c #5	42	35	28	21	14	07	00
	57	b	1,6,5,6	c	43	36	29	22	15	08	01
	58	c	0,9,3,0	ctr c #4	44	37	30	23	16	09	02
	59	b	1,6,5,7	d	45	38	31	24	17	10	03
	60	c	0,9,6,0	ctr c #3	46	39	32	25	18	11	04
	61	b	1,5,1,9	CE heading	47	40	33	26	19	12	05
	62	t	0,5,6,1		48	41	34	27	20	13	06
	63	r	1,0,4,9		49	42	35	28	21	14	07

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization: Not UT		Okay		Not D	Not DM	N Only
	06 00	u	0913		50	43	36	29	22	15	08
	01	b	1655	b	51	44	37	30	23	16	09
	02	c	1644	ctr c #5	52	45	38	31	24	17	10
	03	b	1654	a	53	46	39	32	25	18	11
	04	c	1404	ctr c #6	54	47	40	33	26	19	12
	05	b	1520	ACE heading	55	48	41	34	27	20	13
	06	t	0609		56	49	42	35	28	21	14
	07	r	1049		57	50	43	36	29	22	15
	08	u	0913		58	51	44	37	30	23	16
	09	b	1424	bc	59	52	45	38	31	24	17
	10	c	0930	ctr c #4	60	53	46	39	32	25	18
	11	b	1654	a	61	54	47	40	33	26	19
	12	c	1644	ctr c #5	62	55	48	41	34	27	20
	13	b	1149	1	63	56	49	42	35	28	21
	14	c	1404	ctr c #6	00	57	50	43	36	29	22
	15	b	1521	BCE heading	01	58	51	44	37	30	23
	16	t	0619		02	59	52	45	38	31	24
	17	r	1049		03	60	53	46	39	32	25
	18	u	0913		04	61	54	47	40	33	26
	19	b	1316	abc	05	62	55	48	41	34	27
	20	c	0930	ctr c #4	06	63	56	49	42	35	28
	21	b	1307	1	07	00	57	50	43	36	29
	22	c	1644	ctr c #5	08	01	58	51	44	37	30
	23	b	1522	ABCE heading	09	02	59	52	45	38	31
	24	t	0627		10	03	60	53	46	39	32
	25	r	1049		11	04	61	54	47	40	33
	26	u	0913		12	05	62	55	48	41	34
	27	b	1316	abc	13	06	63	56	49	42	35
	28	c	0960	ctr c #3	14	07	00	57	50	43	36
	29	b	1154	de	15	08	01	58	51	44	37
	30	c	0259	ctr c #2	16	09	02	59	52	45	38
	31	b	0260	1	17	10	03	60	53	46	39

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For Date 1/26/61 Track

By R. A. Lamm Number F4-22

Program Input Codes	Loc.	Instruction Op.	Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	06 32	c	0930	ctr c #4	18	11	04	61	54	47	40
	33	b	1523	DE heading	19	12	05	62	55	48	41
	34	t	0637		20	13	06	63	56	49	42
	35	r	1049		21	14	07	00	57	50	43
	36	u	0913		22	15	08	01	58	51	44
	37	b	1424	bc	23	16	09	02	59	52	45
	38	c	0960	ctr c #3	24	17	10	03	60	53	46
	39	b	1654	a	25	18	11	04	61	54	47
	40	c	0930	ctr c #4	26	19	12	05	62	55	48
	41	b	1524	ADE heading	27	20	13	06	63	56	49
	42	t	0645		28	21	14	07	00	57	50
	43	r	1049		29	22	15	08	01	58	51
	44	u	0913		30	23	16	09	02	59	52
	45	b	1656	c	31	24	17	10	03	60	
	46	c	0960	ctr c #3	32	25	18	11	04	61	54
	47	b	1655	b	33	26	19	12	05	62	55
	48	c	0930	ctr c #4	34	27	20	13	06	63	56
	49	b	1654	a	35	28	21	14	07	00	57
	50	c	1644	ctr c #5	36	29	22	15	08	01	
	51	b	1525	BDE heading	37	30	23	16	09	02	59
	52	t	0655		38	31	24	17	10	03	60
	53	r	1049		39	32	25	18	11	04	61
	54	u	0913		40	33	26	19	12	05	62
	55	b	1013	ab	41	34	27	20	13	06	63
	56	c	0930	ctr c #4	42	35	28	21	14	07	00
	57	b	0260	1 at 30	43	36	29	22	15	08	01
	58	c	1644	ctr c #5	44	37	30	23	16	09	02
	59	b	1526	ABDE heading	45	38	31	24	17	10	03
	60	t	0663		46	39	32	25	18	11	04
	61	r	1049		47	40	33	26	19	12	05
	62	u	0913		48	41	34	27	20	13	
	63	b	0961	cde	49	42	35	28	21	14	07

Program Input Codes	Loc.	Instruction Op.	Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	07 00	c	0259	ctr c #2	50	43	36	29	22	15	08
	01	b	1013	ab	51	44	37	30	23	16	09
	02	c	0960	ctr c #3	52	45	38	31	24	17	10
	03	b	0260	1 at 30	53	46	39	32	25	18	11
	04	c	0930	ctr c #4	54	47	40	33	26	19	12
	05	b	1527	CDE heading	55	48	41	34	27	20	13
	06	t	0709		56	49	42	35	28	21	14
	07	r	1049		57	50	43	36	29	22	15
	08	u	0913		58	51	44	37	30	23	16
	09	b	1655	b	59	52	45	38	31	24	17
	10	c	0960	ctr c #3	60	53	46	39	32	25	18
	11	b	1654	a	61	54	47	40	33	26	19
	12	c	0930	ctr c #4	62	55	48	41	34	27	20
	13	b	1528	ACDE heading	63	56	49	42	35	28	21
	14	t	0717		00	57	50	43	36	29	22
	15	r	1049		01	58	51	44	37	30	23
	16	u	0913		02	59	52	45	38	31	24
	17	b	1623	bcde	03	60	53	46	39	32	25
	18	c	0259	ctr c #2	04	61	54	47	40	33	26
	19	b	1654	a	05	62	55	48	41	34	27
	20	c	0960	ctr c #3	06	63	56	49	42	35	28
	21	b	1307	1	07	00	57	50	43	36	29
	22	c	0930	ctr c #4	08	01	58	51	44	37	30
	23	b	1529	BCDE heading	09	02	59	52	45	38	31
	24	t	0727		10	03	60	53	46	39	32
	25	r	1049		11	04	61	54	47	40	33
	26	u	0913		12	05	62	55	48	41	34
	27	b	1149	1	13	06	63	56	49	42	35
	28	c	0960	ctr c #3	14	07	00	57	50	43	36
	29	b	1436	abcde	15	08	01	58	51	44	37
	30	c	0259	ctr c #2	16	09	02	59	52	45	38
	31	b	1530	ABCDE heading	17	10	03	60	53	46	39

