

JOSS

Direct only:

Cancel.

Go.

~~#####~~

Form 1:

Delete step 1.1.

Delete part 1.

Delete form 1.

Delete all steps.

Delete all parts.

Delete all forms.

Delete all.

~~Delete all values.~~

Punch.

Read deck 3173.

$x = 3$

Indirect only:

1.1 To step 3.7.

1.1 To part 3.

1.1 Done.

1.1 Stop.

1.1 Demand x .

Both direct and indirect:

Line.

Page.

Set $x=y+1$.

Do part 1. Do step 1.1.

Delete a, b, c.

~~#####~~ Delete all values.

~~Type 2+2, x, y+1.~~

Type step 1.1.

Type part 1.

Type form 1.

Type all steps.

Type all parts.

Type all forms.

Type all values.

Type "ok".

Type size.

Type a, b, c in form 1.

Type a, b, $V(i)$, V , $A(i,j)$, A, —.

Type all.

JOSS (continued)

Functions:

sqrt(x)
log(x)
exp(x)
sin(x)
cos(x)
arg(x,y)
ip(x)
fp(x)
~~coef(x)~~ ~~dp(x)~~
~~sfk(x)~~ ~~xp(x)~~
sgn(x)
max(a,b,...,z)
min(a,b,...,z)

The conditional clause may be used at the end of any legitimate step.

if a<b or c=d and e≤x≤f.

All six numerical relations may be used. The "and" and "or" are evaluated from left to right.

Brackets and parentheses may be used interchangeably. The absolute value bars may be used for brackets in expressions but not for enclosing subscripts or arguments.

The dollar sign may be used to refer to the line number on the page for editing purposes.

An asterisk at either end of the input line kills the line unless it is a form.

Arithmetic operators:

x+y x-y x·y x/y x*y

52 letters for identifiers. Any letter may be singly or doubly subscripted. No declarations. A new assignment overrides a previous assignment even to the extent of changing dimensions. Subscripts must be integers from 0 to 99.

Activity of user during "green" and JOSS during "red" are mutually exclusive. A task may be completed or stopped or interrupted or errored. The last three changes to "green" are flagged by messages. Only one suspended task is allowed and that may be continued by Go or cancelled by Cancel or Do.

Eight slots on the drum for users. ~~1000~~ 1024 words for each user which covers tables, steps, forms and values. User may type size of his program but is otherwise unconcerned for storage.

JOSS (continued)

Forms:

Within a form one or more underline characters will be interpreted as a blank into which a number is to be placed in fixed point form. A string of periods will likewise be interpreted as a blank into which a number is to be placed in scientific notation (roughly-- actually only the coefficient and scale factor exponent will appear). In both cases numbers will be rounded to fit.

Numerical representation:

Nine dedimal coefficient with sign and two decimal scale factor exponent with sign. All constraints are in decimal therefore the binary nature of JOHNNIAN never shows through. Only this scientific notation is used so there are no special representations for "integer", "boolean", etc.

Indexing : $V(i)$ / $A(i,j)$

For clause : for $x = 1(1)10(5)100, 7.3, 8.49, 15(.01)15.2.$

~~*Condition values*~~

JOSS Regions:

= Directory for Routines
A Character Properties of Input Characters
B Drum Control Words
C System Statistics
D Drum Routines
E Error Directory
F Function Directory
G Process Directory
H Context
I Integers
J Parameters, Origins, Constants
K Constants General
L Lists
M Core Area for Drum Routines
N Table of Powers of Ten

P Single Data Words
Q Lists
R Read-Write-Interpret Block (82 words)
S Output Block
↑ [T Temporary Storage
↑ U Tables
V Variables
↑ W Words
↑ X Executive Routines
Y
Z Run Context and Statistics

JOSS 412 Storage Assignment

	Origin (8)	Block Length	Unused Gap
M	5240	240	0
B	5620	16	0
D	5640	16	8
F	5660	16	3
K	5700	48	5
X	5760	16	0
A	6000	136	4
U	6210	120	0
=	6400	84	3
I	6524	12	2
E	6540	32	0 4
L	6600	24	3
T	6630	8	0
H	6640	32	0
J	6700	20	2
N	6724	12	0
W	6740	16	0
G	6760	16	2
R	7000	82	0
Z	7122	14	?
P	7140	32	0
S	7200	76	2
Q	7314	20	1
V	7340	64	11
Space	7440	224	0

JOSS Routines:

- = 0 Read clock
- = 1 Step one character
- = 2 Advance to nonspace
- = 3 Eliminate spaces
- = 4 Put (P1) in next S cell (P12)+1
- = 5 Converter
- = 6 Packer
- = 7 Unpacker
- = 8 Assign buffer
- = 9 Assign drum
- = 10 Deal out a storage space
- = 11 Unpack (Q3)
- = 12 Push Q2-Q3 Operand PDL
- = 13 Pop Q2-Q3 Operand PDL
- = 14 Push Q4-Q5 Operator PDL
- = 15 Pop Q4-Q5 Operator PDL
- = 16 Push Q6-Q7 Auxiliary PDL
- = 17 Pop Q6-Q7 Auxiliary PDL
- = 18 Push Q8-Q9 Control PDL
- = 19 Pop Q8-Q9 Control PDL
- = 20 Evaluate unsigned numerical expression
- = 21 Evaluate expression
- = 22 Type time line
- = 23 Evaluate condition
- = 24 Convert function to operator

