SPERRY UNIVAC COMPUTER SYSTEMS

PUBLICATIONS UPDATE

Series 90

Management Control System/90 (MCS/90) Programmer Reference

UP-8046 Rev. 1–B

This Library Memo announces the release and availability of Updating Package B to "SPERRY UNIVAC Series 90 Management Control System/90 (MCS/90) Programmer Reference," UP-8046 Rev. 1.

Updating Package B provides the file requirements and job control sequences for MCS/90 operating within the Operating System/3 (OS/3) and the Virtual Memory Operating System/9 (VS/9).

Examples are provided for the following MCS/90 reports:

- Project – Network Report
- Resource Requirements Report
- Resource Cost Category Plan
- Financial Plan
- Resource Requirements Plan

Also included are new and revised MCS/90 error messages.

Copies of Updating Package B are now available for requisitioning. Either the updating package alone, or the complete manual with the updating package may be requisitioned by your local Sperry Univac Representative. To receive the updating package alone, order UP-8046 Rev. 1–B. To receive the complete manual, order UP-8046 Rev. 1.

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SPERRY UNIVAC

PUBLICATIONS REVISION

SERIES 90

Management Control System

Programmer Reference

UP-8046 Rev. 1

This SPERRY UNIVAC ™ Library Memo announces the release and availability of "SPERRY UNIVAC Series 90 Management Control System/90 (MCS/90) Programmer Reference," UP-8046 Rev. 1. Restriction Distribution Item (RD).

The Management Control System (MCS) is a method of handling the problems of scheduling within multiproject jobs. This manual explains the network structural organization of MCS and describes the preparation of input cards. The output reports are described and sample printouts are provided. The networking techniques employed are described through diagrams. A bibliography of text books is included to further clarify the concepts of MCS.

UP-8046 Rev. 1 contains changed and added material throughout the original manual. This revision includes new material for the three appendixes:

- Report Examples
- Error Messages
- File Formats for Report Output

A subject index is also included to aid the user in locating needed information.

Destruction Notice: This revision supersedes and replaces "UNIVAC OS/4 and OS/7 Management Control System Programmer Reference," UP-8046 released March 1974.

This revision also supersedes and replaces "UNIVAC 9400 System Management Control System Programmer Reference," UP-7873 released October 1971, UP-7873-A released October 1972. Please destroy all copies of UP-7873, UP-7873-A, UP-8046 and/or its Library Memos.

Additional copies may be ordered by your local Sperry Univac Representative.

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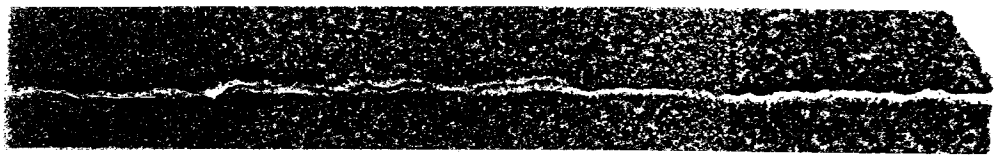

SPERRY UNIVAC Series 90

Management Control System/90 (MCS/90)

Programmer Reference

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1. Concepts of MCS

1.1. INTRODUCTION TO NETWORK-ORIENTED PROJECT MANAGEMENT

The UNIVAC Management Control System (MCS) is a network-based application program that evaluates tactics of performance to achieve overall objectives. While MCS cannot set up strategic planning, it monitors tasks within the network plan by determining dates, accumulating cost, and projecting resources. Tasks are represented by activities, each constituting a unit of work. MCS analyzes these activities and places them in a time-dependent calendar-date schedule. This method is the processing technique of existing program evaluation and review technique (PERT) packages. MCS not only includes this accepted method of scheduling and planning activities, but improves upon standard techniques of scheduling large projects within today's complex multiproject contracts.

The following terms and definitions have been accepted and are used in this manual:

- a network is composed of activities and is the lowest level in the system;
- a project is composed of one or more networks; and
- the system is composed of one or more projects (Figure 1–1).

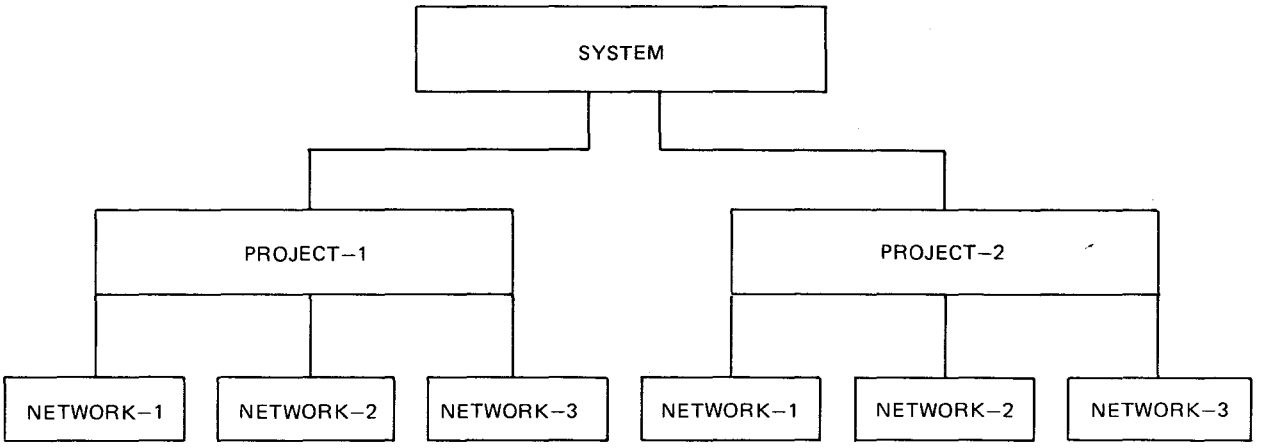


Figure 1–1. System Hierarchical Structure

1.1.1. Functional Capabilities

MCS includes and extends the capabilities of current pert/time and pert/cost programs.

Extensions include:

- alternate description of activity-on-arrow and activity-on-node (networks described in one mode can be joined to networks described in the other mode);
- extensive input editing;
- alphanumeric, randomly named event and work-item codes;
- multiple start and end events;
- multiple start and end work items;
- assignment of schedule and actual dates to both the start and finish of the work item;
- assignment of a schedule date to the event;
- optional percentage-of-completion report for in-progress activities;
- incorporation of arbitrary nonwork days;
- assignment of a work-week length, start day, and continuity code to each activity;
- processing of multinetworks;
- data base file organization to aid in the retrieval and updating of data;
- parallel cost control and reporting based on work breakdown structure (WBS) and organizational accounting structure (OAS);
- use and maintenance of resource rate tables;
- cost summarization; and
- projection of cost plan and resource requirements.

1.1.2. Network Fundamentals

Network-based systems are of immediate practical value to decision makers, since they reduce scheduling time and cost. The primary processes of decision making are:

- Planning the overall tasks

  Identifying the objectives and organizing them in a sequential order provides the basic structure from which networks can be prepared.

- Scheduling

  Placing objectives within a calendar time framework provides for step-by-step awareness needed to accomplish project objectives.

- Resource scheduling

  Assigning a specified quantity of resources (e.g., manpower, material, money) to activities according to established requirements and availabilities provides the basis for resource management.

- Cost control

  Accumulating cost within activities, projects, and planning structures provides flexible and accurate financial management.

- Report structure

  Providing specific feedback information to be used for management control gives meaningful output for further network applications.

1.1.2.1. Planning the Overall Tasks

The network and work breakdown structures are the two types of planning structure accepted by MCS. Both graphically display the work to be accomplished in order to achieve the end objectives. The work breakdown is the more important planning structure. It depicts objectives as a sequence of work breakdown elements and provides the framework for developing a network of activities. MCS uses this planning structure for estimating and monitoring costs within a project (1.3). The network plan represents the work process through which objectives and requirements are realized. Since activities are the elements of the network, MCS uses this planning structure to identify, maintain, and report work progress (1.2).

1.1.2.2. Scheduling

Activities in a network consume time; therefore, some duration must be associated with a network. Duration can be a single estimate or a set of three time estimates. The path of maximum duration from the beginning to the end of a network is the network duration. Dates can be introduced in a network either to specify compulsory accomplishments or to measure progress. These dates are scheduled dates and actual dates (2.3.6).

1.1.2.3. Resource Scheduling

The distribution of resources in a network-based structure can increase the difficulties in scheduling certain activities. MCS can provide a resource requirements plan for the user to compare with resource limitations.

1.1.2.4. Cost Control

Adding cost and resource extensions to the basic network structure provides cost data directly related to the activities. Thus, MCS can provide supplementary information about critical areas in the project.

1.1.2.5. Report Structure

The system report structure combines the information necessary to facilitate summarization and translation into usable reports.

The planning structure specifies the recipients of such reports. The fiscal and summary account structure determines what type of information the reports will contain. Information is accumulated, selected, and summarized in formats which reflect selected tasks and distribution of work, i.e., the tasks to be performed and the person responsible.

Correct and meaningful data obtained by a network-based structure and utilized by management can direct the progress and development of assigned tasks. Since the kinds of reports needed are unlimited, MCS considers that the data base file structure provides all the information required to create additional reports programmed by the user.

Upon the user's request, the following types of reports are furnished by the system:

- Activity-oriented reports
- Event-oriented reports
- Bar charts
- Milestone reports
- Management-oriented reports
  - Summary reports
  - Project status report
  - Financial plan and status report
  - Organization status report
- Cost category status report
- Resource status reports
- Cost and resource projections

NOTE:

It is not the intention of MCS to give management numerous reports which could hinder the overall understanding of a given project. Instead, only those reports that are essential to directing the achievement of the planned progress are given.

1.1.3. Features of MCS

MCS provides the following features:

- operation in a multiproject environment;
- alternate description of activity-on-node/activity-on-arrow networks;
- network interfaces;
- multilevel summarization;
- cost summarization by network, work breakdown structure, an organizational accounting structure;
- cost and resource projection;
- use of a data-base structure;
- presentation of customer-tailored reports; and
- consistency with both current government directives and American National Standards. (See Bibliography.)

The MCS application program is available for the SPERRY UNIVAC Series 90 within the SPERRY UNIVAC Operating System/4 (OS/4), Operating System/3 (OS/3), and Virtual Memory Operating System/9 (VS/9). See 3.3 and 3.4 for MCS hardware requirements and operating procedures, respectively. ←

1.2. TIME PROCESSING

The network is the scheduling tool which provides and monitors a graphic display of the work required to accomplish planned objectives. A network is composed of activities; it shows the predecessor-successor relationship of the activities. Each activity normally represents a process, job, or operation which consumes time and possibly resources. An activity which does not represent a process and may consume time but not resources is called a dummy activity.

1.2.1. Network Representations

MCS accepts two types of network representation: activity-on-arrow notation and activity-on-node notation. Processing options applicable to one may be applied to the other. Both representations may be processed simultaneously; however, each network must be expressed entirely in one representation.

1.2.1.1. Activity-on-Arrow (I–J)

In the activity-on-arrow, or I–J notation, the activity is represented by an arrow. Work progresses from the tail of the arrow to the head of the arrow. (A dummy activity is represented by a dashed arrow.) Each arrow runs between two events.

An event represents a point in time, a state, or a condition; it consumes neither time nor resource. An event is represented by a circle and provides checkpoint information. The event which defines the beginning of an activity is the start event (I-event) and the event which defines the finish of the activity is the end event (J-event). Each activity is uniquely identified by its start and end events. Parallel activities are not permitted; two activities may not have the same I-event and the same J-event.

An event occurs when all of the activities which terminate at the event (the predecessor activities of the event) have been completed. Work on an activity may start only after its start event has occurred, i.e., all predecessor activities have been completed.

A level of significance may be associated with each event. The level indicates the importance of the occurrence of the event relative to the importance of the occurrence of other events. This level is called the milestone level of the event, and the event is called a milestone event. Milestone levels may be used to achieve selective report generation (3.2) and during network summarization (1.2.8).

Figure 1–2 shows two activities represented in activity-on-arrow notation. Event B occurs when work on activity AB has been completed. When event B has occurred, work on activity BC can begin. Event B is the end event of activity AB and the start event of activity BC.

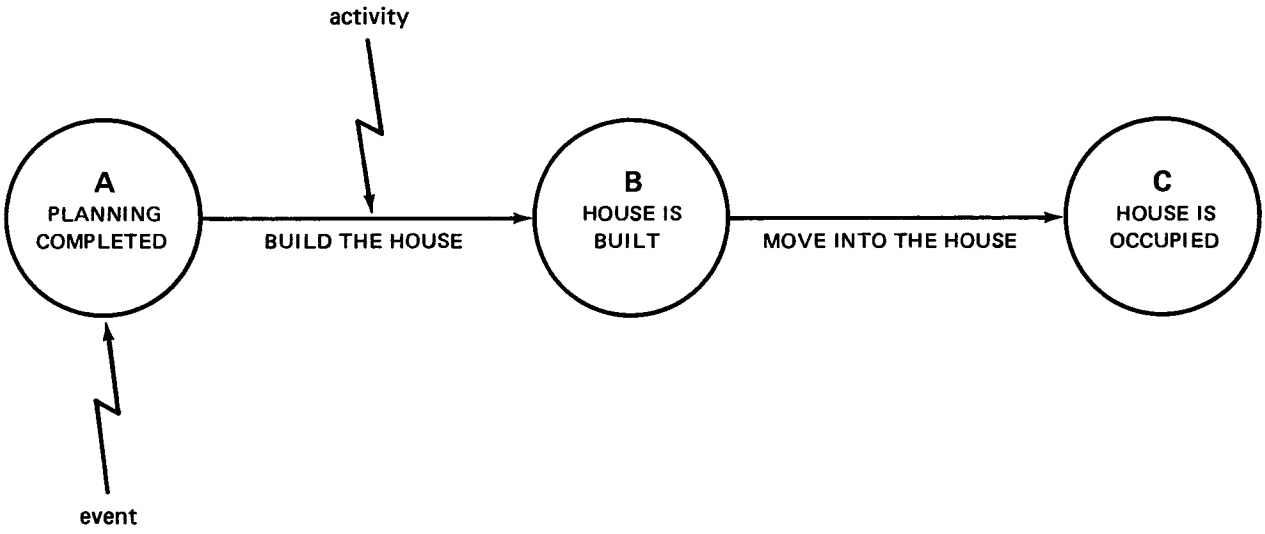


Figure 1–2. Activity-on-Arrow Activities

1.2.1.2. Activity-on-Node (Precedence)

In the activity-on-node (precedence) notation, each activity is represented by a rectangle called a work item. The predecessor-successor dependency between the start or end of one work item and the start or end of another successor work item is represented by a solid line.

There are four possible predecessor-successor dependencies between two work items (Figures 1–3 through 1–6):

- In the finish-to-start dependency (Figure 1–3), the predecessor work item (WI1) must be completed before the successor work item (WI2) may be started.
- In the finish-to-finish dependency (Figure 1–4), the finish of the predecessor work item (WI3) must precede, or occur at the same time as, the completion of the successor (WI4).
- In the start-to-start dependency (Figure 1–5), the start of the predecessor work item (WI6) must precede, or occur at the same time as, the start of the successor work item (WI7).
- In the start-to-finish dependency (Figure 1–6), the start of the predecessor work item (WI9) must precede, or occur at the same time as, the finish of the successor (WI10).

A delay may be imposed on the precedence dependency between two work items. In Figure 1–5, such a delay would represent the time required for the first coat of paint to dry, before the second coat of paint is applied. This delay is called the lead or lag; it may be positive or negative. Lead represents a delay in the start of the successor activity. Lag represents a delay in the completion of the successor activity.

A level of significance may be associated with the start and the end of each work item. The level indicates the importance of the beginning or completion of the work item, relative to the beginning or completion of other work items. The level is called the milestone level of the start or end of the work item. Milestone levels may be used to achieve selective report generation (3.2) and during network summarization (1.2.8).

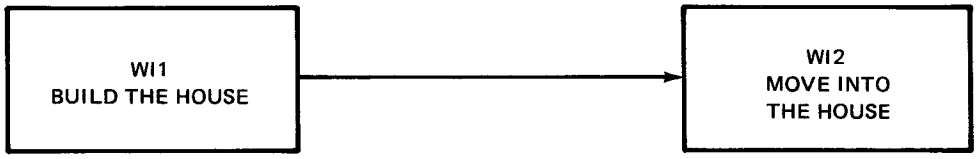


Figure 1–3. Finish-to-Start

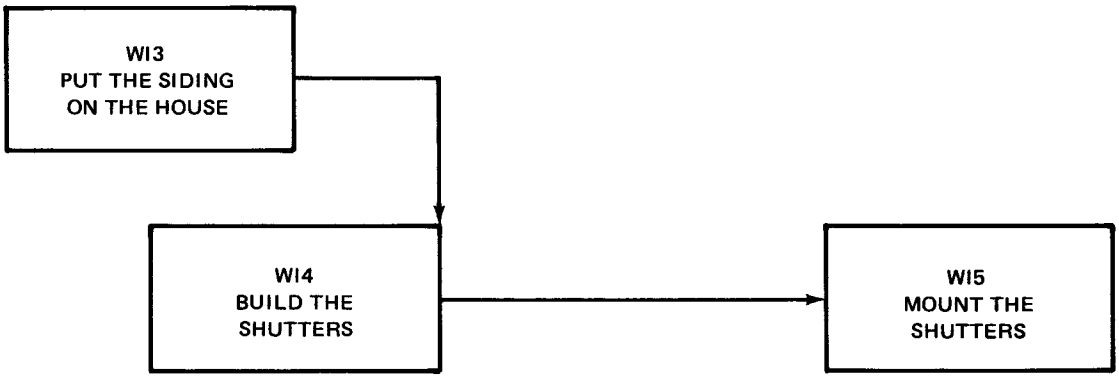


Figure 1–4. Finish-to-Finish

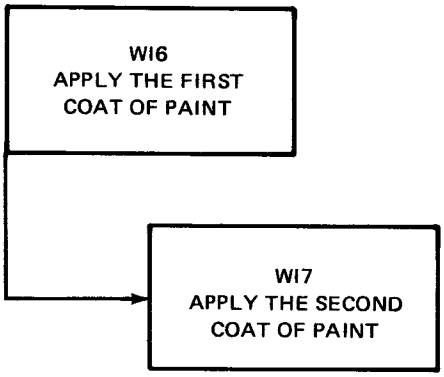


Figure 1–5. Start-to-Start

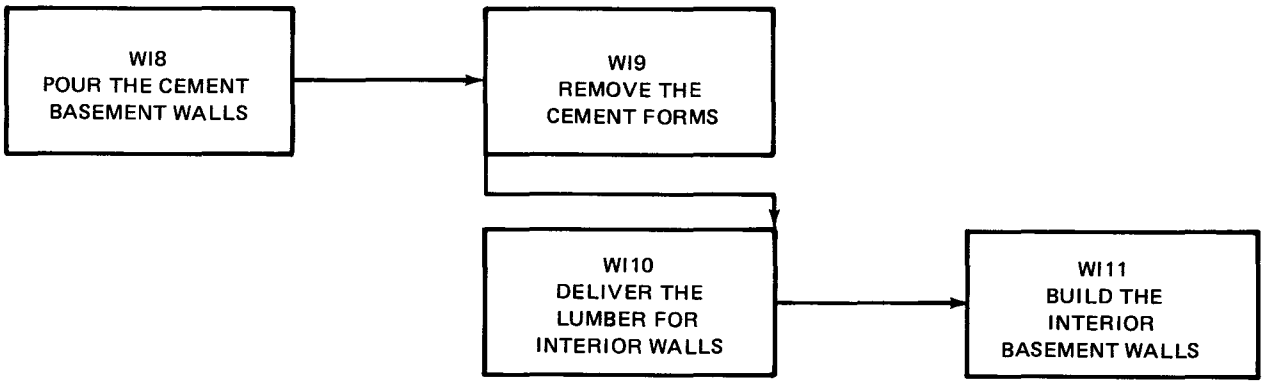


Figure 1–6. Start-to-Finish

Rules and guides for network diagramming are:

- The length of the activity arrow or the size of the rectangle has no relationship to time. Time scales are inadvisable, particularly during the early phases of network design.
- No activities should be left dangling without a successor, except those whose completion actually represents the completion of all the work on a path through the network.
- No activity can go backward in time.
- Loops are not permitted in MCS.

Activity and event ranks are generated by MCS. The rank is 1 for each activity or event that does not have a predecessor. The rank of an activity or event that does have a predecessor is the maximum rank of any predecessor plus 1. Reports sorted by rank may be used to diagram large, complex networks.

1.2.2. Network Terminal Points and Dates

The network terminal points denote the start and end of all the work. In an activity-on-arrow network, each event that has no predecessor activities is called a network start event; each event that has no successor activities is called a network end event. Each I–J activity, whose end event is a network end event, is called a network end activity.

In an activity-on-node network, each work item that has no predecessor from its start is a network start activity (work item); each work item that has no successor from its finish is a network end activity (work item). In Figure 1–6, WI8 and WI10 are network start activities; WI9 and WI11 are network end activities.

The user-supplied date on which work in a network may begin is the network scheduled start date; the user-supplied date at which all work in a network should be finished is the network scheduled end date. The exact processes used and the schedules resulting are described in 1.2.3 to 1.2.8.

1.2.3. Times Related to Activities

MCS generates numerous dates and times for each activity in the network. These times indicate the same thing, whether the network is an I–J network or a precedence network.

1.2.3.1. Working Days

MCS recognizes working days and nonworking days for each activity. These are determined using the system, project, and network holidays and vacations, the work-week definition, and the activity continuity code. ←

The user may supply MCS with a list of dates normally considered nonworking holidays and vacations for all activities.

The work-week definition of each activity is supplied by the user and consists of the work-week start day and the work-week length. The length of each work day may vary from one hour to three 8-hour shifts. All MCS time computations are done in terms of days, regardless of the number of hours of work being performed during the day.

If the user does not provide a work-week definition, MCS assumes a 5-day work week starting on Monday, and having eight working hours per day. In this case, each Monday, Tuesday, Wednesday, Thursday, and Friday is considered as a working day for the activity, unless its date is specifically declared to be a nonworking holiday/vacation by the user; each Saturday and Sunday would be considered as a nonworking day.

The activity continuity code (2.3.4) allows the user to direct MCS to use an alternate interpretation of the work-week definition and holidays/vacations. The options available include: ignoring holidays and vacations, considering the work-week length to be seven days, and delaying the start of the activity until it can be completed without interruption.

1.2.3.2. Activity Duration

The duration of an activity is the number of working days required to complete the activity. If the exact duration is known (deterministic case), the user may supply it to MCS. This duration is used in performing the time calculations.

Sometimes it is not possible to give a single, exact activity duration (probabilistic case). MCS accepts three durations for an activity:

1. the optimistic estimate of duration;

2. the most likely estimate of duration; and

3. the pessimistic estimate of duration.

When a set of three durations is provided, MCS converts them to a single duration using the equation:

$$\text{duration} = \frac{\text{optimistic} + 4 \times \text{most likely} + \text{pessimistic}}{6}$$

This single duration is then used in performing the time calculations.

All durations supplied by the user must be stated in hours, days, or weeks; they are converted to days before processing.

1.2.3.3. Earliest and Latest Dates

The dates generated by MCS can be classified as earliest and latest. The earliest time of each activity is constrained by the network scheduled start and the earliest times of all its predecessor activities. The generation of the earliest times is called the forward pass of time processing. Each latest time of each activity is constrained by the network end date and the latest times of all its successor activities. The generation of the latest times is called the backward pass of time processing.

The earliest start of an activity is the first working day after the satisfaction of all the constraints of the predecessors of the activity. The earliest start of each network start activity is the earliest working day which is on or after the network scheduled start.

The earliest finish of an activity is the first working day on which the activity can be finished, assuming that it starts on the earliest start date and works for the number of days in the activity duration.

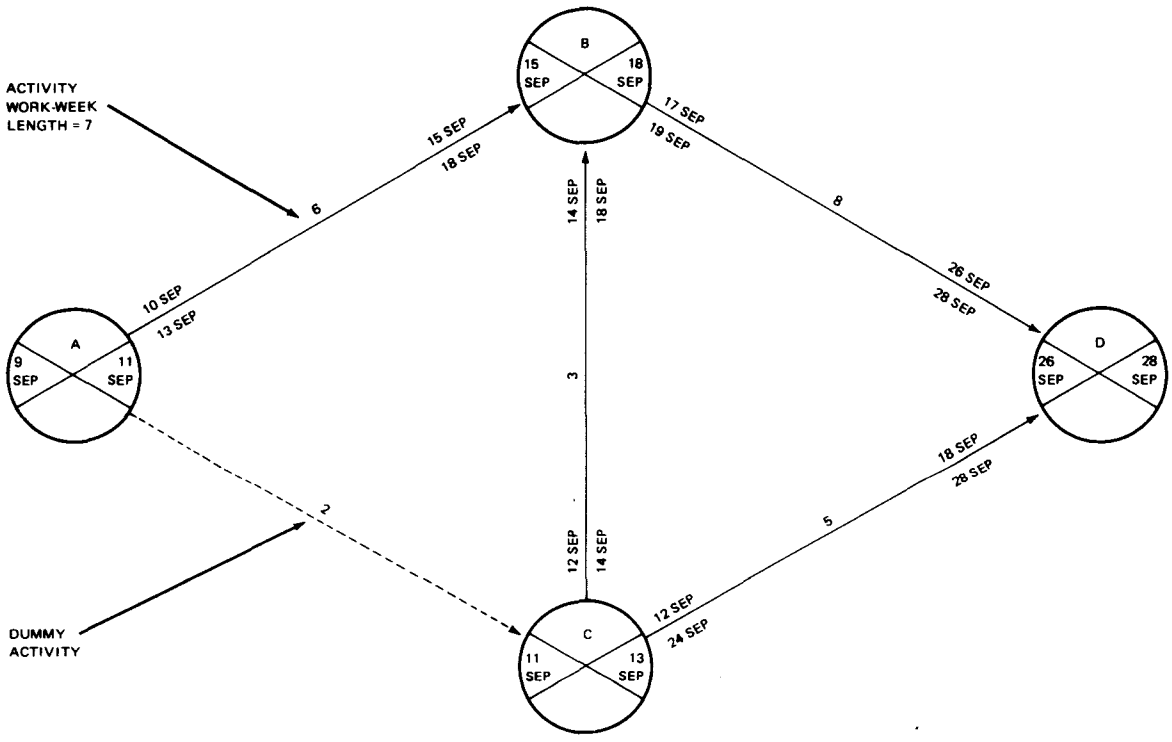
Each end activity in the network has an earliest finish. The network earliest finish is the latest of the earliest finish of the network end activities. It is the earliest date on which all the work represented by the network can be finished.

