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Volume II.  
TRANSIM V User's Manual.

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**THE TRANSIM V MANUAL**

**Volume II**

**TRANSIM V User's Manual**

**Prepared for**

**The Department of the Navy**

**Under Contract N00014-76-C-0112**

**Project TRANSIM**

**School of Engineering and Applied Sciences**

**University of California, Los Angeles**

**August 1978**

THE TRANSIM V MANUAL

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THE TRANSIM V MANUAL

Volume II

TRANSIM V User's Manual.

## Volume II

### TRANSIM V User's Manual.

#### A. GENERAL.

##### 1. Background.

UCLA Project TRANSIM and its predecessor research and development project activities at UCLA have received contractual funding support from the Department of the Navy since 1951. Development of the original TRANSIM general-purpose computer simulator was completed by the UCLA Project TRANSIM staff in 1966 after a three-year development program sponsored by the U.S. Department of Commerce, Maritime Administration, and the Department of the Navy. Prior to 1963, the Office of Naval Research was Project TRANSIM's primary sponsor. In recent years, major Navy support has been furnished by the Naval Sea Systems Command (NAVSEA) and the Office of Naval Research (ONR), with secondary support from the Naval Facilities Engineering Command (NAVFAC) and Naval Electronic Systems Command (NAVELEX).

The general objective of the UCLA Project TRANSIM Program has been to provide ongoing development research and implementation of the UCLA-developed computer simulation techniques and to provide a training program which would assure successful Navy implementation of this program package. A specific research and development objective of Project TRANSIM was to develop general-purpose computer simulation to its ultimate as a versatile, economical, easy-to-use, and effective management tool. The basic developmental "vehicle" has been the TRANSIM general-purpose simulation technique. By virtue of its general-purpose

design, the TRANSIM approach offers the advantage of a single, versatile modeling technique capable of replacing individual special-purpose techniques now employed by the Navy. The latest version, TRANSIM V, is designed to be used as a management tool by the Navy in a number of different management problem situations, including:

A. Systems Analysis

1. Early analysis of requirements.
2. Evaluating alternative concepts, system equipment, facilities and operating policies.
3. Determining efficient manning levels and resource allocation.
4. Calculating reliability vs. maintainability tradeoffs.
5. Determining integrated logistics support resource requirements.

B. Project Risk Management

1. Technical tradeoff analysis.
2. Planning.
3. Cost estimating.
4. Scheduling.
5. Resource allocation.
6. Project control (resource management and budget).
7. Change order impact analysis.

C. Production Scheduling

1. Shipyards.
2. Other Navy industrial installations.
3. Navy ship system contractors.

D. Risk Analysis

1. Technological risks.
2. Schedule risks.
3. Make-or-buy decision risks.
4. Cost and capital investment risks.

The technique is designed to exploit to the fullest the user's knowledge of problem situation and environment peculiarities while minimizing his involvement with tedious computer-oriented chores

by adhering to the principle of user-orientation, the TRANSIM computer-based techniques can be successfully used by personnel who are not familiar with computer programming and technology.

The "end products" of the UCLA Project TRANSIM Research and Development Program are currently in effective use on numerous Navy projects. Based upon the feedback experiences from such actual applications, it has been possible to improve, update, and expand the analytical power of the technique while increasing its analytical efficiency. This continuing development capability has resulted in the development of the current TRANSIM V version which has considerably more analytical power and efficiency than the original TRANSIM I and interim versions.

## 2. Description of TRANSIM V.

Unlike conventional critical-path network techniques, TRANSIM V can account for uncertainty in project planning and performance. The availability of the TRANSIM technique makes feasible project risk analysis and risk management of highly complex projects.

Management has long known of the existence of risk on many projects, but has not had a convenient and rigorous means of determining how much risk exists and how to control it. With TRANSIM V, project management can:

- o Determine the level of risk associated with its adopted project plan, schedule, and budget.
- o Develop a project plan, schedule, and budget conforming to a level of risk acceptable to management.
- o Control the project from beginning to end within acceptable limits of schedule and budget risks.

a. Planning with TRANSIM V.

The network planning of a project is the arranging of the precedence and sequence of project tasks as appropriate to provide the "road map" for project execution. Probabilistic planning of projects which can be either event- or activity-oriented (or a combination of both) differs only slightly from conventional, deterministic planning.

The probabilistic planner may include in his listing of project activities those not having a 100% likelihood of being performed at all; or, if performed, may not always follow the same sequence. For example, a design task may not have a 100% probability of realizing approval; some changes may have to be made. The planner can account for such uncertainty by providing a probabilistic network branch with an estimated chance of being realized. Similar probabilistic branches may be required to represent other planning uncertainties (i.e., the failure of a test would require diagnosis, corrective action, and a retest).

b. Scheduling with TRANSIM V.

Project managers are not universally aware that the expected project completion time produced by deterministic methods has, perhaps, as much as a 45 to 50% probability of being exceeded. This can have important consequences when the project completion date is keyed to such important events as starting the operation of a production line, moving into a new building, or a new bank, or completing the building of a ship. By definition, the deterministic "expected" completion time does not account for the actual range of completion times which result from the aggregation of all project uncertainties.

TRANSIM V utilizes the estimator's full range of experiences for its input data as a more accurate basis for schedule decisions. Whereas conventional, deterministic techniques utilize a single value which may be optimistically or pessimistically biased, the input to TRANSIM V involves a range of values from the smallest to the largest probable value. This bracketing of activity durations and the probabilities of various activity times falling within the bracket usually cancels out any personal bias on the part of the estimator and provides a far better indepth estimate for schedule purposes.

TRANSIM V produces as output the distribution of project completion times. The project manager then has available a data presentation which will allow his selection of a completion date compatible with an acceptable level of risk. For example, there might be a 10-20% likelihood that the actual project completion date may exceed the "expected"-date by 30%. In the case of a ship construction project, he might accept a scheduled completion date which has a 75% probability of being attained. For the delivery of a newly developed sonar system, the importance of the equipment to ship construction may cause selection of a procurement lead time schedule which will provide a 98% assurance that the equipment will be delivered in time.

Because capacity for risk-taking differs among individuals and for different project circumstances, each project manager on each different type of project has his own unique acceptable level of risk which is dependent upon considerations such as cost, size of investment, interaction with other projects, lost revenue, weather (completing before winter, etc.), and availability of budget funds. The ability of the

project manager to select a project schedule to fit the degree of acceptable risk is one of the unique features of the probabilistic network analysis technique.

c. Resource Allocation with TRANSIM V.

Projects always make demands on resources such as manpower, materials, machines, tools, facilities, and capital. All project schedules typically suffer from some scarcity of resources and the net effect is always to delay completion. As a result, analysis to determine how level of available resources affects scheduling is critical to effective project management.

Several of the conventional network techniques can account for resource requirements and the net effects on schedule caused by limitations in resource availability. Typically, the planner first develops the schedule. Next, he sums up the net requirements for each of the resources. Usually, the level of required resources will show intolerable peaks and valleys when viewed over the length of the project. If resources were unlimited, the management task would be simple: To merely assure that the resources were at the right place when required. However, due either to cost or to insufficient supply (such as highly specialized skills), most resources are severely limited, and the planner will "level" them. In other words, he will establish a resource level compatible with project objectives, cost, and resource availability. Establishing resource requirements using this deterministic technique is straightforward but inaccurate.

On real-life projects, the assignment of resources must also be dependent upon the variable start and finish dates of individual project activities. Thus, the probabilistic network planner deals with "probabilities" of different levels of resources being required on different project dates as will be experienced once the project is actually underway. As in the case of probabilistic scheduling, the resource decision will be dependent upon the acceptable level of risk. For a critical activity or for projects with firm completion commitments, a low risk level might be appropriate. For others, a higher risk level might be tolerated.

## B. INPUT DATA.

### 1. Data Requirements

TRANSIM V, like other general purpose modeling techniques, can accept input data at any level of detail. Depending upon the availability of and the need for detail, a model may be very detailed in one area and relatively gross in other areas. For example, a ship acquisition project model will initially concentrate on design details; later on, as the project progresses, detail emphasis will shift to construction, then to outfitting, sea trials, and so on.

Data may be derived from the most reliable and readily available sources. Experience has shown that with proper interviewing techniques, subjective estimates of activity performance time obtained from experienced personnel are generally superior to experience data based on inadequate sample sizes (See Engineering Report No. 7111, Bongers, L. S. "Obtaining Task Time Data from Human Store and Factors Affecting Retrieval," December 1971.)

### 2. Data Preparation

For systems analysis applications only, please refer to the TRANSIM User's Manual (UCLA Engineering Report No. 7168, December 1971) and Supplement (UCLA Engineering Report No. 7443, August 1974).

The following sections of this manual apply to project risk management applications only. TRANSIM V data preparation is accomplished through the aid of preprinted data sheets. FORMS C-0 through C-15A, as described below, serve to collect all the data necessary to set up and execute a model, and include complete output report specifications. When completed, the forms are processed for the computer as described in

Section C., "Computer Operations."

a. TRANSIM V Input Data Sheets.

(1) FORM C-0 (RUN TITLE, STORAGE ALLOCATION AND  
WORKDAY/CALENDAR DATE CONVERSION DATA).

The data described on FORM C-0 should appear at the beginning of the TRANSIM V input data deck.

FORM C-0 input begins with the RUN TITLE CARD which gives, in Columns 1-72, the title to be printed at the top of each page of output. It is recommended that the date of the run and/or a run number always be included in the title in addition to the name of the project.

The INTERNAL DATA STORAGE REQUIREMENTS CARD is the second input item on FORM C-0. The number of required internal storage words should be the only entry on the second input card and can appear anywhere in Columns 1-72. However, as seen in FORM C-0, for consistency purposes Columns 54-59 have been allocated for appropriate storage requirement entry.

The relationship between the internal data storage and the actual machine storage requirements to be specified in the job control deck is dependent on the installation where the job is being run. However, the internal data storage requirements for a given network is approximately the same for any installation.

For any network, the total data storage requirements can be approximated by the following formula:

$$T = 70A + RD(10+P)$$



where T = Total number of words of storage space required;

A = Total number of activities in a network;

RD = Total number of resource pools to be reported on multiplied by the average number of workdays (or time periods, if time periods are used) over which the resource/cost pools are in use; and

P = Total number of words used for percentile resource or cost reports. (If there are no percentiles, P will be zero.)

$$\text{where } P = \underbrace{\left(\frac{I}{100} (n + 100 - u) + 4\right)}_{\text{(percentiles)}} + \underbrace{\left(\frac{I}{100} (N + 100 - U) + 4\right)}_{\text{(cumulative percentiles)}}$$

with I = The number of iterations

n = The lower percentile for the resource or cost report

u = The upper percentile

N = The lower percentile for the cumulative value

U = The upper percentile for the cumulative value

For example, if the total number of activities in the network is 662, and resource pool AA is in use on the average from time period 100 through 174; pool BB from time period 110 through 127 and again from time period 133 through 150; and pool CC from time period 212 through 406; then the total number of words of data storage required for the network would be approximately:

$$(70 \times 662) + \left(3 \times \frac{306}{3} \times 10\right) = 49,400$$

or 46,340 words for activities and 3,060 for resource reports.

As an example of percentile storage requirement, consider a network with 600 activities and two cost codes, BCOST and TCOST. BCOST is used from time period 100 through 149 and TCOST from time period 100 through 199. For BCOST, we ask for cost report percentiles 10 and 90 and cumulative percentiles 5 and 95. For TCOST, we ask for cost report percentiles 2 and 98. One hundred iterations are run.

Then:

$$\begin{aligned}
 T = & 70 \times 60 + 50 \left( 10 + \underbrace{\left( \frac{100}{100} (10 + 100 - 90) + 4 \right)}_{\text{BCOST percentiles}} \right) \\
 & + \underbrace{\left( \frac{100}{100} (5 + 100 - 95) + 4 \right)}_{\text{BCOST cumulative}} + 100 \left( 10 + \right. \\
 & \left. \underbrace{\left( \frac{100}{100} (2 + 100 - 98) + 4 \right)}_{\text{TCOST percentiles}} \right)
 \end{aligned}$$

$$\begin{aligned}
 T &= 42,000 + 2,400 + 1,800 \\
 &= 46,200
 \end{aligned}$$

In the above example, the resource/cost reporting requirements are small relative to the requirements for activities. However, in many cases, the opposite is true either because the number of resource/cost pools is large, or because their use extends over many workdays/time periods, or both. In such a case, the data storage requirements may be reduced, if necessary, by either increasing the size of the time period (which is by default one workday, if not otherwise specified on Form C-10), or by suppressing printing of reports for some of the

resource/cost pools (by means of Forms C-14 and C-15A). More than one computer run may be made if necessary in order to obtain all the reports needed for analysis without loss of correlation of results, because the simulation will be identical from run to run if no changes are made in the input data (except, of course, for the report specifications).

The report given at the end of each run, giving the maximum data storage used, is an accurate accounting and can be used with confidence to predict future requirements for similar runs.

WORKDAY/CALENDAR CONVERSION SPECIFICATIONS--"YES" or "NO".

If "NO", then simply enter "NO" and go to the next form. The output reports will be specified in terms of the relative number of workdays from the beginning day of the network.

If "YES", enter "YES" and go on to the next line where the BEGINNING DATE should be entered. If "YES" is entered in WORKDAY/CALENDAR CONVERSION SPECIFICATIONS, cross out those days of the week not applicable (i.e., nonworking days) and list below this where indicated, those holidays taken which fall on a normal working day. For example, July the Fourth falls on a Tuesday in 1978, which is normally a working day. List 4 July 1978 in one of the columns as specified below (Keywords for months are listed on the sheet and are to be used in all cases where date entry is necessary). HOLIDAYS listed do not have to be in sequence.

(2) FORM C-1 (ACTIVITY/MILESTONE LIST).

The ACTIVITY/MILESTONE LIST (FORM C-1) follows FORM C-0. Entered on this form is the ACTIVITY/MILESTONE CODE, ACTIVITY/MILESTONE DESCRIPTION, and RESPONSIBILITY CODE. There are as many lines as there are Responsibilities coded for any given activity.