- = 25 Output line from S to stn
- = 26 Evaluate grouped list
- = 27 Accumulate letters (6 max)
- = 28 Erase left linked list
- = 29 Erase right linked list
- = 30 Check range and pack (Q3)
- = 31 Add
- = 32 Subtract
- = 33 Multiply
- = 34 Divide
- = 35 Exponentiate
- = 36 Convert integer for output
- = 37 Simple direct tests
- = 38 Simple indirect tests
- = 39 Verify space and advance to nonspace in R
- = 40 Positive integer test on (Q3)
- = 41 Subscript range test and replace (Q3)
- = 42 Limit range test on (Q3)
- = 43 Deck test on (Q3)
- = 44 Part test on (Q3)
- = 45 Step test on (Q3)
- = 46 Form test on (Q3)
- = 47 Move stn to bottom of list
- = 48 'TO' routine
- = 49 Update time of last activity
- = 50 Find part a/c P20

- = 51 Find step a/c P21
- = 52 Find form a/c P22
- = 53 Kick out current program (if any)
- = 54 Bring in program a/c stn (if any)
- = 55 Switch to user (CL+SU)
- = 56 Erase step a/c H21-H26
- = 57 Erase form a/c H24-H26
- = 58 Release current buffer (if any) for stn
- = 59 Release drum to available list
- = 60 Initialize drum for stn (H12)
- = 61 Convert time for output
- = 62 Insert space in output
- = 63 Copy step number from R to S
- = 64 Unpack message to S for output composition
- = 65 Output canned message
- = 66 Put (P11) in next S cell (P12)+1
- = 67 Block transfer R → S
- = 68 Compute part (P20) for step (P21)
- = 69 Insert period and CR+EOM in output
- = 70 Compare (H21) w (H22)
- = 71 Find single indexed value
- = 72 Find double indexed value
- = 73 Assign value
- = 74 Evaluate indexed letter
- = 75 Erase value(s) for letter
- = 76 Erase one level of control structure

= 77 Match groupers
= 78 Cancel
= 79 Verify preceding space
= 80 Transmit line for drum routine

D 0 Error routine
D 1 Ext of G5 for 'all ---'
D 2 Ext of G5 for spec. values
D 3 Ext of G6 for 'all ---'
D 4 Ext of D3 for 'all values'
D 5
D 6 Ext of G6 for spec. values
D 7 Ext of G6 for values in form
D 8 Ext of G6 for step, part, form, size

G 5 Delete (step, part, form)
G 6 Type (via D extensions)

Operation Codes are Base Eight Numbers. Notes are Base Ten.