The network end date is, at the user's option (2.3.1), the network scheduled end date or the network earliest finish. The latest finish of each network end activity is the latest working day which is on or before the network end date. The latest finish of an activity is the last working day before the satisfaction of all the constraints of the successors of the activity.

The latest start of an activity is the latest working day on which work may start, assuming that the activity duration must be completed on the latest finish.

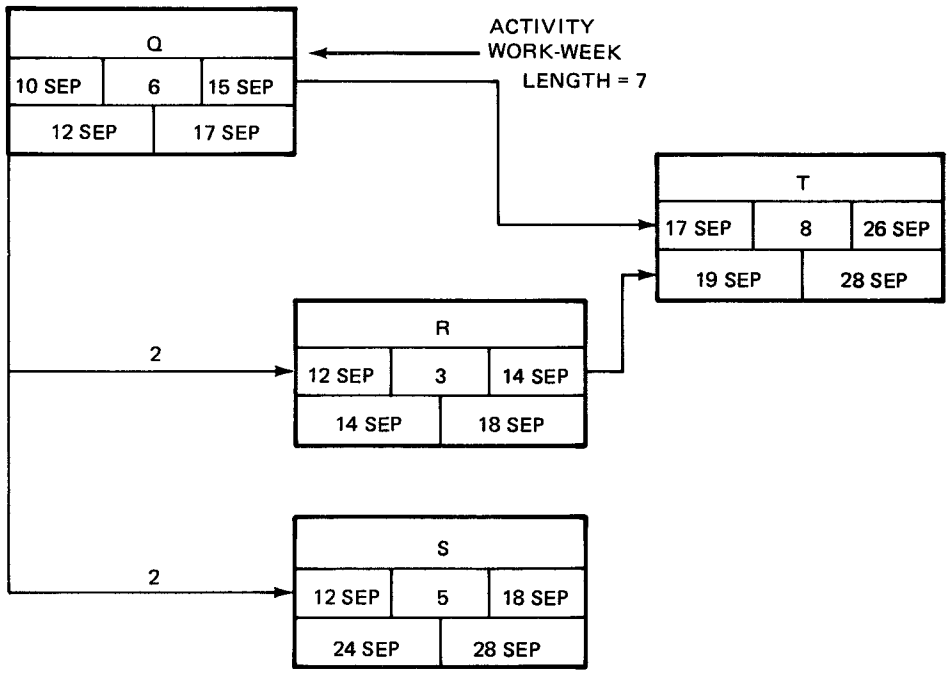
The earliest and latest start and finish of an activity are also effected by activity schedule dates (2.3.6) and interface processing (1.2.7).

Figure 1–7 shows the earliest and latest times for the activities in two small networks.



Network 1–J1

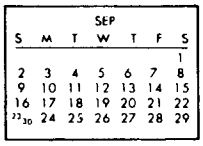
Figure 1–7. Earliest and Latest Times for Activity-on-Arrow and Activity-on-Node Networks (Part 1 of 2)



Network P1

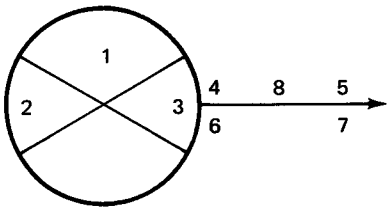
NOTES:

a. Network scheduled start = 10 Sep 73
b. Network scheduled finish = 28 Sep 73
c. Network work-week start = Monday
d. Network work-week length = 5



LEGEND:

1 – Identification
2 – Earliest occurrence
3 – Latest occurrence
4 – Earliest start
5 – Earliest finish
6 – Latest start
7 – Latest finish
8 – Duration in working days
9 – Lead/lag



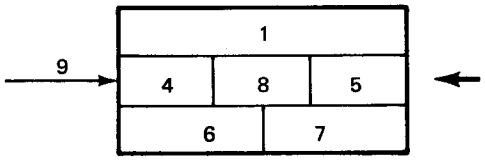


Figure 1–7. Earliest and Latest Times for Activity-on-Arrow and Activity-on-Node Networks (Part 2 of 2)

1.2.3.4. Total Float and Free Float

One of the most important features of network techniques is the ability to predict slippages or delays. MCS provides two floats which indicate how delays in an activity affect the remainder of the network: the total float and the free float of the activity.

The total float of an activity is the number of working days which the earliest finish may be delayed without delaying the schedule represented by the latest times, i.e., the number of working days between the earliest finish of the activity and the latest finish of the activity.

The critical path of the network is the series of activities whose individual activities have the smallest total float. Thus, the critical path consists of the activities which are most likely to delay the schedule.

The free float of an activity is the minimum number of working days that the finish of the activity may be delayed without delaying the earliest start or finish of any successor activity. The free float of a completed activity is 0. The desired finish of an activity is the date on which the activity must be finished to have a free float of 0.

In activity-on-node representation, the free float is the minimum number of working days between the earliest finish of the activity and :

- the earliest start of any successor with a finish-to-start dependency;
- the earliest finish of any successor with a finish-to-finish dependency; or
- the network earliest finish (if the activity does not have successors with finish-to-start or finish-to-finish dependencies).

In Figure 1–7, the total float of activity AB is 3, and the total float of activity CD is 8. The free float of activity AB is 1 (working day) and the free float of activity CB is 0 (working days).

1.2.4. Times Related to Events

In an I–J network, events are the basis for monitoring project status and describing the activities between them. An event occurs as soon as all of its predecessor activities are finished. The earliest occurrence (earliest expected date) of an event is the earliest time the event can happen, subject to prior constraints of the network. The latest occurrence (latest acceptable date) of an event is the latest time an event can occur subject to the constraints of the network following the event.

The slack of an event is the number of working and nonworking days between the latest and the earliest occurrence of the event. In preferred terminology, the term "slack" pertains only to events, although, historically, it has also applied to activities.

1.2.5. Controlling the Schedule

In controlling the scheduling process, the user may wish to specify a date for starting and completing an activity. A schedule date is an imposed date upon which an event should occur or a work item should start or end. The schedule date represents an intended accomplishment for the event or work item. Six optional interpretations of schedule dates, and their applications, are described in 2.3.6. The earliest and latest dates of activities may be adjusted or completely overridden to comply with a schedule date.

MCS provides a float and a slack which are related to the schedule dates. They are computed on the assumption that each schedule date must be met, regardless of the interpretation selected by the user. The secondary activity float is the number of working days by which the earliest finish may be delayed, without delaying the schedule represented by the schedule dates. The secondary slack of an event is the number of working and nonworking days by which the occurrence of the event may be delayed without delaying the schedule represented by the schedule dates.

User-supplied schedule dates aid in the adjustment of the planned schedule; however, their use may not produce a realistic schedule for the individual activities. If schedule dates are used to shorten the critical path, other critical paths may develop. By redefining earliest and latest dates using scheduled starts and finishes, the user controls the scheduling process.

1.2.6. Reporting Activity Progress

Network schedules can best be evaluated and modified when they are based on the most recent status of the actual work. When an activity is reported as actual or in-process, all of its predecessors are considered to be actual and are called implied actual activities. All progress prior to the user-supplied cut-off date (2.3.1) is assumed to have been reported. Accomplishments prior to the cut-off date can be reported as:

- actual start date or end date of an activity;
- percentage of the activity completed; or
- estimated remaining duration of the activity.

If necessary, MCS automatically recomputes the activity duration based on the actual progress to the cut-off date. For example, if there are three working days between the actual start date and the cut-off date and the activity is reported to be 15% complete, MCS changes the activity duration to 20 days.

1.2.7. Multiproject, Multinetwork Scheduling

One of the benefits of MCS is its ability to integrate the plans of related networks. Networks can be interdependent through one or more interfaces.

Because it is difficult, during the planning stages, to determine all interproject dependencies, it is often best to first schedule each network by itself. After all the networks have been prepared, they can be tied together through their common event or work-item interfaces.

1.2.7.1. Interface Processing and Network Integration

Interface processing is a technique which groups networks together through designated events or work items, as if all the networks constitute one contiguous network. Interfacing reveals the dependent relationship of work items and events in a network to work items and events in one or more other networks. Any number of events, work-item starts, and work-item ends may be on each interface; however, no more than one event or work item from a particular network may be included on a single interface. Thus, valid dates reflecting the results of interfaces are computed for every event and work item.

1.2.7.1.1. Interface Earliest and Latest Times

Interface occurrences are computed as "after the completion of work on the specified day".

The earliest interface occurrence is the latest of:

- the earliest occurrence of each interfacing event;
- the day before the earliest start of each work item interfaced at its start; and
- the earliest finish of each work item interfaced at its end.

The latest interface occurrence is the earliest of:

- the latest occurrence of each interfacing event;
- the day before the latest start of each work item interfaced at its start; and
- the latest finish of each work item interfaced at its end.

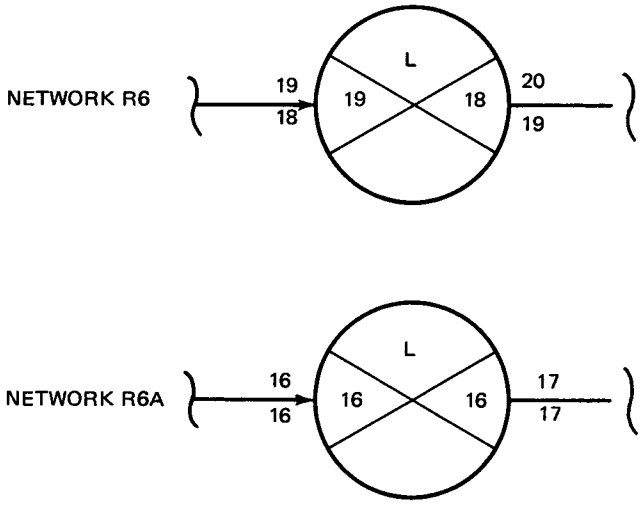
1.2.7.1.2. Interface Deflection

Interfacing events and work items may also have a positive or negative bias factor called deflection. The deflection of an event is the number of days the event occurrences differ from the interface occurrences. The deflection of a work item is the number of days the work-item times differ from the interface occurrences. The computation of work-item earliest and latest times is also affected by the work-week definition.

1.2.7.2. Earliest and Latest Times With Interfaces

The earliest times of each successor to an interface are constrained by the earliest interface occurrence and the deflection, if any. The latest times of each predecessor to an interface are constrained by the latest interface occurrence and the deflection, if any.

Figure 1–8 is an example of two network segments without interfacing. Figure 1–9 shows interfacing and deflections between two events. The earliest interface occurrence is 19 and the latest interface occurrence is 16. Figure 1–10 shows I–J and precedence network segments without interfacing. Figure 1–11 shows an interface between I–J and precedence networks.



LEGEND:

1 – Identification
2 – Earliest occurrence
3 – Latest occurrence
4 – Earliest start
5 – Earliest finish
6 – Latest start
7 – Latest finish
8 – Duration in working days
9 – Lead/lag
10 – Interface deflection

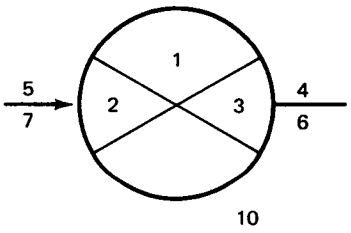
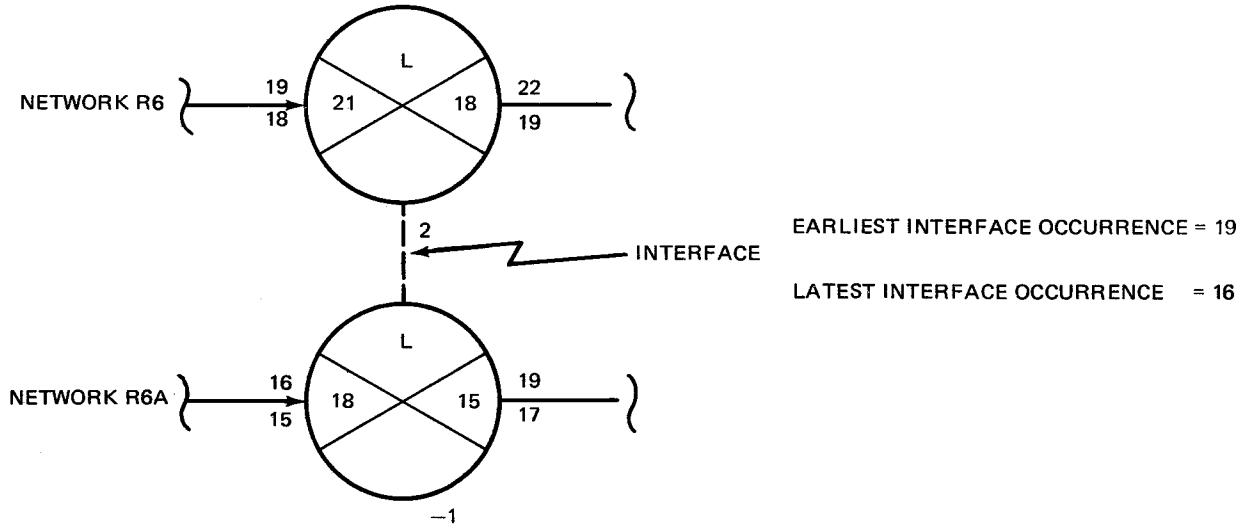


Figure 1–8. Two Network Segments Without Interfacing



LEGEND:

1 – Identification
2 – Earliest occurrence
3 – Latest occurrence
4 – Earliest start
5 – Earliest finish
6 – Latest start
7 – Latest finish
8 – Duration in working days
9 – Lead/lag
10 – Interface deflection

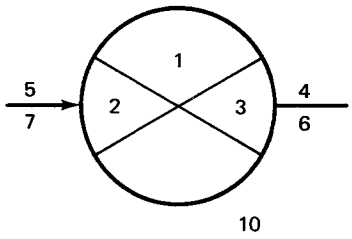
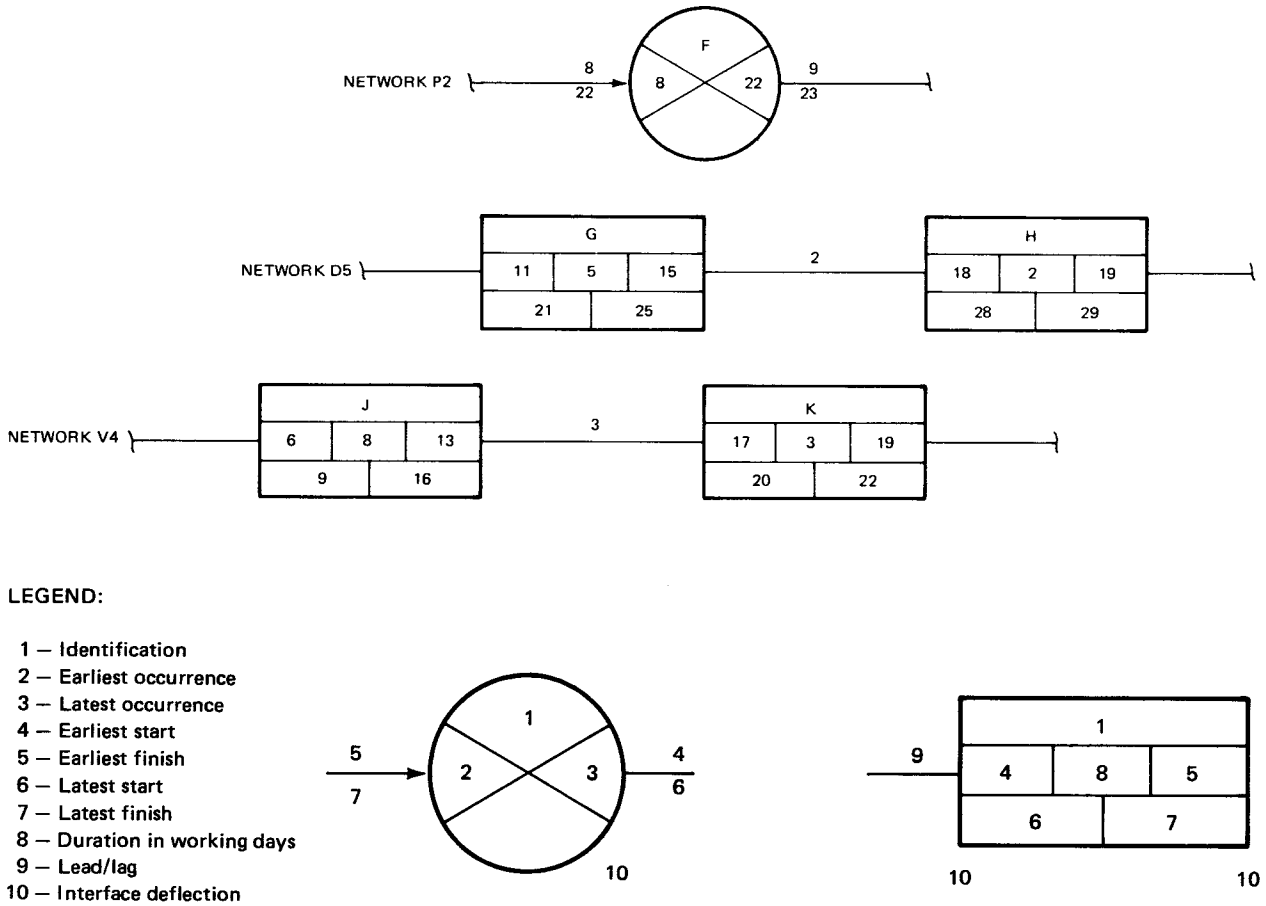


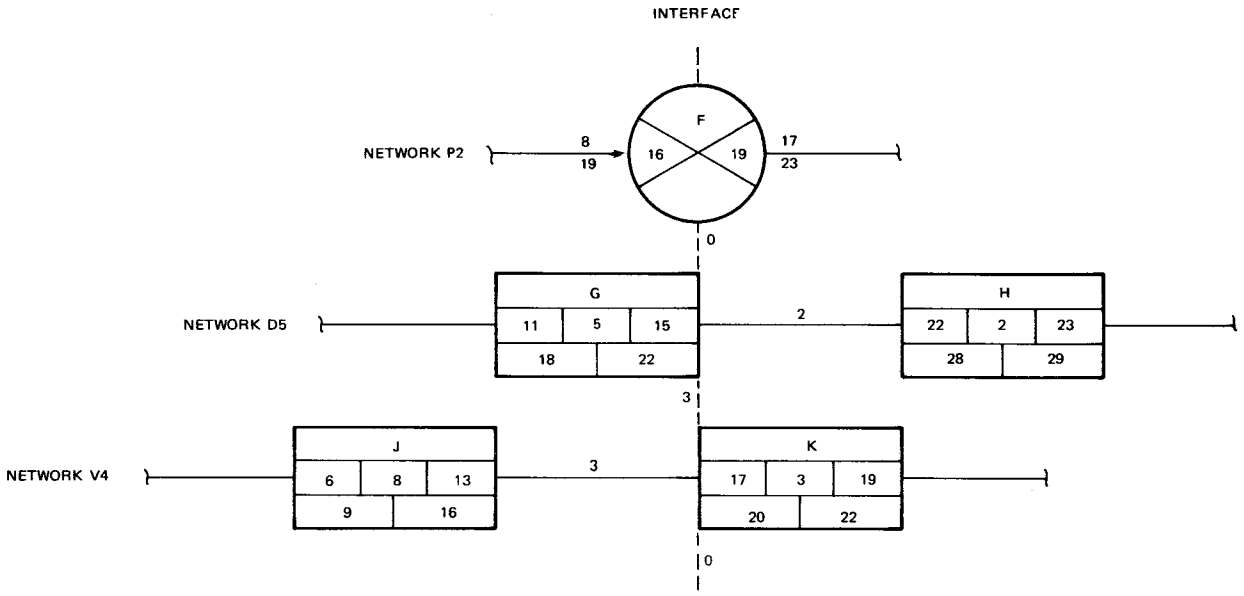
Figure 1–9. Two Network Segments With Interfacing and Deflections



LEGEND:

1 — Identification
2 — Earliest occurrence
3 — Latest occurrence
4 — Earliest start
5 — Earliest finish
6 — Latest start
7 — Latest finish
8 — Duration in working days
9 — Lead/lag
10 — Interface deflection

Figure 1–10. I–J and Precedence Network Segments Without Interfacing



EARLIEST INTERFACE OCCURRENCE = 16
LATEST INTERFACE OCCURRENCE = 19
WORK-WEEK LENGTH = 7

LEGEND:

1 – Identification
2 – Earliest occurrence
3 – Latest occurrence
4 – Earliest start
5 – Earliest finish
6 – Latest start
7 – Latest finish
8 – Duration in working days
9 – Lead/lag
10 – Interface deflection

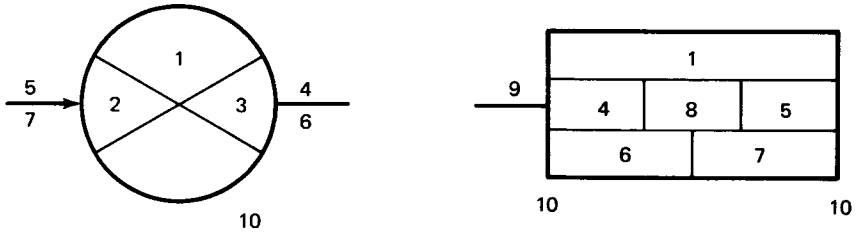


Figure 1–11. An Interface Between I–J and Precedence Network Segments

1.2.8. Network Summarization

In many cases, it is neither desirable nor practical for a manager to examine the schedule for every activity in a network. Instead, the manager wishes to consider all the work done between selected reference points as if it were performed by a single activity. In this manner, excess detail can be eliminated while retaining significant scheduling information. Reference points are selected because of their significance to the project or their effect on subsequent projects. MCS provides this capability through network summarization.

All the activities performed between each two successive reference points are represented by a single summary activity. The status of the summary activity is based on the status of the activities performed between the reference points. If no activities are performed, no summary activity is generated.

1.2.8.1. Reference Points

The reference points used during summarization of an activity-on-arrow network are:

- each network start event;
- each network end event;
- each event on an interface; and
- each event that has a milestone level selected by the user for inclusion in the summarization (3.2).

The reference points used during summarization of an activity-on-node network are:

- the start of a work item when:
  - it is on an interface;
  - it has a milestone level selected by the user for inclusion in the summarization;
  - the work item is a network start activity; or
  - the work item is not the successor of at least one start-to-start or finish-to-start dependency.
- the finish of a work item when:
  - it is on an interface;
  - it has a milestone level selected by the user for inclusion in this summarization;
  - the work item is a network end activity; or
  - the work item is not the predecessor of at least one finish-to-start or finish-to-finish dependency.

→ The start or finish of a zero duration work item may be used as a reference point.

1.2.8.2. Identification

Each summary activity is identified by the reference points for the start and end of the summary activity.

1.2.8.3. Start and End Dates

Each summary activity represents several activities with individual earliest and latest start dates and earliest and latest finish dates.

The earliest start of a summary activity is the earliest of the earliest start dates of the activities represented by the summary activity. The latest start of a summary activity is the earliest of the latest start dates of the activities represented by the summary activity.

The earliest finish date of a summary activity is the latest of the earliest finish dates of the activities represented by the summary activity. The latest finish of a summary activity is the latest of the latest finish dates of the activities represented by the summary activity.

1.2.8.4. Durations

Two durations are associated with each summary activity: strict duration and elapsed duration. To determine the strict duration, each path between the reference points is examined and the activity durations are summed. The greatest sum is the strict duration of the summary activity. The elapsed duration is the number of calendar days, inclusive, between the earliest start date and the earliest finish date of the summary activity.