BASIC DEFINITIONS.

ACTIVITY. An ACTIVITY is a specific task to be performed.

MILESTONE. A MILESTONE is an activity whose performance time is essentially zero and does not take any resources; e.g., final delivery or acceptance of a group of tools.

RESPONSIBILITY. A RESPONSIBILITY is the individual, department, or code in charge of performing the listed activity.

ACTIVITY/MILESTONE CODE.

Coding of the activity entered on this form should be done in as simplified and clear a form as possible. The code must consist of a minimum of two and a maximum of eight contiguous characters--NOT LISTED AS A KEYWORD.

Some acceptable codes are:

01  
A1  
NAM3  
56678  
JOB00101

Some unacceptable codes are:

MONTH (keyword)



1.01 (decimal number)

A (only one digit; minimum of two necessary)

AB 12 (noncontiguous characters)

Remember that these rules apply to all codes whether they be ACTIVITY/MILESTONE, RESPONSIBILITY, or EXHIBIT references, and that they are unique to their elements throughout the TRANSIM V package.

ACTIVITY/MILESTONE DESCRIPTION.

ACTIVITY/MILESTONE DESCRIPTIONS can be a combination of alphanumeric characters and blank spaces. It provides a "shorthand" description of the activity, unless a complete description can be given in the 40 columns allotted on the computer card for this purpose.

The Description appears, along with the Activity Code, on all output reports pertaining to Activity Schedules. A missing description will result in a warning message.

RESPONSIBILITY CODE.

Like the Activity/Milestone Codes, the Responsibility Codes consist of two to eight contiguous characters which have not been listed as a keyword. These codes are used to produce separate, selected Activity Schedule Reports in addition to a master Schedule Report, which includes all activities irrespective of their Responsibilities.

The RESPONSIBILITY CODE is entered on the same line as the ACTIVITY/MILESTONE CODE and DESCRIPTION. If there is more than one Responsibility for a specific activity, they are listed on the following line(s).

CARD SEQUENCE or IDENTIFICATION (optional).

TRANSIM V does not interpret any data punched in this section. This

section is most commonly used to provide identification and/or sequencing information as an aid in handling large data decks.

Certain installations have facilities which enter SEQUENCE NUMBERS automatically in these columns (i.e., this is done by the on-line editing features of many time-sharing computer systems).

(3) FORM C-1A (SCHEDULE START AND FINISH DATES).

ACTIVITY/MILESTONE CODE taken from TRANSIM V

FORM C-1 is entered in the first column of FORM C-1A.

For each ACTIVITY/MILESTONE CODE, a "SCHEDULE START" DATE and a "SCHEDULE FINISH" DATE may be listed. These dates are for referential use only. They do not influence the simulation results in any way.

TRANSIM V INPUT DATA SHEET FORM C-1A (SCHEDULE START AND FINISH DATES)

Keypuncher: Punch data in shaded columns only when followed by asterisk (\*) in the next (unshaded) field to the right

PROJECT DATE

ACTIVITY/MILESTONE CODE (Maximum 100 characters)	SCHEDULE START DATE			SCHEDULE FINISH DATE			CARD SEQUENCE OR IDENTIFICATION (Optional)
	Day	Month	Year	Day	Month	Year	
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							

FIGURE 3.

(4) FORM C-2 (ACTIVITY DATA)

ACTIVITY/MILESTONE CODES should be taken from FORM C-1 and listed on FORM C-2.

Information on PREDECESSOR ACTIVITIES, RESOURCE REQUIREMENTS, and WORKING TIMES for each specified activity should be entered on this form.

There should be a minimum of one line. There can be a maximum of as many lines as there are PREDECESSOR ACTIVITIES or as many lines as there are RESOURCE REQUIREMENTS--whichever is greater.

Reference of the project network drawing and FORM C-1 would be necessary to determine PREDECESSOR ACTIVITIES and respective ACTIVITY/MILESTONE CODES assigned to these activities.

(a) ACTIVITY/MILESTONE CODES

Taken from FORM C-1 and entered here.

(b) PREDECESSOR ACTIVITIES

A PREDECESSOR ACTIVITY is an activity that precedes a specific activity. There can be more than one PREDECESSOR ACTIVITY for any given activity.

For the BEGINNING ACTIVITY, the word "NONE" would be entered as its PREDECESSOR ACTIVITY. There may be more than one beginning activity in a given NETWORK; however, all activities must eventually lead to a single end activity.

List the first PREDECESSOR ACTIVITY (taken from the NETWORK by CODE (either marked on the NETWORK or taken from FORM C-1). If there is more than one PREDECESSOR ACTIVITY, list them all on successive lines.

TRANSIM V INPUT DATA SHEET FORM C-2 (ACTIVITY DATA)

PROJECT \_\_\_\_\_

DATE \_\_\_\_\_

Keypuncher: Punch data in shaded columns only when followed by user supplied data in the next (shaded) field to the right

ACTIVITY CODE (From Form C-1)	PREDECESSOR ACTIVITIES (Use code from Form C-1) (One predecessor per line) (Enter "NONE" for beginning activity)	RESOURCE REQUIREMENTS (One resource type and quantity per line)		SCHEDULED "ON" TO ACTIVITY START (Mark start of work day if "none")	WORKING TIME EXPENDED TO DATE (Number of hours) (Leave blank if "none")	WORKING TIME REFERENCE EXHIBIT NUMBER (Enter number corresponding to appropriate entry on Form C-2A or Form C-2B)	ACTIVITY PERFORMANCE TO CONTINUE UNTIL START OF ANOTHER ACTIVITY (Use code from Form C-1) (Leave blank if not applicable)	CARD SEQUENCE OR IDENTIFICATION (Optional)
		Resource Type Name or Code (From Form C-1)	Quantity Required					
01								
02								
03								
04								
05								
06								
07								
08								
09								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								

FIGURE 4.

(c) RESOURCE REQUIREMENTS

For any given activity, there may be one or more RESOURCE CODE(S). These are listed in sequence corresponding to the given activity -- the first RESOURCE CODE is listed on the same line as the corresponding activity; each additional Resource is listed on each succeeding line.

(d) QUANTITY

The QUANTITY of the Resource required is listed corresponding to the specific RESOURCE TYPE CODE. Decimal fractions with one or two digits to the right of the decimal point may be used.

QUANTITY is taken as the average level of Resource application over the entire duration of the activity.

No entry in a corresponding COST REPORT will appear for a given activity where a RESOURCE entry is zero.

(e) SCHEDULED HOLD PRIOR TO ACTIVITY START

Use this section whenever it is desired to deliberately hold an activity for a specified number of workdays following completion of all its PREDECESSOR ACTIVITIES.

(f) WORKING TIME EXPENDED TO DATE

If workdays have already been spent on activity listed, then enter number of days spent here; otherwise, leave blank. Entry can be made in terms of whole days and in decimal fractions. If actual start and finish dates are known, use Form C-9 instead.

(g) WORKING TIME EXHIBIT REFERENCE

List EXHIBIT REFERENCE CODES here when

time estimates are variable.

(h) PERFORMANCE TO CONTINUE UNTIL THE  
START OF ANOTHER ACTIVITY

Entry of ACTIVITY/MILESTONE CODE designated as the TARGET ACTIVITY is made here when it is necessary to extend the duration of one activity to the start of another (not necessarily an immediate successor in a given net). The entry is made on the same line as the ACTIVITY/MILESTONE CODE.

NOTE: The START of the TARGET ACTIVITY is defined for this purpose by the completion of all its PREDECESSORS, followed by the completion of any hold time specified for the TARGET ACTIVITY on FORM C-2.

(5) FORM C-2A (PROBABILISTIC AND CONDITIONAL SUCCESSORS)

ACTIVITY CODES for PROBABILISTIC SUCCESSORS along with their corresponding percentage probabilities are entered into columns where indicated. Codes for the activity designated a PROBABILISTIC SUCCESSOR are taken from FORM C-1 and entered in columns 10-17; one successor activity per line. Use as many lines as there are SUCCESSOR ACTIVITIES.

Beginning on the same line as the last listed PROBABILISTIC SUCCESSOR, go to the PREDECESSOR ACTIVITY CODES column, and enter ACTIVITY CODE(S) of those activities that precede this PROBABILISTIC SUCCESSOR or set of SUCCESSORS. If there is more than one PREDECESSOR ACTIVITY to the given SUCCESSOR, list their codes (taken from FORM C-1) using as many lines as are necessary.

If a group of PREDECESSOR ACTIVITIES is shown, the probability of branching to a specific group of SUCCESSOR ACTIVITIES should be shown just once, on the same line as the first PREDECESSOR ACTIVITY of the group.



All sets of SUCCESSORS (PROBABILISTIC or CONDITIONAL) must have the same PREDECESSOR or set of PREDECESSORS and these relationships must be shown on FORM C-2 also, beginning on the same line as the last of the possible SUCCESSORS.

CONDITIONAL SUCCESSORS are those SUCCESSOR ACTIVITIES whose start is dependent upon the "START" or "FINISH" of another activity. If, for some reason, the specified activity has not "STARTED" or "FINISHED", an alternative SUCCESSOR ACTIVITY is listed. All ACTIVITY CODES are obtained from FORM C-1.

CARD SEQUENCE or IDENTIFICATION (optional):

(6) FORM C-2B (PROBABILISTIC AND CONDITIONAL PREDECESSORS)

Enter on FORM C-2B those PREDECESSORS that have been defined as PROBABILISTIC or CONDITIONAL.

ACTIVITY CODE (taken from FORM C-1) for a designated activity with a set of PROBABILISTIC or CONDITIONAL PREDECESSORS is entered in the first column.

ACTIVITY CODES (taken from FORM C-1) of PROBABILISTIC PREDECESSOR ACTIVITIES and their corresponding PROBABILITIES are entered in column 3 and 2, respectively. Caution must be taken to insure that all PREDECESSOR ACTIVITIES in a set are complete before going on to another. Enter the probability just once for each set of PREDECESSORS (adjacent to the first predecessor of the set).

ACTIVITY CODES (taken from FORM C-1) for PREFERRED CONDITIONAL PREDECESSORS (or set of PREDECESSORS) are entered where indicated. Required conditions (i.e. the "START" or "FINISH" of another designated

TRANSIM V INPUT DATA SHEET FORM C-2b (PROBABILISTIC AND CONDITIONAL PREDECESSORS)

PROJECT \_\_\_\_\_  
DATE \_\_\_\_\_

Keypuncher: Punch data in shaded columns only when followed by user supplied data in the next (unshaded) field to the right.

ACTIVITY CODE (from Form C-1)	PROBABILISTIC PREDECESSORS		PREFERRED PREDECESSOR		CONDITIONAL		PREDECESSORS		ALTERNATIVE PREDECESSOR ACTIVITY CODE(S) (from Form C-1)	CARD SEQUENCE OR IDENTIFICATION (Optional)
	PERCENTAGE PROBABILITY	ACTIVITY CODE(S) (from Form C-1)	ACTIVITY CODE(S) (from Form C-1)	HAS (HAVE) BEEN PROVIDED THAT:	ACTIVITY CODE(S) (from Form C-1)	"STARTED" OR "FINISHED"	OTHERWISE			
1 A	13	10	10	IF	13	10	10	10	10	10
2 A	13	10	10	IF	13	10	10	10	10	10
3 A	13	10	10	IF	13	10	10	10	10	10
4 A	13	10	10	IF	13	10	10	10	10	10
5 A	13	10	10	IF	13	10	10	10	10	10
6 A	13	10	10	IF	13	10	10	10	10	10
7 A	13	10	10	IF	13	10	10	10	10	10
8 A	13	10	10	IF	13	10	10	10	10	10
9 A	13	10	10	IF	13	10	10	10	10	10
10 A	13	10	10	IF	13	10	10	10	10	10
11 A	13	10	10	IF	13	10	10	10	10	10
12 A	13	10	10	IF	13	10	10	10	10	10
13 A	13	10	10	IF	13	10	10	10	10	10
14 A	13	10	10	IF	13	10	10	10	10	10
15 A	13	10	10	IF	13	10	10	10	10	10
16 A	13	10	10	IF	13	10	10	10	10	10
17 A	13	10	10	IF	13	10	10	10	10	10
18 A	13	10	10	IF	13	10	10	10	10	10
19 A	13	10	10	IF	13	10	10	10	10	10
20 A	13	10	10	IF	13	10	10	10	10	10
21 A	13	10	10	IF	13	10	10	10	10	10
22 A	13	10	10	IF	13	10	10	10	10	10
23 A	13	10	10	IF	13	10	10	10	10	10
24 A	13	10	10	IF	13	10	10	10	10	10
25 A	13	10	10	IF	13	10	10	10	10	10
26 A	13	10	10	IF	13	10	10	10	10	10
27 A	13	10	10	IF	13	10	10	10	10	10
28 A	13	10	10	IF	13	10	10	10	10	10
29 A	13	10	10	IF	13	10	10	10	10	10
30 A	13	10	10	IF	13	10	10	10	10	10
31 A	13	10	10	IF	13	10	10	10	10	10
32 A	13	10	10	IF	13	10	10	10	10	10
33 A	13	10	10	IF	13	10	10	10	10	10

FIGURE 6.

activity), are then listed on the same line as the last Predecessor of the set.

CARD SEQUENCE or IDENTIFICATION (optional)

(7) FORM C-3A (ACTIVITY TIME EXHIBIT)

This form for entry of ACTIVITY TIME EXHIBITS includes given percent probabilities for each of the three TIME ESTIMATES (Optimistic, Most Likely, and Pessimistic). Entered along with these time estimates are corresponding probabilities. These probabilities must add up to 100 percent.

TIME ESTIMATES are number of workdays measured from activity start to activity completion. Basic assumptions are that all Predecessors to the Specified Activity have been completed and that all required resources are available. If delay in the net occurs because of incomplete Predecessors or unavailability of resources, it will automatically be picked up by the computer.