Program Input Codes	Loc.	Instruction Op.	Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	07 32	t	0735		18	11	04	61	54	47	40
	33	r	1049		19	12	05	62	55	48	41
	34	u	0913		20	13	06	63	56	49	42
	35	b	0907	xb6238 reset DPSOSOP	21	14	07	00	57	50	43
	36	x,c	6145		22	15	08	01	58	51	44
	37	u	1232	Λ of V	23	16	09	02	59	52	45
	38	b	1653	ctr c #1 (0810)(0820)	24	17	10	03	60	53	46
	39	s	0804	1 at 30 (0749)	25	18	11	04	61	54	47
	40	t	0762		26	19	12	05	62	55	48
	41	c	1327	ctr #1	27	20	13	06	63	56	49
	42	b	[ ]		28	21	14	07	00	57	50
	43	a	[pΣ]		29	22	15	08	01	58	51
	44	c	[pΣ]		30	23	16	09	02	59	52
	45	u	0756		31	24	17	10	03	60	53
	46	b	[Lo pΣ]		32	25	18	11	04	61	54
	47	x,z	0002	1 at 28	33	26	19	12	05	62	55
	48	b	1327	ctr #1 (0759)	34	27	20	13	06	63	56
	49	u	0739		35	28	21	14	07	00	57
	50	x,z	0001		36	29	22	15	08	01	58
	51	c	[ ]	(1010) part	37	30	23	16	09	02	59
	52	b	0838	ctr of clear	38	31	24	17	10	03	60
	53	s	1039	wwwwj loop	39	32	25	18	11	04	61
	54	t	[ ]		40	33	26	19	12	05	62
	55	u	1008		41	34	27	20	13	06	63
	56	b	0742	(0745)	42	35	28	21	14	07	00
	57	a	1215	1 at 29	43	36	29	22	15	08	01
	58	c	0742		44	37	30	23	16	09	02
	59	u	0748		45	38	31	24	17	10	03
0000002'	60	l,q,l	q,l,q,0		46	39	32	25	18	11	04
	61	k,0,0,0	0,0,0,0	-6 at 4	47	40	33	26	19	12	05
	62	b	1134	ctr #2 (0740)	48	41	34	27	20	13	06
	63	s	1149	1 at 30	49	42	35	28	21	14	07

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By R. A. Lamm — Number F4-222

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization: Not UT		Okay		Not D	Not DM	N Only
	0,8,00	t	0826	loop 3	50	43	36	29	22	15	08
	01	u	0805		51	44	37	30	23	16	09
,0,0,0,0,0,0,3'	02	[	]	N_1 of binarization	52	45	38	31	24	17	10
	03	[	]	N_2 of binarization	53	46	39	32	25	18	11
	04		2	1 at 30	54	47	40	33	26	19	12
	05	c	1134	ctr #2 (0801)	55	48	41	34	27	20	13
	06	b	1449	1 at 29	56	49	42	35	28	21	14
	07	a	0743	a[pΣ]	57	50	43	36	29	22	15
	08	y	0744		58	51	44	37	30	23	16
	09	y	0743		59	52	45	38	31	24	17
	10	u	0738		60	53	46	39	32	25	18
	11	t	0832	loop 4 (0828)	61	54	47	40	33	26	19
	12	c	0262	ctr #3	62	55	48	41	34	27	20
	13	b	0263	Lo 3	63	56	49	42	35	28	21
	14	y	0743		00	57	50	43	36	29	22
	15	y	0744		01	58	51	44	37	30	23
	16	b	0259	ctr c #2	02	59	52	45	38	31	24
	17	s	0260	1 at 30	03	60	53	46	39	32	25
	18	u	0819		04	61	54	47	40	33	26
	19	c	1134	ctr #2	05	62	55	48	41	34	27
	20	u	0738		06	63	56	49	42	35	28
,0,0,0,0,0,0,3'	21	l,w,w,q	0000	mask	07	00	57	50	43	36	29
	22	9388	0000	-55,536 at 16	08	01	58	51	44	37	30
	23		2	1 at 30	09	02	59	52	45	38	31
	24	b	0960	ctr c #3 (0849)	10	03	60	53	46	39	32
	25	c	0262	ctr #3	11	04	61	54	47	40	33
	26	b	0262	ctr #3 (0800)	12	05	62	55	48	41	34
	27	s	1149	1 at 30	13	06	63	56	49	42	35
	28	u	0811		14	07	00	57	50	43	36
	29	u	0048	see(0043)	15	08	01	58	51	44	37
	30	[	]	cd	16	09	02	59	52	45	38
	31	x,i	0000	1 at 13	17	10	03	60	53	46	39

Program Input Codes	Loc	Instruction Op.	Instruction Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	0,8,32	b	1,1,1,8	ctr #4 (0811)	18	11	04	61	54	47	40
	33	s	1,3,6,2	1 at 30	19	12	05	62	55	48	41
	34	t	0,8,5,2	loop 5	20	13	06	63	56	49	42
	35	u	0,8,3,9		21	14	07	00	57	50	43
0,0,0,0,0,0,3	36	8,0,0,0	0,0,0,0	-1 at 0	22	15	08	01	58	51	44
	37	[	]	word for print loop	23	16	09	02	59	52	45
	38	[	]	ctr for input and clear loop	24	17	10	03	60	53	46
	39	c	1,1,1,8	ctr #4 (0835)	25	18	11	04	61	54	47
	40	b	1,1,2,6	ctr c #2 at 29	26	19	12	05	62	55	48
	41	a	0,2,6,3	Lo_3	27	20	13	06	63	56	49
	42	c	0,2,6,3	Lo_3	28	21	14	07	00	57	50
	43	u	0,8,2,4		29	22	15	08	01	58	51
	44	b	0,9,3,0	ctr c #4 (0856)	30	23	16	09	02	59	52
	45	s	0,2,6,0	1 at 30	31	24	17	10	03	60	53
	46	c	1,1,1,8	ctr #4	32	25	18	11	04	61	54
	47	b	1,0,1,2	Lo_2	33	26	19	12	05	62	55
	48	c	0,2,6,3	Lo_3	34	27	20	13	06	63	56
	49	u	0,8,2,4		35	28	21	14	07	00	57
	50	x, z	0,0,3,2		36	29	22	15	08	01	58
	51	[	]	Σx^2	37	30	23	16	09	02	59
	52	b	1,0,2,4	ctr #5 (0834)(0903)	38	31	24	17	10	03	60
	53	s	0,8,0,4	1 at 30	39	32	25	18	11	04	61
	54	t	0,8,5,7	loop 6	40	33	26	19	12	05	62
	55	c	1,0,2,4	ctr #5	41	34	27	20	13	06	63
	56	u	0,8,4,4		42	35	28	21	14	07	00
	57	b	1,0,2,9	ctr #6 (0854)	43	36	29	22	15	08	01
	58	s	0,8,2,3	1 at 30	44	37	30	23	16	09	02
	59	t	1,0,1,4	exit partial Σ	45	38	31	24	17	10	03
	60	c	1,0,2,9	ctr #6	46	39	32	25	18	11	04
	61	b	1,0,1,2	Lo_2	47	40	33	26	19	12	05
	62	a	0,8,0,3	ctr c #2 x ctr c #4 at 29	48	41	34	27	20	13	06
	63	c	1,0,1,2	Lo_2	49	42	35	28	21	14	07