000	Proceed to next order in sequence	004 LM	Clear MQ, M → MQ
001 TNL	If A < 0, c → left command in M	005 TNR	If A < 0, c → right command in M
002 TPL	If A ≥ 0, c → left command in M	006 TPR	If A ≥ 0, c → right command in M
003 TFL	If overflow, c → left command in M	007 TFR	If overflow, c → right command in M
010 TRL	c → left command in M	014 TRH	c → right command in M
011 T1L	If T ₁ on, c → left command in M	015 T1R	If T ₁ on, c → right command in M
012 T2L	If T ₂ on, c → left command in M	016 T2R	If T ₂ on, c → right command in M
013 T3L	If T ₃ on, c → left command in M	017 T3R	If T ₃ on, c → right command in M
020 RA	Clear A, M → A	024 A	M + A → A
021 RS	Clear A, -M → A	025 S	M + A → A
022 RAV	Clear A, M → A	026 AV	M + A → A
023 RSV	Clear A, M → A	027 SV	- M + A → A
030 MR	Clear A, M * MQ rounded → A	034 MB	M * MQ + 2 ⁻³⁹ A + 1/2(1 - A ₁) → A and MQ
031 MNR	Clear A, -M * MQ rounded → A	035 MNB	-M * MQ + 2 ⁻³⁹ A + 1/2(1 - A ₁) → A and MQ
032 M	Clear A, M * MQ → A and MQ	036 MA	M * MQ + 2 ⁻³⁹ A → A and MQ
033 MN	Clear A, -M * MQ → A and MQ	037 MNA	-M * MQ + 2 ⁻³⁹ A → A and MQ
040 DS	A ÷ M → MQ, r → A	044 D	(A + 2 ⁻³⁹ MQ) ÷ M → MQ, r → A
041 DNS	A ÷ (-M) → MQ, r → A	045 DN	(A + 2 ⁻³⁹ MQ) ÷ (-M) → MQ, r → A
050 ST	A → M	054 SAB	2 ¹⁹ A ₁₉ and 2 ¹⁹ A ₃₉ → 2 ¹⁹ M ₁₉ and 2 ¹⁹ M ₃₉
051 SOL	0 A ₀ → 0 M ₀	055 SOR	20 ^A 27 → 20 ^M 27
052 SAL	7 A ₁₉ → 7 M ₁₉	056 SAR	24 ^A 39 → 24 ^M 39
053 SHL	0 A ₁₉ → 0 M ₁₉	057 SHR	20 ^A 39 → 20 ^M 39
060 STQ	Clear A, MQ → A and M	064 AQS	MQ + A → A and M
061 SNQ	Clear A, -MQ → A and M	065 SQS	-MQ + A → A and M
062 SVQ	Clear A, MQ → A and M	066 AVS	MQ + A → A and M
063 SNV	Clear A, - MQ → A and M	067 SVS	- MQ + A → A and M
070 SRC	Clear MQ, shift A right n places Zeros into A ₀ .	074 SRH	Shift A right n places. Zeros into A ₀ .
071 CLC	Clear MQ, circular shift of A and MQ left n places. Couple MQ ₀ to A ₃₉ , A ₀ to MQ ₃₉ .	075 CLH	Circular shift of A and MQ left n places. Couple MQ ₀ to A ₃₉ ; A ₀ to MQ ₃₉ .
072 LRC	Clear MQ, power shift A and MQ right n places. Couple A ₃₉ to MQ ₁ . 0 ^A ₀ to → 0 ^M ₀ .	076 LRH	Power shift A and MQ right n places. Couple A ₃₉ to MQ ₁ . 0 ^A ₀ → 0 ^M ₀ .
073 LLC	Clear MQ, power shift A and MQ left n places. Couple zeros into MQ ₃₉ ; MQ ₁ to A ₃₉ .	077 LLH	Power shift A and MQ left n places. Couple zeros into MQ ₃₉ , MQ ₁ to A ₃₉ .
100 SEL	Select I-O XXX0 Pri. Feed Reader Address XXX1 Sec. Feed Reader Part XXX2 Feed Punch XXX3 Feed Punch & Echo 100 XXX4 Sel. left 80 col. of Printer XXX5 Sel. right 80 " " XXX6 Sel. Plotter	104 DIS	Display
101 C	M Copy Order M → 40 Leftmost Selected Col. A → 40 Rightmost	105 HUT	Hoot
110 RD	Read drum words to M and memory addresses following numerically. Denoting MQ as xxx f ₁ f ₂ f ₃ f ₄ dpb l ₁ l ₂ l ₃ l ₄ , the f's determine the first drum address and the l's the last drum address. d selects the drum; p, the position of the heads; and b, the bank to be read.	106 EJ	Address part XXX0 Restore one page of 106 XXX1 Advance 1 print line XXX2 Advance 2 print lines
111 WD	Read M and words in memory addresses following numerically to drum. MQ has the same significance as in 110.	107	Read clock → A
120 ZTA	Clear A to Zero	124 PI	M I A → A
121	Clear A	125 NI	-M I A → A (- denotes digit inversion of M).
122	Clear A	126 FMI	M I A → A
123	Clear A	127 NMI	- M I A → A
130 HTL	Halt c → left command in M	134 HTR	Halt c → right command in M
131 H1L	Halt if H ₁ on; c → left command in M	135 H1R	Halt if H ₁ on; c → right command in M
132 H2L	Halt if H ₂ on; c → left command in M	136 H2R	Halt if H ₂ on; c → right command in M
133 H3L	Halt if H ₃ on; c → left command in M	137 H3R	Halt if H ₃ on; c → right command in M
140	Write line buffer	144	Search all SCRs for Match
141	Read line buffer	145	Search all SCRs for Mismatch
142	Write SCR	146	Display Graphic I/O
143	Read SCR	147	Read Graphic I/O Tablet
150			
160			
170			

*A copy order (10.1) directed to the Plotter as selected by 10.0 XXX6 gates only the contents of the specified memory word to the Plotter register with the following meaning:

DEFINITIONS

A	Accumulator
M ₀ -Circle Radius	MQ Multiplier Quotient Register
M ₁₈ -X Magnitude	M Word in the M th address in Internal Storage
21 _M ₂₄ -Character Selection	20 ^A ₃₉ Digits in position 2-20 through 2-39 of the word in A
M ₂₅ -Circle Drawing	c → Control goes to
M ₂₆ -Line Drawing	I Logical (digit by digit) product or intersection
M ₂₇ -Arm Selection	
28 _M ₃₉ -Y Magnitude	

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	
Left Operation										Left Address										Net used	Right Operation										Right Address									

Cliff:

I came in.
Mud

New TW Ball.

1'2"3#4\$5≤6≥7<8>9(0)-_+*qQwWeErRtTyYuUiIoOpP·|aAsSdDfFgGhHjJkKlL;:=zZxXcCvVbBnNmM,[.]/?

1'2"3#4\$5≤6≥7<8>9(0)·⁽⁸⁶⁸⁾_+*qQwWeErRtTyYuUiIoOpP·|aAsSdDfFgGhHjJkKlL;:=zZxXcCvVbBnNmM,[.]/?

ugh!
CLB

At least there were no goofs!
Try it with a fresh ribbon.
Elite suffers some but you
now can get a full 80 character
input line and margins!

F1

904 11-19-64

$$\frac{\sqrt{2}}{2} \cdot 2^3 \cdot 10^8$$

1	0
2	1
4	2
8	3
<hr/>	
5	0
10	1
<hr/>	
5.6	0
11.2	1

$$\frac{\sqrt{2}}{2} \cdot 2^3 \cdot 10^8 < x < \sqrt{2} \cdot 2^3 \cdot 10^8$$

Check it. Looks like coefficient
between 1 and $\sqrt{2}$ gets doubled several
times.

Error msg construction:

Error during step ---:--
 5 | 6 | 4 | 10 | 2

$\frac{72}{31}$
 41 characters for error msg.
 exclusive of CR+EOF.

