

DATA ITEM DESCRIPTION			Form Approved OMB No. 0704-0188	
2. TITLE PROGRAM EVALUATION AND REVIEW TECHNIQUE (PERT)/TIME NETWORK DIAGRAM		1. IDENTIFICATION NUMBER DI-MGMT- 80505		
3. DESCRIPTION/PURPOSE 3.1 The program evaluation and review technique (PERT)/TIME network diagram shall be used by the Government to evaluate a contractor's ability to manage the contract in a timely, effective and economical manner based upon: (a) reasonableness of estimates, (b) the size of time increments into which the program/project is developed for monitoring purposes, (c) the inclusion of key (Continued on Page 2)				
4. APPROVAL DATE (YYMMDD) 880115	5. OFFICE OF PRIMARY RESPONSIBILITY (OPR) G/Y223	6a. DTIC APPLICABLE	6b. GIDEP APPLICABLE	
7. APPLICATION/INTERRELATIONSHIP 7.1 This data item description (DID) contains the format and content preparation instructions for the data product generated by the specific and discrete task requirement as delineated in the contract. 7.2 This DID is applicable when a PERT/TIME network diagram is required in contracts covering complex development or other one-time projects or programs of substantial dollar value. (Continued on Page 2)				
8. APPROVAL LIMITATION		9a. APPLICABLE FORMS	9b. AMSC NUMBER G4288	
10. PREPARATION INSTRUCTIONS 10.1 <u>Format</u> . This diagram shall be in the contractor's format. 10.2 <u>Content</u> . This diagram shall contain the following: 10.2.1 A graphical display of the time dependency network reflecting the schedule for all the tasks of the program or project from the award date of the contract to the completion date of the contract. The key elements of the PERT/TIME network to be constructed in the diagrammatic representation are as follows: a. <u>Event</u> - A specific definable accomplishment in the program/project network, recognizable at a particular instant in time. Events are numbered serially from the start to finish of the program or project, e.g., 0, 1, 2, 3, etc., and are depicted by a circled number (1) b. <u>Activity</u> - A time consuming element, e.g., work in progress between interdependent events. In addition, an activity may simply represent a connection of interdependency between two events of the network. "Activity" is one work step in the total program/project and is represented by an arrow (→). The tail of the arrow represents the beginning of the activity and the head represents its completion. Length, shape or position of the arrow is insignificant. The important thing is the way the activities represented by arrows are linked together in a logical time sequence within the network. (Continued on Page 2)				
11. DISTRIBUTION STATEMENT <u>DISTRIBUTION STATEMENT A</u> : Approved for public release; distribution is unlimited.				

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## Block 3. Description/Purpose (Continued)

events, (d) discussion of critical path problems, and, (e) the method proposed to accomplish the program/project shown by the network.

3.2 This PERT/TIME network diagram shall depict to the extent practicable each event of the program or project. The network diagram shall identify the earliest expected date of each event, indicate the critical path and other limited areas affecting the program and the method proposed to accomplish the project.

## Block 7. Application/Interrelationship (Continued)

7.3 This DID shall be applied in contracts when DI-MGMT-80506, PERT/TIME Analysis Report is used.

7.4 This DID supersedes DI-A-5613.

## Block 10. Preparation Instructions (Continued)

c. Most likely time (m) - The one best estimate provided by the best informed person of the elapsed time of an activity.

d. Optimistic time (a) - The estimate provided by the best informed person of the elapsed time of an activity that assumes no unforeseen problems. There is little likelihood of completing the activity in less time.

e. Pessimistic time (b) - The estimate provided by the best informed person of the elapsed time of an activity that assumes more than the usual number of unforeseen problems, except "Acts of God", strikes or other catastrophes.

f. Expected elapsed time ( $t_e$ ) - The statistical mean of the estimate of optimistic, pessimistic and most likely times of an activity, computed by the linear function.

$$t_e = \frac{a+4m+b}{6}$$

g. Scheduled elapsed time ( $t_s$ ) - The period of time scheduled for performing an activity.

h. Work package - The work required to complete a specific job or process, e.g., a report, a design, a documentation requirement or portion thereof, a piece of hardware or service. A work package may consist of one or more cost significant activities. A work package is the lowest level of identification of work performed and is represented by a charge number related to a single summary number. The work package couples to the cost accounting system through the charge number and to the PERT/TIME network through the beginning and ending event numbers of activities in the package.