Program Input Codes	Loc.	Instruction Op.	Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	0,9,00	u	0,9,0,1		50	43	36	29	22	15	08
	01	b	1,6,4,4	ctr c #5 (1007)	51	44	37	30	23	16	09
	02	c	1,0,2,4	ctr #5	52	45	38	31	24	17	10
	03	u	0,8,5,2		53	46	39	32	25	18	11
,0,0,0,0,0,0,4,	04	l,q,0,1	w,q,0,0	mask	54	47	40	33	26	19	12
	05	g,2,0,0	0,0,0,0	-156 at 8	55	48	41	34	27	20	13
	06	[	]	N_3 of binarization #PΣ	56	49	42	35	28	21	14
	07	b	3,q,9,8	xb6238 (see 0735)	57	50	43	36	29	22	15
	08	d	0,2,3,7	abcder (0928)	58	51	44	37	30	23	16
	09	x,h	6,2,5,9		59	52	45	38	31	24	17
	10	x,p	1,6,6,0		60	53	46	39	32	25	18
	11	c	0,2,6,1	1/n at 0	61	54	47	40	33	26	19
	12	u	1,6,2,0		62	55	48	41	34	27	20
	13	r	1,2,2,8	begin PΣ, SOS loop	63	56	49	42	35	28	21
	14	u	1,2,2,2	print heading	00	57	50	43	36	29	22
	15	b	0,9,3,0	ctr c #4	01	58	51	44	37	30	23
	16	n	0,2,5,9	ctr c #2	02	59	52	45	38	31	24
	17	h	0,8,0,3	loop 6 incrementer at 29	03	60	53	46	39	32	25
	18	n	1,4,0,4	ctr c #6	04	61	54	47	40	33	26
	19	m	0,9,6,2	1 at 1	05	62	55	48	41	34	27
	20	h	0,9,0,6	#PΣ at 29	06	63	56	49	42	35	28
	21	s	0,7,5,0	1 at 29	07	00	57	50	43	36	29
	22	h	1,3,0,8	d.f. at 29	08	01	58	51	44	37	30
	23	n	0,8,3,1	1 at 13	09	02	59	52	45	38	31
	24	a	0,7,4,6	b[PΣ]	10	03	60	53	46	39	32
	25	r	0,7,5,4	clear partial Σ	11	04	61	54	47	40	33
	26	u	1,0,0,8		12	05	62	55	48	41	34
	27	b	0,9,0,6	#PΣ at 29	13	06	63	56	49	42	35
	28	u	0,9,0,8		14	07	00	57	50	43	36
	29	[b	[ ]	b[Lo PΣ + #PΣ]	15	08	01	58	51	44	37
	30	[	]	ctr c #4	16	09	02	59	52	45	38
	31	b	0,7,4,6	b[PΣ] (1622)	17	10	03	60	53	46	39

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By R. A. Lamm — Number FA-222

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization: Not UT		Okay		Not D	Not DM	N Only
	09 32	y	1026	SOS loop	18	11	04	61	54	47	40
	33	y	1012	Lo_2	19	12	05	62	55	48	41
	34	a	0906	#PΣ	20	13	06	63	56	49	42
	35	c	0929	loop test	21	14	07	00	57	50	43
	36	c	0851	ΣX_L^2	22	15	08	01	58	51	44
	37	x c	6248	ΣX_H^2 } for SOS loop	23	16	09	02	59	52	45
	38	u	0939		24	17	10	03	60	53	46
	39	b	1404	ctr c #6	25	18	11	04	61	54	47
	40	s	1362	1 at 30	26	19	12	05	62	55	48
	41	u	0943		27	20	13	06	63	56	49
0000001	42	l	w400	1000 at 24	28	21	14	07	00	57	50
	43	c	1029	ctr #6 (0941)	29	22	15	08	01	58	51
	44	b	0259	ctr c #2	30	23	16	09	02	59	52
	45	n	0260	1 at 30	31	24	17	10	03	60	53
	46	u	0947		32	25	18	11	04	61	54
	47	c	1126	ctr c #2 at 29	33	26	19	12	05	62	55
	48	b	1049	u[α+2]	34	27	20	13	06	63	56
	49	s	1400	4 at 29	35	28	21	14	07	00	57
	50	y	1015		36	29	22	15	08	01	58
	51	u	1001		37	30	23	16	09	02	59
0000001	52		4000	1 at 17	38	31	24	17	10	03	60
	53	b	1011	SOS (1214)	39	32	25	18	11	04	61
	54	s	[ ]		40	33	26	19	12	05	62
	55	c	1011	SOS	41	34	27	20	13	06	63
	56	s	[ ]		42	35	28	21	14	07	00
	57	a	1308	} d.f.	43	36	29	22	15	08	01
	58	c	1308		44	37	30	23	16	09	02
	59	u	1142		45	38	31	24	17	10	03
0000005	60	[ ]		ctr c #3 - SOS for P.O.	46	39	32	25	18	11	04
	61	[ ]		cde	47	40	33	26	19	12	05
	62	4000	0000		48	41	34	27	20	13	06
	63	[ ]		cder	49	42	35	28	21	14	07

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By R. A. Lamm Number F4-222

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	10 00	3qc	3w00		50	43	36	29	22	15	08
	01	b	1644	ctr c #5 (0951)	51	44	37	30	23	16	09
	02	n	0960	ctr c#3	52	45	38	31	24	17	10
	03	n	1653	ctr c #1	53	46	39	32	25	18	11
	04	m	1647	1 at 2	54	47	40	33	26	19	12
	05	xc	6253	n at 30	55	48	41	34	27	20	13
	06	xp	1663		56	49	42	35	28	21	14
	07	u	0901		57	50	43	36	29	22	15
	08	y	0751	part of	58	51	44	37	30	23	16
	09	c	0838	ctr clear	59	52	45	38	31	24	17
	10	u	0751	loop	60	53	46	39	32	25	18
	11	[	]	SOS at 30	61	54	47	40	33	26	19
	12	[	]	Lo_2 PΣ	62	55	48	41	34	27	20
	13	[	]	ab at 30	63	56	49	42	35	28	21
	14	b	0850	32 at 29 (0859)	00	57	50	43	36	29	22
	15	a	[ ]	b(Lo code word)	01	58	51	44	37	30	23
	16	h	1138		02	59	52	45	38	31	24
	17	h	1125		03	60	53	46	39	32	25
	18	e	1361	wj	04	61	54	47	40	33	26
	19	a	1055	3w00	05	62	55	48	41	34	27
	20	y	1056	SOS storage	06	63	56	49	42	35	28
	21	s	0850	32 at 29	07	00	57	50	43	36	29
	22	y	1151	d.f.storage	08	01	58	51	44	37	30
	23	u	1026		09	02	59	52	45	38	31
	24	[	]	ctr #5 and T.S. for SOS	10	03	60	53	46	39	32
	25	[	]	total SOS at 30	11	04	61	54	47	40	33
	26	b	[ ]	(1044)(1023)	12	05	62	55	48	41	34
	27	xh	6249	ΣX	13	06	63	56	49	42	35
	28	u	1030		14	07	00	57	50	43	36
	29	[	]	ctr #6	15	08	01	58	51	44	37
	30	xh	6252	ΣY (1028)	16	09	02	59	52	45	38
	31	n	1439	10 at 31	17	10	03	60	53	46	39