This is the major reason for keeping $1 \leq \text{step} < 10^9$
 so that we wouldn't have to copy wild expressions
 into msg and take up to 3 lines. With new = 20
 we now have to check step label for number of characters.

Also check: {1.
 {1.2.

I n e e
 01011001 00100101 00010101 00010101

d		m	o	r
e		s	t	o
r	a	g	e	
s	p	d	c	e
.	z	□		

'JCS' deck

T 512

010 1021, 00000000 000 0377
 0000, 010 0014 000 0000
 0001, 010 0020 000 0000
 0002, 010 0036 000 0000
 0003, 010 0053 000 0000
 0004, 010 0070 000 0000
 0005, 010 0120 000 0000
 0006, 010 0147 000 0000
 0007, 010 0252 000 0000
 0010, 010 0270 000 0000

Master
Load from Acc ~ T1
Punch % Acc ~ T2
Print % Acc ~ T3
Punch A thru B less blanks.
Print A thru B less blanks.
Print one word, loc in MQ.
Block transfer
Loader for style F

0014, 020 0014 011 0001
 0015, 020 0015 012 0002
 0016, 020 0016 013 0003
 0017, 120 0000 130 0014
 0020, 024 0034 052 0032
 0021, 070 0000 020 0033
 0022, 130 0023 000 0000
 0023, 011 0024 010 0032
 0024, 050 0027 120 0000
 0025, 130 0026 000 0000
 0026, 011 0027 010 0032

0030, 020 0027 024 0035
 0031, 011 0022 000 0000
 0032, 010 0000 000 0000
 0033, 000 0000 050 1000
 0034, 000 0001 000 0000
 0035, 000 0000 000 0001
 0036, 024 0052 052 0050
 0037, 070 0000 020 0051
 0040, 100 0002 000 0000
 0041, 130 0042 000 0000
 0042, 012 0043 010 0047
 0043, 050 0045 000 0000
 0044, 020 0044 010 0004

0046, 020 0045 012 0041
 0047, 100 0002 100 0002
 0050, 010 0000 000 0000
 0051, 000 1000 000 1777
 0052, 000 0001 000 0000
 0053, 024 0067 052 0065
 0054, 070 0000 020 0066
 0055, 106 0000 000 0000
 0056, 130 0057 000 0000
 0057, 013 0060 010 0064
 0060, 050 0062 000 0000
 0061, 020 0061 010 0005

0063, 020 0062 013 0056
 0064, 106 0000 106 0000
 0065, 010 0000 000 0000
 0066, 000 1000 000 1777
 0067, 000 0001 000 0000
 0070, 024 0114 052 0072
 0071, 024 0114 052 0103
 0072, 020 2402 056 0116
 0073, 070 0025 056 0115
 0074, 020 0115 056 0075
 0075, 056 0100 020 7775
 0076, 005 0077 025 0112

0100, 004 0117 020 7777
0101, 101 0115 020 0115
0102, 025 0116 005 0103
0103, 010 2403 020 0115
0104, 024 0113 056 0115
0105, 056 0100 075 0117
0106, 006 0100 010 0074
0107, 020 0115 025 0116
0110, 002 0103 020 0115
0111, 024 0113 056 0115
0112, 014 0074 000 0000
0113, 000 0000 000 0001
0114, 000 0001 000 0000
0115, 000 0000 050 7777
0116, 000 0000 050 7777
0117, 000 0000 000 4000
0120, 024 0142 052 0123
0121, 024 0142 052 0136
0122, 020 0141 050 0145
0123, 020 0000 056 0144
0124, 070 0025 014 0137
0125, 000 0000 023 0000
0126, 007 0126 001 0132
0127, 021 0145 002 0135
0130, 050 0145 010 0131
0131, 106 0001 010 0135
0132, 004 0143 010 0133
0133, 020 0133 010 0006
0134, 020 0141 050 0145
0135, 020 0143 025 0144
0136, 002 0000 020 0143
0137, 024 0141 056 0143
0140, 056 0125 014 0125
0141, 000 0000 000 0001
0142, 000 0001 000 0000

0147, 024 0242 052 0220
0150, 060 0250 056 0154
0151, 020 0243 050 0250
0152, 075 0034 010 0153
0153, 020 0153 010 0221
0154, 000 0000 004 0000
0155, 060 0251 006 0157
0156, 020 0241 024 0245
0157, 050 0245 075 0001
0160, 020 0160 010 0221
0161, 004 0251 075 0007
0162, 020 0162 010 0221
0163, 106 0001 100 0004
0164, 004 0251 075 0023
0165, 020 0165 010 0221
0166, 004 0251 075 0034
0167, 020 0167 010 0221
0170, 020 0244 125 0247
0171, 125 0246 125 0245
0172, 050 0250 101 0250
0173, 020 0244 125 0247
0174, 125 0246 124 0245
0175, 050 0250 101 0250
0176, 020 0244 125 0247
0177, 124 0246 125 0245
0200, 050 0250 101 0250
0201, 020 0244 125 0247
0202, 124 0246 124 0245
0203, 050 0250 101 0250