TIME may be expressed in whole workdays and/or decimal fractions of a workday (i.e. 10 (days); 5.24 (days); 6.5 (days); .75 (days)). TIMES are expressed by an "OPTIMISTIC" or minimum value, "MOST LIKELY" and "PESSIMISTIC" or maximum value. They are defined as follows:

OPTIMISTIC VALUE--minimum time that the activity might take to complete. Minimal completion time would occur where no problems occur and the activity proceeds smoothly to completion with very little, if any difficulty.

MOST LIKELY VALUE--normal time taken to activity completion with typical but no unusual or difficult problems.



PESSIMISTIC VALUE--maximum time taken to completion of an activity taking into consideration unusual problems causing some extensive difficulties resulting in major setbacks to activity completion.

It is preferable that there be a one-to-one correspondence between Exhibit Time References and Specified Activity. Doing so will eliminate the possibility that a change in time estimate made for one activity will not be mistakenly applied to another activity as well.

However, EXHIBIT TIMES may be referenced by more than one activity if it is so desired.

EXHIBIT NUMBER or NAME is taken from FORM C-2 and entered into the first column.

PROBABILITIES and corresponding time estimates are entered as indicated on the form and as specified earlier in this write-up (i.e. Optimistic, Most Likely, and Pessimistic).

CARD SEQUENCE or IDENTIFICATION (optional)

(8) FORM C-3B (ACTIVITY TIME EXHIBIT)

FORM C-3B is used when there are no PROBABILITY entries. It assumes that a modified triangular distribution is used wherein OPTIMISTIC and PESSIMISTIC TIME LEVELS are assumed to be at the 5% probability level, uniformly rising--on both sides--to a MOST LIKELY TIME VALUE at a maximum percentage of probability of its occurrence.

As stated for FORM C-3A, workdays are entered in whole days and/or in decimal fractions (i.e., 10, 5.2, .7, etc.).

(9) FORM C-3C (ACTIVITY TIME EXHIBIT)

This form is used for EXHIBITS containing TIME ESTIMATES with PROBABILITIES for the "OPTIMISTIC" and/or "PESSIMISTIC" times only. Obtain EXHIBIT NUMBER from FORM C-2.

NOTE: A modified triangular or house distribution is assumed wherein OPTIMISTIC and PESSIMISTIC TIMES may be unequal. For example, the OPTIMISTIC TIME of a given EXHIBIT may be 5% and a PESSIMISTIC TIME may be 10%. If both PROBABILITY entries at the ends are omitted from any EXHIBIT, then 5% will be assumed for both OPTIMISTIC and PESSIMISTIC PROBABILITY VALUES. However, if a PROBABILITY VALUE is entered at the OPTIMISTIC end only, it will be applied to the PESSIMISTIC side also. If a PROBABILITY VALUE is entered at the PESSIMISTIC end, the 5% default will be applied to the OPTIMISTIC end.

(10) FORM C-4A (RESOURCE POOL DATA AND RATE/COST TABLE)

This form lists RESOURCE CODES and DESCRIPTION along with total number initially available in the RESOURCE POOL and RATE

**TRANSIM V INPUT DATA SHEET FORM C-38 (ACTIVITY TIME EXHIBITS)**  
(Use this form for exhibits containing time estimates without probabilities)  
(A triangular distribution will be assumed)

Key puncher: Punch data in shaded columns only when followed by use suspended data in the next (unshaded) field to the right.

PROJECT \_\_\_\_\_

DATE \_\_\_\_\_

EXHIBIT NUMBER OR NAME (From Form C-2)	OPTIMISTIC TIME (see instructions) Workdays	MOST LIKELY TIME (see instructions) Workdays	PESSIMISTIC TIME (see instructions) Workdays	CARD SEQUENCE OR IDENTIFICATION (optional)
01	01	01	01	01
02	02	02	02	02
03	03	03	03	03
04	04	04	04	04
05	05	05	05	05
06	06	06	06	06
07	07	07	07	07
08	08	08	08	08
09	09	09	09	09
10	10	10	10	10
11	11	11	11	11
12	12	12	12	12
13	13	13	13	13
14	14	14	14	14
15	15	15	15	15
16	16	16	16	16
17	17	17	17	17
18	18	18	18	18
19	19	19	19	19
20	20	20	20	20
21	21	21	21	21
22	22	22	22	22
23	23	23	23	23
24	24	24	24	24
25	25	25	25	25
26	26	26	26	26
27	27	27	27	27
28	28	28	28	28
29	29	29	29	29
30	30	30	30	30
31	31	31	31	31
32	32	32	32	32
33	33	33	33	33

FIGURE 8.

TRANSIM V INPUT DATA SHEET FORM C-3C (ACTIVITY TIME EXHIBITS)  
 (Use this form for exhibits containing time estimates with probabilities only for the "Optimistic" and/or "Pessimistic" times)  
 (A modified triangular distribution will be assumed)

Key/punch: Punch data in shaded columns only when followed by user supplied data in the next (unshaded) field to the right

PROJECT \_\_\_\_\_  
 DATE \_\_\_\_\_

EXHIBIT NUMBER OR NAME (from Form C-2)	"OPTIMISTIC" TIME <small>(see instructions)</small>		"MOST LIKELY" TIME <small>(see instructions)</small>		"PESSIMISTIC" TIME <small>(see instructions)</small>		CARD SEQUENCE OR IDENTIFICATION <small>(Optional)</small>
	Percent Probability	Workdays	Percent Probability	Workdays	Percent Probability	Workdays	
01	10	10	10	10	10	10	01
02	10	10	10	10	10	10	02
03	10	10	10	10	10	10	03
04	10	10	10	10	10	10	04
05	10	10	10	10	10	10	05
06	10	10	10	10	10	10	06
07	10	10	10	10	10	10	07
08	10	10	10	10	10	10	08
09	10	10	10	10	10	10	09
10	10	10	10	10	10	10	10
11	10	10	10	10	10	10	11
12	10	10	10	10	10	10	12
13	10	10	10	10	10	10	13
14	10	10	10	10	10	10	14
15	10	10	10	10	10	10	15
16	10	10	10	10	10	10	16
17	10	10	10	10	10	10	17
18	10	10	10	10	10	10	18
19	10	10	10	10	10	10	19
20	10	10	10	10	10	10	20
21	10	10	10	10	10	10	21
22	10	10	10	10	10	10	22
23	10	10	10	10	10	10	23
24	10	10	10	10	10	10	24
25	10	10	10	10	10	10	25
26	10	10	10	10	10	10	26
27	10	10	10	10	10	10	27
28	10	10	10	10	10	10	28
29	10	10	10	10	10	10	29
30	10	10	10	10	10	10	30
31	10	10	10	10	10	10	31
32	10	10	10	10	10	10	32
33	10	10	10	10	10	10	33

FIGURE 9.



or COST PER RESOURCE UNIT (per day or hour and effective from a specified workday).

As mentioned before, like the ACTIVITY CODE, the RESOURCE TYPE NAME or CODE must consist of a minimum of two and a maximum of eight contiguous alpha-numeric characters.

DESCRIPTION is optional, but if to be listed, it is preferable to enter it exactly as it appears in the RESOURCE REPORT TITLE. The RESOURCE DESCRIPTION may consist of any combination of alpha-numeric characters and blank spaces.

The NUMBER of RESOURCE UNITS initially available in the pool (from which the requirements of individual activities will be drawn) may be expressed as an integer number or as a decimal number with one or two digits to the right of the decimal point (hundredths of units). Care must be taken to insure that the QUANTITY is large enough to meet the demands of any individual activity drawing from that pool, because no activity is allowed to begin until all of its resource requirements are available. If two or more activities require resources from the same pool and there are not enough resource units available to allow simultaneous performance of all those activities, then the resources will be allocated to as many activities as possible, with preference given to those activities that have been waiting the longest; i.e. those whose PREDECESSOR ACTIVITIES were all completed at the earliest times. In no case will the number of resource units assigned to an activity be less than the number shown as "required" on FORM C-2.

RATE/COST PER RESOURCE UNIT. Enter dollar amount of cost per RESOURCE UNIT on a daily (D) or hourly (H) rate.

RATE/COST EFFECTIVE FROM DATE. Enter DATE (day, month, year) that the RATE or COST is effective. If COST/RATE remains the same, leave blank.

If COST/RATE changes, list beginning COST/RATE per resource unit. Then, on the next line, list new COST/RATE and in its corresponding column, enter in the date that this new rate is effective.

CARD SEQUENCE or IDENTIFICATION (optional)

As previously mentioned (See Brief on FORM C-1).

(11) FORM C-9 (COMPLETED AND/OR UNDERWAY ACTIVITIES ONLY).

Enter ACTIVITY CODE of given ACTIVITY taken from FORM C-1 as indicated. For COMPLETED ACTIVITIES, enter START and COMPLETION DATES, as indicated.

For UNDERWAY ACTIVITIES, enter START DATE and DATE OF UPDATE. Then, enter an EXHIBIT REFERENCE for the estimated Time to Completion.

RESOURCE REQUIREMENTS should be entered on this form even if they are the same as those already entered on FORM C-2. Then the C-2 entry should be deleted.

RESOURCE TYPE NAMES or CODES must correspond to FORM C-4A. For any given activity, there may be one or more RESOURCE CODE(S). These are listed in sequence following their corresponding activity.

If ACTIVITY PERFORMANCE of the SPECIFIED ACTIVITY is to continue to the start of another activity, enter in designated column the appropriate ACTIVITY CODE (taken from FORM C-1).

TRANSIM V INPUT DATA SHEET FORM C-8 (COMPLETED AND/OR UNDERWAY ACTIVITIES ONLY)

DATE \_\_\_\_\_

Activity Code (From Form C-11)

Activity Code	Activity Description	Resource Type	Quantity	Working Time	Activity Performance	Card Sequence
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						

FIGURE 11.

(12) FORM C-10 (GENERAL)

The UPDATE line is used to establish an overall "date of update" for the run. The number of workdays actually spent on each individual activity to date may be entered in the appropriate columns on FORM C-2. The actual START DATE and DATE OF UPDATE may be entered on FORM C-9.

The TIME PERIOD LINE is used to determine the time scaling of the output reports. The time period is normally set equal to one workday; however, on lengthy projects, it is often desirable to have the reports somewhat condensed. For example, in a lengthy project where one workweek equals five workdays, the time period might be specified as five workdays, resulting in presentation of all output reports in terms of five-day (workweek) intervals.

The NUMBER OF RESOURCE UNIT HOURS PER RESOURCE UNIT WORKDAY refers to the number of hours worked per day (8, 16, 24, etc.) as presented in the RESOURCE UTILIZATION HISTORY REPORT. The keyword, "ITERATIONS" is used to specify the number of successive iterations or project network simulations desired.

If multiple copies are specified, the total requested for each report will be printed before going on to the next report.

Additional instructions for desired format and editing options are listed next. Options not utilized should be crossed out.

TRANSIM V INPUT DATA SHEET FORM C-10 (GENERAL)  
Refer to the form for details on data in shaded columns

PROJECT \_\_\_\_\_

DATE \_\_\_\_\_

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	
01	02	03	04	05	06	07	08	09	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	
OUTPUT REPORT	UPDATE ON	TIME PERIOD	NUMBER OF	ITERATIONS	COPIES	GRAPH	MAX COPY																													
SPECIFICATIONS	WORKDAY	PERIOD	HOURS IN	OF	NUMBER	OF	COPIES	IN	WORKDAY																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
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OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
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OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
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OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
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OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
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OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
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OF	OF	OF	OF	OF	OF	OF	OF	OF	OF																											
OF	OF	OF	OF																																	

(13) FORM C-10A (RISK REPORT SPECIFICATIONS)

If a SCHEDULE RISK REPORT is desired, enter "YES" in the space (columns 22-24) allocated next to SCHEDULE RISK REPORT. If "NO", enter "NO" and go to the next form.

SORT OPTIONS for the SCHEDULE RISK REPORT are listed on the form. Cross out the options NOT desired and enter number of desired copies.

Enter ACTIVITY/MILESTONE CODES (taken from FORM C-1) of Activities to be included in the Risk Report. List the corresponding "LEAD RESPONSIBILITY" which is the first Responsibility listed for each designated Activity. Enter APPROVED SCHEDULE DATE and designate as indicated on this form the type of approved schedule date ("B" entered if it is an Activity Beginning Date; "C" entered for Activity Completion Date; and "M" for Milestone Date).

Enter ACCEPTABLE LEVEL OF RISK as given in percentages.

For specified ACTIVITIES (MILESTONES), a punched output deck can be produced and will have the following information:

- o Activity/Milestone Code
- o Approved Schedule Date
- o Probability of Meeting Approved Schedule Date
- o Acceptable Risk Level
- o Date of Meeting Acceptable Risk Level
- o Percent Criticality

For subsequent runs, the punched deck should be inserted before the "GO" card of the Input Deck.

TRANSIM V INPUT DATA SHEET FORM C 10A (RISK REPORT SPECIFICATIONS)

Key: On lines 1 through 6 do NOT punch data in shaded columns.  
On lines 1 through 34 punch data in shaded columns only when followed by  
asterisk (\*) or number only if the number differs from previously specified number - of copies of output report(s) to be printed.