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Program Input Codes	Loc.	Instruction Op.	Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	10 32	m	0261	1/n at 0	18	11	04	61	54	47	40
	33	t	1155		19	12	05	62	55	48	41
	34	8001t	1059		20	13	06	63	56	49	42
	35	u	1036		21	14	07	00	57	50	43
	36	xr	2651	print mean x 10 (1158)(1035)	22	15	08	01	58	51	44
	37	xu	2500		23	16	09	02	59	52	
	38	u	1059		24	17	10	03	60	53	46
,0000001'	39	w	wwwj	1 at 11 - 1 at 29	25	18	11	04	61	54	47
	40	b	1026	(1122)(1112)	26	19	12	05	62	55	48
	41	a	1220	1 at 29	27	20	13	06	63	56	49
	42	y	1026		28	21	14	07	00	57	50
	43	s	0929	B[ ]	29	22	15	08	01	58	51
	44	t	1026		30	23	16	09	02	59	
	45	xp	1631		31	24	17	10	03	60	53
	46	u	1114		32	25	18	11	04	61	54
	47	xa	6363	(1058)	33	26	19	12	05	62	55
	48	xc	6363		34	27	20	13	06	63	56
	49	u	[α + 2]	exit PΣ, SOS loop	35	28	21	14	07	00	
	50	m	0836	-1 at 0 (1152)	36	29	22	15	08	01	58
	51	xa	6331		37	30	23	16	09	02	59
	52	xc	6331	error d.f.	38	31	24	17	10	03	60
	53	b	1011	SOS	39	32	25	18	11	04	61
	54	u	1056		40	33	26	19	12	05	62
	55	xz	6300		41	34	27	20	13	06	63
	56	h	[ ]	store SOS (1054)	42	35	28	21	14	07	00
	57	m	0836	-1 at 0	43	36	29	22	15	08	01
	58	u	1047		44	37	30	23	16	09	02
	59	xr	6145	(1156)(1034)(1038)	45	38	31	24	17	10	03
	60	xu	6111		46	39	32	25	18	11	04
	61	xb	6251	R_H	47	40	33	26	19	12	
	62	xa	6248	ΣX_H^2	48	41	34	27	20	13	06
	63	xc	6248		49	42	35	28	21	14	07

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By R. A. Lamm — Number F4-222

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization: Not UT		Okay		Not D	Not DM	N Only
	11 00	x b	6250	R_L	50	43	36	29	22	15	08
	01	a	0851	ΣX_L^2	51	44	37	30	23	16	09
	02	h	1024	T.S.	52	45	38	31	24	17	10
	03	e	1153	3wwwwwq	53	46	39	32	25	18	11
	04	u	1108		54	47	40	33	26	19	12
	05	n	1317	see 0119	55	48	41	34	27	20	13
0000002	06	7 w w w	w w w q		56	49	42	35	28	21	14
	07	[	]	der at 30	57	50	43	36	29	22	15
	08	c	0851	ΣX_L^2 (1104)	58	51	44	37	30	23	16
	09	b	1024	T.S.	59	52	45	38	31	24	17
	10	n	0260	1 at 30	60	53	46	39	32	25	18
	11	t	1119		61	54	47	40	33	26	19
	12	u	1040		62	55	48	41	34	27	20
	13	[	]	total d.f. at 29	63	56	49	42	35	28	21
	14	b	1643	total R_H (1045)	00	57	50	43	36	29	22
	15	x c	6251		01	58	51	44	37	30	23
	16	u	1317		02	59	52	45	38	31	24
	17	u	1614	(see 0231)	03	60	53	46	39	32	25
	18	[	]	ctr #4	04	61	54	47	40	33	26
	19	x b	6248	(1111)	05	62	55	48	41	34	27
	20	a	1149	1 at 30	06	63	56	49	42	35	28
	21	x c	6248		07	00	57	50	43	36	29
	22	u	1040		08	01	58	51	44	37	30
	23	a	1338	1 at 29 (0051)	09	02	59	52	45	38	31
	24	u	0033		10	03	60	53	46	39	32
	25	[	]	b[Lo ext mask]	11	04	61	54	47	40	33
	26	[	]	ctr c #2 at 29	12	05	62	55	48	41	34
	27	b	1642	tot R_L (1318)	13	06	63	56	49	42	35
	28	x c	6250		14	07	00	57	50	43	36
	29	b	0851	ΣX_L^2	15	08	01	58	51	44	37
	30	x r	6235		16	09	02	59	52	45	38
	31	x u	6146		17	10	03	60	53	46	39

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By R. A. Lamm Number F4-22

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	1,1 32	c	1,0,1,1	SOS at 30	18	11	04	61	54	47	40
	33	u	1,1,3,6		19	12	05	62	55	48	41
	34	[	]	ctr #2	20	13	06	63	56	49	42
	35	u	1,4,6,0	see 0006	21	14	07	00	57	50	43
	36	b	1,4,4,1	b1531 (Lo ext msk -1) (1133)	22	15	08	01	58	51	44
	37	y	1,1,5,9		23	16	09	02	59	52	45
	38	[b	[ ]	extract mask	24	17	10	03	60	53	
	39	h	1,2,1,8		25	18	11	04	61	54	47
	40	c	1,2,1,9		26	19	12	05	62	55	48
	41	x,p	1,6,2,7		27	20	13	06	63	56	49
	42	b	1,1,5,9	(0959)(1162)	28	21	14	07	00	57	50
	43	a	1,2,1,5	1 at 29	29	22	15	08	01	58	51
	44	y	1,1,5,9		30	23	16	09	02	59	52
	45	u	1,1,4,6		31	24	17	10	03	60	53
	46	s	1,1,2,5	b(Lo ext mask)	32	25	18	11	04	61	54
	47	t	1,1,5,9		33	26	19	12	05	62	55
	48	u	1,1,5,0		34	27	20	13	06	63	56
,0000001'	49		2	1 at 30	35	28	21	14	07	00	57
	50	b	1,3,0,8	d.f. (1148)	36	29	22	15	08	01	58
	51	h	[ ]		37	30	23	16	09	02	59
	52	u	1,0,5,0		38	31	24	17	10	03	60
,0000002'	53	3,w,w,w	w,w,w,q		39	32	25	18	11	04	61
	54	[	]	de at 30	40	33	26	19	12	05	62
	55	m	1,6,2,7	-1 at 0 (1033)	41	34	27	20	13	06	63
	56	8,0,0,t	1,0,5,9		42	35	28	21	14	07	00
	57	m	0,8,3,6	-1 at 0	43	36	29	22	15	08	01
	58	u	1,0,3,6		44	37	30	23	16	09	02
	59	b	[ ]	(1147)	45	38	31	24	17	10	03
	60	e	1,2,1,8	mask	46	39	32	25	18	11	04
	61	s	1,2,1,9	mask	47	40	33	26	19	12	05
	62	t	1,1,4,2		48	41	34	27	20	13	06
	63	u	1,2,0,8		49	42	35	28	21	14	07