0205, 125 0246 125 0245
0206, 050 0250 101 0250
0207, 020 0244 124 0247
0210, 125 0246 124 0245
0211, 050 0250 101 0250
0212, 020 0244 124 0247
0213, 124 0246 125 0245
0214, 050 0250 101 0250
0215, 020 0244 124 0247
0216, 124 0246 124 0245
0217, 050 0250 101 0250
0220, 010 0000 000 0000
0221, 024 0242 052 0240
0222, 020 0250 014 0231
0223, 020 0247 075 0001
0224, 050 0247 020 0246
0225, 075 0001 050 0246
0226, 020 0245 075 0001
0227, 050 0245 020 0250
0230, 024 0250 003 0231
0231, 050 0250 001 0223
0232, 020 0247 071 0001
0233, 050 0247 020 0246
0234, 071 0001 050 0246
0235, 020 0245 071 0001
0236, 050 0245 020 0250
0237, 071 0001 050 0250
0240, 001 0000 010 0232
0241, 000 0000 000 0001
0242, 000 0001 000 0000
0243, 170 3367 360 0400
0244, 000 1707 367 3600

0250, 056 0251 014 0251
0251, 130 0251 020 0625
0252, 024 0267 052 0256
0253, 024 0267 052 0261
0254, 024 0267 052 0257
0255, 024 0267 052 0264
0256, 020 7113 050 0260
0257, 021 7115 050 0265
0260, 020 7171 050 0521
0261, 020 7114 024 0260
0262, 054 0260 020 0266
0263, 024 0265 005 0257
0264, 010 7116 000 0000
0265, 177 7777 777 7777
0266, 000 0000 000 0001
0267, 000 0001 000 0000
0270, 100 0000 004 0274
0271, 101 0272 014 0272
0272, 000 0000 010 1001
0273, 075 0117 002 0271
0274, 010 0270 000 4000

0400 → 0520 = message area.

JCS 2-8-62

Message area working block:

050	0570	—	—	—	----
050	0571	—	—	—	----
050	0572	—	—	—	—
050	0573	—	—	—	0400
050	0574	—	—	—	0121
050	0575	—	—	—	0001
050	0576	—	----	—	----

Current character.
Next character address.
Buildup cell.
Origin of message area,
Length 81.
Constant 1.
Revolver word.

Directory

010	1021,	000	1000	000	1077	
	1000,	010	1100	000	0000	Scanner
	1001,	010	2200	000	0000	OF (re-initialize)
	1002,	010	1200	000	0000	RC
	1003,	010	1300	000	0000	EJ
	1004,	010	1400	000	0000	TO
	1005,	010	1500	000	0000	TC
	1006,	010	1600	000	0000	RI
	1007,	010	1700	000	0000	CL+SU
	1010,	050	2012	010	2000	Convert OPN+ADDR from message.
	1011,	050	2104	010	2100	Pick up character.
	1012,	010	2300	000	0000	ON
	1013,	010	3100	000	0000	Convert nonneg integer for typing
	1014,	010	3200	000	0000	Transmit line from 0400 to current channel + str.
	1015,	010	3400	000	0000	Monitor OF, RI, TO
	1020,	010	2600	000	0000	Erase of Acc.
	1021,	010	2700	000	0000	Type of Acc.
	1022,	010	2400	000	0000	Trans of Acc.
	1023,	010	2500	000	0000	Print of Acc.
010	1022,	000	1000	000	1077	

Scanner

010 1021, 000 1100 000 1177
1100, 120 0000 145 1140
1101, 050 1141 001 1100
1102, 124 1142 050 0576
1103, 020 1141 124 1151
1104, 025 1151 002 1012 *ON*
1105, 020 1141 124 1152
1106, 025 1152 002 1001 *OF*
1107, 020 1141 124 1153
1110, 025 1153 002 1005 *TC*
1111, 020 1141 124 1154
1112, 025 1154 002 1006 *RI*
1113, 020 1141 124 1155
1114, 025 1155 002 1002 *RC*
1115, 020 1141 124 1156
1116, 025 1156 002 1003 *EJ*
1117, 020 1141 124 1157
1120, 025 1157 002 1004 *TO*
1121, 130 1100 000 0000

1140, 000 0000 177 0000 *mag mask*
1141, (000 0000 004 0000)
1142, 000 0017 000 0177 *LIB+STN mask*

1151, 000 0000 100 0000 *ON*
1152, 000 0000 040 0000 *OF*
1153, 000 0000 020 0000 *TC*
1154, 000 0000 010 0000 *RI*
1155, 000 0000 004 0000 *RC*
1156, 000 0000 002 0000 *EJ*
1157, 000 0000 001 0000 *TO*

010 1022, 000 1100 000 1177

RC

010 1021, 000 1200 000 1277
1200, 020 0576 125 1220
1201, 142 1220 141 0400
1202, 020 0573 050 0571
1203, 020 1204 010 1010
1204, 057 1210 010 1205
1205, 020 1206 010 1011
1206, 020 1207 010 1010
1207, 020 1210 010 1010
1210, 014 1210 (010 1021)
1211, 010 1007 000 0000

1220, 000 0000 004 0000 RC

010 1022, 000 1200 000 1277

EJ

010 1021, 000 1300 000 1377
1300, 020 0576 125 1320
1301, 142 1320 141 0400
1302, 010 1202 000 0000

