ELLIOTT 900

Volume 2: PROGRAMMING INFORMATION

Part 6: APPLIED PROGRAMMING

Section 1: PERT

Contents

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Amendments

Page 4, line 4 should be corrected to read:

"The data is checked for 'loops', and activity lists and events....."

Page 7,.....The diagram should show an arrow from event 40 to event 25.

Page 17.....Add to the 4th line from the bottom of the page:

"control symbols should be preceded and followed by new line. Their effect lasts until cancelled by another control symbol (except for D)."

Page 17.....Add to the 2nd line from the bottom of the page:

"Page separator. This is used to separate the data into a sequence of pages to simplify the location of errors.

Page 19.....Add the sentence.

"The numbers in the data line may be separated by colons instead of spaces, as shown in the example (3.4)."

Chapter 1: INTRODUCTION

In the planning and analysis of a project, one of the most useful approaches is to draw a network diagram. This diagram is a schematic representation of the relationship between various parts of the project in the form of a network of points in time (representing events) joined by straight lines (representing activities).

Using the critical path analysis technique, a time analysis can be performed on the network. This will schedule each activity in the project, and will identify those activities which affect the scheduled finish date of the project i.e. are critical. Also this technique will allow the network to be reviewed as the project proceeds.

1.1 Summary

This is a program for performing time analysis on a project.

The information input consists of an overall project duration (optional) and a list of all the activities in the project, each activity being defined by the following:

start event, marking the inception of the activity

end event, marking the completion of the activity

duration of the activity.

The output available consists of an event report, giving earliest and latest times of each event, and several activity reports, giving earliest and latest start dates and float of each activity. These reports may be sorted and classified in various ways, the exact form of the output depends on the user requirements.

1.1.1 Limitations

Maximum number of activities = 511

Maximum number of events = 511

Event numbers must lie in the range 1 to ~~511~~ 510, durations must lie in the range 0 to 127 time units.

Overall project duration must not exceed 510 time units. The float (or slack) of any activity must be in the range -255 to +255 time units. Large floats may be avoided by inserting dummy events in the network.

1.1.2 User Features

(a) Random event numbering.

(b) One or three time estimates allowed for each activity.

(c) Multiple start and/or end events allowed.

(d) An overall project duration can be set.

(e) The project can be readily updated by the addition of new activities, removal of existing activities, or alterations to the durations of existing activities.

(f) A project start date, and the number of working days per week can be set, to produce calendar dated reports.

(g) Comprehensive range of output available:
Activity check list.
Events report.
Activities report, including or excluding dummy activities.
Activities report, including critical path activities only.
(These reports can be sorted on event numbers, or on earliest and latest start dates).

(h) Production of binary data tapes to speed up subsequent updating runs.

(i) Time units may be days or weeks.

(j) Input data is vetted and suitable messages will be output when errors are found.

(k) Network loops are identified and each loop is output separately.

(l) Output of start and end events assist in the detection of 'dangles'.

1.2 Configuration

8k store
Paper tape reader
Paper tape punch
(On-line teleprinter may be used if available).

1.3 Form of Distribution

The program is in the form of a single tape to be input via initial instructions.

1.4 Notation

It is expected that the user is familiar with the terminology of C.P.A. (Critical Path Analysis) before running the program.

1.5 References

"Planning by Network" by H.S. Woodgate (1964, Business Publications Ltd.).

"An Introduction to Critical Path Analysis" by K.G. Lockyer (1964, Sir Isaac Pitman & Sons Ltd.).

Chapter 2: FUNCTIONS

2.1 Summary

The program performs all the necessary calculations for the basic time analysis of a network, thus producing earliest and latest dates for each event (either with or without overall project duration being set). The data is checked for 'loops', and activity lists and events may be output to help in checking the network. Duplications and other errors in the data will also be detected during input.

If a teleprinter is attached and all devices are in AUTO, then all diagnostic information appears on the teleprinter and main output on punch.

Once all the data is in an acceptable form it may be reviewed from time to time as the project proceeds e. g. estimated durations may be replaced by actual durations. A binary tape of the accepted activites may be output during any run and re-input at the next run to save time. The output required by the user is requested via a control tape.

Each run has, associated with it, a 'run number' and a 'date of run'. Run numbers must go in sequence i. e. only run no. 4 can follow no. 3. The date is used on the binary data tape and on the output obtained for the run.