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Program Input Codes	Loc.	Instruction Op.	Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	12 00	x p	0015	(see 1225)	50	43	36	29	22	15	08
	01	x p	0451	BS L.C. (1341)	51	44	37	30	23	16	09
	02	b	1340		52	45	38	31	24	17	10
	03	a	1453	1 at 29	53	46	39	32	25	18	11
	04	y	1340		54	47	40	33	26	19	12
	05	u	1334		55	48	41	34	27	20	13
	06	x p	0115		56	49	42	35	28	21	14
	07	x z	0016	1 at 25	57	50	43	36	29	22	15
	08	b	1323	wj (1163)	58	51	44	37	30	23	16
	09	e	1159		59	52	45	38	31	24	17
	10	a	1660	3w00	60	53	46	39	32	25	18
	11	y	0954		61	54	47	40	33	26	19
	12	s	1462	32 at 29	62	55	48	41	34	27	20
	13	y	0956		63	56	49	42	35	28	21
	14	u	0953		00	57	50	43	36	29	22
	15	x z	0001	1 at 29	01	58	51	44	37	30	23
	16	b	1439	10 at 31 (0116)	02	59	52	45	38	31	24
	17	u	0118		03	60	53	46	39	32	25
	18	[	]	ext mask	04	61	54	47	40	33	26
	19	[	]	ext mask	05	62	55	48	41	34	27
	20	x z	0001	1 at 29	06	63	56	49	42	35	28
	21	n	1207	1 at 25	07	00	57	50	43	36	29
	22	h	0837	print word	08	01	58	51	44	37	30
	23	m	0952	1 at 17	09	02	59	52	45	38	31
	24	e	1660	3w00 Print	10	03	60	53	46	39	32
	25	a	1200	p0015 Loop	11	04	61	54	47	40	33
	26	h	1229		12	05	62	55	48	41	34
	27	s	1206	p 0115	13	06	63	56	49	42	35
	28	t	[ ]	exit	14	07	00	57	50	43	36
	29	[p	]		15	08	01	58	51	44	37
	30	b	0837		16	09	02	59	52	45	38
	31	u	1221		17	10	03	60	53	46	39

Program Input Codes	Loc.	Instruction Op.	Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	12 32	x r	1900	(0737)	18	11	04	61	54	47	40
	33	x u	1900		19	12	05	62	55	48	41
0000017	34	2018	3010	ANOVA	20	13	06	63	56	49	42
	35	3072	3246		21	14	07	00	57	50	43
	36	3a72	2020	Effect d.f. SOS MS	22	15	08	01	58	51	44
	37	4f08	5454		23	16	09	02	59	52	45
	38	4f6f	5f30		24	17	10	03	60	53	46
	39	2f2a	542a		25	18	11	04	61	54	47
	40	3006	0610		26	19	12	05	62	55	48
	41	067f	0646		27	20	13	06	63	56	49
	42	067f	3006		28	21	14	07	00	57	50
	43	0606	0606		29	22	15	08	01	58	51
	44	3f06	7f08		30	23	16	09	02	59	52
	45	300j	0404		31	24	17	10	03	60	53
	46	2a3f	7f26		32	25	18	11	04	61	54
	47	4f3f	7f20		33	26	19	12	05	62	55
	48	2018	5f46	total	34	27	20	13	06	63	56
	49	5f72	0j30		35	28	21	14	07	00	57
	50	vq00	0000		36	29	22	15	08	01	58
	51	b	1113	total d.f. at 29	37	30	23	16	09	02	59
	52	x r	1056	Int. P.O.	38	31	24	17	10	03	60
	53	x u	1000		39	32	25	18	11	04	61
	54	b	1025	total SS	40	33	26	19	12	05	62
	55	x r	2651	output 30	41	34	27	20	13	06	63
	56	x u	2500		42	35	28	21	14	07	00
	57	b	0315	Lo b	43	36	29	22	15	08	01
	58	y	1309		44	37	30	23	16	09	02
	59	b	0309	Lo [A code word]	45	38	31	24	17	10	03
	60	y	1340		46	39	32	25	18	11	04
	61	b	1440	2 at 30	47	40	33	26	19	12	05
	62	c	1327	SOS ctr	48	41	34	27	20	13	06
	63	x b	6331	error d.f. at 29	49	42	35	28	21	14	07

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By R. A. Lamm — Number F4-222

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization: Not UT		Okay		Not D	Not DM	N Only
	13 00	m	1636	1 at 1	50	43	36	29	22	15	08
	01	xd	6363	error SOS	51	44	37	30	23	16	09
	02	c	1024	Y ems at 0	52	45	38	31	24	17	10
	03	u	1309		53	46	39	32	25	18	11
	04	u	1609	(see 0133)	54	47	40	33	26	19	12
0,0,0,0,0,0,5	05	[	]	MS	55	48	41	34	27	20	13
	06	f3	k70f	1/200 at 0	56	49	42	35	28	21	14
	07		2		57	50	43	36	29	22	15
	08	[	]	d.f. at 29 and Acc Dump 0129	58	51	44	37	30	23	16
	09	b	[ ]	(1332)(1303)	59	52	45	38	31	24	17
	10	s	1453	2 at 30	60	53	46	39	32	25	18
	11	t	1333		61	54	47	40	33	26	19
	12	b	1327	SOS etr	62	55	48	41	34	27	20
	13	n	1149	1 at 30	63	56	49	42	35	28	21
	14	c	1327	SOS ctr	00	57	50	43	36	29	22
	15	u	1328		01	58	51	44	37	30	23
	16	[	]	abc at 30	02	59	52	45	38	31	24
	17	[xz	0000]	0, 10 or 100 at 31, delay (1116)	03	60	53	46	39	32	25
	18	u	1127		04	61	54	47	40	33	26
	19	b	1305	MS begin	05	62	55	48	41	34	27
	20	s	1306	1/50 at 0 100MS/ems	06	63	56	49	42	35	28
	21	t	1343	printout	07	00	57	50	43	36	29
	22	u	1350		08	01	58	51	44	37	30
0,0,0,0,0,0,5	23		wj		09	02	59	52	45	38	31
	24		3w00		10	03	60	53	46	39	32
	25	7www	wwwq		11	04	61	54	47	40	33
	26			abcd at 30	12	05	62	55	48	41	34
	27	[	]	ctr #1 and SOS ctr	13	06	63	56	49	42	35
	28	b	1309	(1315)	14	07	00	57	50	43	36
	29	a	1215	1 at 29	15	08	01	58	51	44	37
	30	y	1309		16	09	02	59	52	45	38
	31	s	0517	b(Lo r)	17	10	03	60	53	46	39