Merge with RC

1320, 000 0000 002 0000 EJ

010 1022, 000 1300 000 1377

TO

010 1021, 000 1400 000#1477
1400, 020 0576 142 1420
1401, 010 1000 000 0000

1420, 000 0000 001 0000 TO

010 1022, 000 1400 000 1477

TC

010 1021, 000 1500 000 1577
1500, 020 0576 125 1520
1501, 142 1520 010 1000

1520, 000 0000 020 0000 TC

010 1022, 000 1500 000 1577

RI

010 1021, 000 1600 000 1677
1600, 020 0576 125 1620
1601, 142 1620 010 1007

1620, 000 0000 010 0000 RI

010 1022, 000 1600 000 1677

CLTSU

010 1021, 000 1700 000 1777
1700, 020 0576 024 1720 (ok to add)
1701, 142 1720 010 1000

1720, 003 0000 000 0000 CLTSU

010 1022, 000 1700 000 1777

Convert OPN+ADDR

Format: xxx_XXXX_
 ←————→

10 1021, 000 2000 000 2077
2000, 020 2001 010 2020
2001, 020 2002 010 2020
2002, 020 2003 010 2020
2003, 020 2004 010 1011
2004, 020 2005 010 2020
2005, 020 2006 010 2020
2006, 020 2007 010 2020
2007, 020 2010 010 2020
2010, 020 2011 010 1011
2011, 020 0572 010 2012
2012, (014 1210 010 1021)

Result is right instruction in 0572 and acc.

2020, 050 2030 010 2021
2021, 020 2022 010 1011
2022, 124 2040 010 2023
2023, 025 2041 001 2025
2024, 120 0000 014 2025
2025, 024 2041 050 2042
2026, 020 0572 071 0003
2027, 024 2042 050 0572
2030, (020 2011 010 1011)

Subst zero if character value ≥ 8.

leave buildup in 0572

2040, 000 0000 000 0177
2041, 000 0000 000 0010
2042, (000 0000 000 0007)

010 1022, 000 2000 000 2077

Pick up character.

010 1021, 000 2100 000 2177
2100, 020 0571 056 2102
2101, 024 0575 010 2102
2102, 056 0571 020 (0433)
2103, 050 0570 010 2104
2104, (020 0572 010 2012)

leave char in 0570 and accumulator

010 1022, 000 2100 000 2177

OF (initialize)

010 1021, 000 2200 000 2277
2200, 010 2210 000 0000

2210, 120 0000 050 2270
2211, 020 2272 024 2270
2212, 142 2272 020 2270
2213, 024 2271 050 2270
2214, 025 2274 001 2211
2215, 021 2275 010 2216
2216, 024 2271 001 2216
2217, 120 0000 050 2270
2220, 020 2273 024 2270
2221, 142 2273 020 2270
2222, 024 2271 050 2270
2223, 025 2274 001 2220
2224, 010 1000 000 0000

Disable all (n) stations.

Enable all (n) stations

2271, 000 0000 000 0001
2272, 020 0000 000 0000
2273, 040 0000 000 0000
2274, 000 0000 000 0016
2275, 000 0000 010 0000

DS

FN

nbr of stns to enable. (n)

Delay

010 1021, 000 2300 000 2377
2300, 010 2310 000 0000

ON

2310, 020 0576 142 2320 *Reset ON*
2311, 124 2321 050 2322
2312, 120 0000 050 2324
2313, 020 2324 025 2322
2314, 005 2315 025 2325
2315, 001 2330 020 2324
2316, 024 2323 142 2323
2317, 010 2330 000 0000
2320, 000 0000 100 0000 *ON*
2321, 000 0000 000 0177
~~2322,~~
2323, 020 0000 000 0000 *DS turned ON.*
~~2324~~ *DS*
strs for DS
2325, 000 0000 000 0001
2326, 000 0000 000 0016

2330, 020 2324 024 2325 *Count.*
2331, 050 2324 025 2326
2332, 001 2313 010 1007 *Quit when all other strs disabled.*

010 1022, 000 2300 000 2377
010 1022, 000 2300 000 2377

Punch of Acc then SU.

010	1021,	000	2400	000	2477
	2400,	050	2402	000	0000
	2401,	020	2401	010	0004
	2402,	(000	2200	000	2277)
	2403,	100	0002	100	0002
	2404,	010	1007	000	0000

010	1022,	000	2400	000	2477
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Print of Acc. then SU

0000000000000000

010 1021, 000 2500 000 2577
2500, 050 2502 000 0000
2501, 020 2501 010 0005
2502, (000 1000 000 3777)
2503, 106 0000 010 1007

010 1022, 000 2500 000 2577

Erase of Acc than SU

010 1021, 000 2600 000 2677
2600, 056 2621 070 0025
2601, 056 2620 056 2604
2602, 020 2621 025 2620
2603, 050 2622 001 1007
2604, 120 0000 050 (1500)
2605, 020 2604 024 0575
2606, 056 2604 020 2622
2607, 025 0575 010 2603

2620, 000 0000 000 (1400)
2621, 000 0000 000 (1477)
2622, (177 7777 777 7777)

010 1022, 000 2600 000 2677

Type as Acc H.