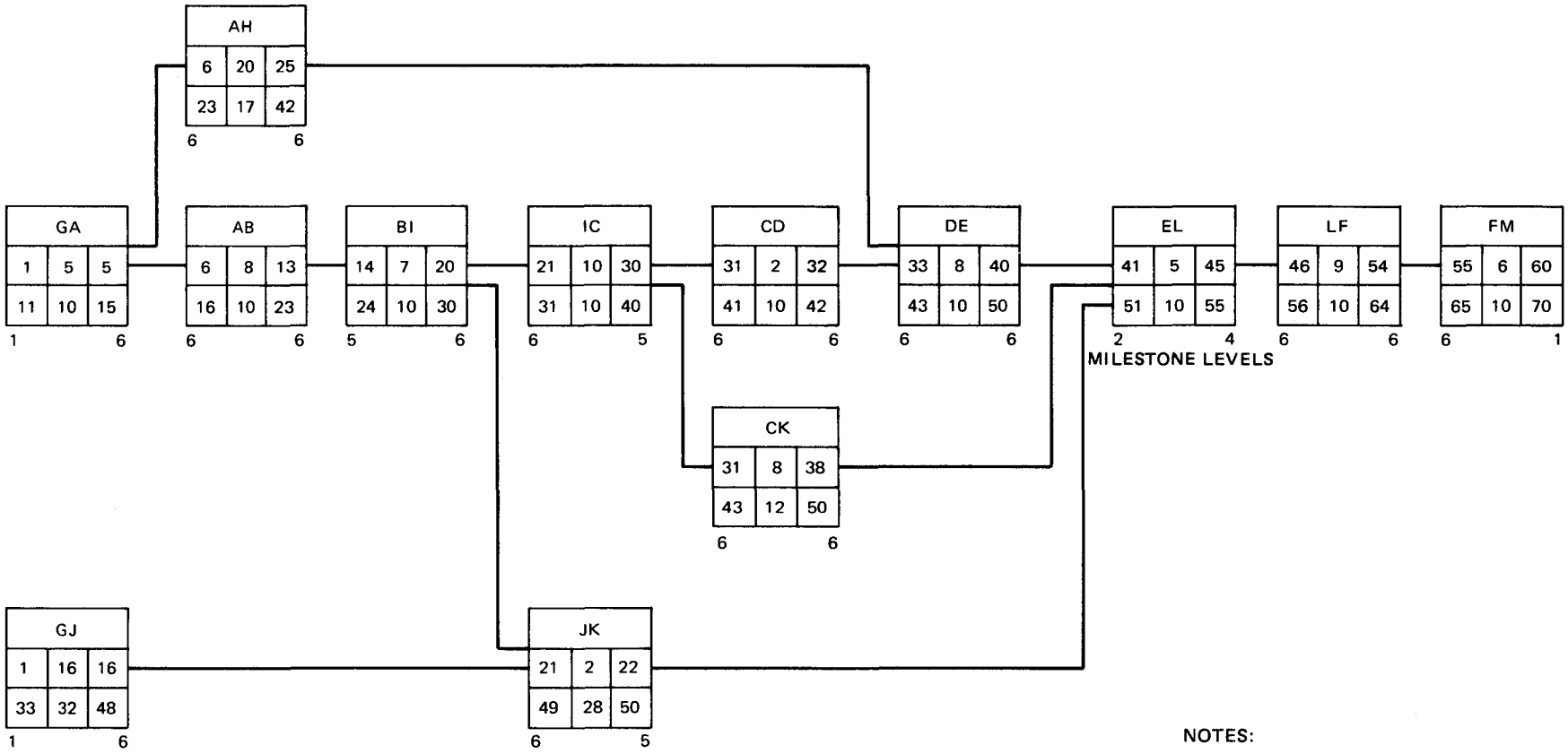
1.2.8.5. Floats

Three floats are associated with each summary activity: free float, total float, and detail float. The free float and the total float of a summary activity correspond exactly to the free float and total float of a standard activity. The work-week definition used while computing floats is the work-week definition of the activity used to determine the earliest finish of the summary activity.

To determine the detail float, each path between the reference points is examined and the free floats of the activities are summed. The smallest sum is the detail float of the summary activity.

1.2.8.6. Examples of Summarization

Figure 1–12 shows activity-on-node network AN with the results of the time computations and the milestone level of the start and finish of each work item. The result of summarizing network AN to level 5 is shown in Figure 1–13. Figure 1–14 shows network AN summarized to level 2. The summarization of a more complex network segment is shown in Figures 1–15 and 1–16.



LEGEND:

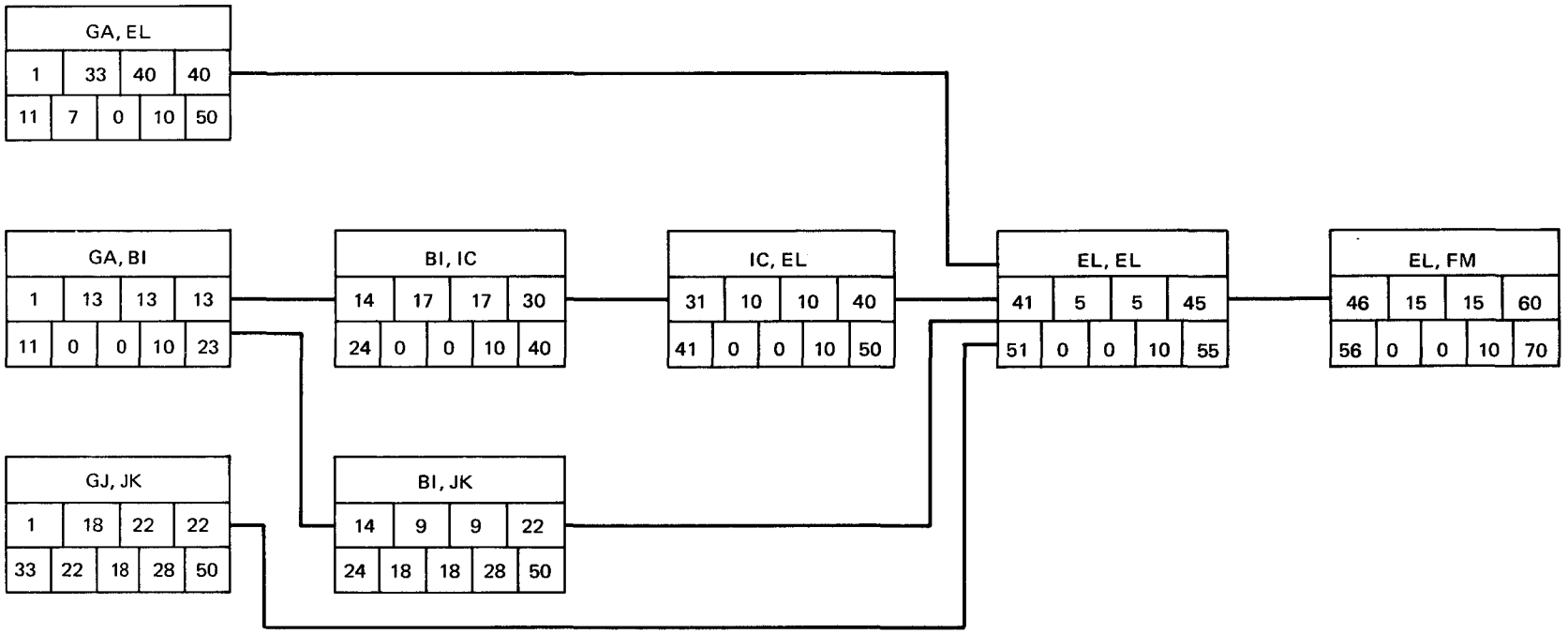
1 – Identification
2 – Earliest start
3 – Duration in working days
4 – Earliest finish
5 – Latest start
6 – Total float
7 – Latest finish

1		
2	3	4
5	6	7

NOTES:

a. Network scheduled start date = 1
b. Network scheduled finish date = 70
c. Work-week start = Monday
d. Work-week length = 7

Figure 1–12. Activity-on-Node Network AN



LEGEND:

1 – Identification
2 – Earliest start
3 – Strict duration
4 – Elapsed duration
5 – Earliest finish
6 – Latest start
7 – Detail float
8 – Free float
9 – Total float
10 – Latest finish

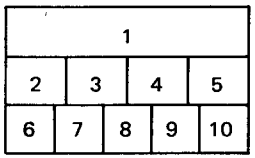
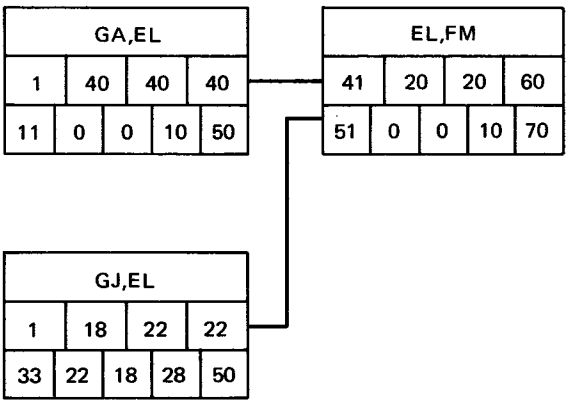


Figure 1–13. Network AN Summarized to Level 5



LEGEND:

1 – Identification
2 – Earliest start
3 – Strict duration
4 – Elapsed duration
5 – Earliest finish
6 – Latest start
7 – Detail float
8 – Free float
9 – Total float
10 – Latest finish

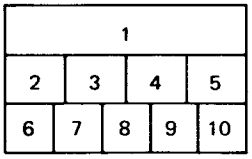
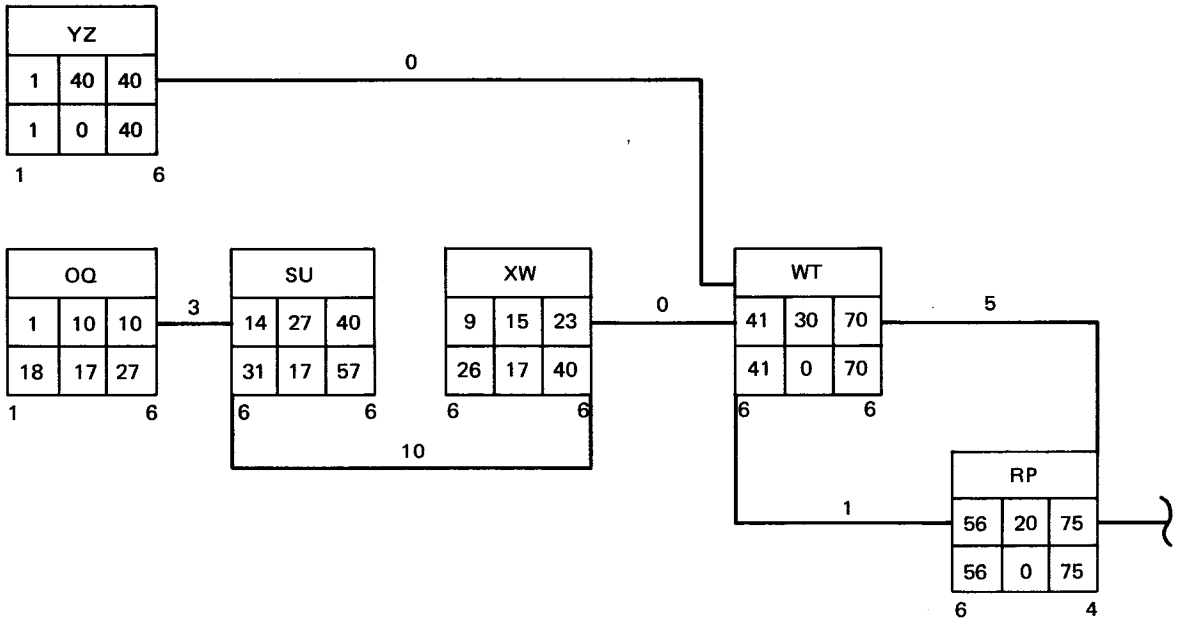


Figure 1–14. Network AN Summarized to Level 2



LEGEND:

1 – Identification
2 – Earliest start
3 – Duration in working days
4 – Earliest finish
5 – Latest start
6 – Total float
7 – Latest finish

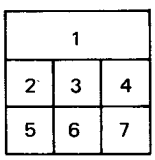
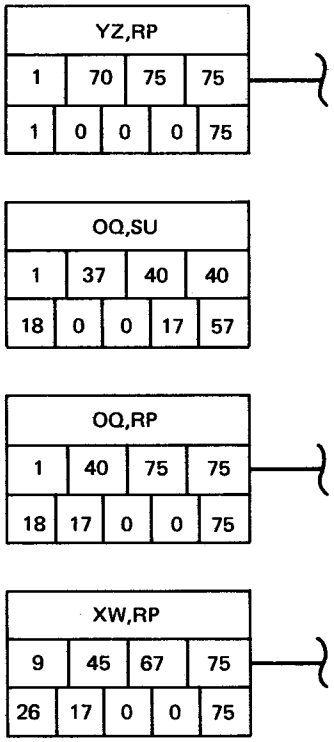


Figure 1–15. Part of Activity-on-Node Network With Various Types of Lead and Lag



LEGEND:

1 — Identification
2 — Earliest start
3 — Strict duration
4 — Elapsed duration
5 — Earliest finish
6 — Latest start
7 — Detail float
8 — Free float
9 — Total float
10 — Latest finish

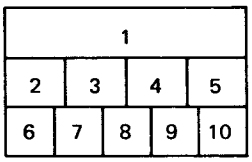


Figure 1–16. Part of Activity-on-Node Network With Various Types of Lead and Lag Summarized to Level 4

1.3. PASSIVE COST AND RESOURCE CONTROL

The manager of a complex project is concerned with more than the schedule of that project. The available material and financial resources must be carefully monitored. The total amount of resources used to complete work to the present time, and required to complete work according to the current schedule, must be compared with the available resources. Projections of future resource requirements indicate the resources needed by the current schedule and allow a manager to determine the feasibility of the current schedule. Corrective management action may then be applied where necessary. This action could involve changing the resource requirements and/or changing the schedule by altering the duration of the activities, by modifying the network structure, or by imposing schedule dates. The MCS passive cost processor provides the information needed to achieve this level of management control.

1.3.1. Resources

MCS maintains a list of all the available resources. The measure of a resource is the unit, hours, shift, or week, independent of duration. Each resource requirement of each activity is given to MCS as a quantity per measure of resource.

To determine the cost of the resource requirements of each activity, MCS uses resource rates. The resource rates table includes both direct and overhead cost rates (1.3.2) and the effective dates of the rates. The direct cost rate is expressed per measure of resource. The overhead cost rate is expressed either per measure of resource or as a percentage of the direct cost.

1.3.2. Costs' Relationship to Activities

The manager of a project must monitor the costs involved. In the MCS data structure, all costs are attributes of the activity (i.e., item of work). If some costs are incurred while meeting a specified resource requirement of an activity, those costs are attributes of both the activity and the specified resource requirement.

1.3.2.1. Types of Cost

Costs can be categorized according to type of expense. MCS recognizes two types of expense:

1. Direct cost – an expense for a specific use of a resource.

2. Overhead cost – an expense for performing work or using a resource, that cannot be directly related to the use of the resource.

In a factory, employee wages are a direct cost, while the cost of maintaining tools is an overhead cost.

Costs can also be categorized according to type of expenditure. MCS recognizes two types of expenditures:

1. Disbursement – an actual payment or transfer of funds.

2. Unliquidated Obligation – an estimated amount of a future disbursement.

The actual cost of performing an activity is the sum of all the disbursements and unliquidated obligations for the activity. An unliquidated obligation is created to ensure that actual cost accurately reflects the best information available to management. It allows the inclusion of an expenditure in the actual cost during the delay between the time when work is accomplished and when a disbursement is made. Because of this delay, unliquidated obligations may exist for a completed activity.

1.3.2.2. Estimating Cost of an Activity

The overall estimate of the cost of an activity is the sum of the direct and overhead expenses of fulfilling all the resource requirements of the activity. This is calculated using the resource direct cost rates and resource overhead cost rates provided by the user. The rates used are those in effect when the resource is required. If the measure of the resource is units, the rates in effect on the earliest start date are used.

The estimated cost to complete an in-process activity is:

- a dollar value provided by the user;

- the product of the overall estimate and the percentage of work remaining (where work remaining is 100 percent minus a user-supplied percentage of work completed); or

- the product of the overall estimate and the percentage duration remaining.

Suppose it is necessary to calculate the actual cost of an in-process activity. To do this, it is necessary to know what fraction of the unliquidated obligations covers work already completed. There is no valid way to deduce this fraction; therefore, in MCS, all unliquidated obligations are for work performed prior to the cut-off date. Note that if the sum of unliquidated obligations and disbursements is not equal to the actual cost of all work completed prior to the cut-off date, incorrect cost projection occurs.

An increase in disbursement does not cause MCS to make a corresponding decrease in unliquidated obligations, because an unliquidated obligation is an estimate. The adjustment of unliquidated obligations is the responsibility of the user. Since costs can be categorized by type of expense and type of expenditure, MCS recognizes four types of costs:

1. disbursements for direct costs;

2. unliquidated obligations for direct costs;

3. disbursements for overhead costs; and

4. unliquidated obligations for overhead costs.

MCS allows the user to input the cost of performing an activity according to these four types. The input may indicate a new total, a positive increment to the old total, or a negative increment to the old total. The form of the input may be:

- a dollar value;

- a dollar value for use of a particular resource; or

- a quantity of resources.

If a quantity of resources is specified, MCS computes the cost using the resource rates in effect on the network cut-off date. If a quantity of resources is specified, the cost becomes an attribute of both the activity and the resource requirements. Furthermore, the user may input one type of expense for a specified resource, and request that MCS calculate the other. ←

1.3.3. Cost Summarization

Managers responsible for cost analysis require reports of cost data within their own organizational frame of reference. MCS provides three types of cost accumulation:

1. Network structure cost accumulation

2. Work breakdown structure (Figure 1–17)

3. Organizational accounting structure (Figure 1–18)

The network structure is defined by the relationship of activities. The actual cost of the network is the sum of all costs reported for the activities in the network. The network costs are further summed to form project and system costs.

The work breakdown structure (WBS) and organizational accounting structure (OAS) each consists of a set of cost accounts identified by charge numbers on a maximum of 12 levels. The lowest level of the WBS consists of the work packages. Each work package contains a set or sets of contiguous activities. The lowest level of the OAS consists of the organizational account numbers. These numbers are usually associated with the smallest management units of the performing organization.

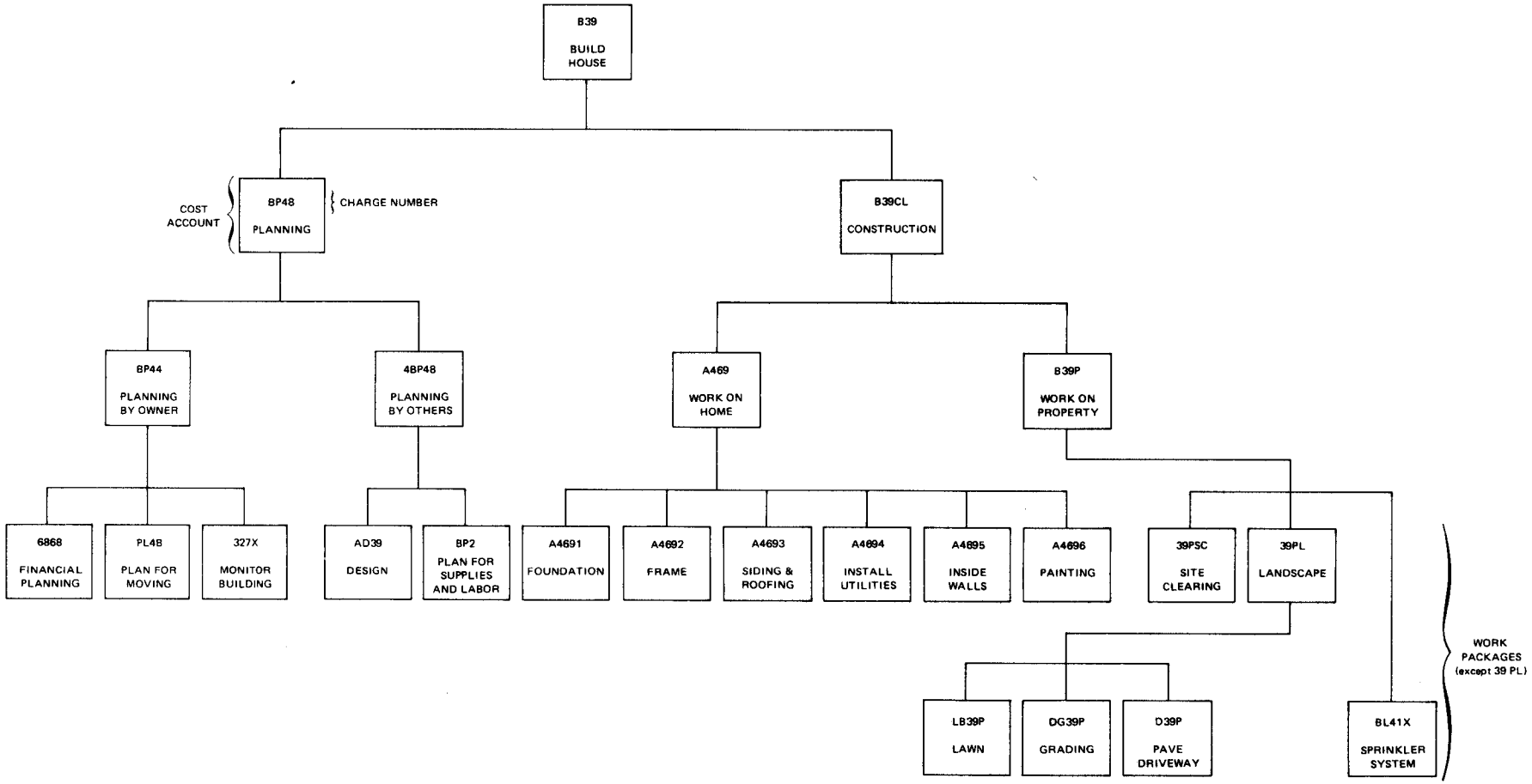


Figure 1–17. Work Breakdown Structure

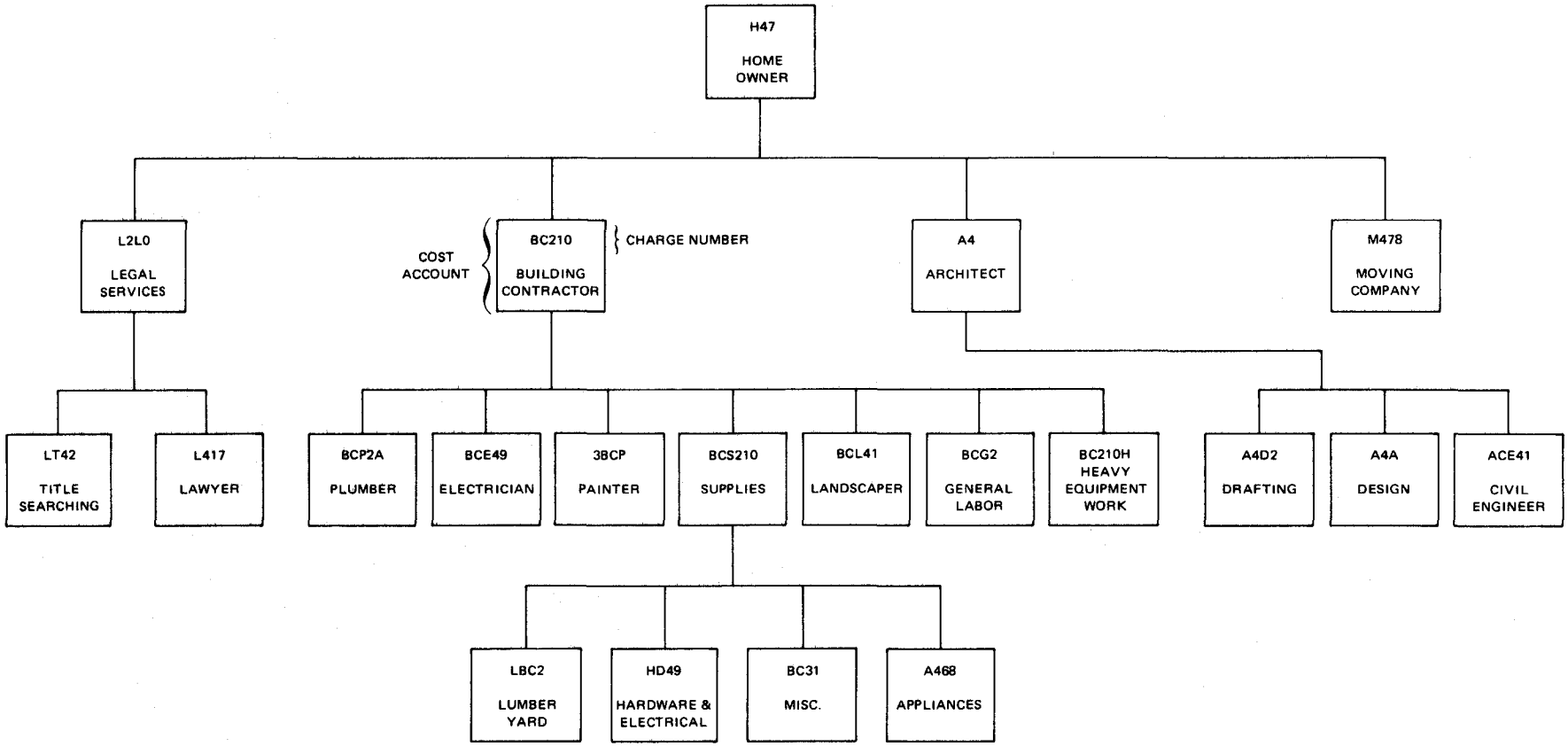


Figure 1–18. Organizational Accounting Structure

An activity may report directly to a charge number at any level in the WBS and the OAS. A charge number (e.g. 6868 in WBS, Figure 1–17; BCP2A in OAS, Figure 1–18) may be summarized to a charge number which is one or more levels above itself (BP44 in WBS, Figure 1–17; BC210 in OAS, Figure 1–18). The higher level charge number is called the summary charge number. Therefore, in the preceding example, the charge numbers BP44 and BC210 are the summary charge numbers for their lower level charge numbers.

MCS ensures that every element of cost is reported, when cost data is summarized to any level of a structure, by maintaining four internally defined pseudo charge numbers at each level of each structure. These four pseudo charge numbers accumulate:

- costs which enter the structure at a charge number above this level;
- costs which enter the structure at a charge number on a lower level, but bypass this level;
- lower level costs which are summarized to an illegal charge number. At the lowest level of the structure, this charge number accumulates costs related to activities which do not report to a valid charge number in this structure; or
- costs summed to a lower charge number which has no summary charge number.