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization: Not UT		Okay		Not D	Not DM	N Only
	1,3 32	t	1,3,0,9		18	11	04	61	54	47	40
	33	x,p	1,6,1,9	(1434)(1311)	19	12	05	62	55	48	41
	34	b	1,3,2,7	SOS ctr	20	13	06	63	56	49	42
	35	s	1,3,0,7	1 at 30	21	14	07	00	57	50	43
	36	h	1,3,2,7	SOS ctr	22	15	08	01	58	51	44
	37	s	0,8,2,3	1 at 30	23	16	09	02	59	52	45
	38	x,z	0,0,0,1	delay	24	17	10	03	60	53	[illegible]
	39	t	1,4,4,1	print error line	25	18	11	04	61	[illegible]	[illegible]
	40	b	[,]	code word	26	19	12	05	62	55	48
	41	t	1,2,0,1		27	20	13	06	63	56	49
	42	u	1,3,5,1		28	21	14	07	00	57	50
	43	a	1,4,0,1	1/200 at 0 (1321)	29	22	15	08	01	58	51
	44	n	1,4,2,3	100 at 30	30	23	16	09	02	59	52
	45	m	1,0,2,4	1/ems	31	24	17	10	03	60	[illegible]
	46	a	0,8,0,4	1 at 30	32	25	18	11	04	61	54
	47	m	0,9,6,2	1 at 1	33	26	19	12	05	62	55
	48	x,r	2,6,5,1	output 30	34	27	20	13	06	63	56
	49	x,u	2,5,0,0		35	28	21	14	07	00	57
	50	u	[,]	exit (1322)	36	29	22	15	08	01	58
	51	r	1,2,2,8	print loop (1342)	37	30	23	16	09	02	[illegible]
	52	u	1,2,2,2		38	31	24	17	10	03	60
	53	x,p	2,4,3,9	tab	39	32	25	18	11	04	61
	54	b	1,3,4,0		40	33	26	[illegible]	12	05	62
	55	a	1,2,2,0	1 at 29	41	34	27	20	[illegible]	06	63
	56	y	1,3,4,0		42	35	28	21	14	07	00
	57	s	1,2,1,5	1 at 29	43	36	29	22	15	08	01
	58	e	1,3,2,3	wj	44	37	30	23	16	09	02
	59	a	1,3,2,4	3w00	45	38	31	24	17	10	03
	60	u	1,4,2,6		46	39	32	25	18	[illegible]	04
,0,0,0,0,0,5	61		w,j	mask	47	40	33	26	19	12	[illegible]
	62		2	1 at 30	48	41	34	27	20	13	[illegible]
	63	4,0,0,0	0,0,0,0	1 at 1	49	42	35	28	21	14	07

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By R. A. Lamm Number F4-222

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	1400		10	4 at 29	50	43	36	29	22	15	08
	01	f	3k70f	1/200 at 0	51	44	37	30	23	16	09
	02	b	0960	SOS @ 30 (1415)	52	45	38	31	24	17	10
	03	u	1419		53	46	39	32	25	18	11
	04	[	]	ctr c #6 and design ctr	54	47	40	33	26	19	12
	05	b	[ ]	d.f. at 29 begin d.f.,	55	48	41	34	27	20	13
	06	h	1435	SOS, MS P.O.	56	49	42	35	28	21	14
	07	xr	1056	int. P. O.	57	50	43	36	29	22	15
	08	xu	1000		58	51	44	37	30	23	16
	09	b	[ ]	SOS at 30	59	52	45	38	31	24	17
	10	h	0960	SS	60	53	46	39	32	25	18
	11	xr	2651	output 30	61	54	47	40	33	26	19
	12	xu	2500		62	55	48	41	34	27	20
	13	b	1435	d.f.	63	56	49	42	35	28	21
	14	s	1429	2 at 29	00	57	50	43	36	29	22
	15	t	1402		01	58	51	44	37	30	23
	16	b	1338	1 at 29	02	59	52	45	38	31	24
	17	d	1435	d.f.	03	60	53	46	39	32	25
	18	m	0960	SS (1403)	04	61	54	47	40	33	26
	19	h	1305	MS	05	62	55	48	41	34	27
	20	xr	2651	output 30	06	63	56	49	42	35	28
	21	XU	2500		07	00	57	50	43	36	29
	22	u	[ ]	exit	08	01	58	51	44	37	30
0000003	23		j8	100 at 30	09	02	59	52	45	38	31
	24	[	]	bc at 30	10	03	60	53	46	39	32
	25	4000	0000	1 at 1	11	04	61	54	47	40	33
	26	y	1405	(1360)	12	05	62	55	48	41	34
	27	a	1463	32 at 29	13	06	63	56	49	42	35
	28	y	1409		14	07	00	57	50	43	36
	29	xz	0002	delay and 2 at 29	15	08	01	58	51	44	37
	30	r	1422	print d.f. at 29	16	09	02	59	52	45	38
	31	u	1405	SOS at 30 and MS at 30	17	10	03	60	53	46	39

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization: Not UT		Okay		Not D	Not DM	N Only
	14 32	r	1350	print 100 MS/ems at 30	18	11	04	61	54	47	40
	33	u	1319		19	12	05	62	55	48	41
	34	u	1333		20	13	06	63	56	49	42
,0000006'	35	[	]	d.f. for A of V printout	21	14	07	00	57	50	43
	36	[	]	abcde at 30	22	15	08	01	58	51	44
	37	8000	0000	-1 at 0	23	16	09	02	59	52	45
	38	7wwww	wwwq		24	17	10	03	60	53	4
	39		f	10 at 31	25	18	11	04	61	54	47
	40		4	1 at 29	26	19	12	05	62	55	48
	41	b	1531	error code word (1339)	27	20	13	06	63	56	49
	42	r	1228	print loop	28	21	14	07	00	57	50
	43	u	1222		29	22	15	08	01	58	51
	44	xp	2430		30	23	16	09	02	59	52
	45	b	1051	xa6331	31	24	17	10	03	60	5
	46	y	1405		32	25	18	11	04	61	54
	47	a	0850	32 at 29	33	26	19	12	05	62	55
	48	y	1409		34	27	20	13	06	63	56
	49	xz	0001	delay and 1 at 29	35	28	21	14	07	00	57
	50	r	1422	d.f., SOS, MS printout	36	29	22	15	08	01	58
	51	u	1405		37	30	23	16	09	02	59
	52	xp	1638	carr. ret.	38	31	24	17	10	03	60
	53	xz	0001	delay and 1 at 29	39	32	25	18	11	04	61
	54	u	1661		40	33	26	19	12	05	62
	55	e	1106		41	34	27	20	13	06	63
	56	r	1635	(1605)	42	35	28	21	14	07	00
	57	u	1629	binarize datum	43	36	29	22	15	08	01
	58	m	1437	-1 at 0	44	37	30	23	16	09	02
	59	[	]	ul460 or nl317 (1608)	45	38	31	24	17	10	03
	60	u	1614	or ul609	46	39	32	25	18	11	04
,0000103'	61	[	]	er at 30	47	40	33	26	19	12	05
	62		80	32 at 29	48	41	34	27	20	13	0
	63		80	32 at 29	49	42	35	28	21	14	07