010	1021,	000	2700	000	3077	
	2700,	056	2771	070	0025	
	2701,	056	2770	020	2771	
	2702,	025	2770	001	1007	
	2703,	020	0576	050	2772	
	2704,	020	0575	050	2767	
	2705,	020	2770	056	2706	
	2706,	000	0000	020	(2706)	
	2707,	050	2766	023	2766	
	2710,	001	2713	023	2767	
	2711,	006	2743	020	2775	
	2712,	050	0400	010	2735	First zero → CR
	2713,	020	2777	050	0400	nonzero
	2714,	050	0401	050	0402	
	2715,	050	0403	010	2716	
	2716,	020	2764	050	2765	
	2717,	020	2770	071	0104	
	2720,	020	2721	010	2756	(4)
	2721,	020	2722	010	3020	,
	2722,	020	2723	010	3010	#
	2723,	020	2766	010	2724	
	2724,	071	0046	010	2725	
	2725,	020	2726	010	2750	(3#4)
	2726,	020	2727	010	3010	#
	2727,	020	2766	010	2730	
	2730,	071	0073	010	2731	
	2731,	020	2732	010	2750	(3#4)
	2732,	020	2733	010	3030	RC
	2733,	010	2735	020	0576	
	2734,	140	0400	010	2742	
	2735,	020	2735	010	1015	monitor OF, RI
	2736,	010	2737	010	2737	
	2737,	020	0576	143	0000	
	2740,	124	2774	025	2774	
	2741,	005	2733	010	2735	Stall if TL=1
	2742,	020	0576	024	2774	Transmit
	2743,	142	2774	020	2770	
	2744,	025	2771	002	1007	→ user on exit
	2745,	020	2770	024	0575	Tally
	2746,	056	2770	020	2766	
	2747,	050	2767	010	2705	

2750,	050	2754	010	2751	<i>Routine for (3#4)</i>
2751,	020	2752	010	2755	<i>(3)</i>
2752,	020	2753	010	3010	<i>#</i>
2753,	020	2754	010	2756	<i>(4)</i>
2754,	020	2733	010	3030	
2755,	050	2763	010	2760	<i>Routine for (3)</i>
2756,	050	2763	010	2757	<i>Routine for (4)</i>
2757,	020	2760	010	3000	
2760,	020	2761	010	3000	
2761,	020	2762	010	3000	
2762,	020	2763	010	3000	
2763,	020	2733	010	3030	
2764,	000	0000	000	0404	<i>1st char. pos</i>
2765,	(000	0000	000	0434)	<i>curr char pos.</i>
2766,	(000	0000	000	0434)	<i>This line</i>
2767,	(000	0000	000	0434)	<i>Last line</i>
2770,	000	0000	000	(2770)	<i>Current address</i>
2771,	000	0000	000	3077	<i>Last address</i>

2774,	004	0000	000	0000	<i>TL</i>
2775,	000	0000	000	0052	<i>CA+EA</i>
2776,	000	0000	000	0073	<i>,</i>
2777,	000	0000	000	0016	<i>#</i>
3000,	050	3035	120	0000	<i>Octal char routine</i>
3001,	075	0003	025	0575	
3002,	002	3003	024	3004	
3003,	024	0575	010	3031	
3004,	000	0000	000	0060	<i>zero</i>

3010,	050	3035	020	2777	<i># routine</i>
3011,	010	3031	000	0000	

3020,	050	3035	020	2776	<i>,</i> routine
3021,	010	3031	000	0000	

3030,	050	3035	020	2775	<i>RC routine</i>
3031,	050	0570	020	2765	
3032,	056	3034	024	0575	
3033,	056	2765	010	3034	
3034,	020	0570	050	(0433)	
3035,	(010	2735	020	0576)	

010 1022, 000 2700 000 3077

Convert (a) as nonneg integer, units $\rightarrow \beta$.

010 1021, 000 3100 000 3177
3100, 024 3172 052 3102
3101, 024 3172 052 3114
3102, 020 (5027) 052 3104
3103, 056 3110 010 3104
3104, 004 (5073) 060 3170
3105, 001 3114 120 0000
3106, 044 3173 025 3171
3107, 002 3110 024 3174
3110, 024 3171 050 (0413)
3111, 020 3110 025 3171
3112, 056 3110 061 3170
3113, 005 3105 010 3114
3114, 010 (5030) 000 0000

020 \neq 0 010 3100
 α β

3171, 000 0000 000 0001
3172, 000 0001 000 0000
3173, 000 0000 000 0012
3174, 000 0000 000 0060

010 1022, 000 3100 000 3177

Transmit line from 0400 to str 9c 0576.

010 1021, 000 3200 000 3277
3200, 024 3271 052 3211
3201, 020 0576 143 0000
3202, 124 3270 025 3270
3203, 002 3220 020 0576
3204, 140 0400 020 0576
3205, 125 3270 024 3270
3206, 142 3270 000 0000
3207, 020 3207 010 1015
3210, 010 3211 010 3211
3211, 010 5032 000 0000
 2251
3220, 020 3220 010 1015
3221, 014 3203 010 3220

3270, 004 0000 000 0000
3271, 000 0001 000 0000

010 1022, 000 3200 000 3277

Monitor OF, IN 0

130 130

TL

Echo

010 1021, 000 3300 000 3377
3300, 010 3310 000 0000

3310, 020 0576 125 3374
3311, 024 3374 142 3374
3312, 020 0576 143 0000
3313, 010 3340 000 0000

3316, 020 0576 125 3373
3317, 142 3373 141 0400
3320, 020 3372 014 3326
3321, 020 (0437) 124 3377
3322, 025 3375 001 3330
3323, 025 0575 002 3330
3324, 020 3376 010 3325
3325, 050 (0437) 020 3321
3326, 025 3371 052 3321
3327, 052 3325 010 3321
3330, 020 0576 140 0400
3331, 020 0576 125 3370
3332, 024 3370 142 3370
3333, 010 3312 000 0000

3340, 075 0031 001 3316
3341, 075 0001 002 3344
3342, 020 0576 142 3367
3343, 014 3317 000 0000
3344, 075 0115 001 1000
3345, 020 3345 010 1015
3346, 010 3312 010 3312

3367, 000 0000 002 0000
3370, 007 0000 000 0000
3371, 000 0001 000 0000
3372, 000 0520 000 0000
3373, 000 0000 004 0000
3374, 003 0000 000 0000
3375, 000 0000 000 0016
3376, 000 0000 000 0052
3377, 000 0000 000 0177
010 1022, 000 3300 000 3377

To scanner if TC.
Monitor OK.