1.3.3.1. Costs Related to Summarization

All data in the WBS and the OAS is summarized as of a single date called the system cost cut-off date (2.3.1).

- Actual cost

  The actual cost of a charge number in the WBS or the OAS is the sum of the actual cost of each directly subordinate charge number and the actual cost of each activity which enters the structure at the charge number. The actual cost of a network is the sum of the actual cost of each activity in the network.

- Planned cost

  The planned cost (budget) may be entered for each charge number in the WBS, in the OAS, and for each network. If the user does not specify a planned cost for a charge number, the planned cost is defined as the sum of the planned cost of each directly subordinate charge number plus the overall estimate of the cost of each activity which enters the structure at this charge number. If the user does not provide a planned cost for a network, the planned cost is defined as the sum of the overall estimate of the cost of each activity in the network.

- Committed cost

  The committed cost is that part of the planned cost which has been administratively reserved for the payment of expenses that have been authorized, and may or may not have been incurred, and those which are expected to be authorized in the future. Committed costs may be entered for each charge number in the WBS, in the OAS, and for each network. They are not accumulated and are 0 unless provided by the user.

- Indirect cost

  An indirect cost is an expense incurred while performing a group of activities, but that cannot be related to a specific activity or the use of a specific resource. MCS does not provide special processing for indirect cost. However, the user can input indirect costs for a charge number or network. An additional dummy activity should be assigned to the network or to the charge number. Indirect cost data may then be input to MCS as regular overhead data for this special dummy activity. These costs are included in the total costs for the network or charge number.

- Latest revised estimate

  The latest revised estimate of the final cost of an activity is the sum of its actual cost and its estimated cost to complete. The latest revised estimate of the final cost of a network is the sum of the latest revised estimate of each activity in the network. The latest revised estimate of the final cost of a charge number is the sum of the latest revised estimate of each directly subordinate charge number and the latest revised estimate of each activity which enters the structure at this charge number.

- Overrun/underrun

  Using these costs, MCS provides an analysis of how the incurred and projected final costs compare with the value of what has been accomplished and what will be accomplished. A cost overrun exists when the cost of performing work exceeds the value of the work. A cost underrun exists when the cost of performing work is less than the value of the work.

MCS projects the final overrun or underrun for a network or charge number by comparing the planned cost and the latest revised estimate of the final cost. Cost overrun or underrun of a network or charge number is also analyzed for the work performed to date by comparing the value of the work performed (value received) to the actual cost to date. The value of work performed is a fraction of the value of all the work, i.e., a fraction of the planned cost of the network or charge number. Specifically, the value of work performed is:

$$\frac{\text{actual cost}}{\text{latest revised estimate}} \times \text{planned cost}$$

1.3.3.2. Resource Cost Categories

The user may assign a group of resources to a resource cost category. Resource cost categories provide actual cost data for user-defined classes of resources. All four types of costs are maintained for each resource cost category. As previously stated, the user may modify the costs of an activity by giving a positive or negative increment in units of, or dollars for, a resource. Such an increment is also applied to the resource's resource cost category.

Note that the total actual cost for all resource cost categories is not likely to equal the total actual cost for all activities. This is because the latter may be modified without modifying the former, and some resources may not be assigned to any resource cost category.

1.4. RESOURCE ALLOCATION

(To be supplied)

1.5. REPORT TYPES

MCS provides reports for all levels of management from the project leader to higher level management. Most reports are in the form of documents; however, some reports present graphic displays. The reports provide comparisons between planned and projected accomplishments, highlight important information, and allow management to make its decisions with a full understanding of the current situation.

1.5.1. Alternate Report Formats

MCS allows the user to control the contents of each report and the order of presentation. Multiple copies of each report can be obtained. Dates may be printed in Gregorian form (2.2.4), or as the number of days from the calendar zero date.

The user may request that the report include only milestone events, milestone work items, or I–J activities which start or end at a milestone event. Reports may be limited to those activities which start or finish between user-supplied dates. Activities may be separated according to department. Cost data may be summarized to any level of the WBS or the OAS.

A high degree of flexibility is attained by allowing the user to select the sort order for each report. Available sort parameters include:

- Project and network identifiers
- Event and work-item identifiers
- Department
- Earliest and latest start and finish dates
- Floats and slacks
- Resource codes
- Charge numbers

1.5.2. MCS Reports

The following reports are provided by MCS:

- Bar charts

  The activity and critical path activity bar chart reports provide a graphic display of each activity in its earliest or latest position on a time scale. Nonworking days, holidays, and vacations are indicated.

- Activity report

  The activity report provides detailed descriptions and schedules of all the activities (complete, in-progress, and future). The report includes earliest and latest start and finish dates, total, free, and secondary floats.

- Event report

  The event report provides a detailed description of each event's earliest and latest occurrence and slack.

- Predecessor-successor report

  The predecessor-successor report provides a list of the predecessors and successors of each activity. Some schedule information is also included. This report is available for activity-on-arrow and activity-on-node networks.

- Summary activity report

  The summary activity report provides schedule information for the summary activities in a summarized network.

  Summarization is performed in accordance with the concepts described in 1.2.8. The user may select the level to which each network is summarized (3.2). Earliest and latest dates, strict duration, elapsed duration, and floats are included.

- Interface report

  The interface report provides a list of the events and work items which are on each interface. The earliest interface occurrence, latest interface occurrence, and deflections are included.

- Critical path activity report

  The critical path activity report provides descriptions and schedules of all the activities on the critical path. The information included is the same as that on the activity report.

- Calendar report

  The calendar report prints the calendar dates in Gregorian form. Nonworking days, holidays, and vacations are shown.

- Cost structure reports

  The cost structure reports provide a list of all the charge numbers in the work breakdown strucuture (WBS) or the organizational accounting structure (OAS) and their relationships to each other within each structure. The activities that report directly to each charge number are shown.

- Financial status report

  The financial status report provides detailed financial information including actual cost, latest revised estimate, planned cost, and overrun/underrun for each charge number. The report is available for any level of the WBS or OAS. The totals are shown for each charge number on the selected level. Each total is broken down to show a subtotal of the costs for each charge number which reports directly to this summary charge number. An additional subtotal includes all the activities and work items which enter the structure at this charge number. This report is also available for all networks in the system.

- Management activity report

  The management activity report provides both schedule and fiscal status for each activity. The activities may be sorted according to charge number in the OAS, charge number in the WBS, or project/network.

- Resource cost category plan

  The resource cost category plan projects costs per accounting period for each resource cost category. The costs are summed with costs already reported for each resource to date. Direct and overhead costs are shown.

- Financial plan

  The financial plan provides the projected cost per accounting period of each charge number on the selected level of the WBS or OAS. Cumulative totals are included. The report is available for any level of the WBS or the OAS. This report is also available for all networks in the system.

- Resource requirements plan

  The resource requirements plan provides the total projected requirements and costs for each resource per accounting period. Cumulative totals and totals for each network are shown.

- Resource rates table

  The resource rates table contains the direct cost of each measure of resource, overhead of each measure of resource, and overhead as a percentage of the direct cost of each resource.

  This report also provides the effective dates of these resource rates, and the description, measure, and cost category of the resource.

- Project-network report

  The project-network report provides a description of each project and network plus scheduled start, scheduled end, and cut-off dates for each. Also shown are earliest start, earliest finish, latest start, and latest finish of each project and network as computed during time processing.

- Resource requirements report

  The resource requirements report presents all requirements, along with the activity identifications and schedules. The quantity of resource per measure of resource, total quantity, and total direct and overhead cost of the requirement are included.

2. Data and Processing in MCS

2.1. GENERAL PROCESSING FLOW

The processing performed by MCS can be broken down into seven steps:

1. Syntax editing
2. Data base creation or modification
3. Table generation
4. Time processing
5. Passive cost processing
6. Resource allocation processing
7. Report generation

The steps must be performed in the order indicated; however, every step need not be performed during a single execution of MCS. The steps to be performed during an execution of MCS are controlled by the user (3.1 and 3.3).

2.1.1. Syntax Editing

All data and control information is entered as input to MCS from cards. The format of each card is described in 2.2, 2.3, and 2.4.

During syntax editing, each input card is screened and checks are made for the acceptability and logical consistency of the data on the card. These checks include tests for acceptable codes, dates in the proper format, numbers in fields which indicate numeric data, and complete and valid data identification. Input cards are accepted in random order. If a syntax error is detected, the error is indicated on the printer, along with an image of the card in error, and the action taken by MCS.

2.1.2. Data Base Creation or Modification

The input cards supplied by the user may contain data which is to be added to the data base maintained by MCS. The input cards may also direct MCS to modify previously supplied data (2.2). During the data base creation or modification step, the data on the input cards is used to create or modify the data base. The new (created or modified) data base file (MCNEWDB), however, is not ready to be processed by MCS until the table generation step has been completed. (See 3.3.2.4.) If illegal modification is requested by the user (e.g., an attempt to delete data which does not exist), the error is noted on the printer along with the action taken by MCS.

2.1.3. Table Generation

Before the data in the data base may be processed further, the data must be placed in the internal data and control tables of MCS (MCTABLES). (See 3.3.2.3.) These tables contain both data and numerous pointers which indicate the logical relationships among data items. The table generation step moves the data from the data base to the MCS tables. If any logical inconsistency is detected (e.g., reporting the progress of a nonexistent activity), the error is noted on the printer along with the action taken by MCS. At the end of this step, the new data base file (MCNEWDB) is ready to be processed by MCS. (See 3.3.2.4.)

2.1.4. Time Processing

MCS performs all time processing during this step and in accordance with the concepts discussed in 1.2. The results are placed in the MCS tables and are available for use during passive cost processing and report generation. If any logical inconsistency is detected (e.g., a loop in a network), the error is noted on the printer along with the action taken by MCS (Appendix B).

2.1.5. Passive Cost Processing

MCS performs all passive cost processing during this step and in accordance with the concepts discussed in 1.3. If any error condition occurs (e.g., the total costs reporting to a charge number exceed the system capacity), the error is noted on the printer along with the action taken by MCS (Appendix B).

2.1.6. Resource Allocation Processing

(To be supplied)

2.1.7. Report Generation

MCS generates the reports requested by the user. The reports are based on the current contents of the MCS tables. If any summary activity reports are requested, the network summarization is performed at this time. All reports are printed on the printer. A file containing the sorted report information is generated, if requested (3.3.2.6). The available reports are described in 1.5, and an example of each type of report is given in Appendix A. The format of report requests is described in 3.2.

2.2. DATA INPUT AND EDITING

All data and control information is entered as input to MCS in fixed-format cards. The cards may be in random order.

2.2.1. Card Code

The card code is a 2-digit number that identifies each fixed card format. Acceptable codes and their corresponding descriptions are listed in Table 2–1.

Table 2–1. MCS Input Card Codes

Card Code	Description	Paragraph
00*	Run-time parameterization	3.1
01*	Run-time parameterization	3.1
10	System, project, or network header	2.3.1
11	System, project, or network description	2.3.2
12	Holiday/vacation	2.3.3
14*	Report request	3.2
20	Resource description	2.4.1
21	Cost category	2.4.2
30	Resource rates	2.4.3
40	Activity definition	2.3.4
41	Precedence definition	2.3.5
42	Milestone, work-item/event schedule	2.3.6
43	Resource requirements	2.4.4
44	Interface definition	2.3.7
45	Activity progress	2.3.8
46**	Cost progress	2.4.5
50	Cost structure definition	2.4.6
51	Charge number assignment	2.4.7
52**	Charge number planned cost	2.4.8
53**	Network planned cost	2.4.9

* This card contains control information only. It does not cause MCS to update the data base.

**This card always causes the data base to be updated and does not contain a transaction code.

2.2.2. Transaction Codes and How to Modify the Data Base

MCS uses data on input cards to modify the data base. The fields on a card are divided into two classes: identifier fields (e.g., network identifier, resource code) and updater fields (e.g., activity duration, overhead cost rate).

A card must contain a complete identification before the transaction is processed. The transaction code tells MCS how to use the data on the card. The five acceptable transaction codes and their meanings are:

1. A, N, or blank – Add to the data base.

2. D – Delete all data associated with the identification. All updater fields on the card are ignored. A full explanation of delete processing is included in the description of each card format (2.3 and 2.4). A maximum of 100 D transactions may be processed per execution of MCS.

3. R – Replace selected updateable data items with data from the card. If data is provided in an updater field, the data replaces the contents of the data base. Data may also be selectively deleted using this transaction code. If the special character, ampersand (&), is in the first column of an updater field, the corresponding data is deleted.

The type 00, 01, and 14 cards contain only control information and do not require a transaction code, they effect only one execution of MCS. The type 46, 52, and 53 cards always cause the data base to be updated and do not contain a transaction code.

2.2.3. Identification Formats

The MCS identification character set consists of:

0, 1,...,9	
A, B,...,Z	
+	plus
–	minus
*	asterisk
/	slash
$	currency symbol
&	ampersand
.	period
,	comma
Δ	blank

2.2.3.1. Project–Network Identification

The project–network identification is a 6-character field used to identify a network within a project or a project within the system. The identification is divided into two 3-character subfields. The first is the project code and the second is the network code. Any combination of the characters in the MCS identification character set may be used for each code. A blank subfield has a special meaning to MCS and is permitted only on the type 10 (2.3.1), type 11 (2.3.2), and type 12 (2.3.3) cards.

2.2.3.2. Event–Work-Item Identification

Each event and work item is identified by six characters from the MCS identification character set, except all blanks.

2.2.3.3. Resource Identification

Each resource is identified by six characters from the MCS identification character set, except all blanks.

2.2.3.4. Charge Number Identification

Each charge number is identified by 18 characters from the MCS identification character set, except all blanks.

2.2.4. Dates

All dates on input cards and in reports are normally in one of the following formats:

- **ddmmyy**
- **ddmm**

where dd is day, mm is month, and yy is year.

Dates in the form yymmdd are also available. The user may direct all dates on input cards or reports to be in this form (3.1.1).

All dates supplied by the user are considered to lie between January 1, 1950, and December 31, 2049.

NOTE:

All start dates mean "before the start of work on the specified day"; all finish, end, occurrence, and cut-off dates mean "after the completion of work on the specified day."

2.3. TIME INPUT FORMATS

The input data required for an individual activity/work item and the network itself is described in succeeding paragraphs. Following each card format is a column-by-column description of the card fields. If applicable, each card field is classified as either an identifier field (I) or an updater field (U) (2.2.2).

2.3.1. Type 10 Project–Network Header

The type 10 card defines information pertaining to a project in a multiproject process, and to a network in a multinetwork process. Hence, this card, with its project–network names, identifies the elements of the hierarchical structure of Figure 1–1.

Following are the three types of type 10 cards:

- System

  A blank project – network field represents the system level.

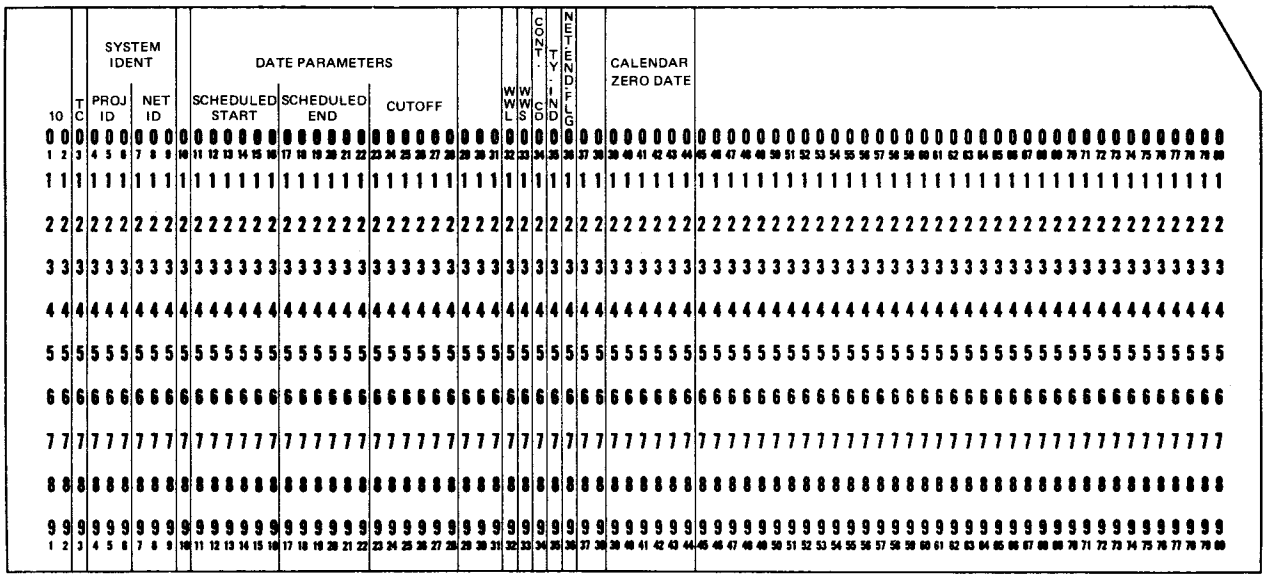
- Project

  A blank network field and a nonblank project field represent the project level.

- Network

  Nonblank project and network fields represent the network associated with the project.

The type 10 card has the following format:



Column	Class	Purpose
1–2	I	Card code = 10 (2.2.1)
3	I	Transaction code: R, A, N, or D If the D transaction code is used for a network type 10 card, it deletes the entire network, its component activities, related cost and resource requirements, and description information. If network reentry is necessary, the network must be treated as if it is new, and all associated cards describing applicable time, cost, and resource information must be reentered (2.2.2). If the D transaction is used with a project type 10 card, all of the information previously input via project type 10 cards for the identified project is deleted. The networks in the project, the project description, and contract are not deleted. The D transaction is not permitted with a system type 10 card.
4–6	I	Project identification (PROJ-ID, 2.2.3.1)
7–9	I	Network identification (NET-ID, 2.2.3.1)
11–16	U	Scheduled start date (2.3.1.1)
17–22	U	Scheduled end date (2.3.1.1) The use of the scheduled end date is determined by the network end date flag, column 36.
23–28	U	Cut-off date (2.3.1.1) MCS assumes that all activity progress up to this date has been reported. No future activity is assigned an earliest start prior to this date. If the field is blank and in-progress activities exist, an error message may be given (Appendix B). The earliest cut-off date is used as the system cost cut-off date (1.3.3.1).
32	U	Work-week length (WWL, 2.3.1.1) Code 1–7, the number of days in a work week.
33	U	Work-week start day (WWS, 2.3.1.1) The following codes describe the start day of the work week for the network:

Column	Class	Purpose

Code	Description
M	Monday
T	Tuesday
W	Wednesday
H	Thursday
F	Friday
S	Saturday
U	Sunday

→ 34 U Activity continuity code (CONT-CD)

The codes indicating the continuous or noncontinuous activity durations are:

Code	Description
1	Each activity may be split into multiple working periods with embedded nonworking days.
2	Each activity cannot be interrupted under any circumstance, i.e., holidays, vacations, and weekends are work days.
3	Each activity may be interrupted only by holidays and vacations. Regular weekends are considered work days.
4	Each activity cannot be started until the full duration of the activity is available without encountering any holiday or vacation periods. Regular weekends are considered work days.
5	Same as code 1 except that the activity must start on the work-week start day.
6	Same as code 2 except that the activity must start on the work-week start day.
7	Same as code 3 except that the activity must start on the work-week start day.
8	Same as code 4 except that the activity must start on the work-week start day.

Column	Class	Purpose

35 U Type of network (TY-IND)

This field is valid only on network type 10 cards.

The following codes indicate network representation:

A – Activity-on-arrow network representation (I–J notation, 1.2.1.1).

P – Activity-on-node or precedence network representation (work-item notation, 1.2.1.2).

Blank – A blank code indicates activity-on-arrow representation.

36 U Network end date flag (NET-END-FL)

The following are acceptable single numeric codes indicating the network latest finish:

Code	Description
0	Use the scheduled end date (1.2.2). If the scheduled end date is not provided use the network earliest finish.
1	Use the earliest of the network scheduled end date and the network earliest finish (1.2.2).
2	Use the latest of the network scheduled end date and the network earliest finish (1.2.2).
3	Use the network earliest finish (1.2.3.3). The scheduled end date serves only for secondary computation.

39–44 U Calendar zero date

When reports contain dates expressed in integer days (3.2.2), the day numbers are computed relative to this date (unless a report zero date is provided, 3.2.1).

This field is valid only on a system type 10 card.

Input information can be defined for every element of the hierarchical structure from the system level, downward to the network level. The information is used from the network level, upward to the system level.

If the required data is provided at the network level, it is used. If the required input is not given at the network level, MCS searches for the data upward in the hierarchical structure. If the required data is not given at any level of the structure, MCS uses the default value or terminates the run.

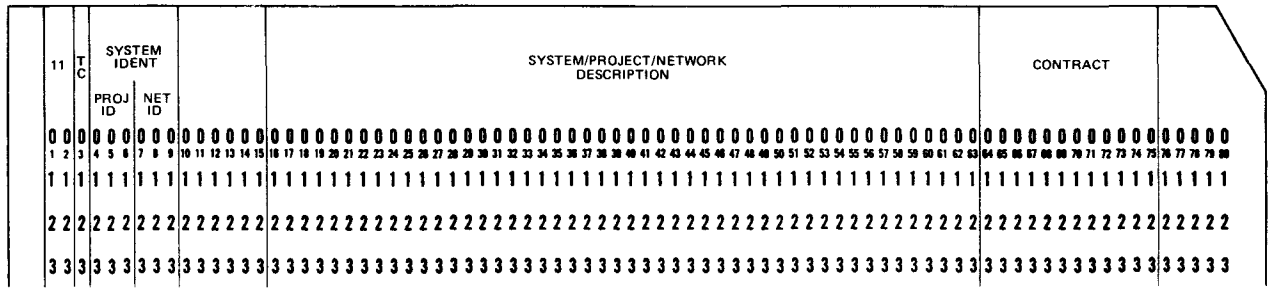
2.3.1.1. Project–Network Header Card Data Items

The following data items are processed through the hierarchical structure:

- Scheduled start date – If this date is not provided, the program terminates after table generation.
- Scheduled end date – Default date is the network earliest finish.
- Cut-off date – There is no default value. MCS attempts to run without a cut-off date.
- Work-week length – Default is five days.
- Work-week start – Default is M (Monday).
- Continuity code – Default is 1 (a noncontinuous activity).
- Network end date flag – Default is use of the scheduled end date.

2.3.2. Type 11 Project–Network Description

The type 11 card contains a description to be included in the report headings. The type 11 card has the following format:



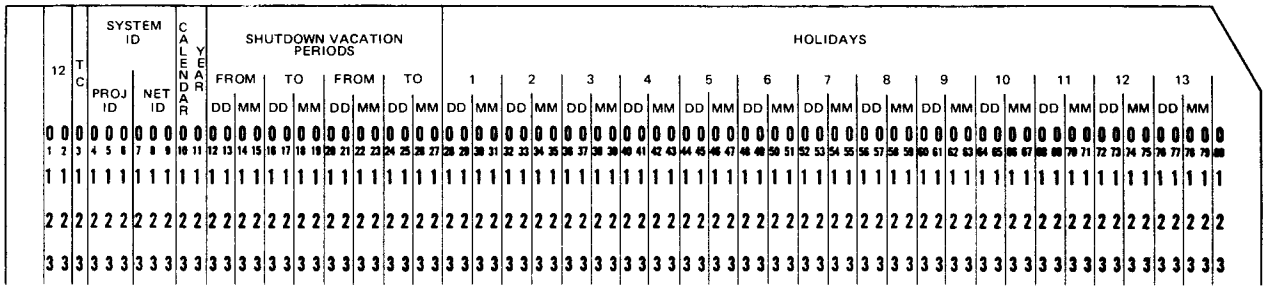
Column	Class	Purpose
1–2	I	Card code = 11
3	I	Transaction code: R, A, N, or D The D transaction code deletes the contract and the description from the hierarchical structure.
4–9	I	Project – network identification (2.2.3.1)
16–63	U	Project – network description This description is used in report headings (2.2.3.2).

Column	Class	Purpose
64–75	U	Contract

This field is also used as part of the report heading. Any 12 printable characters may be used.

2.3.3. Type 12 Holiday/Vacation

This card defines the holidays and vacations that occur during the duration of the scheduling process. Multiple holiday/vacation cards can be entered for any year. For a network, the MCS uses all holidays and vacation-shutdown periods supplied via the appropriate network and project type 12 cards and the system type 12 cards. The type 12 card has the following format:



Column	Class	Purpose
1–2	I	Card code = 12 (2.2.1)
3	I	Transaction code: A, N, or D

The D transaction code deletes the holidays and vacations specified on the card. If columns 12–79 are blank, all holidays and vacations for the year are deleted.

4–9	I	Project – Network identification (2.2.3.1)
10–11	I	Calendar year

The calendar year is specified by a 2-digit numeric field in the range 00–99 (2.2.4).

12–27	I	Shutdown-vacation periods

The dates are inclusive, e.g., 2/7 to 5/7 is four days.

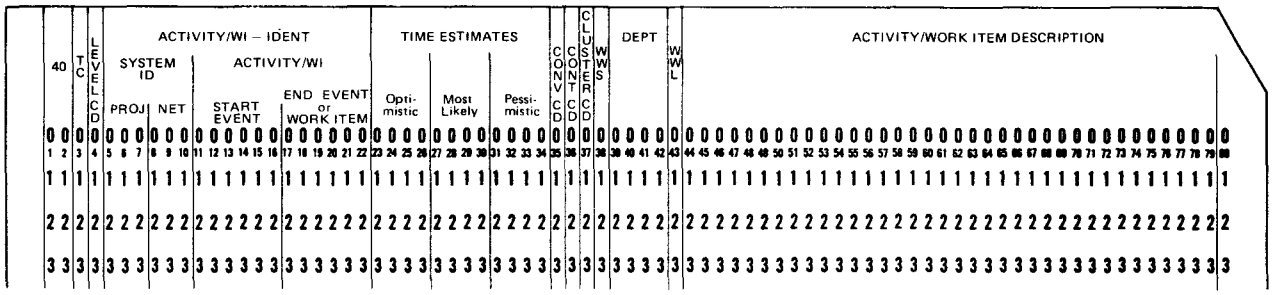
28–79	I	Holidays

Holidays do not need to be in chronological order.