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## Block 10. Preparation Instructions (Continued)

- i. Actual occurrence date ( $T$ ) - The actual date an event is completed.
- j. Earliest expected date ( $T_E$ ) - The earliest expected date for an event to occur is the summation of expected elapsed times ( $t_e$ ) for activities along the longest path leading from the initial event up to the given event.
- k. Directed date ( $T_D$ ) - A time commitment for a specific accomplishment, e.g., the date directed for accomplishment by contract schedule.
- l. Latest allowable date ( $T_L$ ) - That time by which an event must occur before it becomes limiting to the scheduled accomplishment of the program. The latest allowable date ( $T_L$ ) is determined by summing the expected times ( $t_e$ ) for activities along the longest path leading back from the end event to the given event and subtracting this time from the directed date ( $T_D$ ), or from the earliest expected date ( $T_E$ ) if no directed date ( $T_D$ ), is established, for the end event. ( $T_L = T_D - \sum t_e$  or  $T_L = T_E - t_e$ ).
- m. Event slack ( $T_L - T_E$ ) - Slack ( $S$ ) is the amount by which earliest expected date ( $T_E$ ) for a given event may slip before it becomes equal to latest allowable date ( $T_L$ ) for that event. The amount of slack existing at any point in the network is calculated by subtracting the earliest expected date ( $T_E$ ) for a given event from the latest allowable date ( $T_L$ ) for that event. The slack figure can be zero, positive or negative, indicating on schedule, schedule freedom or schedule delinquency. ( $S = T_L - T_E$ ).
- n. Critical path - The particular sequence of activities in a network that comprise the most rigorous time constraint in the accomplishment of the end event, i.e., the path with the smallest amount of positive slack or the largest amount of negative slack. The Critical path is denoted by a heavy line (——).
- o. Scheduled completion date for an activity ( $T_S$ ) - A date assigned for completion of an activity for purposes of planning and control within an organization.
- p. Earliest completion date ( $S_E$ ) - The earliest date on which an activity can be completed. For a given activity it is equal to the sum of the scheduled elapsed time ( $t_s$ ) for the activities on the longest path from the beginning of the project up to and through the given activity. ( $S_E = \sum t_s$ ).
- q. Latest completion date ( $S_L$ ) - The latest date on which an activity can be scheduled for completion without delaying the completion of the project. For a given

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## Block 10. Preparation Instructions (Continued)

activity it is calculated by subtracting the sum of the scheduled elapsed time ( $t_s$ ) on the longest path from the given activity to the end event of the project from the directed date ( $T_D$ ), or from the earliest expected date ( $T_E$ ) if no directed date ( $T_D$ ) is established, for the event.

$$(S_L - T_D - \Sigma t_s \text{ or } S_L = T_E - \Sigma t_s).$$

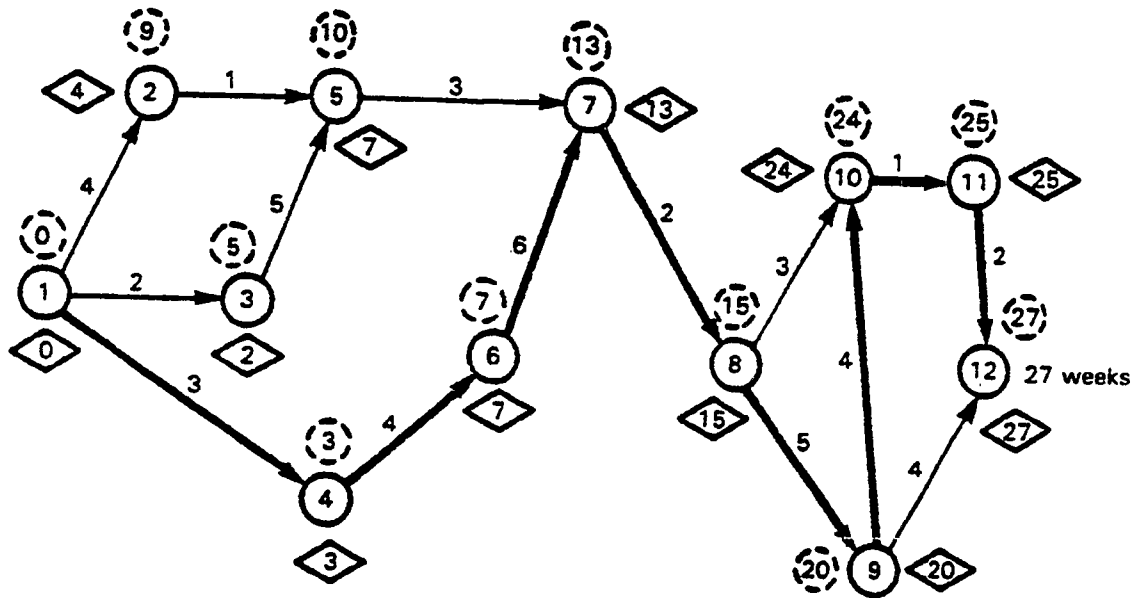
10.2.2 Figure 1 depicts an example of a typical PERT/TIME Network diagram showing events, critical path, etc. Figure 2 depicts an example of a PERT/TIME Network diagram with the Work Package concept which applies when the network is related to the Work Breakdown Structure (WBS) applied in the contract.