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Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	15 00	7201	0000	a	50	43	36	29	22	15	08
	01	f00	0000	b	51	44	37	30	23	16	09
	02	7228	0000	ab	52	45	38	31	24	17	10
	03	6f00	0000	c	53	46	39	32	25	18	11
	04	73f8	0000	ac	54	47	40	33	26	19	12
	05	gf8	0000	bc	55	48	41	34	27	20	13
	06	7229	f000	abc	56	49	42	35	28	21	14
	07	2f00	0000	d	57	50	43	36	29	22	15
	08	72f8	0000	ad	58	51	44	37	30	23	16
	09	ff8	0000	bd	59	52	45	38	31	24	17
	10	722f	f000	abd	60	53	46	39	32	25	18
	11	6ff8	0000	cd	61	54	47	40	33	26	19
	12	73ff	f000	acd	62	55	48	41	34	27	20
	13	gff	f000	bcd	63	56	49	42	35	28	21
	14	7229	ff80	abcd	00	57	50	43	36	29	22
	15	4f00	0000	e	01	58	51	44	37	30	23
	16	7328	0000	ae	02	59	52	45	38	31	24
	17	g28	0000	be	03	60	53	46	39	32	25
	18	722j	f000	abe	04	61	54	47	40	33	26
	19	6g28	0000	ce	05	62	55	48	41	34	27
	20	73fj	f000	ace	06	63	56	49	42	35	28
	21	gfj	f000	bce	07	00	57	50	43	36	29
	22	7229	g280	abce	08	01	58	51	44	37	30
	23	2g28	0000	de	09	02	59	52	45	38	31
	24	72fj	f000	ade	10	03	60	53	46	39	32
	25	ffj	f000	bde	11	04	61	54	47	40	33
	26	722f	g280	abde	12	05	62	55	48	41	34
	27	6ffj	f000	cde	13	06	63	56	49	42	35
	28	73ff	g280	acde	14	07	00	57	50	43	36
	29	gff	g280	bcde	15	08	01	58	51	44	37
	30	7229	ffjf	abcde	16	09	02	59	52	45	38
	31	4f69	g19f	error	17	10	03	60	53	46	39

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By R. A. Lamm Number F4-22

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	15 32	f	f,f,f,0	SOS masks A	18	11	04	61	54	47	40
	33	j	j,j,j,0	B	19	12	05	62	55	48	41
	34	8	8,8,8,0	AB	20	13	06	63	56	49	42
	35	w	0,w,0,0	C	21	14	07	00	57	50	43
	36	f	0,f,0,0	AC	22	15	08	01	58	51	44
	37	j	0,j,0,0	BC	23	16	09	02	59	52	45
	38	8	0,8,0,0	ABC	24	17	10	03	60	53	46
	39	w	w,0,0,0	D	25	18	11	04	61	54	47
	40	f	f,0,0,0	AD	26	19	12	05	62	55	48
	41	j	j,0,0,0	BD	27	20	13	06	63	56	49
	42	8	8,0,0,0	ABD	28	21	14	07	00	57	50
	43	w	0,0,0,0	CD	29	22	15	08	01	58	51
	44	f	0,0,0,0	ACD	30	23	16	09	02	59	52
	45	j	0,0,0,0	BCD	31	24	17	10	03	60	53
	46	8	0,0,0,0	ABCD	32	25	18	11	04	61	54
	47	w	w,w,w,0	E	33	26	19	12	05	62	55
	48	f	f,f,f,0	AE	34	27	20	13	06	63	56
	49	j	j,j,j,0	BE	35	28	21	14	07	00	57
	50	8	8,8,8,0	ABE	36	29	22	15	08	01	58
	51	w	0,w,0,0	CE	37	30	23	16	09	02	59
	52	f	0,f,0,0	ACE	38	31	24	17	10	03	60
	53	j	0,j,0,0	BCE	39	32	25	18	11	04	61
	54	8	0,8,0,0	ABCE	40	33	26	19	12	05	62
	55	w	w,0,0,0	DE	41	34	27	20	13	06	63
	56	f	f,0,0,0	ADE	42	35	28	21	14	07	00
	57	j	j,0,0,0	BDE	43	36	29	22	15	08	01
	58	8	8,0,0,0	ABDE	44	37	30	23	16	09	02
	59	w	0,0,0,0	CDE	45	38	31	24	17	10	03
	60	f	0,0,0,0	ACDE	46	39	32	25	18	11	04
	61	j	0,0,0,0	BCDE	47	40	33	26	19	12	05
	62	8	0,0,0,0	ABCDE	48	41	34	27	20	13	06
	63				49	42	35	28	21	14	07

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By R. A. Lamm — Number FA-222

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization: Not UT		Okay		Not D	Not DM	N Only
	1,6 00	x,p	0,0,5,0	(1619) begin input loop	50	43	36	29	22	15	08
	01	y	1,6,1,4		51	44	37	30	23	16	09
	02	c	0,8,3,8	ctr	52	45	38	31	24	17	10
	03	x,i	0,0,5,3		53	46	39	32	25	18	11
	04	n	0,7,4,7	1 at 28	54	47	40	33	26	19	12
	05	t	1,4,5,5		55	48	41	34	27	20	13
	06	r	1,6,3,5	binarize datum	56	49	42	35	28	21	14
	07	u	1,6,2,9		57	50	43	36	29	22	15
	08	u	1,4,5,9		58	51	44	37	30	23	16
	09	x,r	1,7,2,4	log (18.0) (1460)	59	52	45	38	31	24	17
	10	x,u	1,7,0,0		60	53	46	39	32	25	18
	11	x,z	0,0,3,0		61	54	47	40	33	26	19
	12	x,z	0,0,0,2		62	55	48	41	34	27	20
	13	m	0,9,4,2	1000 at 24	63	56	49	42		28	21
	14	c	[ ]	Lo of storage (1460)	00	57	50	43	36	29	22
	15	u	1,6,1,6		01	58	51	44	37	30	23
	16	b	0,8,3,8	ctr	02	59	52	45	38	31	24
	17	s	1,0,3,9	wwwwj	03	60	53	46	39	32	25
	18	t	[ ]	exit	04	61	54	47	40	33	26
	19	u	1,6,0,0		05	62	55	48	41	34	27
	20	b	0,2,3,5	m[Lo d] (0912)	06	63	56	49	42	35	28
	21	y	0,7,4,2		07	00	57	50	43	36	29
	22	u	0,9,3,1		08	01	58	51	44	37	30
,0,0,0,0,0,0,6	23	[	]	bcde at 30	09	02	59	52	45	38	31
	24				10	03	60	53	46	39	32
	25	5,0	0,0,0,0	$ at 11	11	04	61	54	47	40	33
	26	[	]	bcder at 30	12	05	62	55	48	41	34
	27	8,0,0,0	0,0,0,0	-1 at 0	13	06	63	56	49	42	35
	28	[	]	bcd at 30	14	07	00	57	50	43	36
	29	m	0,2,5,8	1 at 2 begin binar.	15	08	01	58	51	44	37
	30	h	0,8,0,2	N_1	16	09	02	59	52	45	38
	31	e	0,7,6,0	lqlqlq0	17	10	03	60	53	46	39