2.3.4. Type 40 Activity Definition

This card defines data for individual activities in either activity-on-node or activity-on-arrow networks.

The type 40 card has the following format:



Column	Class	Purpose
1–2	I	Card code = 40 (2.2.1)
3	I	Transaction code: R, A, N, or D

The D transaction code deletes the activity, related cost, and resource requirements. If activity reentry is necessary, the activity must be treated as if it is new, and all associated cards describing applicable time, cost, and resource information must be reentered (2.2.2).

4	U	Level

This field is a code 1–9, where 1 indicates the highest level of significance, and 9 indicates the lowest level. Screening out certain activities at report time is accomplished with the use of this level. A blank code is considered as a code 6.

5–10	I	Project–network identification (2.2.3.1)
11–16	I	Start event

The I-event of an activity in I–J notation. In precedence notation, this field is blank (2.2.3.2).

17–22	I	End event or work item

The J-event of an activity in an I–J notation or the work item identification in the precedence notation (2.2.3.2).

23–26	U	Duration or optimistic estimate of duration

This field indicates duration of the activity or work item. If three time estimates are used, the optimistic estimate is the first estimate (1.2.3.2). Leading and trailing blanks are ignored.

27–30	U	Most likely estimate of duration

This field provides the second time estimate. It is blank if one time estimate is used (1.2.3.2). Leading and trailing blanks are ignored.

Column	Class	Purpose
31–34	U	Pessimistic estimate of duration

This field provides the third time estimate. It is blank if one time estimate is used (1.2.3.2). Leading and trailing blanks are ignored.

35 U Time conversion code (CONV-CD)

The fundamental unit of time in MCS is days. The following alphanumeric character codes describe the unit of the duration estimates:

Code	Description
1 or Blank	One 8-hour shift day
2	Two 8-hour shift days
3	Three 8-hour shift days
4	Four-hour days
5	Five-hour days
6	Six-hour days
7	Seven-hour days
8	Eight-hour days
9	Nine-hour days
D	Days
H	Hours
W	Weeks

36 U Activity continuity code (CONT-CD)

The codes indicating the continuous or noncontinuous activity durations are:

Code	Description
1	Indicates a noncontinuous activity; i.e., the activity may be split into multiple working periods with embedded nonworking days.
2	Indicates a continuous activity which cannot be interrupted under any circumstances, i.e., holidays, vacations, and weekends are work days.
3	Indicates a continuous activity that may be interrupted only by holidays and vacations. Regular weekends are considered work days.

Column	Class	Purpose

4 Indicates a continuous activity that cannot be started until the full duration of the activity is available without encountering any holiday or vacation periods. Regular weekends are considered work days.

5 Same as code 1 except that the activity must start on the work-week start day.

6 Same as code 2 except that the activity must start on the work-week start day.

7 Same as code 3 except that the activity must start on the work-week start day.

8 Same as code 4 except that the activity must start on the work-week start day.

Blank The network continuity code is used.

Examples of noncontinuous activities are building a frame for a house or digging the foundation for a building; and continuous activities are operating an emulsion mill, shutting down a steel mill blast oven, or any chemical process involving volatile reactions.

37 U Activity cluster code

An alphanumeric 1-character code is used to associate a group of activities or work items within a network. The valid cluster codes are A–Z and 0–9. This permits a maximum of 36 subdivisions or categories within a single network. A blank field indicates that the activity or work item is not associated with a specific cluster.

38 U Work-week start (WWS, 2.3.1.1)

The following codes describe the start day of the work week for the activity:

Code	Description
M	Monday
T	Tuesday
W	Wednesday
H	Thursday
F	Friday
S	Saturday
U	Sunday
Blank	The network work week start is used.

39–42 U Performing department

Column	Class	Purpose
43	U	Work-week length (WWL, 2.3.1.1)

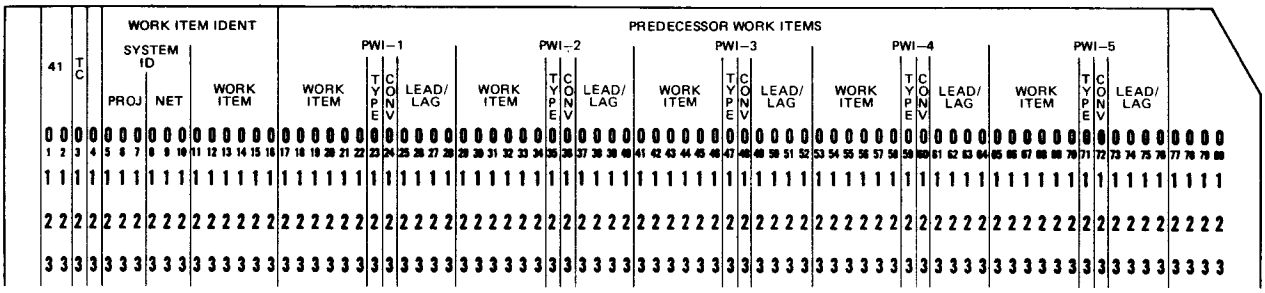
Code 1–7 describes the length of the working week. If this field is blank, the network work week length is used.

44–79	U	Activity (work item) description

This description appears in the printed reports (2.2.3.3).

2.3.5. Type 41 Precedence Definition

This card defines the dependency between the work item and its predecessor. Each card can specify up to five predecessor work items. The type 41 card has the following format:



Column	Class	Purpose
1–2	I	Card code = 41 (2.2.1)
3	I	Transaction code: R, A, N, or D

The D transaction code deletes the existing dependency between a work item and its predecessor. If columns 17–76 are blank, all existing dependencies between the work item and its predecessors are deleted (2.2.2).

5–10	I	Project–network identification (2.2.3.1)
11–16	I	Work item (2.2.3.2)
17–22	I	Predecessor work item (1.2.1.2)
23	I	Type of dependency

This code expresses the dependency between the predecessor work item in columns 17–22 and the work item in columns 11–16.

Column	Class	Purpose

Code	Description
F	Denotes finish-to-finish dependency (Figure 1–4)
S	Denotes start-to-start dependency (Figure 1–5)
N	Denotes finish-to-start dependency (Figure 1–3)
X	Denotes start-to-finish dependency (Figure 1–6)

24 U Time conversion code

The following codes represent the unit of expression for lead/lag in columns 25–28:

Code	Description
D or blank	Days
W	Weeks
P	Percentage – If column 23 = S, this is the percentage of duration of the predecessor work item, columns 17–22. If column 23 = F, this is the percentage of duration of the work item, columns 11–16. If column 23 = N or X, this code is invalid.

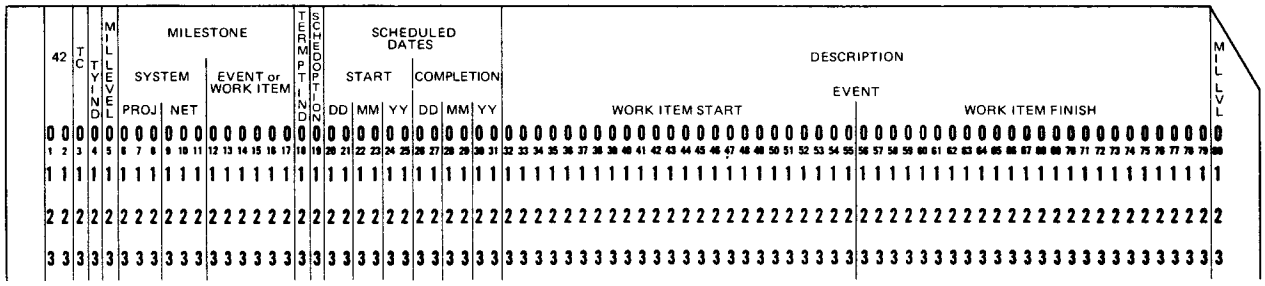
25–28 U Lag or lead time (1.2.1.2)

A positive or negative number of calendar days or percentage. If this is a percentage, it must be in the range of 0 to 100. Leading and trailing blanks are ignored.

29–76 U These columns provide space for four more predecessor work-item fields. The format of each is the same as columns 17–28.

2.3.6. Type 42 Milestone Work Item/Event Schedule

This card establishes the event or the work item as a milestone, assigns schedule dates, and identifies network terminal points. The type 42 card has the following format:



Column	Class	Purpose
1–2	I	Card code = 42 (2.2.1)
3		Transaction code R, A, N, or D

The D transaction code deletes all updateable fields (2.2.2).

4	I	Type of network

The following codes indicate network representation:

Code	Description
A	I–J notation
P	Precedence notation

5	U	Milestone level code (MIL-LEVEL CD, 1.2.8.1)

A code of 1–9 is allowed. It is the event milestone level if the type of network in column 4 is an A (I–J notation). If column 4 is a P, this column indicates the milestone level for the beginning of the work item.

6–11	I	Project–network identification (2.2.3.1)
12–17	I	Event or work item (2.2.3.2)
18	U	Network terminal point indicator (1.2.2)

→

S	The event is a network start event or the work item is a network start activity.
E	The event is a network end event or the work item is a network end activity.
B	The work item is a network start activity and a network end activity.
Blank	The event or work item is not a network terminal point.

If any terminal point of a network is identified using a type 42 card, then all terminal points in the network must be identified using type 42 cards. If none of the terminal points of a network are identified using a type 42 card, MCS will automatically identify and process all network terminal points.

19	U	Scheduled date (SCHED OPTION, 1.2.5)

The optional scheduled-date code indicates that a scheduled time or date for an event or work item is desired.

There are six alternatives represented by the character codes listed in Table 2–2.

Column	Class	Purpose
20–25	U	Scheduled start date for the work item or the scheduled date for the event (1.2.2)
26–31	U	Scheduled end date for the work item (1.2.2)
32–79	U	If column 4 is an A, this field contains the event description. If column 4 is a P, columns 32–55 contain the description of the milestone at the beginning of the work item; columns 56–79 contain the description of the milestone at the end of the work item.
80	U	Milestone level code (MIL-LVL, 1.2.8.1) This code of 1–9 is the milestone level for the end of the work item. If column 4 (type of network) is A, this field is blank.

Code	Activity-on-Arrow (I–J)	Scheduled Date Must Be Specified	Activity-on-Node (Precedence)	Scheduled Start Date Must Be Specified	Scheduled End Date Must Be Specified
1	The latest occurrence of the event is equal to the scheduled date.	Yes	The latest finish of the work item is equal to the scheduled end date.		Yes
2	The latest occurrence of the event is equal to the earliest of the latest occurrence and the scheduled date.	Yes	The latest finish of the work item is equal to the earliest of the latest finish and the scheduled end date.		Yes
3	The scheduled date is used for report purpose.	Yes	The scheduled end of the work item is used for report purpose.		Yes
4	The latest occurrence of the event is equal to the earliest occurrence of the event.		The latest finish of the work item is equal to the earliest finish of the work item.		
5	The earliest occurrence of the event is equal to the latest of the earliest occurrence and the schedule date.	Yes	The earliest start of the work item is equal to the latest of the earliest start and the scheduled start date.	Yes	

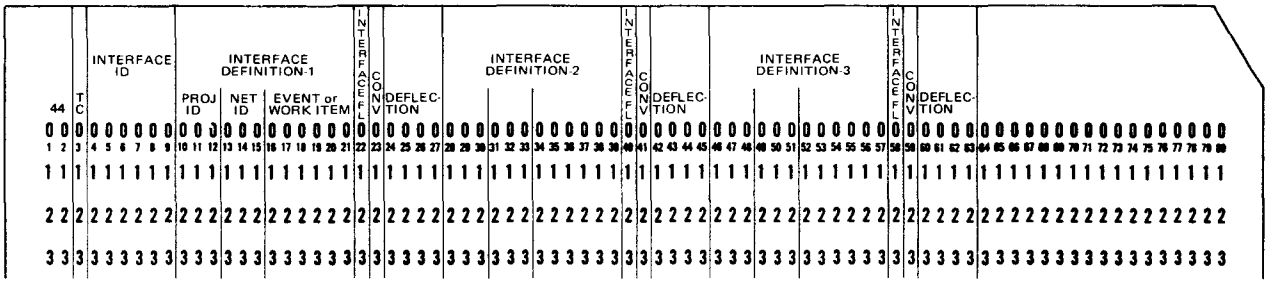
Table 2–2. Character Codes for Scheduled Date (SCHED OPTION) (Part 1 of 2)

Table 2–2. Character Codes for Scheduled Date (SCHED OPTION) (Part 2 of 2)

Code	Activity-on-Arrow (I–J)	Scheduled Date Must Be Specified	Activity-on-Node (Precedence)	Scheduled Start Date Must Be Specified	Scheduled End Date Must Be Specified
6	The earliest occurrence of the event is equal to the schedule date.	Yes	The earliest start of the work item is equal to the scheduled start date.	Yes	No
			The earliest finish of the work item is equal to the scheduled end date.	No	Yes
			The earliest start and the earliest finish of the work item are equal to the scheduled start and scheduled end dates. The duration of the work item is the number of working days between the scheduled start date and the scheduled end date.	Yes	Yes

2.3.7. Type 44 Interface Definition

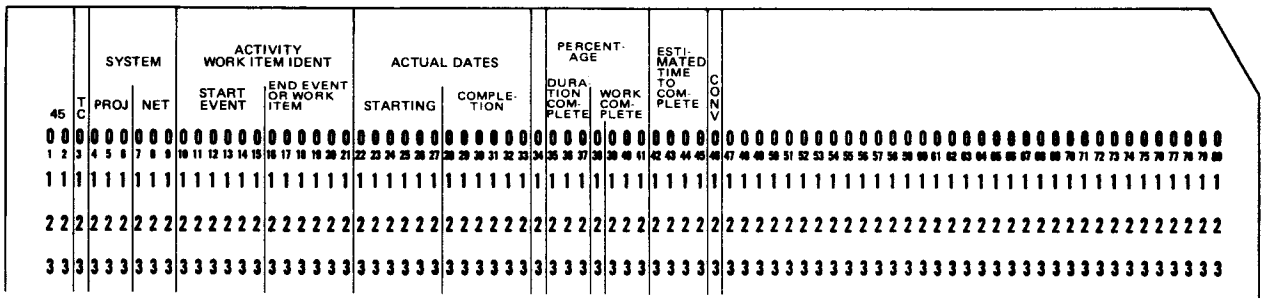
This card defines event and work item interfaces. Events and work items need not have the same identifier. Each member of an interface has the same interface identification provided by the interface-ID. Each interface may contain no more than one event or work item from a particular network. One card can specify up to three interface definitions. Multiple interface definition cards can be used to describe a single interface. The type 44 card has the following format:



Column	Class	Purpose
1–2	I	Card code = 44 (2.2.1)
3	I	Transaction code: R, A, N, or D The D transaction deletes the interface relationship of the specified events or work items. If no events or work items are given in columns 10–63, all the interface definitions associated with the interface identification are deleted (2.2.2).
4–9	I	Interface identification A 6-character field identifying an interface. Any combination of characters from the MCS identification character set, except all blanks, may be used.
10–15	I	Project–network identification (2.2.3.1)
16–21	I	Identification of an event or work item on the interface (2.2.3.2)
22	U	Interface flag Indicates the event or work item interface condition: **Code** — **Description** Blank — Event is the interface. S — The start of the work item is the interface reference point. F — The finish of the work item is the interface reference point.
23	U	Time conversion code Unit of expression for interface deflection in columns 24–27: **Code** — **Description** D or blank — Days W — Weeks
24–27	U	Interface deflection A positive or negative bias from the interface time expressed in calendar days (1.2.7.1.2)
28–63	U	These columns provide space for two additional interface definitions. Additional members of the interface can be specified on additional cards.

2.3.8. Type 45 Activity Progress

This card is used to report the progress of an activity. All activity progress must be reported up to the cut-off date supplied by the type 10 card. Type 45 activity progress card is not used when setting up the initial plan. The type 45 card has the following format:



Column	Class	Purpose
1–2	I	Card code = 45 (2.2.1)
3	I	Transaction code: R, A, N, or D The D transaction code deletes all updateable fields (2.2.2).
4–9	I	Project–network identification (2.2.3.1)
10–15	I	Start event This field contains the I-event identification of an activity in I–J notation. In the case of precedence notation, this field is blank (2.2.3.2).
16–21	I	End event or work item This field contains the J-event identification of an activity in I–J notation, or the work item identification in the precedence notation (2.2.3.2).
22–27	U	Actual start This field specifies the date the activity actually began.
28–33	U	Actual completion This field specifies the date the activity was completed.
35–37	U	Percentage duration complete This optional field, in the form xxx, describes the percentage duration completed to the cut-off date.

Column	Class	Purpose
39–41	U	Percentage work complete. This optional field has the form xxx.
42–45	U	Estimated time to completion. This field specifies the time required to complete the activity.
46	U	Time conversion code (CONV-CD) This field specifies the unit of expression for estimated time to complete in columns 42–45.

Code	Description
D or blank	Days
W	Weeks

The 11 ways to specify the status of an activity are listed in Table 2–3. When an activity is reported as being actual or in process, all of its predecessors are considered to be actual. A type 45 card is not required for these implied actual activities.

Table 2–3. Data Required for Specification of Activity Status

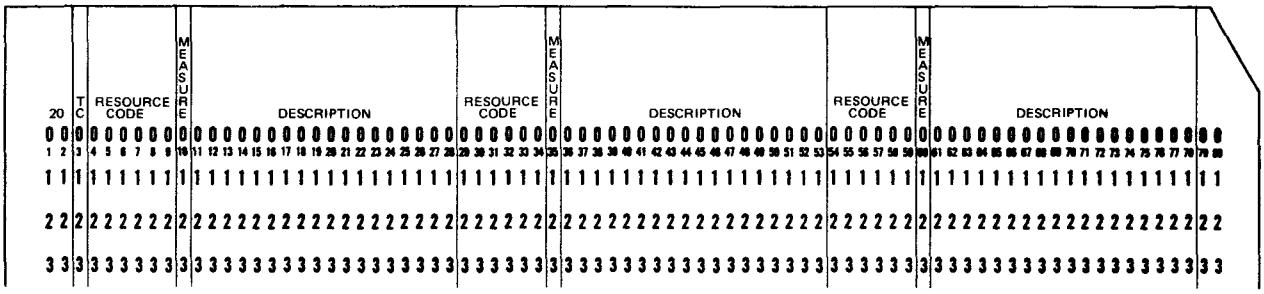
Data From Type 45 Card	Status										
	Actual					In-Process					Future
	1	2	3	4	5	6	7	8	9	10	11
Actual start	Yes	Yes				Yes	Yes	Yes			
Estimate-to-complete						Yes			Yes		
Percentage duration complete		100	100		100		<100			<100	
Actual completion	Yes			Yes	Yes						

2.4. PASSIVE COST AND RESOURCE SCHEDULING INPUT FORMATS

The following paragraphs describe the input cards used for passive cost and resource scheduling data. In the column-by-column card field descriptions, fields are classified as either identifier fields (I) or updater fields (U) (2.2.2).

2.4.1. Type 20 Resource Description

Data from this card defines one, two, or three resources. Every resource code must be defined using a type 20 card before it is used on any other card. The type 20 card has the following format:

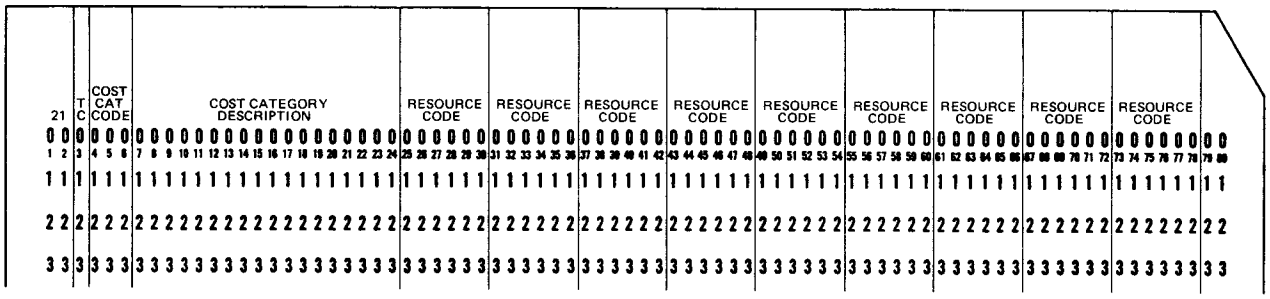


Column	Class	Purpose
1–2	I	Card code = 20 (2.2.1)
3	I	Transaction code: A, D, N, or R (2.2.2) The D transaction code deletes the resource completely, including all resource requirements and resource rates.
4–9	I	Resource code (2.2.3.3)
10	U	Measure of resource: H – Hour S – Shift U – Unit W – Week
11–28	U	Description of the resource (any 18 printable characters)
29–34	I	Resource code (2.2.3.3)

Column	Class	Purpose
35	U	Measure of resource: H – Hour S – Shift U – Unit W – Week
36–53	U	Description of the resource (any 18 printable characters)
54–59	I	Resource code (2.2.3.3)
60	U	Measure of resource: H – Hour S – Shift U – Unit W – Week
61–78	U	Description of the resource (any 18 printable characters)

2.4.2. Type 21 Cost Category

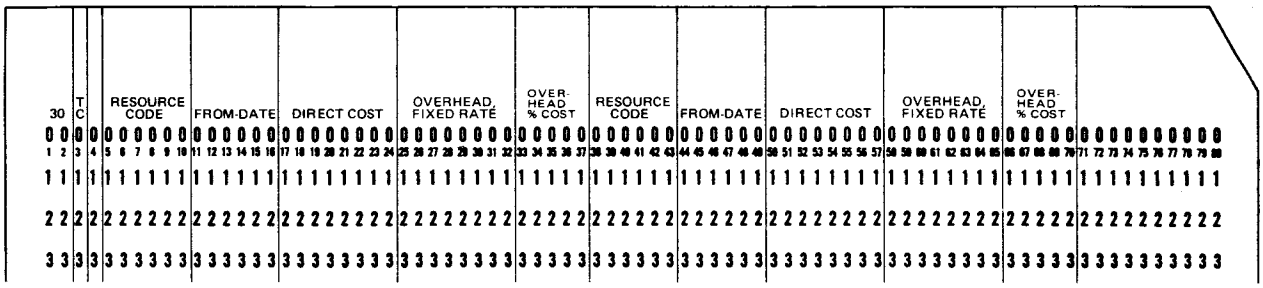
This card defines a resource cost category (1.3.3.2) and assigns resources to the cost category. A resource may belong to only one cost category. The type 21 card has the following format:



Column	Class	Purpose
1–2	I	Card code = 21 (2.2.1)
3	I	Transaction code: A, D, N, or R (2.2.2) The D transaction code deletes the identified resources from the cost category. If no resources are specified, the entire cost category is deleted.
4–6	I	Cost category code (any three characters from the MCS identification character set)
7–24	U	Cost category description (any 18 printable characters)
25–30	I	Resource code (2.2.3.3)
31–36	I	Resource code
37–42	I	Resource code
43–48	I	Resource code
49–54	I	Resource code
55–60	I	Resource code
61–66	I	Resource code
67–72	I	Resource code
73–78	I	Resource code

2.4.3. Type 30 Resource Rates

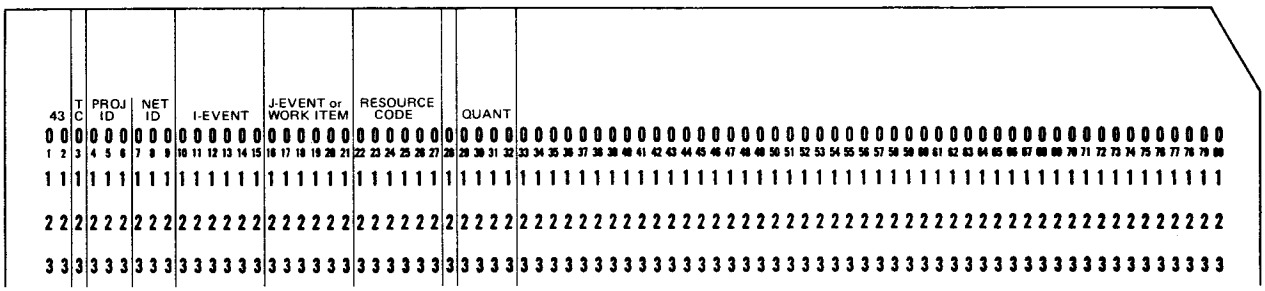
This card defines the direct and overhead cost rates of each resource. Resource rates are effective beginning on the from-date (columns 11–16 and 44–49), and until another set of direct and overhead rates becomes effective. The type 30 card has the following format:



Column	Class	Purpose
1–2	I	Card code = 30 (2.2.1)
3	I	Transaction code: A, D, N, or R (2.2.2) The D transaction code deletes the set of resource rates which begins on the from-date. If no from-date is specified, all the resource rates for the identified resource are deleted.
5–10	I	Resource code (2.2.3.3)
11–16	I	From-date
17–24	U	Direct cost of each measure of resource (fixed rate) The range is $xxxxxx. to $xxx.xxx, leading and trailing blanks are allowed, and the $ is required. If there is no decimal point, it is assumed to be after the last digit (1.3.2.1).
25–32	U	Overhead cost of each measure of resource (fixed rate) The range is $xxxxxx. to $xxx.xxx, leading and trailing blanks are allowed, and the $ is required. If there is no decimal point, it is assumed to be after the last digit (1.3.2.1).
33–37	U	Overhead cost, percentage of the direct cost of each measure of resource This is a value between 0 and 100.0, leading and trailing blanks are allowed. If there is no decimal point, it is assumed to be after the last digit (1.3.2.1).
38–43	I	Resource code (same as columns 5–10)
44–49	I	From-date (same as columns 11–16)
50–57	U	Direct cost of each measure of resource (fixed rate) (same as columns 17–24)
58–65	U	Overhead cost of each measure of resource (fixed rate) (same as columns 25–32)
66–70	U	Overhead cost, percentage of the direct cost of each measure of resource (same as columns 33–37)

2.4.4. Type 43 Resource Requirement

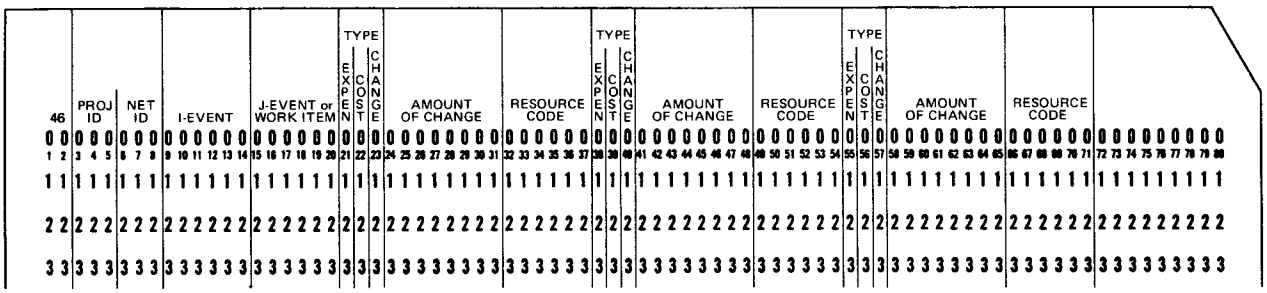
This card specifies a resource requirment of an activity. The type 43 card has the following format:



Column	Class	Purpose
1–2	I	Card code = 43 (2.2.1)
3	I	Transaction code: A, D, N, or R (2.2.2) The D transaction code deletes the resource requirement of the activity. If no resource is identified, all the resource requirements of the activity are deleted.
4–9	I	Project–network identification (2.2.3.1)
10–15	I	I-event (2.2.3.2)
16–21	I	J-event or work item (2.2.3.2)
22–27	I	Resource code (2.2.3.3)
29–32	U	Quantity per measure of resource. This is a number between 0 and 9999. Leading and trailing blanks are allowed.