2.2 Entry Points

The sequence of entries specified on the control tape is generally to input all the relevant information, perform the time analysis calculation, and then select the required output. The particular sequence will depend on the user's objectives, but it should be noted that on completing one entry the choice of the next may be restricted. Each entry has a number associated with it which is used on the control tape to call the entry.

Entry No.	Function	4100 PERT1 equivalent
0	To read in data from paper tape and form activities lists in store.	DATAIN
1	To input the dumped network from paper tape as produced by entry no. 2.	BININ
2	To dump the network activities lists on to paper tape, together with the project title, date produced and run number.	BINDUMP

Entry No.	Function	4100 PERT1 equivalent
3	To calculate the earliest and latest times for each event, checking for loops and outputting the start events, end events and overall project duration.	CALC.
4	To give a list of all events in ascending order of event numbers with their earliest and latest dates, both as a number of working units and as a calendar date.	EVENTLIST
5	To output a checklist of the preceding event, succeeding event and duration of all the activities in preceding/succeeding event number order.	CHECKACT
6	To give a list of all activities in preceding/succeeding event number order i. e. all activities with their start and end events, durations, earliest and latest start and finish dates, total and free float. Activities on the critical path are distinguished by an asterisk in the last column.	ACTALL, IJ
7	All activities in earliest start date order.	ACTALL, ESD
8	All activities in latest start date order.	ACTALL, LSD
9	Critical path activities in preceding/succeeding event number order.	ACTCP, IJ
10	Critical path activities in earliest start date order.	ACTCP, ESD
11	Critical path activities in latest start date order.	ACTCP, LSD
12	All activities except dummies (which are not on critical path) in preceding/succeeding event number order.	ACTXD, IJ
13	All activities except dummies in earliest start date order.	ACTXD, ESD
14	All activities except dummies in latest start date order.	ACTXD, LSD
15 (S) x	To change the overall project duration which in turn adjusts all the latest event dates. The new duration (x) is set by a parameter immediately after the entry no., separated by a space.	PROJDUR, x
16	All activities in Total float order.	none
17	All activities excluding dummies in Total float order.	none
18	All activities in Free float order.	none

Entry No.	Function	4100 PERT1 equivalent
19	All activities excluding dummies in Free float order.	none
-1	Program halt.	none

It is clear that network data must be input before calculation can be started i. e. entry 3 must be preceded by 0 or 1. There are other similar cases where the choice of entries after a certain entry, is restricted, and these will be checked for by the program.