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For — Date 1/26/61 — Track

By R. A. Lamm — Number F4-222

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization: Not UT		Okay		Not D	Not DM	N Only
	1,6, 32	m	0,7,6,1	-6 at 4	18	11	04	61	54	47	40
	33	u	1,6,3,7		19	12	05	62	55	48	41
	34	a	0,9,0,6	N_3 (1651)	20	13	06	63	56	49	42
	35	u	[ ]	exit binarization	21	14	07	00	57	50	43
,0,0,0,0,0,0,1'	36	4,0,0,0	0,0,0,0	1 at 1	22	15	08	01	58	51	44
	37	a	0,8,0,2	N_1 (1633)	23	16	09	02	59	52	45
	38	h	0,8,0,3	N_2	24	17	10	03	60	53	[illegible]
	39	e	0,9,0,4	lq0lwq00	25	18	11	04	61	54	47
	40	m	0,9,0,5	-156 at 8	26	19	12	05	62	55	48
	41	u	1,6,4,5		27	20	13	06	63	56	49
	42	[ ]		tot R_L	28	21	14	07	00	57	50
	43	[ ]		tot R_H	29	22	15	08	01	58	51
	44	[ ]		ctr c #5	30	23	16	09	02	59	52
	45	a	0,8,0,3	N_2 (1641)	31	24	17	10	03	60	53
	46	u	1,6,4,8		32	25	18	11	04	61	[illegible]
,0,0,0,0,0,0,1'	47	2,0,0,0	0,0,0,0	1 at 2	33	26	19	12	05	62	55
	48	h	0,9,0,6	(1646)	34	27	20	13	06	63	56
	49	e	0,8,2,1	lwwq0000	35	28	21	14	07	00	57
	50	m	0,8,2,2	-55,536 at 16	36	29	22	15	08	01	58
	51	u	1,6,3,4		37	30	23	16	09	02	[illegible]
	52	c	1,6,5,4		38	31	24	17	10	03	60
,0,0,0,0,0,0,9'	53	[ ]		ctr c #1	39	32	25	18	11	04	61
	54			a at 30	40	33	26	19	12	05	62
	55			b	41	34	27	20	13	06	63
	56			c	42	35	28	21	14	07	00
	57			d	43	36	29	22	15	08	01
	58			e	44	37	30	23	16	09	02
	59			r	45	38	31	24	17	10	03
	60		3,w,0,0		46	39	32	25	18	11	04
	61		1,0,0,0	xz1600 (1454)	47	40	33	26	19	12	05
	62	u	0,0,0,0		48	41	34	27	20	13	[illegible]
.0,0,0,0,0,0,0'	63				49	42	35	28	21	14	[illegible]

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For _____ Date 1/26/61 Track ___

By R. A. Lamm Number F4-222

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization Not U T		Okay		Not D	Not D M	N Only
	17 00	b	1743	Lo log	50	43	36	29	22	15	08
	01	y	1610		51	44	37	30	23	16	09
	02	a	1712	xz0024	52	45	38	31	24	17	10
	03	y	1609		53	46	39	32	25	18	11
	04	b	1740	Lo "Output 30"	54	47	40	33	26	19	12
	05	y	1256		55	48	41	34	27	20	13
	06	y	1421		56	49	42	35	28	21	14
	07	y	1349		57	50	43	36	29	22	15
	08	y	1037		58	51	44	37	30	23	16
	09	y	1412		59	52	45	38	31	24	17
	10	a	1739	xz0151	60	53	46	39	32	25	18
	11	u	1725		61	54	47	40	33	26	19
	12	x z	0024		62	55	48	41	34	27	20
	13	b	1742	Lo alpha-numeric	63	56	49	42	35	28	21
	14	y	0000		00	57	50	43	36	29	22
	15	y	0001		01	58	51	44	37	30	23
	16	y	0102		02	59	52	45	38	31	24
	17	y	1232		03	60	53	46	39	32	25
	18	y	1233		04	61	54	47	40	33	26
	19	y	0248		05	62	55	48	41	34	27
	20	y	0121		06	63	56	49	42	35	28
	21	y	0122		07	00	57	50	43	36	29
	22	y	0101		08	01	58	51	44	37	30
	23	y	0247		09	02	59	52	45	38	31
	24	u	1731		10	03	60	53	46	39	32
	25	y	1411		11	04	61	54	47	40	33
	26	y	1348		12	05	62	55	48	41	34
	27	y	1036		13	06	63	56	49	42	35
	28	y	1255		14	07	00	57	50	43	36
	29	y	1420		15	08	01	58	51	44	37
	30	u	1713		16	09	02	59	52	45	38
	31	b	1741	Lo I P	17	10	03	60	53	46	39

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By R. A. Lamm Number P4-22

Program Input Codes	Loc.	Instruction Op.	Instruction Add.	Notes	Optimization Not UT		Okay		Not D	Not DM	N Only
	17 32	y	1253		18	11	04	61	54	47	40
	33	y	1408		19	12	05	62	55	48	41
	34	a	1737	xz0056	20	13	06	63	56	49	42
	35	y	1407		21	14	07	00	57	50	43
	36	y	1252		22	15	08	01	58	51	44
	37	x,z	0056		23	16	09	02	59	52	45
	38	u	0000		24	17	10	03	60	53	46
	39	x,z	0151		25	18	11	04	61	54	47
	40	[	]	Lo Output 30	26	19	12	05	62	55	48
	41	[	]	Lo Int. Printout	27	20	13	06	63	56	49
	42	[	]	Lo alpha-numeric (19.0)	28	21	14	07	00	57	50
	43	[	]	Lo log (18.0)	29	22	15	08	01	58	51
	44				30	23	16	09	02	59	52
	45				31	24	17	10	03	60	53
	46				32	25	18	11	04	61	54
	47				33	26	19	12	05	62	55
	48				34	27	20	13	06	63	56
	49				35	28	21	14	07	00	57
	50				36	29	22	15	08	01	58
	51				37	30	23	16	09	02	59
	52				38	31	24	17	10	03	60
	53				39	32	25	18	11	04	61
	54				40	33	26	19	12	05	62
	55				41	34	27	20	13	06	63
	56				42	35	28	21	14	07	00
	57				43	36	29	22	15	08	01
	58				44	37	30	23	16	09	02
	59				45	38	31	24	17	10	03
	60				46	39	32	25	18	11	04
	61				47	40	33	26	19	12	05
	62				48	41	34	27	20	13	06
	63				49	42	35	28	21	14	07

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