2.4.5. Type 46 Cost Progress

This card informs MCS of changes in the estimated cost to complete an activity and the actual costs of an activity. The amount of change may be monetary or a quantity of resource. When resource rates are needed to compute the cost, the rates in effect on the network cut-off date are used. The type 46 card has the following format:

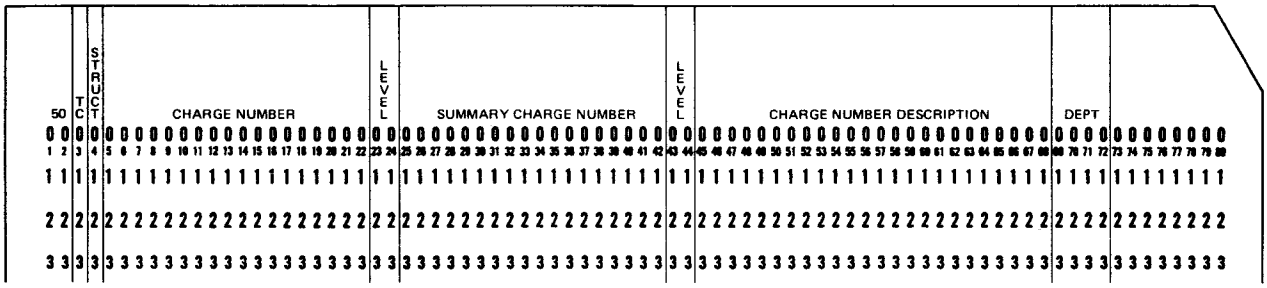


Column	Purpose
1–2	Card code = 46 (2.2.1)
3–8	Project–network identification (2.2.3.1)
9–14	I-event (2.2.3.2)
15–20	J-event or work item (2.2.3.2)
21	Type of expenditure (1.3.2.1 and 1.3.2.2): D – Disbursement E – Estimated cost to complete U – Unliquidated obligation
22	Type of cost (1.3.2.1 and 1.3.2.2): Invalid if column 21 = E. 1 – Direct, MCS computes overhead 2 – Flat rate overhead, MCS computes direct 3 – Direct only 4 – Overhead only
23	Type of change (2.4.5): + Positive increment – Negative increment T New total

Column	Purpose
24–31	Amount of change: ■ If monetary The range is $xxxxxx. to $xxxx.xx, leading and trailing blanks are allowed, and the $ is required. If there is no decimal point, it is assumed to be after the last digit. ■ If quantity of resource The range is 0 to 99999999, and leading and trailing blanks are allowed. Invalid if column 23 = T
32–37	Resource code This code must be present if columns 24–31 contain a quantity of resource, or column 22 = 1 or 2 (2.2.3.3).
38	Type of expenditure (same as column 21)
39	Type of cost (same as column 22)
40	Type of change (same as column 23)
41–48	Amount of change (same as columns 24–31)
49–54	Resource code (same as columns 32–37)
55–71	Same as columns 38–54

2.4.6. Type 50 Cost Structure Definition

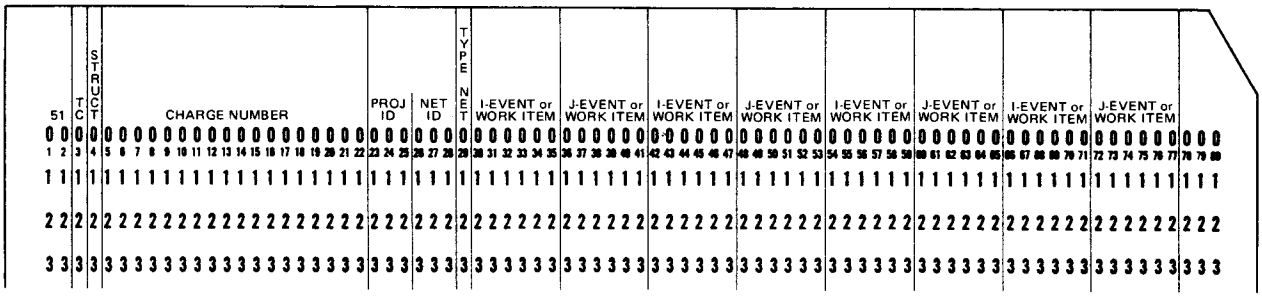
This card defines one account (charge number) in either the work breakdown structure or the organizational accounting structure. The type 50 card has the following format:



Column	Class	Purpose
1–2	I	Card code = 50 (2.2.1)
3	I	Transaction code: A, D, N, or R The D transaction will delete the account from the structure (2.2.2).
4	I	Structure (1.3.3): O – Organizational accounting structure W – Work breakdown structure
5–22	I	Charge number (2.2.3.4)
23–24	I	Level of the charge number (digits 01 through 12)
25–42	U	Summary change number This is the charge number to which the charge number reports (2.2.3.4). The summary charge number must be defined as a charge number using another type 50 card. ←
43–44	U	Level of the summary charge number This field is required if columns 25–42 are not blank. ←
45–68	U	Charge number description (any 24 printable characters)
69–72	U	Responsible department

2.4.7. Type 51 Charge Number Assignment

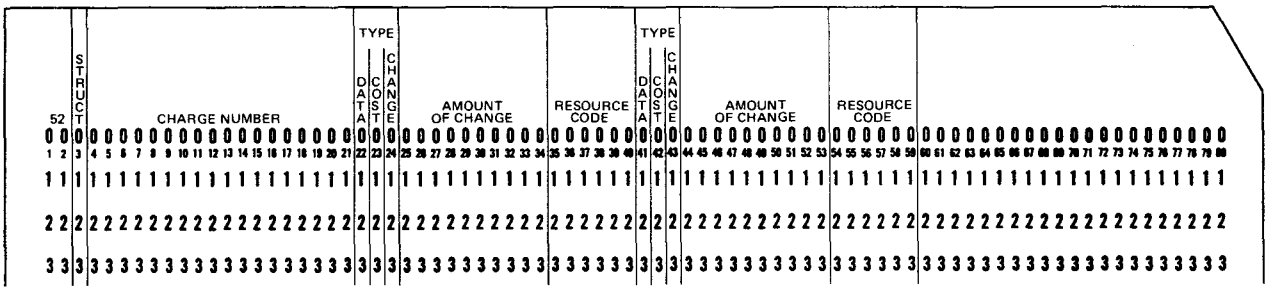
This card designates which charge number is to be used to accumulate costs for each activity. An activity may be assigned one charge number in the work breakdown structure and one in the organizational accounting structure. The type 51 card has the following format:



Column	Class	Purpose
1–2	I	Card code = 51 (2.2.1)
3	I	Transaction code: A, D, or N The D transaction code deletes the assignment of the activity to the charge number. If no activity is identified, all assignments of activities in the identified network to the identified charge number are deleted (2.2).
4	I	Structure (1.3.3): O — Organizational accounting structure W — Work breakdown structure
5–22	I	Charge number (2.2.3.4)
23–28	I	Project–network identification (2.2.3.1)
29	I	Type of network (1.2.1.1 and 1.2.1.2): A — Activity-on-arrow (I–J) P — Activity-on-node (precedence)
30–35	I	I-event or work item (2.2.3.2)
36–41	I	J-event or work item (2.2.3.2)
42–47	I	I-event or work item
48–53	I	J-event or work item
54–59	I	I-event or work item
60–65	I	J-event or work item
66–71	I	I-event or work item
72–77	I	J-event or work item

2.4.8. Type 52 Charge Number Planned Cost

This card informs MCS of changes in the planned and committed cost of a charge number. The amount of change may be monetary or a quantity of resource. When resource rates are needed to compute the cost, the rates in effect on the system cost cut-off date (1.3.3.1) are used. The type 52 card has the following format:



Column	Purpose
1–2	Card code = 52 (2.2.1)
3	Structure (1.3.3):
	O – Organizational accounting structure
	W – Work breakdown structure
4–21	Charge number (2.2.3.4)
22	Type of data:
	P – Planned
	C – Committed
23	Type of cost input (1.3.2.1):
	1 – Direct, MCS computes overhead
	2 – Flat rate overhead, MCS computes direct
	3 – Direct plus overhead
24	Type of change:
	+ Positive increment
	– Negative increment
	T New total

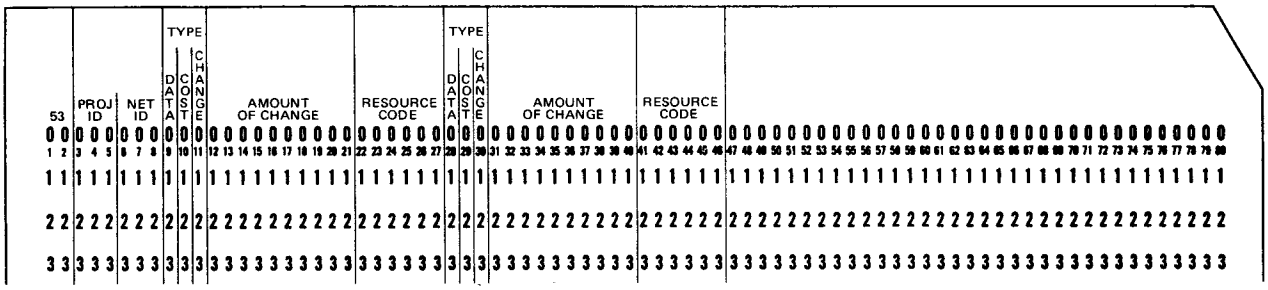
Column	Purpose
25–34	Amount of change: ■ If monetary The range is $xxxxxxxxx to $x, leading and trailing blanks are ignored, and the $ is required. There is no decimal point; it is assumed to be after the last digit. ■ If quantity of resource The range is 0 to 99999999. Leading and trailing blanks are ignored. Invalid if column 24 = T
35–40	Resource code This code must be present if columns 25–34 contain a quantity of resource, or column 23 = 1 or 2 (2.2.3.3).
41	Type of data: P – Planned C – Committed
42	Type of cost input (1.3.2.1): 1 – Direct, MCS computes overhead 2 – Overhead, MCS computes direct 3 – Direct plus overhead
43	Type of change: + Positive increment – Negative increment T New total
44–53	Amount of change: ■ If monetary The range is $xxxxxxxxx to $x, leading and trailing blanks are ignored, and the $ is required. There is no decimal point; it is assumed to be after the last digit. ■ If quantity of resource The range is 0 to 99999999. Leading and trailing blanks are ignored. Invalid if column 43 = T

Column	Purpose
54–59	Resource code

This code must be present if columns 44–53 contain a quantity of resource or column 42 = 1 or 2 (2.2.3.3).

2.4.9. Type 53 Network Planned Cost

This card informs MCS of changes in the planned and committed cost of a network. The amount of change may be monetary or a quantity of resource. When resource rates are needed to compute the cost, the rates in effect on the network cut-off date are used. The type 53 card has the following format:



Column	Purpose
1–2	Card code = 53 (2.2.1)
3–8	Project–network identification (2.2.3.1)
9	Type of data: P – Planned C – Committed
10	Type of cost input (1.3.2.1): 1 – Direct, MCS computes overhead 2 – Flat rate overhead, MCS computes direct 3 – Direct plus overhead
11	Type of change: + Positive increment – Negative increment T New total

Column	Purpose
12–21	Amount of change: ■ If monetary The range is $xxxxxxxxx to $x, leading and trailing blanks are ignored, and the $ is required. There is no decimal point; it is assumed to be after the last digit. ■ If a quantity of resource The range is 0 to 99999999. Leading and trailing blanks are ignored. Invalid if column 11 = T
22–27	Resource code This code must be present if columns 12–21 contain a quantity of resource or column 10 = 1 or 2 (2.2.3.3).
28	Type of data: P – Planned C – Committed
29	Type of cost input (1.3.2.1): 1 – Direct, MCS computes overhead 2 – Overhead, MCS computes direct 3 – Direct plus overhead
30	Type of change: + Positive increment – Negative increment T New total
31–40	Amount of change: ■ If monetary The range is $xxxxxxxxx to $x, leading and trailing blanks are ignored, and the $ is required. There is no decimal point; it is assumed to be after the last digit. ■ If quantity of resource The range is 0 to 99999999. Leading and trailing blanks are ignored. Invalid if column 30 = T

Column	Purpose
41–46	Resource code

This code must be present if columns 31–40 contain a quantity of resource or column 29 = 1 or 2 (2.2.3.3).

2.5. RESOURCE ALLOCATION INPUT FORMATS

(To be supplied)

3. Execution of MCS

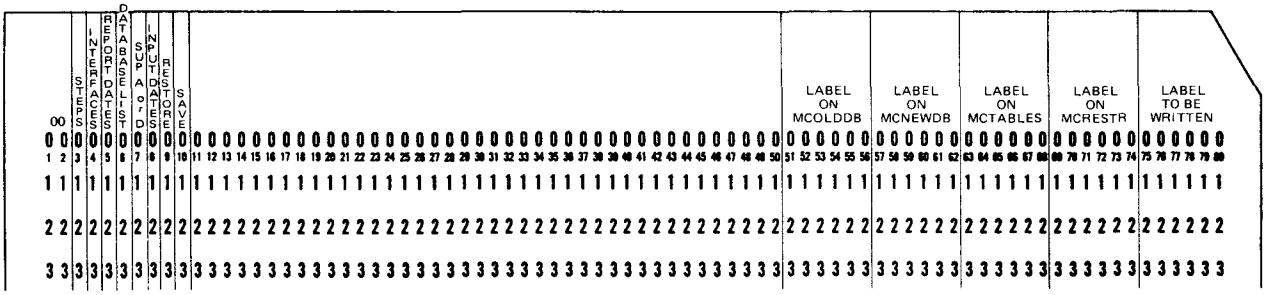
3.1. RUN-TIME PARAMETERIZATION

3.1.1. Input Date Formats

In the UNIVAC Management Control System (MCS), input dates are normally accepted in the form ddmmyy or ddmm (2.2.4). To meet with American National Standards Institute and Department of Defense directives, dates are permitted in the form yymmdd or mmdd. The optional format is used to interpret all dates when requested via a type 00 card (3.1.2). The optional date format is effective only for the single execution of MCS. Data which is supplied in one format may be updated using the same or the other format.

3.1.2. Type 00 Run-Time Parameterization

This optional card allows the selection of a particular processing capability of MCS to be performed during the execution. The type 00 card is not saved in the data base and only controls one execution of MCS. This card has the following format:



NOTE:

If provided, type 00 card must immediately follow the start-of-data (/$) card.

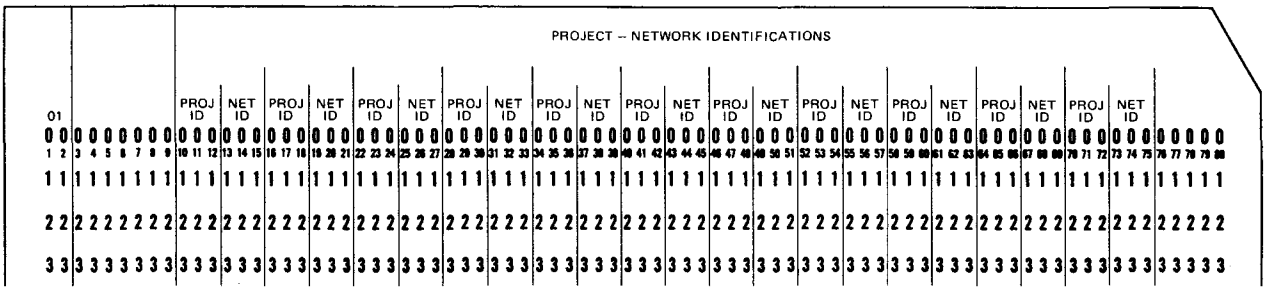
Column	Purpose
1–2	Card code = 00 (2.2.1)
3	Processing steps to be performed (2.1):
	Blank — All steps
	E — Syntax edit only
	D — Syntax edit and data base creation or modification and table generation only.
	T — Syntax edit, data base creation or modification, table generation, time processing, and report generation only
	R — Reports only, based on the current contents of MCTABLES (3.4.2).
4	Interface processing (1.2.7.1):
	Blank or I — Interface processing is performed.
	S — Stand-alone processing (Interfaces are ignored.)
	This column is ignored if no interfaces are defined in the data base.
5	Optional report date format (2.2.4):
	Y — All dates in reports are in the format yymmdd.
	N or blank — All dates in reports are in the format ddmmyy.
6	Data base listing (2.2.2):
	Y or blank — Print the contents of the new data base after updating.
	N — Do not print the contents of the new data base after updating.
7	Suppress actual or zero duration activities:
	A — Suppress reporting of all actual activities.
	D — Suppress reporting of all activities with zero duration.
	B — Both of the above.
	Blank — Report all qualified activities.

Column	Purpose
8	Optional input date format (3.1.1):
	Y — All input dates are in the format yymmdd.
	N or blank — All input dates are in the format ddmmyy.
9	Restore processing (3.4.6):
	Blank — No restore processing.
	Y — Restore from the restore file (MCRESTR). ←
	Z — Restore from the previous data and control tables (MCTABLES). ←
	If restore processing is to be performed, the process option (column 3) must be T or blank.
10	Save processing (3.4.6):
	Blank — No save processing.
	3 — Save the contents of the data and control tables after table generation, latest time processing, and passive cost processing.
	5 — Save the contents of the data and control tables after table generation, topological processing, earliest time processing, latest time processing, and passive cost processing. ↓
51–56	Label on the old data base file (MCOLDDB) before this execution of MCS (3.4.7).
57–62	Label on the new data base file (MCNEWDB) before this execution of MCS (3.4.7).
63–68	Label on the data and control tables (MCTABLES) before this execution of MCS (3.4.7).
69–74	Label on the restore file (MCRESTR) before this execution of MCS (3.4.7).
75–80	Label to be written on the new data base file (MCNEWDB), data and control tables (MCTABLES), and save file (MCSAVE), by label processing during this execution of MCS (3.4.7). ↑

3.1.3. Type 01 Network Selection

When MCS performs time or passive cost processing, it processes the data in the tables produced during the table generation step (2.1.3). This card allows the user to direct the table generation step to process some, but not all, of the networks from the data base. Both time and cost data are included.

An unlimited number of type 01 cards may be submitted during one execution of MCS. If no type 01 card is provided, all the data from the data base is included in the tables. The type 01 card has the following format:



Column	Purpose
1–2	Card code = 01 (2.2.1)
10–15	Project–network identification (2.2.3.1)
16–21	Project–network identification
22–27	Project–network identification
28–33	Project–network identification
34–39	Project–network identification
40–45	Project–network identification
46–51	Project–network identification
52–57	Project–network identification
58–63	Project–network identification
64–69	Project–network identification
70–75	Project–network identification

NOTE:

If a project identification is provided and the network identification is blank, all the networks in the project are included.

3.2. REPORT REQUESTS

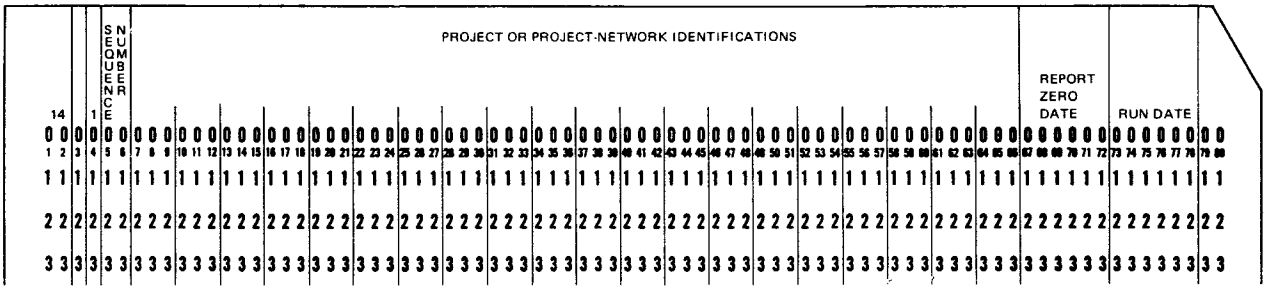
Reports are based on the most recent time and passive cost processing. The reports are requested using type 14 cards. They are valid during one execution of MCS. There are four formats of type 14 cards:

Format	Function
1	Identifies projects and networks for which reports are requested.
2	Provides parameters for time report generation and specifies up to three general or time report requests.
3	Specifies additional time or general report requests.
4	Specifies passive cost report requests.

A set of report requests consists of: one or more consecutive format 1 cards, zero or more format 2 cards, zero or more format 3 cards, and zero or more format 4 cards. Multiple sets of type 14 cards are permitted. A maximum of 99 type 14 cards is permitted during one execution. Each type 14 card, regardless of format, contains a sequence number. The type 14 cards, regardless of format, are processed in sequence number order.

3.2.1. Type 14 Format 1

Columns 7–66 of this card specify the projects and networks desired for the requested reports. The type 14 format 1 card has the following format:



Column	Purpose
1–2	Card code = 14 (2.2.1)
4	Format = 1 (3.2)
5–6	Sequence number

Column	Purpose

Case I – Every project–network in the system

7–9 *S*

Case II – Every network in specified projects

7–9 *P*

10–66 Project identifications

Case III – Specified project–networks

7–9 *PN

10–63 Project–network identifications (2.2.3.1)

Case IV – Specified networks within a single project

7–9 Project identification

10–66 Identifications of networks within the project

All cases

67–72 Report zero date

When reports contain dates expressed in integer days, the day numbers are computed relative to this date. If this date is not supplied, the day numbers are computed relative to the calendar zero date (2.3.1). Reports expressed in integer days are not available if neither report zero date nor calendar zero date is specified.

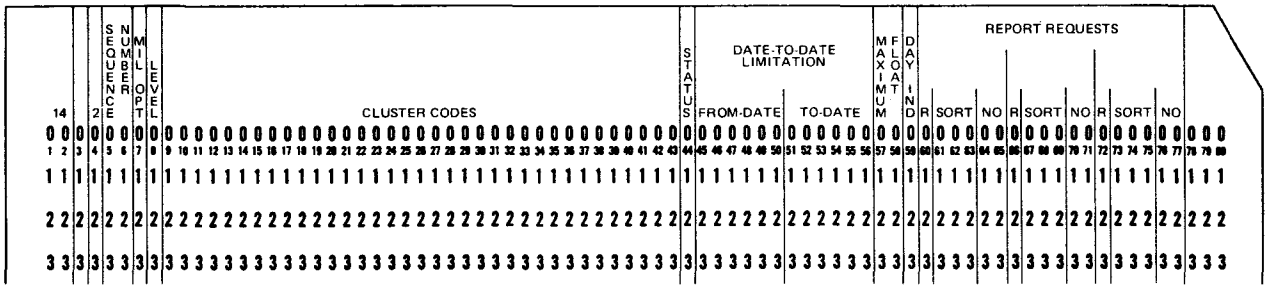
73–78 Run date

If specified, this date is printed as the run date on each report. If not specified, the date of the execution of MCS is printed.

The run date and the report zero date from the first type 14 format 1 card in a set are used.