PROJECT \_\_\_\_\_

DATE \_\_\_\_\_

LINE	SCHEDULE	RISK	REPORT	ENTER	YES	OR	NO	LEAD	RESPONSIBILITY	APPROVED SCHEDULE DATE	DATE	ACCEPTABLE RISK LEVEL (Percent)	CARD SEQUENCE OR IDENTIFICATION
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
30	31	32	33	34									
1	A	A	A	A	A	A	A	A	A	A	A	A	1
2	A	A	A	A	A	A	A	A	A	A	A	A	2
3	A	A	A	A	A	A	A	A	A	A	A	A	3
4	A	A	A	A	A	A	A	A	A	A	A	A	4
5	A	A	A	A	A	A	A	A	A	A	A	A	5
6	A	A	A	A	A	A	A	A	A	A	A	A	6
7	A	A	A	A	A	A	A	A	A	A	A	A	7
8	A	A	A	A	A	A	A	A	A	A	A	A	8
9	A	A	A	A	A	A	A	A	A	A	A	A	9
10	A	A	A	A	A	A	A	A	A	A	A	A	10
11	A	A	A	A	A	A	A	A	A	A	A	A	11
12	A	A	A	A	A	A	A	A	A	A	A	A	12
13	A	A	A	A	A	A	A	A	A	A	A	A	13
14	A	A	A	A	A	A	A	A	A	A	A	A	14
15	A	A	A	A	A	A	A	A	A	A	A	A	15
16	A	A	A	A	A	A	A	A	A	A	A	A	16
17	A	A	A	A	A	A	A	A	A	A	A	A	17
18	A	A	A	A	A	A	A	A	A	A	A	A	18
19	A	A	A	A	A	A	A	A	A	A	A	A	19
20	A	A	A	A	A	A	A	A	A	A	A	A	20
21	A	A	A	A	A	A	A	A	A	A	A	A	21
22	A	A	A	A	A	A	A	A	A	A	A	A	22
23	A	A	A	A	A	A	A	A	A	A	A	A	23
24	A	A	A	A	A	A	A	A	A	A	A	A	24
25	A	A	A	A	A	A	A	A	A	A	A	A	25
26	A	A	A	A	A	A	A	A	A	A	A	A	26
27	A	A	A	A	A	A	A	A	A	A	A	A	27
28	A	A	A	A	A	A	A	A	A	A	A	A	28
29	A	A	A	A	A	A	A	A	A	A	A	A	29
30	A	A	A	A	A	A	A	A	A	A	A	A	30
31	A	A	A	A	A	A	A	A	A	A	A	A	31
32	A	A	A	A	A	A	A	A	A	A	A	A	32
33	A	A	A	A	A	A	A	A	A	A	A	A	33
34	A	A	A	A	A	A	A	A	A	A	A	A	34

FIGURE 13.

(14) FORM C-11 (TIME SUMMARY GRAPHS)

TIME SUMMARY GRAPHS present a histogram of the range of possible elapsed times between specified activities or milestones, or a distribution of start or finish times for a given activity.

It is possible to enter data for two TIME SUMMARY GRAPHS on this form. Enter title of Time Summary Graph to be obtained (lines 1 and 14). Additional data is entered on the next twelve lines where indicated.

TIME SUMMARY GRAPHS are presented in terms of calendar dates only if calendar information is included on FORM C-0 and if a starting activity is not given; otherwise, the report is presented in terms of workdays (or if specified on FORM C-10, in time periods).

If the distribution specifications are not given, the computer will scale the distribution automatically to fit on a single page. Otherwise, the computer will use as many pages as are required to meet the specifications.

For runs in which the number of iterations is greater than 100, fractional percentage occurrences within any interval will be rounded upward or downward to the nearest percent; for example, a 1-in-250 occurrence will be rounded to 0% and will not appear on the graph.

TRANSIMV INPUT DATA SHEET FORM C-11 (TIME SUMMARY GRAPHIS)

Key: number on this form do NOT punch data in shaded columns  
 (\*Enter number only if this number differs from previously specified number of copies of output report(s) to be printed)

PROJECT \_\_\_\_\_

DATE \_\_\_\_\_

Analyze		Label		Instruction		Label		Analyze	
1	2	3	4	5	6	7	8	9	10
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	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170
171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190
191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210
211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230
231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290
291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310
311	312	313	314	315	316	317	318	319	320
321	322	323	324	325	326	327	328	329	330
331	332	333	334	335	336	337	338	339	340
341	342	343	344	345	346	347	348	349	350
351	352	353	354	355	356	357	358	359	360
361	362	363	364	365	366	367	368	369	370
371	372	373	374	375	376	377	378	379	380
381	382	383	384	385	386	387	388	389	390
391	392	393	394	395	396	397	398	399	400
401	402	403	404	405	406	407	408	409	410
411	412	413	414	415	416	417	418	419	420
421	422	423	424	425	426	427	428	429	430
431	432	433	434	435	436	437	438	439	440
441	442	443	444	445	446	447	448	449	450
451	452	453	454	455	456	457	458	459	460
461	462	463	464	465	466	467	468	469	470
471	472	473	474	475	476	477	478	479	480
481	482	483	484	485	486	487	488	489	490
491	492	493	494	495	496	497	498	499	500
501	502	503	504	505	506	507	508	509	510
511	512	513	514	515	516	517	518	519	520
521	522	523	524	525	526	527	528	529	530
531	532	533	534	535	536	537	538	539	540
541	542	543	544	545	546	547	548	549	550
551	552	553	554	555	556	557	558	559	560
561	562	563	564	565	566	567	568	569	570
571	572	573	574	575	576	577	578	579	580
581	582	583	584	585	586	587	588	589	590
591	592	593	594	595	596	597	598	599	600
601	602	603	604	605	606	607	608	609	610
611	612	613	614	615	616	617	618	619	620
621	622	623	624	625	626	627	628	629	630
631	632	633	634	635	636	637	638	639	640
641	642	643	644	645	646	647	648	649	650
651	652	653	654	655	656	657	658	659	660
661	662	663	664	665	666	667	668	669	670
671	672	673	674	675	676	677	678	679	680
681	682	683	684	685	686	687	688	689	690
691	692	693	694	695	696	697	698	699	700
701	702	703	704	705	706	707	708	709	710
711	712	713	714	715	716	717	718	719	720
721	722	723	724	725	726	727	728	729	730
731	732	733	734	735	736	737	738	739	740
741	742	743	744	745	746	747	748	749	750
751	752	753	754	755	756	757	758	759	760
761	762	763	764	765	766	767	768	769	770
771	772	773	774	775	776	777	778	779	780
781	782	783	784	785	786	787	788	789	790
791	792	793	794	795	796	797	798	799	800
801	802	803	804	805	806	807	808	809	810
811	812	813	814	815	816	817	818	819	820
821	822	823	824	825	826	827	828	829	830
831	832	833	834	835	836	837	838	839	840
841	842	843	844	845	846	847	848	849	850
851	852	853	854	855	856	857	858	859	860
861	862	863	864	865	866	867	868	869	870
871	872	873	874	875	876	877	878	879	880
881	882	883	884	885	886	887	888	889	890
891	892	893	894	895	896	897	898	899	900
901	902	903	904	905	906	907	908	909	910
911	912	913	914	915	916	917	918	919	920
921	922	923	924	925	926	927	928	929	930
931	932	933	934	935	936	937	938	939	940
941	942	943	944	945	946	947	948	949	950
951	952	953	954	955	956	957	958	959	960
961	962	963	964	965	966	967	968	969	970
971	972	973	974	975	976	977	978	979	980
981	982	983	984	985	986	987	988	989	990
991	992	993	994	995	996	997	998	999	1000

FIGURE 14.

(15) FORM C-12 (CRITICALITY, DELAY, PROB-  
ABILITY OF OCCURRENCE AND SCHEDULE REPORT)

SORT OPTIONS are as listed below each report heading. You may specify SORT OPTIONS to be utilized and number of copies desired. If it is desired to suppress printing of the portion of the ACTIVITY CRITICALITY REPORT covering activities whose criticality is below a specified percent, enter that CRITICALITY PERCENT in lines 4 and/or 9. A report listing those activities that are delayed for lack of available resources will be automatically printed. Conversely, even though an activity may fail to be executed in all iterations due to Probabilistic and/or Conditional Branch Rules, a report covering this situation will not be printed unless requested on this form.

If an ACTIVITY SCHEDULE TABULATION is requested and no SORT is specified, one complete schedule tabulation will be printed and listed (sorted) according to Activity Code. Additional sorting can be obtained by specifying the keyword "SORT" followed by one or more of the following keyword combinations:

EARLIEST START  
EXPECTED START  
LATEST START  
EARLIEST FINISH  
EXPECTED FINISH  
LATEST FINISH

The ACTIVITY SCHEDULE GRAPH is presented in order of EARLIEST START TIMES. If multiple pages are printed due to the number of

DATE \_\_\_\_\_

Key puncher: On this form, do NOT punch data in shaded columns.

(\*Enter number only, if the number differs from previously specified number of copies of output report(s) to be printed)

Analyst follow instructions below

1	CRITICALITY ANALYSIS REPORT	(ENTER "YES" OR "NO")	COPIES
2	ACTIVITY/MILESTONE CRITICALITY REPORT WITH PREDECESSORS (YES OR NO?)		
3	FOR ACTIVITIES WITH CRITICALITY OF PERCENT OR MORE ONLY		
4	SORT OPTIONS: (CROSS OUT OPTIONS NOT DESIRED)		
5	DECREASING CRITICALITY		COPIES
6	ACTIVITY/MILESTONE CODE		COPIES
7	ACTIVITY/MILESTONE CRITICALITY REPORT WITH SUCCESSORS (YES OR NO?)		
8	FOR ACTIVITIES WITH CRITICALITY OF PERCENT OR MORE ONLY		
9	SORT OPTIONS: (CROSS OUT OPTIONS NOT DESIRED)		
10	DECREASING CRITICALITY		COPIES
11	ACTIVITIES DELAYED AWAITING RESOURCES		COPIES
12	FOR ACTIVITIES WITH CRITICALITY OF PERCENT OR MORE ONLY		
13	ACTIVITY/MILESTONE PROBABILITY OF OCCURRENCE REPORT (YES OR NO?)		
14	SORT OPTIONS: (CROSS OUT OPTIONS NOT DESIRED)		
15	DECREASING PROBABILITY		COPIES
16	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")		
17	SORT OPTIONS: (CROSS OUT OPTIONS NOT DESIRED)		
18	EARLIEST START		COPIES
19	EXPECTED START		COPIES
20	LATEST START		COPIES
21	EARLIEST FINISH		COPIES
22	EXPECTED FINISH		COPIES
23	LATEST FINISH		COPIES
24	ACTIVITY/MILESTONE SCHEDULE GRAPH (ENTER "YES" OR "NO")		
25	GRAPH WILL BE SORTED ACCORDING TO EARLIEST START TIMES ONLY		
26	ACTIVITY/MILESTONE DESCRIPTION FOR GRAPH (ENTER "YES" OR "NO")		

FIGURE 15.

activities and/or the length of the project, they will be designated in the upper right hand corner, as follows:

A1	B1	C1	
A2	B2	C2	
A3	B3	C3	etc.

and may be taped together accordingly for presentation purposes. Only one copy of the ACTIVITY SCHEDULE GRAPH and DESCRIPTION FOR GRAPH may be obtained.

(16) FORM C-13A (SCHEDULE TABULATION GRAPH AND STATUS REPORTS FOR RESPONSIBILITY GRAPH)

Selected ACTIVITY SCHEDULE TABULATION GRAPH and STATUS REPORTS for activities corresponding to one or more RESPONSIBILITY CODES may be specified following the keyword, "RESPONSIBILITY." Enter RESPONSIBILITY CODES for reports required as indicated in instructions on the form.

If a report is desired for each RESPONSIBILITY CODE, simply enter "ALL". If no report is required, leave the blanks unfilled.

Separate ACTIVITY STATUS REPORTS may be obtained for each of the designated responsibilities, covering "ACTIVITIES UNDERWAY," "DUE TO START," and "DUE TO COMPLETE," within the specified time period(s).

(17) FORM C-14 (RESOURCE REPORTS)

Each RESOURCE CODE appearing on this form should have a corresponding entry on FORM C-4A. A given RESOURCE CODE specified should appear only once on FORM-14.

TRANSIMV INPUT DATA SHEET FORM C-13A (SCHEDULE TABULATION GRAPH AND STATUS REPORTS FOR RESPONSIBILITY CODES)

Keypuncher: On this form, do NOT punch data in shaded columns.  
 (\*Enter number only if this number differs from previously specified number of output reports to be printed.)

PROJECT \_\_\_\_\_

DATE \_\_\_\_\_

PAGE \_\_\_\_\_

Analyst: follow instructions below

1	RESPONSIBILITY CODE(S): (IF REPORTS ARE DESIRED FOR EACH RESPONSIBILITY CODE, ENTER THE WORD "ALL" IN ANY ONE OF THE BLANK SQUARES BELOW. IF NO REPORTS ARE DESIRED LEAVE THE BLANKS UNFILLED)	74	75	76	77	78	79	80
2								
3								
4								
5								
6								
7								
8	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
9	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
10	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
11	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
12	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
13	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
14	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
15	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
16	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
17	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
18	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
19	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
20	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
21	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
22	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
23	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
24	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
25	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
26	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
27	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
28	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
29	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
30	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
31	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
32	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
33	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
34	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							
35	ACTIVITY/MILESTONE SCHEDULE TABULATION (ENTER "YES" OR "NO")							

FIGURE 16.



By default, if interval width for the RESOURCE GRAPH is not specified, the vertical axis (number of units) will be automatically scaled to the height of a single page. The horizontal axis (workdays, time periods, or calendar dates) will be scaled according to the length of the project and may extend over several pages.

If more than one page is required due to the number of resources and/or length of the project, they will be designated in the upper right hand corner as follows:

A1	B1	C1
A2	B2	C2
A3	B3	C3

These can be taped together accordingly for presentation purposes.

(18) FORM C-15A (RESOURCE SUMMARY REPORTS)

Information listed on FORM C-15A includes the title of the RESOURCE SUMMARY REPORT, specification of those RESOURCE CODES to be added or subtracted, and units in which these items are to be defined.

Resulting reports include an AGGREGATE RESOURCE HISTORY, HISTORY GRAPH, and DESCRIPTION FOR A HISTORY GRAPH.

This form is also used to obtain COST REPORTS for those resources to which a COST RATE is assigned on FORM C-4A.