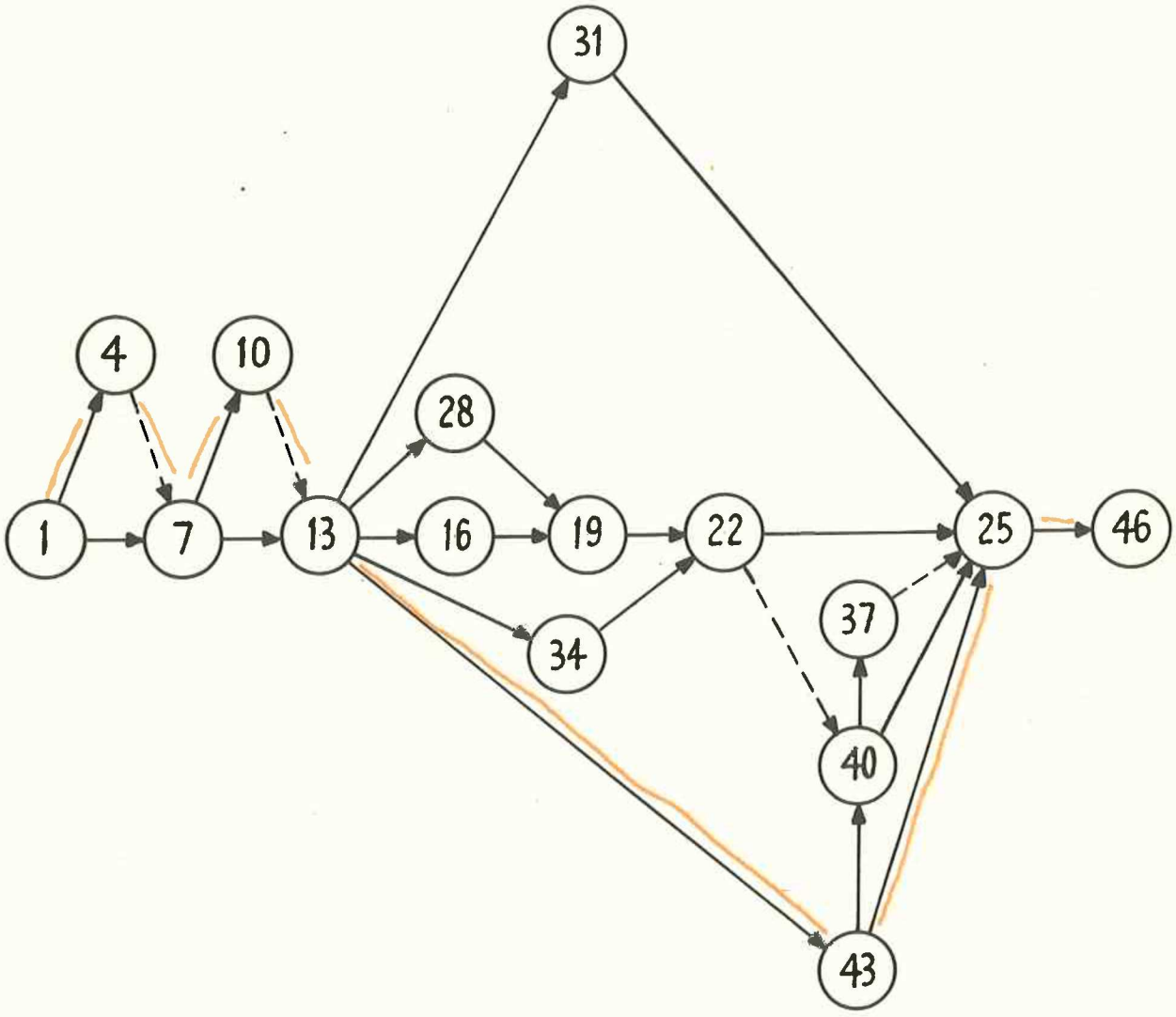
The most convenient method of indicating these restrictions is by means of the following table:-

Last entry \ Next entry →	0	1	2	3	5	4, 6 - 15
0	✓		✓	✓	✓	
1	✓		✓	✓	✓	
2	✓		✓	✓	✓	✓
3	✓		✓		✓	✓
5	✓		✓		✓	✓
4, 6 - 15	✓		✓		✓	✓
No previous entry	✓	✓				

Chapter 3: EXAMPLE

The project chosen is a simplified version of building a pavilion and although simple and small, it is sufficient to show most of the important aspects of the program.

3.1 Network Diagram



3.2 Table of Activities

Preceding Event	Succeeding Event	Duration	Description
1	4	10	Obtain planning permission.
1	7	5	Obtain landlord approval.
4	7	0	
7	10	14	Obtain estimates for materials.
7	13	8	Find amount of Loan available.
10	13	0	
13	16	28	Build Foundations.
13	28	4	Order wiring, joinery and plumbing.
13	31	10	Obtain Fencing Materials.
13	34	4	Order furniture.
13	43	5	Set Target for fund.
16	19	41	Build Structure.
19	22	25	Do wiring, joinery and plumbing.
22	25	5	Install furniture.
22	40	0	
25	46	4	Prepare for opening ceremony.
28	19	9	Collect wiring, joinery and plumbing.
31	25	22	Do fencing.
34	22	5	Collect furniture.
37	25	0	
40	25	3	Place plaque in position.
40	37	2	Send out invitations.
43	25	95	Fund raising.
43	40	4	Order plaque.

3.3 Control Tape

Information punched	Meaning
1	Run number.
5	Number of days per working week.
1 1 67	Date of run.
1 2 67	Project start date.
0	Working units : 0 for days, 1 for weeks.
0	Input data from data tape.
3	Perform the time analysis.
5	Output Checklist of activities.
4	Output Events report.
6	Output all activities in IJ order.
10	Output activities on crit. path in ESD order.
14	Output all activities excluding dummies in LSD order.
15 127	Set overall project duration = 127.
6	Output all activities in IJ order.
-1	End of control tape.
®	

3.4 Data Tape

```
PAVILION.
 1:   4:   10
 1:   7:    5
 4:   7:    0
 7:  10:   14
 7:  13:    8
10:  13:    0
13:  16:   28
13:  28:    4
13:  31:   10
13:  34:    4
13:  43:    5
16:  19:   41
19:  22:   25
22:  25:    5
22:  40:    0
25:  46:    4
28:  19:    9
31:  25:   22
34:  22:    5
37:  25:    0
40:  25:    3
40:  37:    2
43:  25:   95
43:  40:    4
```

3.5 Output

PROJECT PAVILION.