3.2.2. Type 14 Format 2

Columns 7–58 of this card specify the criteria for inclusion of data in a report. All data which is qualified according to all the applicable criteria will be reported. The type 14 format 2 card has the following format:



Column	Purpose
1–2	Card code = 14 (2.2.1)
4	Format = 2 (3.2)
5–6	Sequence number
7	Milestones-only option: blank or M (3.2.2.1)
8	Level code The level code may be any value between 1 and 9, where 1 indicates the highest. If this column is blank, code 6 is assumed. The effect of the level code on each report is discussed in 3.2.2.1.
9–43	Cluster codes Acceptable codes are A–Z and 0–9. Only activities with the specified cluster codes are qualified. If blank, all activities are qualified. This affects only report types B, C, E, J, and K.
44	Status The following codes indicate the status of those activities and events which are qualified. This code affects only report types B, C, D, E, G, J, and K.

Column	Purpose

Code	Description
Blank	All, regardless of status
A	Actuals only
C	Actuals and in-progress only
P	In-progress only
X	In-progress and future only
F	Future only

45–56 Date-to-date limitation

Activities and events with at least one date between the from-date and the to-date are qualified. If the from-date is not specified, the earliest time in the network is the from-date. If the to-date is not specified, the latest date in the network is the to-date. This affects only report types B, C, D, E, G, J, K, and L. The calendar report (type L) contains all dates between the from-year and the to-year. ←

57–58 Maximum total float (1.2.8.5)

Activities with total float less than or equal to this value are qualified. Events with slack less than or equal to this value are qualified. A summary activity is qualified, if any of the activities it represents are qualified.

If this field is blank, all activities are qualified. ←

59 Day indicator

This code selects the format for printing activity and event earliest and latest dates.

Code	Description
T	Integer number of days from the report zero date (3.2.1). If no report zero date is specified, the integer number of days from the calendar zero date (2.3.1).
D or blank	Date format (3.1.1) ←
B	Each report is printed twice, once in form T and once in form D.

Column	Purpose
60	Report type (1.5.2):

Code	Description
A	Project network report
B	Activity bar chart
C	Activity report
D	Event report
E	Predecessor-successor report
G	Summary activity report
I	Interface report
J	Critical path activity bar chart
K	Critical path activity report
L	Calendar

61–63 Sort code

This field is a 3-digit number which indicates how the report is to be sorted before printing. The sort code consists of a single digit (key 1) followed by two digits (key 2). Permissible values for key 1 and key 2 are given in 3.2.2.2 and 3.2.2.3.

64–65 Number of copies (Leading and trailing blanks are ignored.)

66–71 Second report request in the same format as columns 60–65

72–77 Third report request in the same format as columns 60–65

The contents of columns 7–59 from the most recently encountered type 14 format 2 card are used.

3.2.2.1. Use of Level Code and Milestones-Only Option

If the user does not assign a milestone level to an event or work item, then the milestone level is assumed to be 6.

The level code provided in column 8 and the milestones-only option (column 7) are used in qualifying data for reporting. Tables 3–1, 3–2, and 3–3 show the codes and their effects in producing report types B, C, D, E, G, J, and K.

Table 3–1. Type 14 Format 2 Codes for Activity Reports (Type B, C, E, J, and K)

Column 7 Milestones-Only Option Codes	Column 8 Level Code	Data Qualified
blank	1–5	All activities with activity level less than or equal to the level code
blank	6 or blank	All activities
blank	7–9	All activities with activity level equal to the level code.
M	1–5	All work items with either milestone level less than or equal to the level code. All I–J activities whose I-event or J-event has a milestone level less than or equal to the level code.
M	6 or blank	All work items with either milestone level equal to 1–5 or 7–9. All I–J activities whose I-event or J-event has a milestone level equal to 1–5 or 7–9.
M	7–9	All work items with either milestone level equal to the level code. All I–J activities whose I-event or J-event has a milestone level equal to the level code.

Table 3–2. Type 14 Format 2 Codes for Event Reports (Type D)

Column 7 Milestones-Only Option Codes	Column 8 Level Code	Data Qualified
blank or M	1–5	All events with milestone level less than or equal to the level code.
blank	6 or blank	All events
M	6 or blank	All events with milestone level of 1–5 or 7–9
blank or M	7–9	All events with milestone level equal to the level code.

The level code in column 8 is used to determine the reference points (1.2.8.1) for summarization when preparing a summary activity report (type G), shown in Table 3–3.

Table 3–3. Type 14 Format 2 Codes for Summary Activity Reports (Type G)

Column 8 Level Code	Reference Points Include	
	Events With Milestone Level	Start of Work Item or End of Work Item With Milestone Level
1–5	Less than or equal to the level code	Less than or equal to the level code
6	1–5 or 7–9	1–5 or 7–9
7–9	Equal to the level code	Equal to the level code

3.2.2.2. Sort Codes for Time-Related Reports

The sort code is not used when producing report types A or I. The sort code is used to generate all other time-related reports as follows:

- Key 1

Code	Description
0	Sort on key 2 only
1	Sort on project–network–key 2
2	Sort on key 2–project–network
3	Sort on project–network–performing department–key 2
4	Sort on performing department–project–network–key 2
5	Sort on project–network–cluster code–key 2
6	Sort on total float–key 2

Key 1 codes 0, 1, and 2 may be used for report types D and G. Key 1 codes 0, 1, 2, 3, 4, 5, and 6 may be used for report types B, C, E, J, and K. Key 1 code 6 may also be used for report type G. If the value of key 1 is 1, 3, or 5, the report heading will contain a summary of the network's schedule.

- Key 2

  – For Activity Reports (Types B, C, J, and K)

Code	Description
00	No sorting on this key
11	I-event identification
12	J-event identification or work item identification

Code	Description
15	Earliest start
16	Earliest finish
17	Latest start
18	Latest finish
19	Scheduled finish
20	Free float
21	Total float
22	Secondary float
23	Percent completed
25	Earliest start – I-event identification
26	Latest finish – J-event or work item identification
27	Scheduled finish – J-event or work item identification
28	Free float – J-event or work item identification
29	Activity level – earliest start
30	Activity level – earliest finish
31	Activity level – latest start
32	Activity level – latest finish
33	Activity level – scheduled finish
34	Activity level – free float
35	Activity level – percent completed

– For Event Report (Type D)

Code	Description
00	No sorting on this key
11	Event identification
14	Rank level

15	Earliest date
18	Latest date
19	Scheduled date
21	Total slack
22	Secondary slack
29	Milestone level – earliest date
32	Milestone level – latest date
33	Milestone level – scheduled date
36	Status – earliest date
37	Status – latest date
38	Status – scheduled date
39	Status – total slack
40	Status – secondary slack
41	Milestone level – status – earliest date
42	Milestone level – status – latest date
43	Milestone level – status – scheduled date

– For Summary Activity Report (Type G)

Code	Description
00	No sorting on this key
11	Identification of start reference point
12	Identification of end reference point
15	Earliest start
18	Latest finish
19	Total float
21	Free float
22	Detail float

25 Earliest start – identification of start reference point

26 Latest finish – identification of end reference point

36 Status – earliest start

37 Status – latest finish

38 Status – total float

39 Status – free float

40 Status – detail float

44 Status – earliest start – identification of start reference point

45 Status – latest finish – identification of end reference point

– For Predecessor-Successor Report (Type E)

Code	Description
00	No sort on this key
11	I-event identification
12	J-event or work item identification
14	Rank level
15	Earliest start
18	Latest finish
24	Rank level – I-event or work item identification

3.2.2.3. Sort Codes for Calendar Report (Type L)

When generating a calendar report (Type L) the 3-character sort code is interpreted as follows:

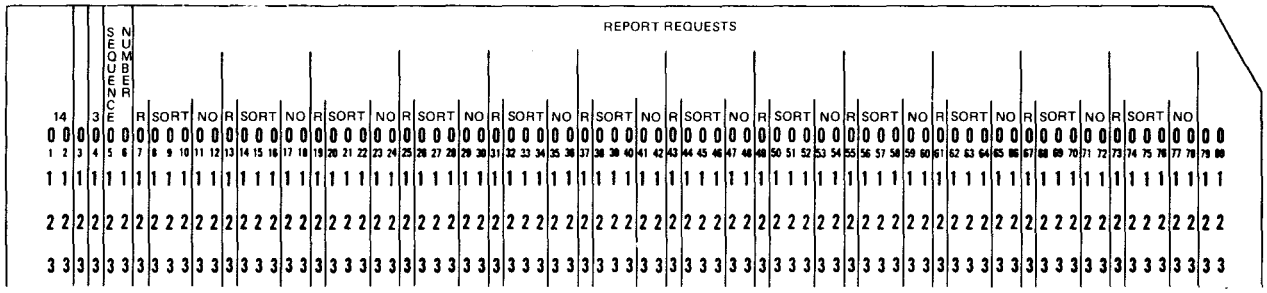
1st character – work-week start (2.3.4) – if blank, the network work-week start is used.

2nd character – work-week length (2.3.4) – if blank, the network work-week length is used.

3rd character – continuity code (2.3.4) – if blank, the network continuity code is used.

3.2.3. Type 14 Format 3

Columns 7–72 of this card specify numerous report requests using the same column code formats as columns 60–65 of format 2 card. The type 14 format 3 card has the following format:



Column	Purpose
1–2	Card code = 14 (2.2.1)
4	Format = 3 (3.2)
5–6	Sequence number
7	Report type (1.5.2):

Code	Description
A	Project network report
B	Activity bar chart
C	Activity report
D	Event report
E	Predecessor-successor report
G	Summary activity report
I	Interface report
J	Critical path activity bar chart
K	Critical path activity report
L	Calendar

8–10 Sort code

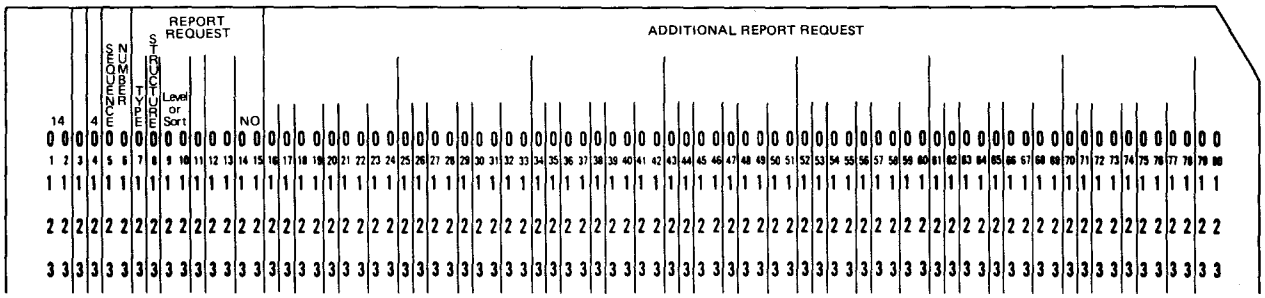
This field is a 3-digit number which indicates how the report is to be sorted before printing. The sort code consists of a single digit (key 1) followed by two digits (key 2). Permissible values for key 1 and key 2 are given in 3.2.2.2 and 3.2.2.3.

11–12 Number of copies (Leading and trailing blanks are ignored.)

13–72 Repetitions of columns 7–12

3.2.4. Type 14 Format 4

The type 14 format 4 card specifies passive cost report requests, and has the following format:



Column	Purpose
1–2	Card code = 14
4	Format = 4 (3.2)
5–6	Sequence number
7	Report type (1.5.2):

Code	Description
R	Resource requirements report
S	Cost structure report
U	Financial status report
V	Management activity report
W	Resource cost category plan
X	Financial plan
Y	Resource requirements plan
Z	Resource rates table

Column	Purpose
8	Structure

For reports S, U, and X:

Code	Description
W	WBS
O	OAS
B	WBS and OAS
N	All networks specified by type 14 format 1 cards (not valid for report S)

9–10 Level or Sort

For report R:

First Digit

Code	Description
1	Resource code – second digit
2	Project – network – resource code – second digit
3	Project – network – second digit

Second Digit

Code	Description
1	I-event or work item identification
2	J-event or work item identification
3	Early start
4	Late finish
5	Total quantity
6	Department

Column	Purpose

For Reports U and X:

Code	Description
01 – 12	Level of the structure

Blank if structure is N.

For Report V:

First Digit

Code	Description
0	Sort on second digit only
1	Sort on WBS charge number – project–network – second digit
2	Sort on OAS charge number – project–network – second digit
3	Sort on project-network – second digit

Second Digit

Code	Description
1	I-event identification
2	J-event or work item identification

For report Y:

First Digit

Code	Description
1	Resource code
2	Project – network – resource code

Second Digit

Must be blank

14–15 Number of copies (Leading and trailing blanks are ignored.)

Column	Purpose
16–24	Same as columns 7–15
25–33	Same as columns 7–15
34–42	Same as columns 7–15
43–51	Same as columns 7–15
52–60	Same as columns 7–15
61–69	Same as columns 7–15
70–78	Same as columns 7–15

3.3. HARDWARE AND FILE REQUIREMENTS

3.3.1. Minimum Hardware

MCS operates in any hardware configuration capable of processing the SPERRY UNIVAC Virtual Memory Operating System/9 (VS/9).

MCS requires the following minimum hardware configuration under the SPERRY UNIVAC Operating System/3 (OS/3) or the SPERRY UNIVAC Operating System/4 (OS/4):

- OS/3 or OS/4 operating in 65K of main storage
- The expanded micrologic feature under OS/3
- Card reader
- Printer with 132 print positions
- Any UNIVAC disc subsystem with two disc drives may be used where data management supports direct relative files.
- One UNISERVO 9-track tape unit is required when a consolidated updating output file from the previous MCS 9400 is being converted to an MCS data base file (3.2.2.7).

Additional disc units are required when processing large problems (3.3.2). Many files may reside on disc or tape (3.3.2.1, 3.3.2.4, 3.3.2.5, and 3.3.2.6).

3.3.2. File Requirements

MCS uses six files to store data and intermediate results during execution. The contents, space requirements, preformatting requirements, and device types of each file are described in succeeding paragraphs. The device type, for files permitted to reside on either tape or disc, is automatically recognized by MCS.

Tapes may be used with MCS only within the OS/3 or OS/4 operating systems. Prior to their first use with MCS on OS/3, all tapes must be prepared without block numbers by using the TPREP routine for OS/3. (Refer to the system service programs manual, UP-8062 (current version) for further information.)

All tapes used with MCS on OS/4 must be prepared without block numbers by using the UTPREP routine for OS/4. (Refer to the utility and service routines manual, UP-7713 (current version) for further information.)

3.3.2.1. Scratch File (MCSCR)

This file is required for every execution of MCS. The file is used to store the intermediate records generated during an execution of MCS and the report data records for each report (one report at a time).

3.3.2.1.1. MCSCR on OS/3 and OS/4

The file may reside either on tape or disc. A disc scratch file is processed in direct relative mode. If the file resides on disc, the user must preformat the file before its first use (3.3.3). Use LFD MCSCR when assigning this file (3.4.1.1, 3.4.1.2).

The number of disc cylinders (cc) required for this file can be approximated by using the equation:

$$cc = \frac{md}{rpc}$$

where:

cc
Is the number of cylinders required.

rpc
Is 150 for SPERRY UNIVAC 8411 Disc Subsystems;
600 for SPERRY UNIVAC 8414 or 8424 Disc Subsystems; or
350 for SPERRY UNIVAC 8416 Disc Subsystems.

md
Is the number of cards input during an execution of MCS, or the number of records in the new data base after data base creation or modification, whichever is greater.

For other disc subsystems, an equivalent amount of storage is required.

3.3.2.1.2. MCSCR on VS/9

MCS automatically allocates this scratch file by using the VS/9 filename MCSCR.yyjjj.hhmmss, where yyjjj is the Julian date and hhmmss is the time of day. This file is erased at normal termination of the MCS execution.

3.3.2.2. Scratch for Sorting (DM01)

This file is required for every execution of MCS. It is used by the operating system sort/merge program.

3.3.2.2.1. DM01 on OS/3

This file must be assigned as a job step temporary work file with the label DM01 (3.4.1.1).

3.3.2.2.2. DM01 on OS/4

This file must reside on disc and be prepared by the user as a sort scratch area. Use LFD DM01 when assigning this file (3.4.1.2). The number of cylinders (cs) required for this file may be approximated by using the equation:

$$cs = \frac{mr}{spc}$$

where:

cs
Is the number of cylinders required.

spc
Is 100 for SPERRY UNIVAC 8414 Disc Subsystems; or
400 for SPERRY UNIVAC 8414 or 8424 Disc Subsystems.

mr
Is either the number of cards input during an execution of MCS, or the number of report intermediate records used to generate the longest report during an execution of MCS, whichever is greater.

For other disc subsystems, an equivalent amount of storage is required.

3.3.2.2.3. DM01 on VS/9

The sort/merge work file on VS/9 is assigned and erased automatically by MCS. It is not necessary to assign a DM01 file.

3.3.2.3. Data and Control Tables (MCTABLES)

This file is not required when a syntax-edit-only execution of MCS is performed. It is required for each execution of MCS that includes table generation, time processing, cost processing, or report generation. It contains MCS data in the internal formats used during time, cost, and report processing.

3.3.2.3.1. MCTABLES on OS/3 and OS/4

Use LFD MCTABLES when assigning this file. The file must reside on disc and is processed in direct relative mode (3.4.1.1, 3.4.1.2). The user must preformat each extent before its first use (3.3.3). The number of cylinders (ct) required for this file can be approximated by using the equation:

$$ct = \frac{ni}{nic} + \frac{np}{npc} + \frac{nc}{ncc} + \frac{nr}{nrc}$$

where:

ni
Is the number of activities in I–J notation to be processed.

np

Is the number of activities in precedence notation to be processed.

nc

Is the number of charge numbers to be processed.

nr

Is the number of resource requirements to be processed.

nic

Is 80 for SPERRY UNIVAC 8411 Disc Subsystems;
400 for SPERRY UNIVAC 8414 or 8424 Disc Subsystems; or
235 for SPERRY UNIVAC 8416 Disc Subsystems.

npc

Is 70 for SPERRY UNIVAC 8411 Disc Subsystems;
350 for SPERRY UNIVAC 8414 or 8424 Disc Subsystems; or
200 for SPERRY UNIVAC 8416 Disc Subsystems.

ncc

Is 200 for SPERRY UNIVAC 8411 Disc Subsystems;
1000 for SPERRY UNIVAC 8414 or 8424 Disc Subsystems; or
580 for SPERRY UNIVAC 8416 Disc Subsystems.

nrc

Is 375 for SPERRY UNIVAC 8411 Disc Subsystems;
1800 for SPERRY UNIVAC 8414 or 8424 Disc Subsystems; or
1100 for SPERRY UNIVAC 8416 Disc Subsystems.

For other disc subsystems, an equivalent amount of storage is required.

3.3.2.3.2. MCTABLES on VS/9

This primary access method (PAM) file is assigned via a FILE command with LINK=MCTABLES (3.4.1.3). This file must be assigned if restore processing from MCTABLES or a report-only execution is requested (3.1.2). In all other cases, if the linkname is not defined, MCS automatically allocates this file with a VS/9 filename MCTABLES.yyjjj.hhmmss, where yyjjj is the Julian date and hhmmss is the time of day.

3.3.2.4. New Data Base (MCNEWDB)

This file contains the MCS data base records. It is an optional file that is required for a data base creation or update run of MCS. Before any time or cost processing is performed, the data in this file is used to generate the data and control tables in the file MCTABLES.

3.3.2.4.1. MCNEWDB on OS/3 and OS/4

The file may reside on either disc or tape. A disc file is processed in direct relative mode. If the file resides on disc, the user must preformat each extent before its first use (3.3.3). The number of disc cylinders required for this file can be approximated by using the equation provided in 3.3.2.1.1. If the file resides on tape, it may occupy only one reel. Use LFD MCNEWDB when assigning this file (3.4.1.1, 3.4.1.2).

3.3.2.4.2. MCNEWDB on VS/9

This PAM file is assigned via a FILE command with LINK=MCNEWDB. If this filename is not defined, MCS automatically allocates the file with the VS/9 filename MCNEWDB.yyjjj.hhmmss, where yyjjj is the Julian date and hhmmss is the time of day.

3.3.2.5. Old Data Base (MCOLDDB)

This is an optional file. It is required for a data base update run of MCS. The contents of the file must be the new data base produced by a previous execution of MCS. When the transaction code on an input card indicates that data is to be updated (D or R), the update operation is performed on the data in this file (2.2.2). The updated file is the new data base (MCNEWDB). If the transaction code on every input card is either A or N and an old data base file is supplied, updating will be performed. If the transaction code on every input card is either A or N and an old data base file is not supplied, then the new data base consists solely of the data supplied on the input cards.

3.3.2.5.1. MCOLDDB on OS/3 and OS/4

This file may reside on either disc or tape. A disc file is processed in direct relative mode. If the file resides on tape, it may occupy only one reel. Use LFD MCOLDDB when assigning this file.

3.3.2.5.2. MCOLDDB on VS/9

This PAM file is assigned via a FILE command with LINK=MCOLDDB. If the old data base is required, it must be assigned. MCS does not make an automatic assignment.

3.3.2.6. Report Output Records (MCREPOUT)

This is an optional file. If the file is provided, MCS places in the file a copy of the intermediate records for each report (3.4.3). See Appendix C for the format of the records in the file. MCS generates all requested reports on the printer, whether or not this file is assigned.

3.3.2.6.1. MCREPOUT on OS/3 and OS/4

This file must reside on disc. It is processed in direct relative mode. The file contains fixed-length, unblocked records of 250 bytes. This file must be preformatted before its use (3.3.3). Use LFD MCREPOUT when assigning this file.

The number of disc cylinders (cr) required for this file can be calculated by using the equation:

$$cr = \frac{rt}{rpc}$$

where:

cr
Is the number of cylinders required.

rt

Is the total number of lines in all reports generated during a single execution of MCS. (Assume that only one copy of each report is requested).

rpc

Is 100 for SPERRY UNIVAC 8411 Disc Subsystems;
400 for SPERRY UNIVAC 8414 or 8424 Disc Subsystems; or
235 for SPERRY UNIVAC 8416 Disc Subsystems.

For other disc subsystems, an equivalent amount of storage is required.

3.3.2.6.2. MCREPOUT on VS/9

This PAM file may be assigned via a FILE command with LINK=MCREPOUT. The records are fixed-length, blocked records of 250 bytes. Each PAM half page (2048 bytes) contains eight records.

3.3.2.7. Consolidated Updating Output File From Previous MCS on OS/4 (FORT09)

The data base file created by the previous version of the MCS on OS/4 was the consolidated updating output file assigned with LFD FORT09. MCS on OS/4 accepts this tape file and converts its contents to an MCS new data base file (LFD MCNEWDB). (See 3.4.4.)

3.3.2.8. Printed Output

MCS assumes that 132 print positions per line are available for all printed output.

3.3.2.8.1. Printer on OS/3 and OS/4

MCS requires a printer for every execution. The forms control loop in the printer must contain between 20 and 99 lines, and use channel 15 to indicate top-of-form. Use LFD PRNTR when assigning this file (3.4.1.1, 3.4.1.2).

3.3.2.8.2. Printed Output on VS/9

MCS writes all printer output to the VS/9 user's SYSLST file.

3.3.2.9. Save File (MCSAVE)

This is an optional file that is required for save processing (3.4.6). It contains a copy of the active data and control tables and is written during save processing.

3.3.2.9.1. MCSAVE on OS/3 and OS/4

The file may reside on either tape or disc. If the file resides on disc, it is processed in sequential mode. The number of disc cylinders required for this file can be approximated by using the equation provided in 3.3.2.3. Use LFD MCSAVE when assigning this file.

3.3.2.9.2. MCSAVE on VS/9

This PAM file may be assigned via a FILE command with LINK=MCSAVE. If this linkname is not defined and the file is required (3.4.6), MCS automatically allocates the file with VS/9 filename MCSAVE.yyjjj.hhmmss, where yyjjj is the Julian date and hhmmss is the time of day.

3.3.2.10. Restore File (MCRESTR)

This is an optional file which is required for restore processing (3.4.6). The contents of the file must have been generated by save processing during a previous execution of MCS.

3.3.2.10.1. MCRESTR on OS/3 and OS/4

This file may reside on disc or tape. If the file resides on disc, it is processed in sequential mode. Use LFD MCRESTR when assigning this file.

3.3.2.10.2. MCRESTR on VS/9

This PAM file may be assigned via a FILE command with LINK=MCRESTR.

3.3.3. Preformatting Disc Files on OS/3 and OS/4

All direct relative disc files must be preformatted by the user before initial use with MCS on OS/3 and OS/4. In OS/3, preformatting is accomplished by including the INIT positional parameter on the LFD job control statement; see the OS/3 job control manual, UP-8217 (current version). In OS/4, preformatting is accomplished in the disc file clear/preformat routine; see the OS/4 utility and service routines manual, UP-7713 (current version). The files do not require end-of-file records. The disc files that require user preformatting and the record descriptions are as follows:

LFD	Key Size	Data Size
MCNEWDB	0	1600
MCSCR	0	1600
MCTABLES	0	1024
MCREPOUT	0	250

3.4. OPERATING PROCEDURES

3.4.1. OS/3, OS/4, VS/9 Execution

A typical execution of MCS would update the data base, generate data and control tables, perform time and cost calculations, and print reports.

3.4.1.1. Sample Job Control Sequence for OS/3

For a complete explanation of the following job control sequence, refer to the job control manual, UP-8217 (current version). Many files may reside on either disc or tape (3.3.2.1, 3.3.2.4, 3.3.2.5, and 3.3.2.6). The following statements form a sample OS/3 job control stream for an MCS execution:

```
1         10        20        30        40        50        60
// JOB RUNMCS
// DVC lun // LFD PRNTR                    printer
// DVC lun // VOL volno
// LBL file-id // LFD MCSCR,1              scratch file on disc
// DMOI WORK1                              sort scratch area
// DVC lun // VOL volno
// LBL file-id // LFD MCTABLES,1           data and control tables
// DVC lun // VOL volno
// LBL file-id // LFD MCNEWDB,1            new data base on disc
// DVC lun // VOL volno
// LBL file-id // LFD MCOLDDB              old data base on tape
// EXEC MCSOS3
/$
   OD card, if any
   MCS input data
/*
/&
// FIN
```

NOTE:

The logical unit numbers (lun) may be equal and should be assigned according to local operating system conventions; likewise, the volume numbers (volno) may be equal.