ANALYST: FOLLOW INSTRUCTIONS BELOW

LINE NO.	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			
1	RE	SO	U	M	M	Y	R	E	P	O	R	T	T	I	T	L	E																			
2	SPECIFY RESOURCE CODES WHICH ARE TO BE ADDED. (A)																																			
3	IF ALL RESOURCE CODES ARE TO BE AGGREGATED, ENTER THE WORD "ALL"																																			
4	IN ANY ONE OF THE BLANKS BELOW:																																			
5																																				
6																																				
7																																				
8																																				
9																																				
10																																				
11																																				
12																																				
13																																				
14	SPECIFY RESOURCE CODES WHICH ARE TO BE SUBTRACTED FROM ABOVE																																			
15	AGGREGATION. (B):																																			
16																																				
17																																				
18																																				
19																																				
20																																				
21																																				
22																																				
23	REPORT NET BALANCE (A-B) IN ( ) UNITS (I.E. DOLLARS, GALLONS, TONS																																			
24	EUC. IF NOTHING SPECIFIED UNITS WILL BE ASSUMED.																																			
25	AGGREGATE RESOURCE HISTORY (YES OR NO?) # COPIES																																			
26	PERCENTILE(S) FOR HISTORY (YES OR NO?)																																			
27	AGGREGATE RESOURCE HISTORY (YES OR NO?)																																			
28	ACTIVITY DESCRIPTION FOR HISTORY GRAPH (YES OR NO?)																																			
29	INTERVAL WIDTH FOR HISTORY GRAPH (IF WIDTH NOT SPECIFIED, GRAPH																																			
30	WILL BE SCALED VERTICALLY TO FIT ON A SINGLE PAGE)																																			
31	AGGREGATE RESOURCE SUMMARY GRAPH (YES OR NO?) # COPIES																																			
32	INTERVAL WIDTH FOR SUMMARY GRAPH (REFER TO LINES 30 AND 31)																																			
33																																				

FIGURE 18.

C. COMPUTER OPERATIONS.

1. Data Deck Structure.

The card deck or input file prepared from the pre-coded forms and submitted to the computer may consist of any number of separate segments, but must always be in the following sequence.

a. Control Cards.

These cards are unique to the particular computer installation. They direct the computer to allocate the necessary requirements (i.e. storage, running time, etc.) to run the package. Control cards convey the following minimum information:

- o Account number.
- o Unique "job" identification and/or sequence number.
- o Machine time and/or output limits (number of lines and/or pages).
- o Identification of the program version to be run.
- o Amount of computer storage to be allocated.

b. TRANSIM V Input Forms.

The remaining information to be "input" into the system for computer identification and analysis are to be taken from the following forms in this sequence only:

C-0, C-1, C-1A, C-2, C-9, C-2A and/or C-2B, C-4A,  
C-3A and/or C-3B and/or C-3C, C-10, C-10A, C-11,  
C-12, C-13A, C-14, C-15A

For a project involving separate networks, each drawing from a common resource pool, the data forms (C-1, C-1A, C-2 and C-9) for each of these subnetworks must be grouped together and introduced by a card using the following format.

(Cols. 1-7)	(Col. 8)	(Cols. 9-70)
NETWORK	space	TITLE OF NETWORK

As shown above, the keyword\* "NETWORK" is followed by a space and then by the "TITLE OF THE NETWORK."

NOTE: For a single network, ignore the above. Specifications of a network name is optional; it will be treated as "NETWORK" by default.

c. Final Card(s).

The final card of the input data deck will include the word "GO." The word can be punched anywhere within Columns 1-72 inclusively.

A "GO" card will permit simulation to proceed if there are no "FATAL" errors found in the input deck.

---

\* A TRANSIM V keyword is any word or set of contiguous characters which is preprinted on the input data forms.

## 2. How to Estimate Computer Running Time.

The running time for any given network varies widely from one computer installation to another due to inherent differences in the operating characteristics of different computer systems. The best guide to running time for a particular network is therefore a comparison to the time requirements of other networks run at the same computer installation.

In general, the following guidelines apply in all cases:

- o The running time is always made up of three basic segments:

The time to edit the input data

The time to simulate the network

The time to generate the reports

- o The time required for input data editing is roughly proportional to the number of cards comprising the input data deck. The time required for simulation is proportional to the number of activities in the network multiplied by the number of iterations while the time required to generate the reports is roughly proportional to the number of pages of the reports produced.

It should be noted that the most significant factor in determining the running time for all but the smallest networks, is the number of iterations. Therefore, it is generally recommended that the number of iterations be held to 100 or less for all test runs, and increased beyond 100 only where necessary for statistical (sample size) reasons.

In general, it can be stated that for typical networks, the computer time required for editing the input data and generating the reports is roughly equal to one half the time required for 100 iterations. Increasing the number of iterations to 200 would therefore increase the running time by 50 percent.

D. OUTPUT REPORTS AND THEIR USE.

TRANSIM V Output Reports are presented in a variety of formats, as specified on the input data sheets. Examples of each are given in this section.

1. SEQUENCE OF REPORTS.

Regardless of which and how many reports are specified, the TRANSIM V output reports will always appear in the following sequence:

- o List of Names Used in the Model (always printed)
- o Summary of Number of Words Data Storage Used (always printed)
- o Schedule Risk Report
- o Time Summary Graph
- o Criticality Analysis Report
- o Activity Criticality Report
  - With Predecessors, sorted by Activity/Milestone Code and/or Decreasing Criticality
  - With Successors, sorted by Activity/Milestone Code and/or Decreasing Criticality
- o Activities Delayed Awaiting Resources
- o Activity/Milestone Probability of Occurrence Report
- o Activity/Milestone Schedule, sorted by
  - Activity/Milestone Code and/or
  - Earliest Start Times and/or
  - Expected Start Times and/or

- Latest Start Times  
and/or
- Earliest Finish Times  
and/or
- Expected Finish Times  
and/or
- Latest Finish Times
- o Activity Schedule Graph
- o Activity Code and Description for  
Schedule Graph
- o Resource Utilization History
- o Resource Requirements Graph
  - Schedule
  - Summary
- o Activity Code and Description for  
Resource Requirements Graph
- o Aggregate Resource History
- o Aggregate Resource History Graph
  - Schedule
  - Summary
- o Activity Code and Description for Aggregate  
Resource History Graph
- o Cumulative Aggregate Resource History  
Graph
- o Aggregate Resource Summary Graph
- o Activity Status Reports
  - Activities Underway for Responsibility
  - Activities Due to Start
  - Activities Due to Complete

2. LIST OF NAMES USED IN THE MODEL.

All TRANSIM V output defines the type of entities used in the model to be analyzed. These may include:

- o Operating Element
- o Traffic Unit Type
- o Table Name
- o Rule Name
- o Group Code
- o Activity Code
- o Resource Code
- o Responsibility Code

Names are listed and the appropriate column is checked. More than one column may be checked; for example, the same NAME may be used for both an Activity and a Table Name (See Figure 19).

3. SUMMARY OF USED DATA STORAGE.

This section summarizes the actual usage of computer storage. It may be used to estimate internal data storage requirements as specified in TRANSIM V Input Data FORM C-0 (See Figure 20).

4. SCHEDULE RISK REPORT.

The SCHEDULE RISK REPORT (See Figure 21) lists the probability that each specified activity will meet its Approved Schedule Date. The report lists Activity/Milestone Codes and Descriptions along with corresponding Percent Criticality and Lead Responsibility.

For example, a 5% probable level of risk is entered in the Acceptable Risk Level column. The computer reports the date that meets this level of acceptable risk, and in the next column (Deficit or

BOILER REPAIR MODEL (14FEB77)

LIST OF NAMES USED IN THIS MODEL FOR:

NAME OPERATING ELEMENT TRAFFIC UNIT TYPE NAME CODE ACTIVITY CODE RESOURCE CODE RESPONSIBILITY CODE

NAME	OPERATING ELEMENT	TRAFFIC UNIT TYPE	NAME CODE	ACTIVITY CODE	RESOURCE CODE	RESPONSIBILITY CODE
9						
0						
1						
2						
3						
4						
5						
6						
7						
8						
32						
31						
30						
29						
28						
27						
26						
25						
24						
23						
22						
21						
20						
19						
18						
17						
16						
15						
14						
13						
12						
11						
10						
09						
08						
07						
06						
05						
04						
03						
02						
01						
YARD						
SHOP-45						
SHOP-44						
SHOP-43						

Figure 19. List of Names Used in This Model.

THE MAXIMUM NUMBER OF WORDS DATA STORAGE USED WAS 17179 OUT OF AN AVAILABLE 35328 WORDS.  
 AT PRESENT  
 360 WORDS USED FOR THE LIST OF NAMES.  
 174 WORDS USED FOR SERVICE TIME TABLES.  
 0 WORDS USED FOR SUMMARY REPORT INDEXING.  
 1213 WORDS USED FOR SUMMARY REPORT WORKING AREA.  
 1213 WORDS WERE USED FOR RESPONSIBILITIES.  
 168 WORDS WERE USED FOR RESOURCE UTILIZATION REPORTS.  
 8226 WORDS WERE USED FOR RISK REPORTS.  
 279 WORDS WERE USED FOR TIME SUMMARY GRAPHS.  
 1137 WORDS WERE USED FOR DELAY REPORTS (ACTIVITIES DELAYED AWAITING RESOURCES).  
 25 WORDS WERE USED FOR SUMMARY REPORT EVENT NOTICES.  
 0 WORDS USED FOR LOAD SUMMARY REPORT DISTRIBUTIONS.  
 0 WORDS USED FOR TIME SUMMARY REPORT DISTRIBUTIONS.  
 THIS IS NOT A COMPLETE LISTING OF ALL THE DATA STORAGE USED.

END OF SIMULATOR OUTPUT. MESSAGES OF FOLLOWING PAGES ARE PRINTED BY THE OPERATING SYSTEM OF THIS COMPUTER INSTALLATION.

Figure 20. Summary of Number of Words Data Storage Used.

BOILER REPAIR MODEL (14FEB77)

SCHEDULE RISK REPORT (LISTED ACCORDING TO ACTIVITY/MILESTONE CODE)

APPROVED SCHEDULE DATE : B = ACTIVITY BEGINNING DATE, C = ACTIVITY COMPLETION DATE, M = MILESTONE DATE  
 \* (SCHEDULE) = THE DATE OF MEETING ACCEPTABLE RISK LEVEL IS (EARLIER) THAN APPROVED SCHEDULE DATE  
 - (DEFICIT) = THE DATE OF MEETING ACCEPTABLE RISK LEVEL IS (LATER) THAN APPROVED SCHEDULE DATE

( \*\*\* CHANGE IN DATE OF MEETING ACCEPTABLE RISK LEVEL :  
 \* = THE DATE IN CURRENT RUN IS (EARLIER) THAN THE DATE IN LAST RUN  
 - = THE DATE IN CURRENT RUN IS (LATER) THAN THE DATE IN LAST RUN )

IDENTIFICATION OF LAST REPORT (RUN TITLE) BOILER REPAIR TEST MODEL 14FEB77

ACTIVITY / MILESTONE	APPROVED SCHEDULE DATE	PROB OF MEETING ACCEPTABLE RISK LEVEL	DEFICIT OR SURPLUS (WORK-DAYS)	ACCEPTABLE RISK LEVEL	DATE OF MEETING ACCEPTABLE RISK LEVEL	PERCENT CRITICALITY	LEAD TIME (PUNTS)	APPROVED SCHEDULE DATE	PROB OF MEETING ACCEPTABLE RISK LEVEL	DEFICIT OR SURPLUS (WORK-DAYS)	ACCEPTABLE RISK LEVEL	DATE OF MEETING ACCEPTABLE RISK LEVEL	PERCENT CRITICALITY	LEAD TIME (PUNTS)
12 FINISH REPAIR BOILER RIGGE CASTING	19MAY77	39 P	0	5 P	28JUN77	27	0	19MAY77	39 P	0	5 P	28JUN77	27	0
13 REMOVE SHEET AND INSTALL STUC TUBES	25MAR77	92 P	0	5 P	20MAR77	2	0	25MAR77	92 P	0	5 P	20MAR77	2	0
15 REMOVE PREP AND INSTALL ECONUMIZE TUBES	12APR77	59 P	0	5 P	4MAY77	16	0	12APR77	59 P	0	5 P	4MAY77	16	0
16	22APR77	100 P	0	5 P	29MAY77	18	0	22APR77	100 P	0	5 P	29MAY77	18	0
20	10MAY77	100 P	0	5 P	14JUN77	94	0	10MAY77	100 P	0	5 P	14JUN77	94	0
28	10FEB77	0 P	0	5 P	21JUN77	93	0	10FEB77	0 P	0	5 P	21JUN77	93	0
29	27MAY77	56 P	0	5 P	21JUN77	17	0	27MAY77	56 P	0	5 P	21JUN77	17	0
30	14MAY77	0 P	0	5 P	27JUN77	14	0	14MAY77	0 P	0	5 P	27JUN77	14	0

Figure 21. Schedule Risk Report.

Surplus Workdays), lists the number of days ("+" (surplus) = the date of meeting acceptable risk level earlier than Approved Schedule Date; "-" (deficit) = the date of meeting acceptable risk level is later than the Approved Schedule Date) between the Acceptable Risk Date and the Approved Schedule Date.

If the report has been updated, another section consisting of an additional three columns is created. These columns list the differences between the current and previous runs, with respect to the probability of meeting the Approved Schedule Date, the DEFICIT or SURPLUS Workdays, and activity criticality.

5. TIME SUMMARY GRAPH.

The TIME SUMMARY GRAPH (See Figure 22) can be obtained for overall project time as well as for the start and/or finish times of a specific activity, or for the elapsed time between activities.

Distributions are automatically scaled to fit a single page if these specifications are not given. If they are, the computer will use as many pages as it required to meet the specifications.

6. CRITICALITY ANALYSIS REPORT.

The CRITICALITY ANALYSIS REPORT (See Figure 23) simply lists the number of activities/milestones in decreasing order of criticality. A Criticality Distribution of the total number of activities/milestones in increments of 10 percentiles starting from zero percentile (which identifies noncritical activities/milestones) is printed.