PROJECT START DATE 1FEB67

DATE OF RUN 1JAN67

WORKING DAYS IN WEEK 5

RUN NUMBER 1

NUMBER OF ACTIVITIES 24

PAGE 1 ACTIVITY OUTPUT

CHECKLIST SORTED ON PRECEDING/SUCCEEDING EVENTS

EVENT NO PREC	SUCC	ACT DUR
1	4	10
1	7	5
4	7	0
7	10	14
7	13	8
10	13	0
13	16	28
13	28	4
13	31	10
13	34	4
13	43	5
16	19	41
19	22	25
22	25	5
22	40	0
25	46	4
28	19	9
31	25	22
34	22	5
37	25	0
40	25	3
40	37	2
43	25	95
43	40	4

PROJECT PAVILION.

DATE OF RUN 1JAN67

RUN NUMBER 1

PROJECT START DATE 1FEB67

WORKING DAYS IN WEEK 5

NUMBER OF ACTIVITIES 24

PAGE 1

EVENTS LIST

EVENT NUMBER	EARLIEST	DATE	LATEST	DATE
1	0	1FEB67	0	1FEB67
4	10	15FEB67	10	15FEB67
7	10	15FEB67	10	15FEB67
10	24	7MAR67	24	7MAR67
13	24	7MAR67	24	7MAR67
16	52	14APR67	53	17APR67
19	93	12JUN67	94	13JUN67
22	118	17JUL67	119	18JUL67
25	124	25JUL67	124	25JUL67
28	28	13MAR67	85	31MAY67
31	34	21MAR67	102	23JUN67
34	28	13MAR67	114	11JUL67
37	120	19JUL67	124	25JUL67
40	118	17JUL67	121	20JUL67
43	29	14MAR67	29	14MAR67
46	128	31JUL67	128	31JUL67

PROJECT PAVILION.

PROJECT START DATE 1FEB67

DATE OF RUN 1JAN67

WORKING DAYS IN WEEK 5

RUN NUMBER 1

NUMBER OF ACTIVITIES 24

PAGE 1 ACTIVITY OUTPUT ALL ACTIVITIES

SORTED ON PRECEDING/SUCCEEDING EVENTS

EVENT NO PREC	EVENT NO SUCC	ACT DUR	EARLIEST DATES START	EARLIEST DATES FINISH	LATEST DATES START	LATEST DATES FINISH	TOT FLOAT	FREE FLOAT	CRIT PATH
1	4	10	1FEB67	15FEB67	1FEB67	15FEB67	0	0	*
1	7	5	1FEB67	8FEB67	8FEB67	15FEB67	5	5	
4	7	0	15FEB67	15FEB67	15FEB67	15FEB67	0	0	*
7	10	14	15FEB67	7MAR67	15FEB67	7MAR67	0	0	*
7	13	8	15FEB67	27FEB67	23FEB67	7MAR67	6	6	
10	13	0	7MAR67	7MAR67	7MAR67	7MAR67	0	0	*
13	16	28	7MAR67	14APR67	8MAR67	17APR67	1	0	
13	28	4	7MAR67	13MAR67	25MAY67	31MAY67	57	0	
13	31	10	7MAR67	21MAR67	9JUN67	23JUN67	68	0	
13	34	4	7MAR67	13MAR67	5JUL67	11JUL67	86	0	
13	43	5	7MAR67	14MAR67	7MAR67	14MAR67	0	0	*
16	19	41	14APR67	12JUN67	17APR67	13JUN67	1	0	
19	22	25	12JUN67	17JUL67	13JUN67	18JUL67	1	0	
22	25	5	17JUL67	24JUL67	18JUL67	25JUL67	1	1	
22	40	0	17JUL67	17JUL67	20JUL67	20JUL67	3	0	
25	46	4	25JUL67	31JUL67	25JUL67	31JUL67	0	0	*
28	19	9	13MAR67	24MAR67	31MAY67	13JUN67	57	56	
31	25	22	21MAR67	20APR67	23JUN67	25JUL67	68	68	
34	22	5	13MAR67	20MAR67	11JUL67	18JUL67	86	85	
37	25	0	19JUL67	19JUL67	25JUL67	25JUL67	4	4	
40	25	3	17JUL67	20JUL67	20JUL67	25JUL67	3	3	
40	37	2	17JUL67	19JUL67	21JUL67	25JUL67	4	0	
43	25	95	14MAR67	25JUL67	14MAR67	25JUL67	0	0	*
43	40	4	14MAR67	20MAR67	14JUL67	20JUL67	88	85	

PROJECT PAVILION.