10.2.3 The master PERT/TIME Network diagram shall display to the extent practicable the entire proposed project or program from award date to completion. The earliest expected date ( $T_E$ ) of each event shall be shown in number of weeks from the initial (award or start) event. The critical path shall be identified. The master network diagram may be supported by detailed subsidiary network diagrams. When detailed subsidiary network diagrams are used, as a minimum, initial and/or end (terminal) events of the subsidiary networks shall be represented on the master network diagram. It is preferred that expected elapsed times ( $t_e$ ) of activities be computed based upon three time estimates as indicated in 10.2.1f. If only a single time estimate is used, the most likely time (m) shall be used for the expected elapsed time ( $t_e$ ).

10.2.4 The PERT/TIME Network diagram shall include the applicable key elements in paragraph 10.2.1 as appropriate, and the requirements in paragraph 10.2.3. Events shall include deliveries of major items as specified in the contract for these events, as well as the end (terminal or completion) event, both the earliest expected date ( $T_E$ ) and the directed date ( $T_D$ ) from the contract schedule shall be indicated. Events and/or activities, as appropriate, shall be labeled with a brief descriptive title and shall also be numbered.

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## Block 10. Preparation Instructions (Continued)



- ① Indicates Event number one.
- $\xrightarrow{2}$  Thin line indicates Activity. (The number 2 indicates expected time in number of weeks.)
- $\xrightarrow{4}$  Heavy line indicates Critical Path. (The number 4 indicates expected time in number of weeks.)
- ◇20◇ Diamond indicates Earliest expected time. (The number 20 indicates expected time in number of weeks.)
- ⊙27⊙ Dotted circle indicates Latest completion date. (The number 27 indicates scheduled time in number of weeks.)

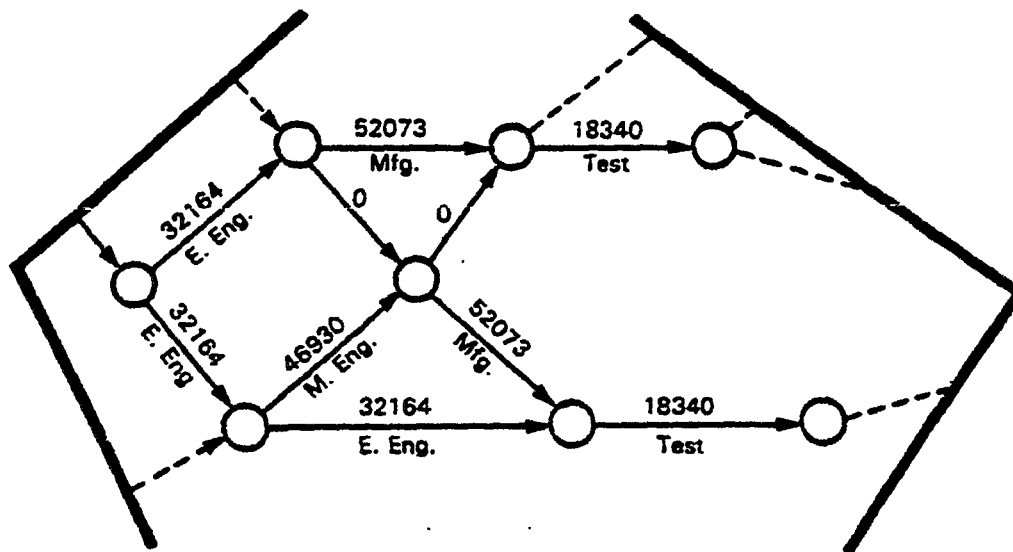
FIGURE 1. Typical PERT/TIME network diagram example.

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## Block 10. Preparation Instructions (Continued)

WORK PACKAGES*	CHARGE NUMBERS
ELECTRICAL ENGINEERING	32164
MECHANICAL ENGINEERING	46930
MANUFACTURING	52073
TESTING	18340

\*Associated with the various levels of the Work Breakdown Structure (WBS)



The purpose of this PERT/NETWORK illustration is to show the relationship of work packages to the various activities of the network. The network is not part of the Work Breakdown Structure. The five (5) digit charge numbers on top of the activity lines identify the various work packages related to that activity.

FIGURE 2. PERT/TIME network with work packages example.