\*CRUDE OIL PIPELINE PROJECT\* \*RUN # 07 OCT 76\* PIPELINE# \*TWO ROUTES\*

TIME SUMMARY GRAPH \*DATE TO COMPLETE\*

LINES OF MILESTONE 99ELKFIN FINISH OF ELK MILLS PROJECT

LATEST DATE : 18 FEB 80  
 EXPECTED DATE : 1 OCT 79  
 EARLIEST DATE : 14 MAY 79

DATE	INTERVAL	X = PERCENT PROBABILITY (ROUNDED)	Y = CUMULATIVE PERCENT PROBABILITY
13 MAY 79	OR EARLIER		
14 MAY 79	THRU 22 MAY 79		
15 MAY 79	THRU 31 MAY 79		
16 JUN 79	THRU 10 JUN 79		
17 JUN 79	THRU 18 JUN 79		
18 JUN 79	THRU 27 JUN 79		
19 JUN 79	THRU 16 JUL 79		
20 JUN 79	THRU 15 JUL 79		
21 JUN 79	THRU 22 JUL 79		
22 JUN 79	THRU 11 AUG 79		
23 JUN 79	THRU 20 AUG 79		
24 JUN 79	THRU 29 AUG 79		
25 JUN 79	THRU 7 SEP 79		
26 JUN 79	THRU 16 SEP 79		
27 JUN 79	THRU 25 SEP 79		
28 JUN 79	THRU 13 OCT 79		
29 JUN 79	THRU 22 OCT 79		
30 JUN 79	THRU 31 OCT 79		
31 JUN 79	THRU 9 NOV 79		
1 JUL 79	THRU 18 NOV 79		
2 JUL 79	THRU 27 NOV 79		
3 JUL 79	THRU 6 DEC 79		
4 JUL 79	THRU 15 DEC 79		
5 JUL 79	THRU 23 DEC 79		
6 JUL 79	THRU 31 DEC 79		
7 JUL 79	THRU 8 JAN 80		
8 JUL 79	THRU 16 JAN 80		
9 JUL 79	THRU 24 JAN 80		
10 JUL 79	THRU 7 FEB 80		
11 JUL 79	THRU 16 FEB 80		
12 JUL 79	THRU 25 FEB 80		
13 JUL 79	THRU 23 FEB 80		

Figure 22. Time Summary Graph.

BOILER REPAIR TEST DATA 25AUG77

CRITICALITY ANALYSIS REPORT

( COMPLETED ACTIVITIES/MILESTONES ARE EXCLUDED FROM THIS REPORT )

TOTAL NUMBER OF ACTIVITIES/MILESTONES : 26

NUMBER OF CRITICAL ACTIVITIES/MILESTONES : 21 ( 81 PERCENT )

CRITICALITY PERCENT	NUMBER OF ACTIVITIES/MILESTONES	PERCENT OF TOTAL
91 THRU 100	2	8
81 THRU 90	0	0
71 THRU 80	0	0
61 THRU 70	1	4
51 THRU 60	5	19
41 THRU 50	0	0
31 THRU 40	2	8
21 THRU 30	0	0
11 THRU 20	5	19
1 THRU 10	6	23
0	5	19

Figure 23. Criticality Analysis Report.

Additional information listed on this report is as follows:

- o Total Number of Activities/Milestones
- o Number of Critical Activities/Milestones  
(along with percent critical)

7. ACTIVITY CRITICALITY REPORT.

The ACTIVITY CRITICALITY REPORT describes the criticality of an activity in the given network. Criticality of an activity is the percent probability that the given activity will be on the Critical Path --defined as the sequence of activities that takes the longest time from Starting Activity to Finish Activity.

The ACTIVITY CRITICALITY REPORT may be obtained with either Predecessor or Successor Activities. The report may be sorted either by (1) Activity/Milestone Code, or (2) By Decreasing Criticality. Figure 24 is an Activity Criticality Report with Predecessors--Listed According to Decreasing Criticality.

ACTIVITY STATUS is coded as follows:

"\*" indicating a Completed Activity, or

"+" indicating an Underway Activity.

These indicators are printed in front of the relevant Activity Description.

ACTIVITY CODES and DESCRIPTIONS of the specified activity and its Predecessor(s) or Successor(s) Activity(ies) are listed with their corresponding Criticality Percent. Activity Expected Slack Time (in Workdays), is listed for the Predecessor or Successor to which it corresponds. More than one report may be printed.

ACTIVITY CRITICALITY REPORT WITH PREDECESSORS (LISTED ACCORDING TO DECREASING CRITICALITY)

ACTIVITY CODE	DESCRIPTION	CRITICALITY (PERCENT)	PREDECESSOR ACTIVITIES CODE	DESCRIPTION	CRITICALITY (PERCENT)	EXPECTED SLACK (WORKDAYS)
04908984	START BUILDERS TRIALS	100	PM-048		0	20.63
			3199049	COMP LTG SYS	PM-045	0
			42395049	COMP NAV-ELEX-ORD OPER TSTG	PM-044	21.25
			84300049	INCLINING	PM-047	0.0
04909989	COMP ACCEPTANCE TRIALS	100	98202049	ACCEPTANCE TRIALS	100	
04910813	DELIVERY	100	98999049	PRE-OUTFITTING DELIVERY	100	
63199997	FINAL PAINT ALL AREAS	100	99702631	2ND DRYDOCK	100	
81306800	COMP SCHEDULED EVENT 1979-1980	100	04910813	DELIVERY	100	
84300049	INCLINING	100	98205833	FUEL SHIP	100	
98201997	DOCK TRIALS	100	19299982	COMP AIR TESTING FINAL	0	103.46
			20999982	EQUIP REMOVAL & REPLCMENT DEMO	4	16.04
			32199982	COMP PWR DISTR SYS	PM-039	14.00
			43199982	COMP IC SYS	PM-040	11.75
			50859982	FINAL INSTL TST MISC PPG ST 2-5	0	40.13
			31299982	COMP PWR DISTR SYS	PM-041	6.04
			98409982	INCLINING	0	90.08
			98409982	STAGE 6 DOCKSIDE TESTING	59	2.46
98202049	ACCEPTANCE TRIALS	100	98407982	STAGE 7 TESTING ALL SYS	100	
98205843	FUEL SHIP	100	99499982	CLEAN SHIP FOR INCLINING	100	
98407982	STAGE 7 TESTING ALL SYS	100	04908984	START BUILDERS TRIALS	PM-048	
98999049	PRE-OUTFITTING DELIVERY	100	04909989	COMP ACCEPTANCE TRIALS	PM-049	
99499982	CLEAN SHIP FOR INCLINING	100	95720994	UNDOCK	PM-046	
99702631	2ND DRYDOCK	100	98201997	DOCK TRIALS	PM-042	
99720994	UNDOCK	100	63199997	FINAL PAINT ALL AREAS	100	
04905999	LAUNCH	97	04904049	COMP HULL ASSEMBLY	PM-017	5.21
			04904049	COMP TOWER ASSEMBLY	PM-018	15.04
			19290049	LAUNCH READINESS TSTG	22	19.03
			41611049	ALIGN BORE RUDDER-INST CLSG PL	20	11.29
			52450049	INST SHFT LOCK&COMP PRE-LAUNCH	PM-018	1.54

Figure 24. Activity Criticality Report (with Predecessor--Listed According to Decreasing Criticality).

8. ACTIVITIES DELAYED AWAITING RESOURCES.

This report (See Figure 25) lists those activities (by Code and Description) with corresponding criticality (percent), delay time (workdays or specified time units), Awaiting Availability of All Resources (minimum, expected, and maximum), and Total Resource Requirements (code and number required).

Activity Status is indicated by "\*" for Completed; "+" for Underway.

9. ACTIVITY/MILESTONE PROBABILITY OF OCCURRENCE REPORT.

This report (See Figure 26) lists by Code and Description those Activities/Milestones with more than zero percent probability of occurrence. Corresponding Percent Criticality and Probability of Occurrence are listed after their Activity/Milestone Code in one of two columns: 100 Percent and Less Than 100 Percent.

10. ACTIVITY/MILESTONE SCHEDULE.

The ACTIVITY/MILESTONE SCHEDULE (See Figure 27) can be listed according to seven different sorts. These are:

- o Activity/Milestone Codes
- o Earliest Start Times
- o Expected Start Times
- o Latest Start Times
- o Earliest Finish Times
- o Expected Finish Times
- o Latest Finish Times

More than one report may be printed. The user may want an Activity/Milestone Schedule printed according to more than one sort.

(CONTINUED)

ACTIVITIES DELAYED AWAITING RESOURCES (LISTED ACCORDING TO ACTIVITY CODE)  
 ( \*\* AVERAGE DAILY RESOURCE UNITS REQUIRED )

ACTIVITY CODE	ACTIVITY DESCRIPTION	CRITICALITY (PERCENT)	DELAY TIME (WORKDAYS) AWAITING AVAILABILITY OF ALL RESOURCES (MIN) (EXPECTED)	DELAY TIME (WORKDAYS) AWAITING AVAILABILITY OF ALL RESOURCES (MAX)	RESOURCE REQUIREMENTS (CODE)	TOTAL RESOURCE REQUIREMENTS (UNITS)**
63807607	REMOVE DECK GRATING	20	0.08	6.04	22.92	MEM 8.78
63807608	REMOVE DECK GRATING	5	0.58	2.39	9.63	MEM 8.57
63807609	INSTALL REEFER PLANTS	0	0.0	3.17	14.50	MEM 6.26
63808603	REMOVE GRATING DECK	0	0.0	3.38	10.50	MEM 9.86
63808604	REMOVE GRATING DECK	0	0.0	2.50	7.75	MEM 9.23
63808605	REMOVE GRATING DECK	5	0.25	2.50	7.04	MEM 8.89
63809607	REMOVE OVERHEAD GRATING	10	0.08	3.38	9.71	MEM 8.47
63809608	REMOVE OVERHEAD GRATING	39	0.38	4.29	21.63	MEM 8.89
63809609	INSTALL REFRID PIPING	0	0.0	0.96	3.08	MEM 3.60
63809603	REMOVE GRATING OVERHEAD	5	0.0	2.42	7.75	MEM 9.00
63809604	REMOVE GRATING OVERHEAD	0	0.0	1.92	6.83	MEM 8.67
63809605	REMOVE GRATING OVERHEAD	0	0.0	2.71	15.13	MEM 8.78
63809607	REMOVE BULKHEADS	30	0.0	0.21	0.88	MEM 6.19
63809608	REMOVE BULKHEAD	35	0.0	0.29	1.58	MEM 3.90
63809609	INSTALL LIGHTING	0	0.0	0.75	3.50	MEM 7.23
63810607	400 DUCTS	10	0.0	0.25	0.67	MEM 5.28
63810608	400 DUCTS	15	0.0	0.25	0.96	MEM 6.94
63810609	CHARGE PIPING	0	0.0	0.33	1.67	MEM 4.71
63811603	REMOVE INSULATION DECK	0	0.0	0.42	1.41	MEM 8.67
63811604	REMOVE INSULATION DECK	0	0.0	0.71	2.42	MEM 8.78

Figure 25. Activities Delayed Awaiting Resources (Listed According to Activity Code).

NAVAL SHIP BOILER REPAIR PROB. MIN EARLIEST ST. (RESC) INCR. ACT. DUR. 30 JUL 75

ACTIVITY/MILESTONE PROBABILITY OF OCCURRENCE REPORT (LISTED ACCORDING TO ACTIVITY/MILESTONE CODE)  
 (ACTIVITIES/MILESTONES WITH ZERO PERCENT PROBABILITY OF OCCURRENCE ARE DELETED FROM THIS AND ALL OTHER REPORTS)

CODE	ACTIVITY / MILESTONE DESCRIPTION	PERCENT CRITICALITY	PROBABILITY OF OCCURRENCE	
			100 PERCENT	LESS THAN 100 PERCENT
01	START	100	100	100
02	REMOVE BOILER BILGE CASING	24	100	100
03	REMOVE AIR REGISTERS	15	100	100
04	INITIAL HYDROSTATIC TEST	61	100	100
05	REPAIR BOILER BILGE CASING	13	100	100
06	REMOVE BOILER BILGE CASING	13	100	100
07	CLEAN REPAIR AIR REGISTERS	0	100	100
08	REMOVE REFRACTORY MATERIAL ASSEMBLY	76	100	100
09	REMOVE DRUM INTERNALS	0	100	100
10	REPAIR BOILER SLIDING SEAT	11	100	100
11	EXPLORATORY BLOCK	40	100	100
12	FINISH REPAIR BOILER BILGE CASING	24	100	100
13	REMOVE FAB AND INSTALL GENERATING TUBES	36	100	100
14	REMOVE FAB AND INSTALL ECONOMIZER TUBES	6	100	100
15	REMOVE FAB AND INSTALL SUPPLEMENTARY TUBES	5	100	100
16	REMOVE FAB AND INSTALL SUPPLEMENTARY TUBES	8	100	100
17	RIG FOR CHEMICAL CLEANING	13	100	100
18	REPAIR DRUM INTERNALS	0	100	100
19	REPAIR CUTTER AIR CASING	26	100	100
20	REBRICK CLEAN TURBINE	20	100	100
21	PERFORM HYDROSTATIC TEST	30	100	100
22	INSTALL AIR REGISTERS	30	100	100
23	INSTALL DRUM INTERNALS	30	100	100
24	FINAL HYDROSTATIC TEST	30	100	100
25	INSTALL PLASTIC REFRACTORY	50	100	100
26	END	100	100	100

Figure 26. Activity/Milestone Probability of Occurrence Report (Listed According to Activity/Milestone Code).