DATE OF RUN 1JAN67

RUN NUMBER 1

PROJECT START DATE 1FEB67

WORKING DAYS IN WEEK 5

NUMBER OF ACTIVITIES 24

PAGE 1 ACTIVITY OUTPUT CRITICAL PATH ONLY

SORTED ON EARLIEST START DATE

EVENT NO PREC	EVENT NO SUCC	ACT DUR	EARLIEST DATES START	EARLIEST DATES FINISH	LATEST DATES START	LATEST DATES FINISH	TOT FLOAT	FREE FLOAT	CRIT PATH
1	4	10	1FEB67	15FEB67	1FEB67	15FEB67	0	0	*
4	7	0	15FEB67	15FEB67	15FEB67	15FEB67	0	0	*
7	10	14	15FEB67	7MAR67	15FEB67	7MAR67	0	0	*
10	13	0	7MAR67	7MAR67	7MAR67	7MAR67	0	0	*
13	43	5	7MAR67	14MAR67	7MAR67	14MAR67	0	0	*
43	25	95	14MAR67	25JUL67	14MAR67	25JUL67	0	0	*
25	46	4	25JUL67	31JUL67	25JUL67	31JUL67	0	0	*

PROJECT PAVILION.

PROJECT START DATE 1FEB67

DATE OF RUN 1JAN67

WORKING DAYS IN WEEK 5

RUN NUMBER 1

NUMBER OF ACTIVITIES 24

PAGE 1 ACTIVITY OUTPUT OMITTING DUMMIES

SORTED ON LATEST START DATE

EVENT NO PREC	SUCC	ACT DUR	EARLIEST DATES START	FINISH	LATEST DATES START	FINISH	TOT FLOAT	FREE FLOAT	CRIT PATH
1	4	10	1FEB67	15FEB67	1FEB67	15FEB67	0	0	*
1	7	5	1FEB67	8FEB67	8FEB67	15FEB67	5	5	
4	7	0	15FEB67	15FEB67	15FEB67	15FEB67	0	0	*
7	10	14	15FEB67	7MAR67	15FEB67	7MAR67	0	0	*
7	13	8	15FEB67	27FEB67	23FEB67	7MAR67	6	6	
10	13	0	7MAR67	7MAR67	7MAR67	7MAR67	0	0	*
13	43	5	7MAR67	14MAR67	7MAR67	14MAR67	0	0	*
13	16	28	7MAR67	14APR67	8MAR67	17APR67	1	0	
43	25	95	14MAR67	25JUL67	14MAR67	25JUL67	0	0	*
16	19	41	14APR67	12JUN67	17APR67	13JUN67	1	0	
13	28	4	7MAR67	13MAR67	25MAY67	31MAY67	57	0	
28	19	9	13MAR67	24MAR67	31MAY67	13JUN67	57	56	
13	31	10	7MAR67	21MAR67	9JUN67	23JUN67	68	0	
19	22	25	12JUN67	17JUL67	13JUN67	18JUL67	1	0	
31	25	22	21MAR67	20APR67	23JUN67	25JUL67	68	68	
13	34	4	7MAR67	13MAR67	5JUL67	11JUL67	86	0	
34	22	5	13MAR67	20MAR67	11JUL67	18JUL67	86	85	
43	40	4	14MAR67	20MAR67	14JUL67	20JUL67	88	85	
22	25	5	17JUL67	24JUL67	18JUL67	25JUL67	1	1	
40	25	3	17JUL67	20JUL67	20JUL67	25JUL67	3	3	
40	37	2	17JUL67	19JUL67	21JUL67	25JUL67	4	0	
25	46	4	25JUL67	31JUL67	25JUL67	31JUL67	0	0	*

PROJECT PAVILION.