EJ
TL+CL+SU
RC
CL+SU

Monitor OF, RI, TO.

010 1021, 000 3400 000 3477
3400, 024 3460 052 3410
3401, 052 3411 020 0576
3402, 143 0000 050 3461
3403, 124 3462 025 3462
3404, 002 1001 020 3461 *initialize if OF.*
3405, 124 3463 025 3463
3406, 002 1007 020 3461 *→ user if RI*
3407, 124 3464 025 3464
3410, 002 (2736) 000 0000 *Exit left if TO.*
3411, 014 (2736) 000 0000

3460, 000 0001 000 0000
3461, (000 0000 001 0000)
3462, 000 0000 040 0000 *OF*
3463, 000 0000 010 0000 *RI*
3464, 000 0000 001 0000 *TO*

010 1022, 000 3400 000 3477

Prime numbers.

010 1021, 000 5000 000 5077
 5000, 020 5071 050 5075
 5001, 020 5073 024 5072
 5002, 050 5073 004 5075
 5003, 032 5075 020 5073
 5004, 065 5070 001 5007
 5005, 020 5075 024 5072
 5006, 050 5075 014 5002
 5007, 020 5071 050 5077
 5010, 020 5077 024 5072
 5011, 050 5077 025 5075
 5012, 002 5016 120 0000
 5013, 004 5073 044 5077
 5014, 025 5071 002 5010
 5015, 010 5001 000 0000
 5016, 020 5016 010 0007
 5017, 020 5076 050 0400
 5020, 000 0000 000 0001
 5021, 000 0000 000 0121
 5022, 020 5074 024 5071
 5023, 050 5074 000 0000
 5024, 020 5024 010 1013
 5025, 000 5074 000 0404
 5026, 020 5026 010 1013
 5027, 000 5073 000 0416
 5030, 020 5067 050 0417
 5031, 020 5031 010 1014
 5032, 010 5001 000 0000

Transmit

5067, 000 0000 000 0052
 5070, (177 7777 777 7764)
 5071, 000 0000 000 0001
 5072, 000 0000 000 0002
 5073, (000 0000 000 0001)
 5074, ()
 5075, (000 0000 000 0021)
 5076, 000 0000 000 0016
 5077, (000 0000 000 0021)

*candidate n
 index i (kicked before used)
 upper limit
 divisor d.*

010 1022, 000 5000 000 5077

7000, 010 7010 000 0000

7010, 020 0576 125 7074
7011, 024 7074 142 7074
7012, 020 0576 143 0000
7013, 050 7070 124 7073
7014, 025 7073 002 7020
7015, 020 7070 124 7072
7016, 025 7072 002 7020
7017, 010 7012 000 0000
7020, 020 0576 142 7073
7021, 020 0576 142 7072
7022, 020 0576 141 0400
7023, 020 7075 050 7070
7024, 020 7070 052 7025
7025, 020 0000 025 7077
7026, 001 7032 025 0575
7027, 002 7032 020 7070
7030, 025 7071 050 7070
7031, 025 7076 002 7024
7032, 020 7070 024 7071
7033, 052 7035 024 7071
7034, 052 7036 020 7067
7035, 050 0000 020 7066
7036, 050 0000 010 7040

7040, 020 7076 050 7070
7041, 020 7065 056 7052
7042, 120 0000 050 7063
7043, 020 7070 052 7046
7044, 024 7071 050 7070
7045, 020 7063 071 0010
7046, 024 0000 050 7063
7047, 124 7066 025 7066
7050, 002 7055 020 7063
7051, 025 7062 001 7043
7052, 024 7062 050 0000
7053, 020 7052 024 7071
7054, 014 7041 000 0000
7055, 020 7052 056 7057
7056, 056 7064 000 0000
7057, 020 7063 050 0000
7060, 025 7062 002 7140
7061, 071 0010 014 7057
7062, 000 4000 000 0000

7064, 000 7100 000 0000
7065, 000 7100 000 7100
7066, 000 0000 000 0200
7067, 000 0000 000 0052

7071, 000 0001 000 0001
7072, 000 0000 002 0000
7073, 000 0000 004 0000
7074, 003 0000 000 0000
7075, 000 0520 000 0520
7076, 000 0400 000 0400
7077, 000 0000 000 0016

7140, 020 7064 010 1021

*To type out octal encoding
of messages 5 characters per
word + CR+EOM + 200.*

010	1022,	000	7000	000	7177
010	1022,	000	7000	000	7177
010	7000				
Overflow.					
	7100,	063	0650	522	4426
	7101,	021	4461	541	5452
	7102,	100	0000	000	0000

Change of 7000 routine.