MANAGEMENT LEVEL NET (NO RESOURCE CONSTRAINT) 24AUG77

ACTIVITY/MILESTONE SCHEDULE LISTED ACCORDING TO EARLIEST START TIMES

CODE	ACTIVITY / MILESTONE DESCRIPTION	START TIMES (DATE)	EARLIEST EXPECTED LATEST (DATE)	EXPECTED DURATION (DAYS)	SCHEDULE EARLIEST (DATE)	SCHEDULE LATEST (DATE)	FINISH TIMES (DATE)	PERCENT COMPLETE
PH300001	AWARD CONTRACT	10DEC76	10DEC76	0.0	10DEC76	10DEC76	10DEC76	0
PH300002	DISCUSS SOW CHANGE	10DEC76	10DEC76	77.50	10DEC76	10DEC76	10DEC76	0
PH300003	REVIEW ENGINE OPTIONS	10DEC76	10DEC76	301.56	10DEC76	10DEC76	10DEC76	0
PH300004	ISSUE OPERATION REQUIREMENTS	31JAN77	31JAN77	0.0	31JAN77	31JAN77	31JAN77	0
PH300005	PREPARE DEVELOP PROPOSAL (DIP)	31JAN77	31JAN77	191.82	31JAN77	31JAN77	31JAN77	0
PH300006	REVISE SOW / SEAL MODEL TEST PLAN	1APR77	1APR77	0.0	1APR77	1APR77	1APR77	0
PH300007	REVISE ENGINEERING PLAN	1APR77	1APR77	10.00	1APR77	1APR77	1APR77	0
PH300008	REVISE QUALITY PROGRAM PLAN	1APR77	1APR77	26.00	1APR77	1APR77	1APR77	0
PH300009	PREPARE 100A MODIFICATION PLAN	1APR77	1APR77	34.00	1APR77	1APR77	1APR77	0
PH300010	EVALUATE COMBAT SYSTEM ALTERNATIVES	1APR77	1APR77	40.00	1APR77	1APR77	1APR77	0
PH300011	PREPARE DCAA REPORT	1APR77	1APR77	45.00	1APR77	1APR77	1APR77	0
PH300012	PREPARE CONFIGURATION MANAGEMENT PLAN	1APR77	1APR77	60.00	1APR77	1APR77	1APR77	0
PH300013	PREPARE C/S SES ACO PLAN (CORL E001)	1APR77	1APR77	103.17	1APR77	1APR77	1APR77	0
PH300014	CONDUCT CONTRACT DESIGN - ORIGINAL SOW	1APR77	1APR77	117.50	1APR77	1APR77	1APR77	0
PH300015	CONDUCT ADVCE MILITARY UTILITY ANALYSIS	1APR77	1APR77	118.00	1APR77	1APR77	1APR77	0
PH300016	PREPARE ROUGH DRAFT C/S SES SHAP	1APR77	1APR77	122.50	1APR77	1APR77	1APR77	0
PH300017	PREPARE C/S SOFTWARE MANAGEMENT PLAN	1APR77	1APR77	131.57	1APR77	1APR77	1APR77	0
PH300018	PREPARE COMBAT SYSTEM MANAGEMENT PLAN	1APR77	1APR77	133.25	1APR77	1APR77	1APR77	0
PH300019	PREPARE 100A SEAL VERIFICATION TEST PLAN	1APR77	1APR77	133.25	1APR77	1APR77	1APR77	0
PH300020	REVIEW AND APPROVE 100A MODEL PLAN	1APR77	1APR77	133.25	1APR77	1APR77	1APR77	0
PH300021	REVIEW ROUGH DRAFT ENGINEERING PLAN	1APR77	1APR77	37.00	1APR77	1APR77	1APR77	0
PH300022	REVIEW CORL E012 AS NECESSARY	1APR77	1APR77	10.00	1APR77	1APR77	1APR77	0
PH300023	PREPARE TAR	2APR77	2APR77	121.07	2APR77	2APR77	2APR77	0
PH300024	INCORPORATE PMS COMMENTS IN ENGR PLAN	2APR77	2APR77	89.00	2APR77	2APR77	2APR77	0
PH300025	REV AND INCORPORATE CORL E012 IN SHAP	2APR77	2APR77	29.00	2APR77	2APR77	2APR77	0
PH300026	REVIEW TAR	13MAY77	13MAY77	5.00	13MAY77	13MAY77	13MAY77	0
PH300027	REVIEW 100A MOD PLAN AS NECESSARY	13MAY77	13MAY77	6.00	13MAY77	13MAY77	13MAY77	0
PH300028	REVIEW 100A MODIFICATION PLAN	13MAY77	13MAY77	50.00	13MAY77	13MAY77	13MAY77	0
PH300029	CONDUCT FIRST OPR	20MAY77	20MAY77	1.00	20MAY77	20MAY77	20MAY77	0
PH300030	CONDUCT PMS COMMENTS	20MAY77	20MAY77	10.00	20MAY77	20MAY77	20MAY77	0
PH300031	MAKE DECISION ON DSARC STATUS	20MAY77	20MAY77	64.28	20MAY77	20MAY77	20MAY77	0
PH300032	INCORP. C/S DECISION IN TLR. PM. SOW (U)	20MAY77	20MAY77	194.37	20MAY77	20MAY77	20MAY77	0
PH300033	MODIFY 100A	1JUN77	1JUN77	156.50	1JUN77	1JUN77	1JUN77	0
PH300034	CONDUCT 100A MODEL TEST. ANAL. REPORTS	2JUN77	2JUN77	99.92	2JUN77	2JUN77	2JUN77	0
PH300035	COMBINE DCAA REPORT WITH TAR	6JUN77	6JUN77	1.00	6JUN77	6JUN77	6JUN77	0

ACTIVITY STATUS : \* COMPLETE + UNDERWAY

Figure 27. Activity/Milestone Schedule (Listed According to Earliest Start Times).

11. ACTIVITY SCHEDULE GRAPH.

The ACTIVITY SCHEDULE GRAPH includes all of the activities in the network (See Figure 28).

Activity Code and Percent Criticality are listed down the page. Activity Schedule Time Duration is indicated on the GRAPH by the following notation:

\*\*\* = Actual Duration of Completed Activities

XXX = Expected Activity Duration

+++ = Completed Portion of Underway Activities

--- = Range from Earliest Start to Latest Finish

C = Activity Duration Extends into Adjacent Pages

S = Scheduled Start Date

F = Scheduled Finish Date

12. ACTIVITY CODE AND DESCRIPTION FOR SCHEDULE GRAPH.

The ACTIVITY CODE AND DESCRIPTION FOR SCHEDULE GRAPH is a listing of all activities in the Schedule Graph, together with their corresponding Description and Criticality (See Figure 29). One may correlate codes between this report and the graph to identify the activity whose worktime duration is charted on the graph.

13. RESOURCE UTILIZATION HISTORY.

The RESOURCE UTILIZATION HISTORY lists all of the utilization of each specified resource. (See Figure 30).

This REPORT is broken down into four basic columns. These are: Period Ending (ending date of each time period), Resource Unit Hours Utilized by All Activities, Resource Unit Workdays Utilized by All Activities, and Daily--Resource Units. Each of the above is further subdivided into subheaded columns.



ACTIVITY CODE	ACTIVITY DESCRIPTION	CRITICALITY (PERCENT)	ACTIVITY CODE	ACTIVITY DESCRIPTION	CRITICALITY (PERCENT)
PMS40007	REVIEW ENGINE OPTIONS	0	PMS40007	REVIEW ENGINE OPTIONS	0
PMS13078	UPDATE APP	0	PMS13078	UPDATE APP	0
PMS13012	PREPARE ROUGH DRAFT JK SES SHAP	0	PMS13012	PREPARE ROUGH DRAFT JK SES SHAP	0
PMS40065	PREPARE C/S SOFTWARE MANAGEMENT PLAN	0	PMS40065	PREPARE C/S SOFTWARE MANAGEMENT PLAN	0
PMS40063	PREPARE COMBAT SYSTEM MANAGEMENT PLAN	0	PMS40063	PREPARE COMBAT SYSTEM MANAGEMENT PLAN	0
PMS40064	REVIEW AND APPROVE 100A MODEL PLAN	0	PMS40064	REVIEW AND APPROVE 100A MODEL PLAN	0
PMS00036	REVIEW SOW W/H ENGINEERING PLAN	0	PMS00036	REVIEW SOW W/H ENGINEERING PLAN	0
PMS00037	PREPARE TAG SED ENGINEERING PLAN	0	PMS00037	PREPARE TAG SED ENGINEERING PLAN	0
PMS30033	REV AND INCORPORATE CDRL E012 IN SHAP	0	PMS30033	REV AND INCORPORATE CDRL E012 IN SHAP	0
PMS00009	REVIEW 100A MODIFICATION PLAN	0	PMS00009	REVIEW 100A MODIFICATION PLAN	0
PMS00052	CONDUCT FIRST CPR	0	PMS00052	CONDUCT FIRST CPR	0
PMS40060	INCRP. C/S DECISION IN ITR, PM, SOW (U)	0	PMS40060	INCRP. C/S DECISION IN ITR, PM, SOW (U)	0
PMS13077	REV AND INCORPORATE ENGR PLAN IN SHAP	0	PMS13077	REV AND INCORPORATE ENGR PLAN IN SHAP	0
PMS00042	NEGOTIATE W/SUPSHIPS FOR ON-SITE SUPPORT	0	PMS00042	NEGOTIATE W/SUPSHIPS FOR ON-SITE SUPPORT	0
PMS00026	NEGOTIATE W/NAVSEA FOR LOGISTIC SUPPORT	0	PMS00026	NEGOTIATE W/NAVSEA FOR LOGISTIC SUPPORT	0
PMS30019	NEGOTIATE W/NAVSEA FOR COMB SYS SUPPORT	0	PMS30019	NEGOTIATE W/NAVSEA FOR COMB SYS SUPPORT	0
PMS40019	NEGOTIATE W/NAVSEA FOR COMB SYS SUPPORT	0	PMS40019	NEGOTIATE W/NAVSEA FOR COMB SYS SUPPORT	0
PMS40021	NEGOTIATE W/NAVSEA FOR ELEC SYS SUPPORT	0	PMS40021	NEGOTIATE W/NAVSEA FOR ELEC SYS SUPPORT	0
PMS50024	NEGOTIATE W/NAVSEC FOR TEST SITE SUPPORT	0	PMS50024	NEGOTIATE W/NAVSEC FOR TEST SITE SUPPORT	0
PMS40028	NEGOTIATE W/NAVSEC FOR C/S CONTR DESIGN	0	PMS40028	NEGOTIATE W/NAVSEC FOR C/S CONTR DESIGN	0
PMS00064	SUBMIT CSMP FOR REVIEW	0	PMS00064	SUBMIT CSMP FOR REVIEW	0
PMS00066	REVIEW DRAFT C/S MANAGEMENT PLAN	0	PMS00066	REVIEW DRAFT C/S MANAGEMENT PLAN	0
PMS13022	INCORPORATE SDD/MOEL IN SHAP	0	PMS13022	INCORPORATE SDD/MOEL IN SHAP	0
PMS30069	COORDINATE C/S MANAGEMENT PLANS W/PARMS	0	PMS30069	COORDINATE C/S MANAGEMENT PLANS W/PARMS	0
PMS40062	PREPARE COMBAT SYSTEM DES REQUIREMENTS	0	PMS40062	PREPARE COMBAT SYSTEM DES REQUIREMENTS	0

Figure 29. Activity Code and Description for Schedule Graph.



Period Ending (Date). Lists ending date of specified time period. Also code following indicates: "\*" = Actual Utilization for the time period; "+" = Sum of actual plus remaining Projected Utilization for this time period.

Resource Unit Hours Utilized by All Activities. Lists Minimum, Expected, and Maximum Projected Utilization. Actual Utilization is listed under the Expected Column.

NOTE: The hours given are determined by multiplying Resource Unit Workdays by the number of Hours in a Working Day (see FORM C-10). Each figure (i.e. Minimum, Expected, and Maximum) is calculated in the same way.

Resource Unit Workdays Utilized by All Activities. Actual Utilization is listed under the Expected Column.

An additional column, Cumulative (Expected), provides the user with a Summation of Expected values.

Daily--Resource Units. Resource Units Required by Activity with Highest Demand (UNITS) is shown, together with Maximum Requirements (UNITS). Also listed are the Available Resource (UNITS) and Expected Percent Utilization of Available Resources.

TOTALS (not in example figure) listed at the end of the report include: Total Expected Resource Unit Hours Utilization; Total Expected Resource Unit Workdays Utilization; Overall Resource Units Expected Utilization (based on Resources Available).

14. RESOURCE REQUIREMENTS GRAPH.

The RESOURCE REQUIREMENTS GRAPH consists of two sections.

a. Schedule Section (See Figure 31).

The first section lists Activity Code, Percent Criticality, and Average Daily Resource Units Required. It charts the following:

\*\*\* = Actual Duration of Completed Activities

XXX = Expected Activity Duration

+++ = Completed Portion of Underway Activities

--- = Range from Earliest Start to Latest Finish

C = Activity Duration Extends to Adjacent Pages

b. Summary Section (See Figure 32).

This section presents graphically the additive requirements of all of the activities listed in the foregoing section (i.e., all of the activities utilizing the particular resource, for each workday or time period).

15. ACTIVITY CODE AND DESCRIPTION FOR RESOURCE REQUIREMENTS GRAPH. This report is similar in content and format to Figure 29: Activity Code and Description for Schedule Graph. As in Figure 29, Activity Codes and Descriptions with their corresponding Criticality Percents is listed on this report.

MANAGEMENT LEVEL NET (NO RESOURCE CONSTRAINT) 2AUG77

RESOURCE REQUIREMENTS GRAPH

RESOURCE CODE : MEN DESCRIPTION : PMS304 MEN  
NUMBER OF RESOURCE UNITS AVAILABLE : 10000.00

TIME PERIOD = 1 WEEK(S)

\*\*\* = ACTUAL DURATION OF COMPLETED ACTIVITIES  
XXX = EXPECTED ACTIVITY DURATION  
C = ACTIVITY DURATION EXTENDS INTO ADJACENT PAGES

+++ = COMPLETED PORTION OF UNDERWAY ACTIVITIES  
--- = RANGE FROM EARLIEST START TO LATEST FINISH

FROM DEC 76 THRU NOV 78

ACTIVITY CODE	PERCENT CAPACITY	PERIOD ENDING :	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
PMS00087	0	4.00																							
PMS13076	0	1.00																							
PMS13012	0	2.00																							
PMS40065	0	1.00																							
PMS20063	0	1.00																							
PMS00036	0	10.00																							
PMS00037	0	10.00																							
PMS00038	0	1.00																							
PMS30033	0	1.00																							
PMS20009	0	6.00																							
PMS00052	0	12.00																							
PMS40060	0	4.00																							
PMS13077	0	2.00																							
PMS20026	0	2.00																							
PMS30015	0	2.00																							
PMS30019	0	2.00																							
PMS40021	0	2.00																							
PMS50024	0	2.00																							
PMS40028	0	1.00																							
PMS00064	0	1.00																							
PMS13022	0	1.00																							
PMS20006	0	4.00																							
PMS40067	0	2.00																							
PMS40062	0	4.00																							

Figure 31. Resource Requirements Graph (Schedule).