PROJECT START DATE 1FEB67

DATE OF RUN 1JAN67

WORKING DAYS IN WEEK 5

RUN NUMBER 1

NUMBER OF ACTIVITIES 24

PAGE 1 ACTIVITY OUTPUT ALL ACTIVITIES

SORTED ON PRECEDING/SUCCEEDING EVENTS

EVENT NO PREC	SUCC	ACT DUR	EARLIEST DATES START	FINISH	LATEST DATES START	FINISH	TOT FLOAT	FREE FLOAT	CRIT PATH
1	4	10	1FEB67	15FEB67	31JAN67	14FEB67	-1	0	*
1	7	5	1FEB67	8FEB67	7FEB67	14FEB67	4	5	
4	7	0	15FEB67	15FEB67	14FEB67	14FEB67	-1	0	*
7	10	14	15FEB67	7MAR67	14FEB67	6MAR67	-1	0	*
7	13	8	15FEB67	27FEB67	22FEB67	6MAR67	5	6	
10	13	0	7MAR67	7MAR67	6MAR67	6MAR67	-1	0	*
13	16	28	7MAR67	14APR67	7MAR67	14APR67	0	0	*
13	28	4	7MAR67	13MAR67	24MAY67	30MAY67	56	0	
13	31	10	7MAR67	21MAR67	8JUN67	22JUN67	67	0	
13	34	4	7MAR67	13MAR67	4JUL67	10JUL67	85	0	
13	43	5	7MAR67	14MAR67	6MAR67	13MAR67	-1	0	*
16	19	41	14APR67	12JUN67	14APR67	12JUN67	0	0	*
19	22	25	12JUN67	17JUL67	12JUN67	17JUL67	0	0	*
22	25	5	17JUL67	24JUL67	17JUL67	24JUL67	0	1	*
22	40	0	17JUL67	17JUL67	19JUL67	19JUL67	2	0	
25	46	4	25JUL67	31JUL67	24JUL67	28JUL67	-1	0	*
28	19	9	13MAR67	24MAR67	30MAY67	12JUN67	56	56	
31	25	22	21MAR67	20APR67	22JUN67	24JUL67	67	68	
34	22	5	13MAR67	20MAR67	10JUL67	17JUL67	85	85	
37	25	0	19JUL67	19JUL67	24JUL67	24JUL67	3	4	
40	25	3	17JUL67	20JUL67	19JUL67	24JUL67	2	3	
40	37	2	17JUL67	19JUL67	20JUL67	24JUL67	3	0	
43	25	95	14MAR67	25JUL67	13MAR67	24JUL67	-1	0	*
43	40	4	14MAR67	20MAR67	13JUL67	19JUL67	87	85	

Chapter 4: PREPARATION OF DATA

4.1 Layout of Data

Data consists of two tapes (may be joined together if required) which are:

Control tape

Data tape.

If these are on the same tape, they must be separated by blanks. The control tape contains all the information required in a run and specifies what outputs are required. It is of the following form:

Run number

Number of working days per week

Date of run

Project start date

Time units : 0 for days, 1 for weeks

followed by a sequence of entry numbers to tell the program what needs to be done. For their meaning see Section 2.2.

The data tape must begin with a project title of up to 40 characters and ending in ".Ⓛ". The first character of the title must be the first character on tape. It should be punched as follows:

Project title ending in ". Ⓛ"

Ⓡ (Run out; about 50 blank characters)

data lines and control symbols

Ⓗ (Halt code)

")" surely?

This will enable all data tapes to be input as one by omitting the title from all but the first, and after the last, feed in a tape having "ⓁⓁ" on it, to terminate the data.

Data may be separated into pages using "(" and control symbols are used to indicate the significance of the succeeding lines of data: Control symbols should be preceded and followed by a new line. Their effect lasts until cancelled by another control symbol (except for D).

Symbol	Significance
Ⓛ	Normal line separator (line feed)
)	Page separator. This is used to separate the data into a sequence of pages to simplify the location of errors.
T0	Data lines with a single time duration

Symbol	Significance
T1	Data lines with three time durations
A	Activities to be added to the activities list
C	Activities to be corrected in the activities list
R	Activities to be removed from the activities list
D	Set an overall project duration (say x, as D (S) x (L)
(	End of data symbol
(H)	Stop code, used if data is on more than one tape
(S)	Space is used as a separator between fields on the same line (tab or colon may also be used)

Control symbols should be preceded and followed by a new line. Their effect lasts until cancelled by another control symbol (except for D).