MANAGEMENT LEVEL NET (NO RESOURCE CONSTRAINT) 24AUG77

(CONTINUED)

RESOURCE REQUIREMENTS GRAPH

RESOURCE CODE: MEN DESCRIPTION: PMS304 MEN  
 NUMBER OF RESOURCE UNITS AVAILABLE: 10000.00

I = RANGE FROM MAXIMUM TO MINIMUM REQUIREMENTS E = EXPECTED REQUIREMENTS

FROM DEC 76 THRU NOV 78

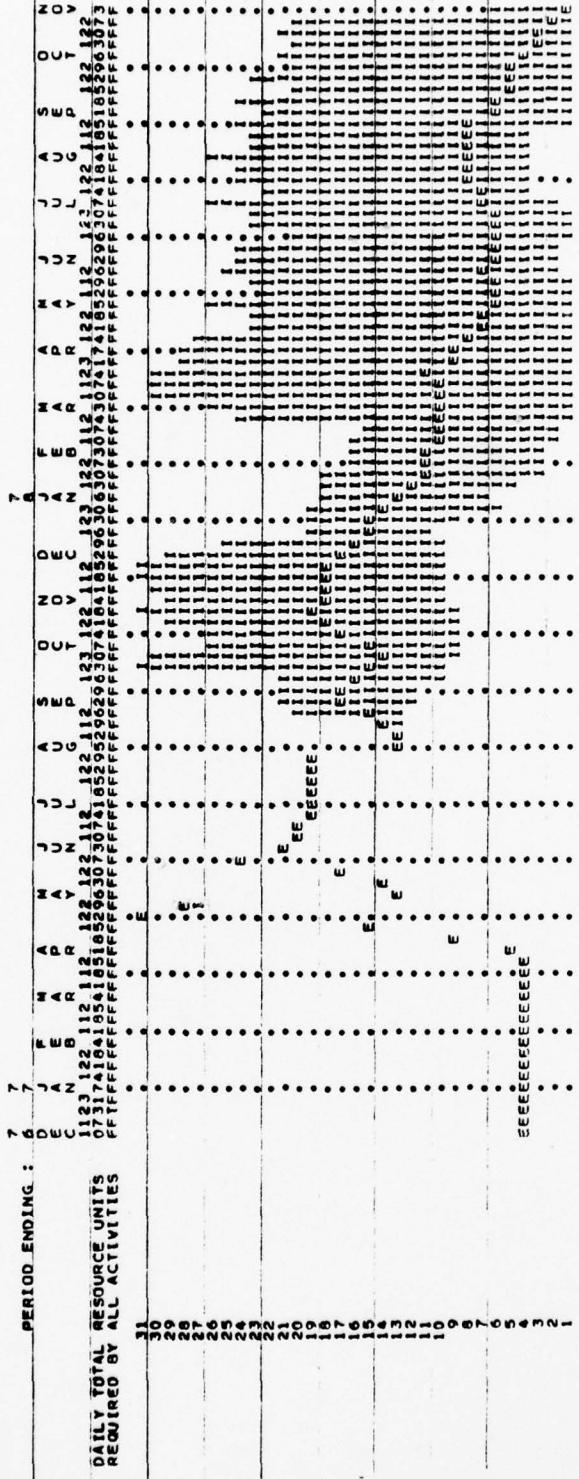


Figure 32. Resource Requirements Graph (Summary).

16. AGGREGATE RESOURCE REPORTS.

AGGREGATE RESOURCE REPORTS are similar to the previously mentioned Resource Reports except that as denoted by the word, "aggregate," these reports show results of a combination of two or more activity resources. Figures 33 is similar to the previously mentioned Resource Utilization History (See Section 13) and Figures 34 and 35 are similar to the previously mentioned Resource History Graphs (See Section 14). Note here that "history" and "requirements" are used interchangeably. Not shown, but possible to retrieve is a report on Activity Code and Description for Aggregate... which is similar to other Activity Code and Description... reports (See Section 12).

Additional reports are as follows:

a. CUMULATIVE AGGREGATE RESOURCE HISTORY GRAPH (See Figure 36).

This report presents the information in terms of cumulative requirements for the specified resource(s).

b. AGGREGATE RESOURCE SUMMARY GRAPH (See Figure 37).

This report lists the minimum, expected, and maximum requirements resource utilization of the specified resource over the entire duration of the project.

As indicated ("X" = Percent Probability (rounded); "C" = Cumulative Percent Probability), the graph charts the percent probability that the Total Resources expended would be at that specified percent probability (i.e., where the X's end; cumulative probability for total project is indicated by the C's).

BOILER REPAIR MODEL (14FEB77)  
 AGGREGATE RESOURCE HISTORY

TOTAL COST

RESOURCE CODES :  
 GENTECH : GENERAL TECHNICIANS  
 GENMACH : GENERAL MAINTENANCE  
 PIPEFTR : PIPE FITTERS  
 MAINTMAN : GEN. MAINT. MEN

UPDATED ON 14 FEB 77

MINIMUM VALUE : 5TH PERCENTILE  
 MAXIMUM VALUE : 95TH PERCENTILE

MINIMUM VALUE : 5TH PERCENTILE  
 MAXIMUM VALUE : 95TH PERCENTILE

DATE	(MIN)	(EXPECTED)	(MAX)	(MIN)	(EXPECTED)	(MAX)
1 FEB 77		248			248	
2 FEB 77		248			744	
4 FEB 77		311			1055	
7 FEB 77		311			1366	
8 FEB 77		435			1501	
9 FEB 77		435			2236	
10 FEB 77		435			2671	
14 FEB 77	435	435	435	3831	3831	3831
15 FEB 77	432	437	437	3977	3977	3977
16 FEB 77	437	437	437	4417	4417	4417
17 FEB 77	437	437	437	4848	4848	4848
18 FEB 77	444	444	444	5285	5285	5285
22 FEB 77	378	449	449	5665	5665	5665
23 FEB 77	378	449	449	6044	6044	6044
24 FEB 77	378	449	449	6423	6423	6423
25 FEB 77	378	449	449	6801	6801	6801
28 FEB 77	378	449	449	7179	7179	7179
1 MAR 77	378	449	449	7557	7557	7557
2 MAR 77	378	449	449	7935	7935	7935
3 MAR 77	378	449	449	8313	8313	8313
4 MAR 77	378	449	449	8691	8691	8691
7 MAR 77	378	449	449	9069	9069	9069
8 MAR 77	378	449	449	9447	9447	9447
9 MAR 77	378	449	449	9825	9825	9825
* ACTUAL VALUE		532		10014	10014	
* SUM OF ACTUAL PLUS REMAINING PROJECTED VALUE		805		10813	10813	
		805		11608	11608	
		805		12403	12403	
		805		13198	13198	
		805		13993	13993	
		805		14788	14788	
		805		15583	15583	
		805		16378	16378	
		805		17173	17173	
		805		17968	17968	
		805		18763	18763	
		805		19558	19558	
		805		20353	20353	
		805		21148	21148	
		805		21943	21943	
		805		22738	22738	
		805		23533	23533	
		805		24328	24328	
		805		25123	25123	
		805		25918	25918	
		805		26713	26713	
		805		27508	27508	
		805		28303	28303	
		805		29098	29098	
		805		29893	29893	
		805		30688	30688	
		805		31483	31483	
		805		32278	32278	
		805		33073	33073	
		805		33868	33868	
		805		34663	34663	
		805		35458	35458	
		805		36253	36253	
		805		37048	37048	
		805		37843	37843	
		805		38638	38638	
		805		39433	39433	
		805		40228	40228	
		805		41023	41023	
		805		41818	41818	
		805		42613	42613	
		805		43408	43408	
		805		44203	44203	
		805		44998	44998	
		805		45793	45793	
		805		46588	46588	
		805		47383	47383	
		805		48178	48178	
		805		48973	48973	
		805		49768	49768	
		805		50563	50563	
		805		51358	51358	
		805		52153	52153	
		805		52948	52948	
		805		53743	53743	
		805		54538	54538	
		805		55333	55333	
		805		56128	56128	
		805		56923	56923	
		805		57718	57718	
		805		58513	58513	
		805		59308	59308	
		805		60103	60103	
		805		60898	60898	
		805		61693	61693	
		805		62488	62488	
		805		63283	63283	
		805		64078	64078	
		805		64873	64873	
		805		65668	65668	
		805		66463	66463	
		805		67258	67258	
		805		68053	68053	
		805		68848	68848	
		805		69643	69643	
		805		70438	70438	
		805		71233	71233	
		805		72028	72028	
		805		72823	72823	
		805		73618	73618	
		805		74413	74413	
		805		75208	75208	
		805		76003	76003	
		805		76798	76798	
		805		77593	77593	
		805		78388	78388	
		805		79183	79183	
		805		79978	79978	
		805		80773	80773	
		805		81568	81568	
		805		82363	82363	
		805		83158	83158	
		805		83953	83953	
		805		84748	84748	
		805		85543	85543	
		805		86338	86338	
		805		87133	87133	
		805		87928	87928	
		805		88723	88723	
		805		89518	89518	
		805		90313	90313	
		805		91108	91108	
		805		91903	91903	
		805		92698	92698	
		805		93493	93493	
		805		94288	94288	
		805		95083	95083	
		805		95878	95878	
		805		96673	96673	
		805		97468	97468	
		805		98263	98263	
		805		99058	99058	
		805		99853	99853	
		805		100648	100648	

Figure 33. Aggregate Resource History.









17. ACTIVITY STATUS REPORTS.

The ACTIVITY STATUS REPORT is generated for a specific Time Period and Responsibility Code. All activities having a particular Responsibility Code are listed by their Activity Code and Description in chronological order. All reports list Network Code (if given), Activity Code and Description, and Percent Criticality.

There are three basic kinds of Activity Status Reports. These are:

- a. ACTIVITY STATUS REPORT (For Activities Underway for Responsibility). This section lists those activities actually underway at the beginning of the specified time period interval, together with Actual Start Dates, plus the four possible Finish Dates (Schedule, Earliest, Expected, and Latest). Scheduled Dates are listed when supplied on FORM C-1A. If an activity has been completed, the Actual Finish Date is listed under the Expected Finish Date column.
- b. ACTIVITY STATUS REPORT (For Activities Due to Start). In this section, all activities for the given responsibility which have started or have some possibility of starting within the specified report time period, are listed.
- c. ACTIVITY STATUS REPORT (For Activities Due to Complete). In this section, all activities for the specified responsibility which have actually been completed or have any possibility of being completed within the report time period, are listed.

BOILER REPAIR MODEL ----- 29SEP77

ACTIVITY STATUS REPORT		PERIOD = 7FEB77 THROUGH 29FEB77		(UNDERWAY AS OF BEGINNING OF 7FEB77)		FINISH TIMES		REMARKS
ACTIVITIES UNDERWAY	YARD	PERCENT CRITICALITY	ACTUAL START DATE	SCHEDULED START DATE	EARLIEST EXPECTED DATE	LATEST DATE		
04	INITIAL HYDROSTATIC TEST	0	1FEB77	04MAY77	20APR77	7JUL77		
04	REMOVE BOILER SLUDGE CASING	47	1FEB77	28APR77	13SEP77	3FEB78		
04	CLEAN REPAIR AIR REGISTER ASSEMBLY	0	1FEB77	23FEB77	13SEP77			

Figure 38. Activity Status Report (Activities Underway).

BOILER REPAIR MODEL ----- 29SEP77

ACTIVITY STATUS REPORT

PERIOD = 7FEB77 THROUGH 29FEB77

ACTIVITIES DUE TO START YARD

NETWORK	ACTIVITY CODE	ACTIVITY DESCRIPTION	PERCENT CRITIC-ALITY	SCHEDULE	EARLIEST DATE	LATEST DATE	START TIMES	EXPECTED DURATION (WORKDAYS)	REMARKS
1	09	REMOVE DRUM INTERNALS	0	9FEB77	9FEB77	9FEB77	9FEB77	12	
1	08	REMOVE MECHANICAL	53	9FEB77	9FEB77	9FEB77	9FEB77	35	
1	20	REPAIR DRUM INTERNALS	0	14FEB77	16FEB77	25FEB77	9FEB77	49	
1	20	REPAIR DRUM INTERNALS	0	14FEB77	16FEB77	25FEB77	9FEB77	58	

Figure 39. Activity Status Report (Activities Due to Start).

AD-A060 397

CALIFORNIA UNIV LOS ANGELES SCHOOL OF ENGINEERING A--ETC F/G 9/2  
THE TRANSIM V MANUAL. VOLUME II. TRANSIM V USER'S MANUAL.(U)  
SEP 78

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2 OF 2

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END  
DATE  
FILMED

1-79

DDC

BOILER REPAIR MODEL ----- 29SEP77

ACTIVITY STATUS REPORT

PERIOD = 7FER77 THROUGH 25FER77

ACTIVITIES DUE TO COMPLETE

YARD

NETWORK ACTIVITY CODE ACTIVITY DESCRIPTION

PERCENT CRITIC- SCHEDULE EARLIEST FINISH TIMES LATEST

ALITY (DATE)

1 04 INITIAL HYDROSTATIC TEST 35EB77 0MAR77

09 REMOVE\_DRUM\_INTERNALS 16FE877 25FE877

0

Figure 40. Activity Status Report (Activities Due to Complete).