In the absence of the appropriate symbol, data lines are assumed to refer to activities with a single time duration and requiring addition to the activities list.

Run-out, erase, carriage return, extra new lines and extra spaces are ignored on data tape.

Should an incorrect title be punched, it may be cancelled by punching "$" and then followed by the correct title, provided the terminating newline has not been punched.

Similarly "$" may be used in a data line. If the "$" is typed before the terminating character for the duration then the whole of that line up to the dollar sign is cancelled.

Control symbols cannot be cancelled by a dollar nor can any character on the control tape.

4.2 Data Lines

A data line is of the form:

I (S) J (S) DUR (L)

where I is the preceding event number of the activity

$1 \leqslant I \leqslant 510$

where J is the succeeding event number of the activity

$1 \leqslant J \leqslant 510 \quad I \neq J$

DUR is the duration of the activity, which may be one or three time estimates. In the latter case DUR would be replaced by D 1 (S) D 2 (S) D 3 where D1, D2, D3, represent the optimistic, most likely and pessimistic time estimates for the duration. The program reduces the three estimates into an expected value by the expression:

$$DUR = (D1 + 4 \times D3 + D3)/6 \qquad 0 \leqslant \text{duration} \leqslant 127$$

The numbers in the data line may be separated by colons instead of spaces, as shown in the example (3.4.).

Chapter 5: OPERATING INSTRUCTIONS

Step	Action	Result
1	Input 903 PERT1 under Initial Instructions	Program is read into store.
2	Load the control tape in reader and enter at location 32	Control tape read in and checked.
3	Load data tape (the first may be a binary tape) and enter at location 9.	Data tape is read in and checked. Repeat this step for any other data tapes.
4	Load tape with "Ⓛ(Ⓛ" on it, check the punch and enter at location 9.	All data has now been read in and the required outputs will be output to punch. The punch may go on for some time, depending how much the user has asked for.

Chapter 6: ERRORS

Error No.	Output (Apart from error No.)	Effect	Cause
1	none	Program waits for re-entry at location 9.	Checksum failure on binary date tape. Re-enter at location 9 to try re-input.
2	PAGE p LINE 1	data line is ignored.	Proceding and succeeding events equal.
3	PAGE p LINE 1	data line is ignored.	An attempt has been made to delete or amend a non-existing activity.
4	PAGE p LINE 1 CONTINUATION NOT POSSIBLE	program halts.	Activities list full.
5	PAGE p LINE 1	duration of the activity read replaces old duration.	Duplicated activity.
6	PAGE p LINE	data line is ignored.	Event number out of range.
7	PAGE p LINE 1	data line is ignored.	Duration out of range.
8	PAGE p LINE 1 ISO CODE=(ISO value)	data line is ignored.	Impermissible character.
9	PAGE p LINE 1 OVERALL PROJECT DURATION IS (dur)	data line is ignored.	Overall duration read from tape is out of range.
10	CONTINUATION NOT POSSIBLE	program halts.	Earliest date out of range; overall duration too large.
11	CONTINUATION NOT POSSIBLE	program halts.	Float of activity out of range.
12	CONTINUATION NOT POSSIBLE	program halts.	Entries on control tape out of sequence.

Error No.	Output (Apart from error No.)	Effect	Cause
13	none	program waits and on re-entry at location 9 the program will obey the first 15 entries and stops.	Too many entries specified (15Ⓢx = two entries).
14	EVENTS IN LOOP . . . CONTINUATION NOT POSSIBLE	All separate loops are output and program halts.	Loop (s) in the network.
15	none	program waits and on re-entry at location 9 the program continues regardless, or on re-entry at location 10 binary data tape may be re-input.	Run number on binary data tape less than the number of the current run.
16	CONTINUATION NOT POSSIBLE	program halts.	Information invalid on control tape i.e. run number >99, dates invalid or number of days in week >7.

Chapter 7: SIZE AND SPEED

7.1 Size

The amount of store used by program, including data space is 5,900 locations (approx.), which is stored from location 32 upwards.

7.2 Speed

Program running time depends on the number of activities in the network, and as an example the following are sample times for a 500 activity network:

data input:	75 seconds
calculations:	26 seconds
output (to punch):	$7\frac{1}{2}$ minutes (for entry No. 6) i.e. approx. 1 activity/second.