3.4.1.2. Sample Job Control Sequence for OS/4

For a complete explanation of the following job control sequence, refer to the job control manual, UP-7793 (current version). Many files may reside on either disc or tape (3.3.2.1, 3.3.2.4, 3.3.2.5, and 3.3.2.6). The following statements form a sample OS/4 job control stream for an MCS execution:

```
1        10        20        30        40        50        60        70        80
// JOB RUNMCS
// DVC lun // LFD PRNTR                          printer
// DVC lun // VOL volno
// LBL file-id,volno // LFD MCSCR,DR,1           scratch file on disc
// DVC lun // VOL volno
// LFD DM01                                      sort scratch area (SYSPDDL)
// DVC lun // VOL volno
// LBL file-id,volno // LFD MCTABLES,DR,1        data and control tables
// DVC lun // VOL volno
// LBL file-id,volno // LFD MCNEWDB,DR,1         new data base on disc
// DVC lun // VOL volno
// LBL ,volno
// LFD MCOLDDB                                   old data base on tape
// EXEC MCSDS4,LOAD$LIB,,,REL
/$
  00 card, if any
  MCS input data
/*
/&
```

NOTE:

The logical unit numbers (lun) may be equal and should be assigned according to local operating system conventions; likewise, the volume numbers (volno) may be equal.

3.4.1.3. Sample Job Control Sequence for VS/9

For a complete explanation of the following job control sequence, refer to the system management manual, UP-8180 (current version). The following statements form a sample VS/9 job control sequence for an MCS execution:

```
/LOGON user-id,acctno
/FILE MCS.DATABASE,LINK=MCOLDDB
/SYSFILE SYSDTA=MCS.NEW.UPDATE.CARDS input card images from a catalogued file
/EXEC MCSVS9
/LOGOFF
```

NOTE:

The MCS files MCSCR (3.3.2.1), MCNEWDB (3.3.2.4), and MCTABLES (3.3.2.3) are assigned automatically according to the MCS naming convention. MCSCR is erased at the end of the execution. Data cards could have been included after the /EXEC command by eliminating the /SYSFILE command.

3.4.2. Report-Only Execution

In a report-only execution of MCS, the required reports are based on the information most recently placed in the data tables in the file MCTABLES. New data and control tables are not created and the time and cost procedures are not performed. A type 00 card must be supplied and column 3 must be R. If there are no valid, previously generated tables, the message

UNABLE TO RESTORE PREVIOUS TABLES

appears on the printed output and the execution of MCS terminates.

3.4.3. Generation of Report Output File

MCS is capable of producing a disc file containing report information requested by the user (3.3.2.6). The records are sorted according to the sort code provided by the user. Report identification information is included on the report output file. The exact format of the records is provided in Appendix C.

To define the file, the following statements must be included in the job control stream:

For OS/4:

```
1         10        20        30        40
// DVC lun // VOL vol,no
// LBL file-id, vol,no
// LFD MCREPOUT,DR,1
```

For OS/3:

```
// DVC lun // VOL vol,no
// LBL file-id // LFD MCREPOUT,1
```

For VS/9:

```
/FILE USER.REPORT.FILE,LINK=MCREPOUT
```

3.4.4. Converting From the Previous MCS on OS/4

The previous version of the MCS on OS/4 used a data base file called the consolidated updating output file with FORT09. MCS accepts this tape file and converts its contents to an MCS new data base file. During this type of MCS run, four files are required: FORT09, MCNEWDB, MCSCR, and DM01. No other files are needed. Card input is not accepted and no other MCS operations may be performed during this execution. All valid MCS operations may be performed on the resulting new data base file during a subsequent execution of MCS. This type of execution is available only within OS/4.

The following statements are a sample OS/4 job control stream for converting from the previous version of MCS:

```
1        10        20        30        40        50        60
// JOB CONVERT
// OPTION NOVOL
// DVC lun // LFD PRNTR                    printer
// DVC lun // VOL volno
// LBL file-id,volno // LFD MCSCR,DR,1     scratch file on disc
// DVC lun // VOL volno
// LFD DM01                                sort scratch area (SYSPOOL)
// DVC lun // VOL volno
// LBL ,volno
// LFD MCNEWDB                             new data base on tape
// DVC lun // VOL volno
// LBL ,volno
// LFD FORT09                              consolidated updating output file
// EXEC MCSDS4,LOAD$LIB,,,REL
/&
```

NOTE:

The logical unit numbers (lun) may be equal and should be assigned in accordance with local operating system conventions; likewise, the volume numbers (volno) may be equal.

All input card formats accepted by the previous MCS on OS/4 are accepted by the current MCS. In the previous system, all dates (input and reported) meant "before the start of work on the specified day." In the current MCS, all start dates mean "before the start of work on the specified day", and all finish and occurrence dates mean "after the completion of work on the specified day." MCS changes actual finish and scheduled finish dates as required, while generating the converted new data base.

3.4.5. Operational Considerations for MCS on OS/3 and OS/4

MCS operating within OS/3 and OS/4 uses all available user-assigned main storage for disc buffer areas. Significant reductions in the elapsed time of MCS execution can be obtained by providing MCS with main storage to be used as disc buffer areas. In addition to the minimum requirement for MCS, one additional disc buffer area is assigned for each 400_{16} locations assigned on the JOB card.

MCS significantly increases the efficiency of its performance if the scratch file (MCSCR), old data base file (MCOLDDB), and the new data base file (MCNEWDB) each reside on a different physical volume. Also, the new data base file (MCNEWDB), and the data and control tables (MCTABLES) should reside on a different physical volume.

3.4.6. Save/Restore Processing

When an execution of MCS is expected to run for an extended period of time, the user may want to make provision for saving intermediate results. Save processing is provided for this purpose and is used in conjunction with restore processing. Restore processing permits MCS to resume processing based on the previously saved intermediate results.

During save processing, the status of the MCS execution and the contents of MCTABLES are placed in the save file (MCSAVE). Save processing may be performed, at the user's option (3.1.2), three times (after table generation, latest time, and passive cost processing) or five times (after table generation, topological, earliest time, latest time, and passive cost processing) during an execution of MCS. Only the most recently saved set of information is available in the save file.

Immediately prior to writing a set of intermediate results on the save file, MCS places all status and control information in the file MCTABLES. If MCS terminates abnormally during save processing, restore processing from MCTABLES is valid.

When MCS terminates normally after table generation, latest time, or passive cost processing, all status and control information is placed in the file MCTABLES, whether or not save processing has been requested.

Restore processing reestablishes MCTABLES and internal control and status information. At the user's option, restore processing is from the restore file MCRESTR (i.e., a file whose contents were previously generated during save processing) or from an MCTABLES containing status and control information.

MCS processing resumes at the section (2.1) indicated by the restored internal status.

During restore processing, the type 00 card is required and is the only valid input card. The following fields of the type 00 card are in effect during restore processing: processing steps to be performed (blank, or T only), restore processing, save processing, label on the data and control tables (if restore processing = Z), label on the restore file (if restore processing = Y), and label to be written.

3.4.7. Label Processing

MCS maintains a set of internal labels on all data files. These labels allow the user to insure that MCS is processing the appropriate data and is not destroying needed data.

A label consists of any six characters from the MCS identification character set (2.2.3) including all blanks. The label on a file which has never been used with MCS, or a file which has never been used with MCS label processing, is automatically all blanks. Labels are specified via the type 00 card (3.1.2).

All label processing is done immediately after syntax editing the type 00 card and before all other processing. MCS first checks that the labels on the physical files are the labels expected by the user. The labels on MCOLDDB and MCNEWDB are always checked if data base updating is to be performed. The label on MCTABLES is checked if the processing option is R or the restore processing option is Z (3.1.2). The label on MCRESTR is checked if the restore processing option is Y (3.1.2).

If there are no errors in the type 00 card or in label checking, MCS immediately writes the new label on the files MCNEWDB, MCTABLES, and MCSAVE.

For every file which will be used during this execution, MCS prints what the "label was" before this execution and what the "label is" after label processing.

Appendix A. Report Examples

A.1. GENERAL

Sample reports are presented in this appendix. Each report available from management control system (MCS) is described in 1.5.2.

The time reports are based on the networks in Figures A–1 and A–2. The cost reports are based on the work breakdown structure in Figure 1–17 and the organizational accounting structure in Figure 1–18. ←

The contents of each field to the reports are indicated in Table A–1, and the reports are cross-referenced to the table. References to additional information elsewhere in this manual are shown in parentheses.

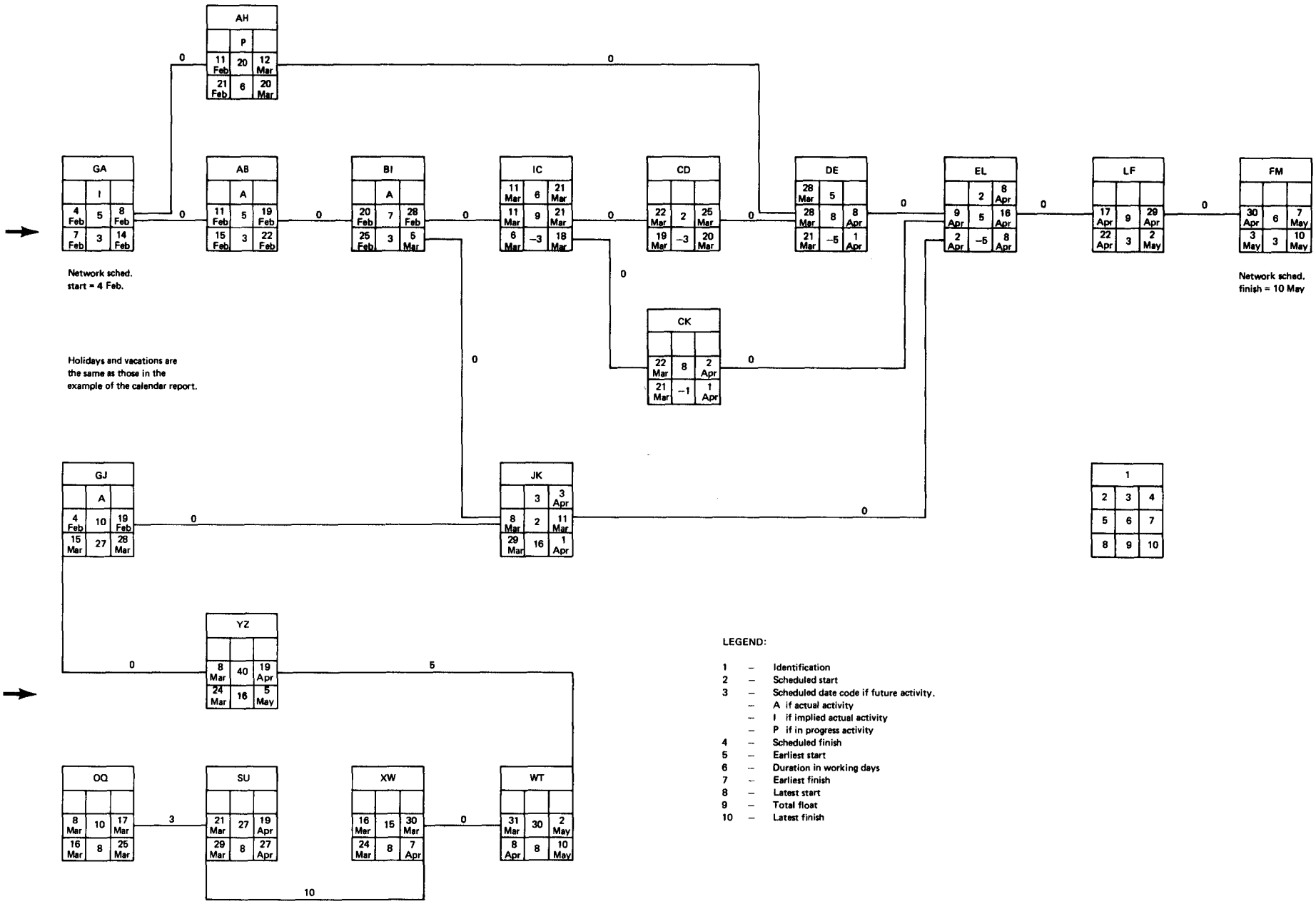


Figure A–1. Project P54, Network AN

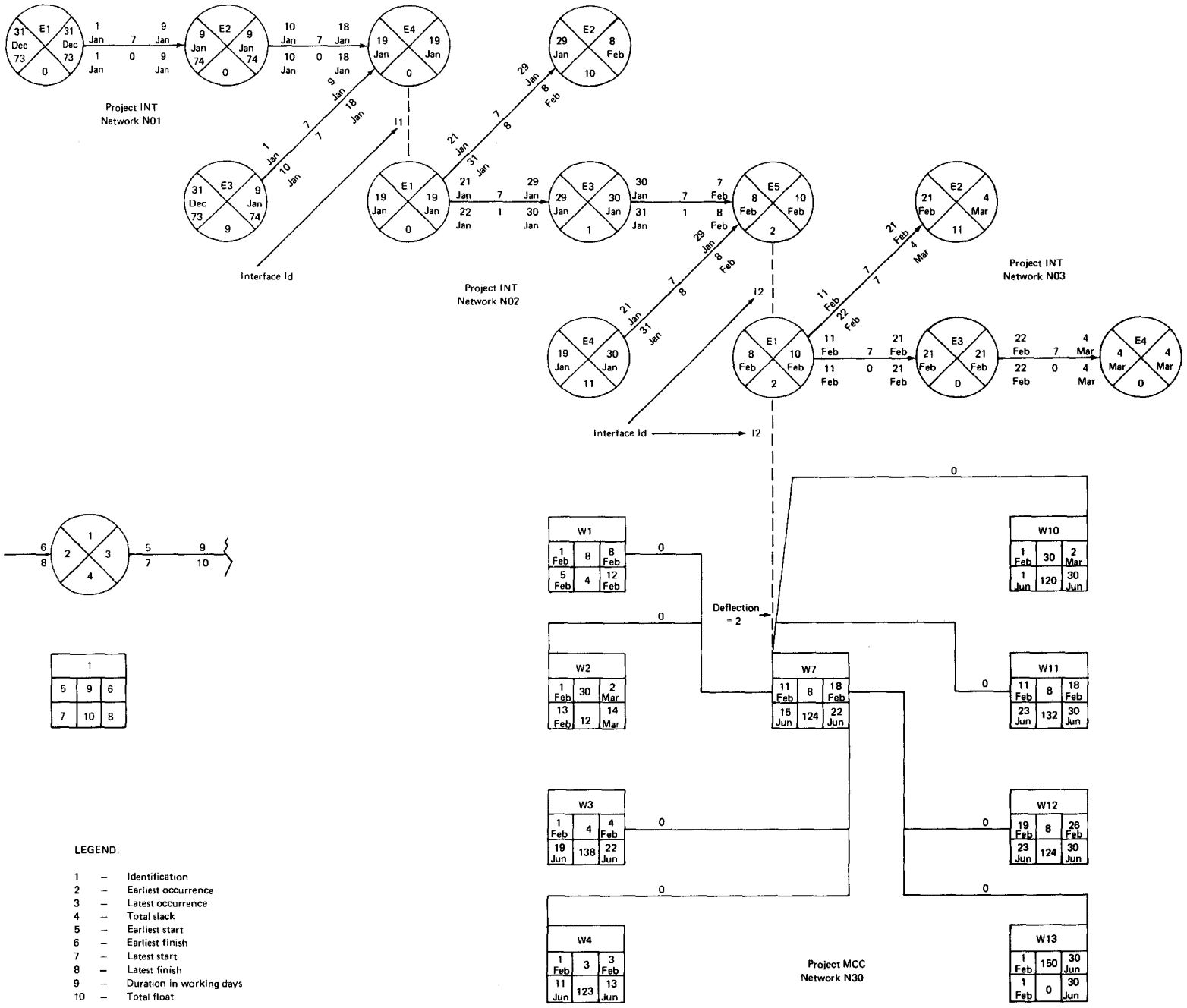


Figure A–2. Interfaces Between Project INT Networks N01, N02, N03 and Project MCC Network N30

Table A-1. Key to Reports (Part 1 of 6)

Field ID	Description
1	Code for report type (1.5, 3.2.2, 3.2.4)
2	Number of copies of the report printed (3.2.2, 3.2.4)
3	Status of activities or events in the report (3.2.2)
4	Maximum total float or slack of activities or events in the report (3.2.2)
5	Level code (3.2.2.1)
6	Project identification (2.2.3.1)
7	Network identification (2.2.3.1)
8	System description (2.3.2)
9	Project description (2.3.2)
10	Network description (2.3.2)
11	Run date (3.2.1)
12	Zero date (2.3.1, 3.2.1)
13	First date of date-to-date limitation (3.2.2)
14	Second date of date-to-date limitation (3.2.2)
15	Sort code (3.2.2.2, 3.2.4)
16	Network scheduled start (2.3.1)
17	Network scheduled finish (2.3.1)
18	Network cutoff (1.2.6, 2.3.1)
19	Network earliest start (1.2.3.3)
20	Network earliest finish (1.2.3.3)
21	Network latest start (1.2.3.3)
22	Network latest finish (1.2.3.3)
23	Network end date flag (2.3.1)
24	The plus sign (+) indicates positive total float (1.2.3.4).
25	The period (.) indicates free float (1.2.3.4).
26	The comma (,) indicates a holiday or vacation day (2.3.3).
27	A blank indicates a nonworking day other than a holiday or vacation (1.2.3.1). (See also, work week length and work week start in 2.3.1, 2.3.4.)
28	The letter E represents one work day (2.3.1, 2.3.4) of the activity duration when the activity starts at its earliest start.

Table A–1. Key to Reports (Part 2 of 6)

Field ID	Description
29	The letter L represents one work day (2.3.1, 2.3.4) of the activity duration when the activity ends at its latest finish.
30	The letter K represents one work day of an activity on a critical path (1.2.3.4).
31	Identification of i-event (2.2.3.2)
32	Identification of j-event or work item (2.2.3.2)
33	Code for the performing department for the activity (2.3.4)
34	Activity cluster code (2.3.4)
35	Level of activity significance (2.3.4)
36	Milestone level(s) of start and/or finish of work item (1.2.1.2, 2.3.6)
37	Interface event and interface at the start and/or the finish of the activity is indicated by the letter I (1.2.7, 2.3.7).
38	Activity work week length (1.2.3.1, 2.3.4)
39	Activity work week start (1.2.3.1, 2.3.4)
40	Activity continuity code (1.2.3.1, 2.3.4)
41	Bar graph time line showing the date of the day for each day.
42	Activity duration in working days (1.2.3.2, 1.2.6, 2.3.4, 2.3.8)
43	Percentage of activity duration completed (1.2.6, 2.3.8). For an implied actual activity, 100I is printed. If an asterisk is printed after the percentage, the implied actual start is later than the cutoff date, or the implied actual start and finish are later than the cutoff date. (See error messages T0605 or T0606.)
44	Activity earliest start (1.2.3.3)
45	Activity earliest finish (1.2.3.3)
46	Activity latest start (1.2.3.3)
47	Activity latest finish (1.2.3.3)
48	Scheduled date or time of i-event or start of work item (1.2.5, 2.3.6)
49	Code specifying the use of the scheduled date for the i-event or the start or finish of the work item (1.2.5, 2.3.6)
50	Scheduled date or time of j-event or finish of work item (1.2.5, 2.3.6)
51	Code specifying the use of the scheduled date for the j-event (1.2.5, 2.3.6)
52	Secondary float (1.2.5)
53	Total float (1.2.3.4)
54	Free float (1.2.3.4)
55	Event identification (2.2.3.2, 2.3.4)

Table A–1. Key to Reports (Part 3 of 6)

Field ID	Description
56	Event description (2.3.6)
57	Milestone level of event (1.2.1.1, 2.3.6)
58	Interface flag (1.2.7, 2.3.7)
59	Event rank (1.2.1.2)
60	Identification of interface event (2.2.3.2, 2.3.4, 2.3.7)
61	Identification of interface work item (2.2.3.2, 2.3.4, 2.3.7)
62	Event earliest occurrence (1.2.3.3)
63	Event latest occurrence (1.2.3.3)
64	Event scheduled occurrence (1.2.5, 2.3.6)
65	Scheduled date option code (1.2.5, 2.3.6)
66	Secondary slack (1.2.5)
67	Total slack (1.2.4)
68	Type of dependency between predecessor work item and successor work item (1.2.1.2, 2.3.5)
69	Lead (or lag) between predecessor work item and successor work item (1.2.1.2, 2.3.5)
70	Activity rank (1.2.1.2)
71	Predecessor activity is marked *PRED. Project-network identifiers are omitted.
72	Activity which is preceded by predecessors marked *PRED and succeeded by successors marked *SUCC.
73	Successor activity is marked *SUCC. Project-network identifiers are omitted.
74	Interface identification (1.2.7, 2.3.7.)
75	Earliest start of work item with type S interface, or earliest finish of work item with type F interface, or earliest occurrence of event with interface (1.2.7.2, 2.3.7)
76	Latest start of work item with type S interface, or latest finish of work item with type F interface, or latest occurrence of event with interface (1.2.7.2, 2.3.7)
77	Interface deflection (1.2.7.1.2, 2.3.7)
78	Earliest interface time (1.2.7.1.1.)
79	Latest interface time (1.2.7.1.1)
80	Identification of start reference point (1.2.8.1, 1.2.8.2)
81	Code indicating type of reference point (blank for event, S for start of work item, and F for finish of work item).
82	Milestone level of the reference point (1.2.8.1, 2.3.6, 3.2.2.1)

Table A-1. Key to Reports (Part 4 of 6)

Field ID	Description
83	Description applying to the reference point. The first 24 characters of an event description, or the milestone description (24 characters) for the start or finish of a work item (2.3.6).
84	Identification of finish reference point (1.2.8.1, 2.3.7)
85	Elapsed duration (1.2.8.4)
86	Strict duration (1.2.8.4)
87	Earliest start of summary activity (1.2.8.3)
88	Earliest finish of summary activity (1.2.8.3)
89	Latest start of summary activity (1.2.8.3)
90	Latest finish of summary activity (1.2.8.3)
91	Detail float of summary activity (1.2.8.5)
92	Holidays and vacations are defined in the type 12 card (1.3.3).
93	Nonworking days as defined when requesting the calendar report in a type 14 card (3.2.2.3)
95	Status of summary activity: A = When all activities between reference points are actual. P = When one or more activities between the reference points are in progress, or some actual and some future. F = When all activities between the reference points are future.
96	Event status (1.2.6, 2.3.8): A = All predecessor activities completed P = Some predecessor activities completed F = No predecessor activities completed
101	Type of structure (1.3.3, Figure 1-17, Figure 1-18, 3.2.4)
102	Level of the charge number (1.3.3, 2.4.6)
103	Charge number (1.3.3, 2.4.6)
104	Code for responsible or performing department (2.4.6)
105	Charge number description (2.4.6)
106	Level of the summary charge number (1.3.3, 2.4.6)
107	Summary charge number to which the charge number reports (1.3.3, 2.4.6)
108	Identification of activities for which cost is accumulated by this charge number (2.2.3.1, 2.2.3.2, 2.4.7)
109	A subtotal for all activities entering the structure at the selected charge number (1.5.2.).
110	Charge numbers which report directly to the summary charge number (1.3.3, 1.5.2)
112	Disbursements for direct cost (1.3.2.1)
113	Unliquidated obligations for direct cost (1.3.2.1)

Table A–1. Key to Reports (Part 5 of 6)

Field ID	Description
115	Disbursements for overhead cost (1.3.2.1)
116	Unliquidated obligations for overhead cost (1.3.2.1)
117	The sum of disbursements and unliquidated obligations for direct and overhead cost (1.3.2.1, 1.3.3.1)
118	Value received = $\frac{\text{actual cost}}{\text{latest revised estimate}}$ x planned cost (1.3.3.1)
119	Percent value received = $\frac{\text{value received}}{\text{planned cost}}$ x 100 (1.3.3.1)
120	Overrun or underrun is the difference between actual cost and value received (1.3.3.1)
121	Percentage overrun or underrun= $\frac{\text{overrun or underrun}}{\text{value received}}$ x 100 (1.3.3.1)
122	Committed cost (1.3.3.1, 2.4.8)
123	(1.3.3.1, 2.4.8)
124	(1.3.3.1)
125	Projected overrun or underrun is the difference between the latest revised estimate and the planned cost (1.3.3.1).
126	Project percentage overrun or underrun = $\frac{\text{projected overrun or underrun}}{\text{planned cost}}$ x 100 (1.3.3.1)
127	Identification of projects and networks for which the financial status is given (1.3.3.1)
128	System contract (2.3.2)
129	Project contract (2.3.2)
130	Network contract (2.3.2)
131	Network cutoff date (2.3.2)
132	Committed cost (1.3.3.1, 2.4.9)
133	(1.3.3.1, 2.4.9)
134	Charge number in the work breakdown structure (1.3.3, 2.4.7)
135	The system cost cutoff date (1.3.3.1)
136	(1.3.2.2, 2.4.5)
137	(1.3.2.2)
138	(1.3.3.1)
139	Charge number in the organizational accounting structure (1.3.3, 2.4.7)
140	(1.3.1, 2.4.1)
141	(2.4.1)
142	(1.3.3.2, 2.4.2)

Table A–1. Key to Reports (Part 6 of 6)

Field ID	Description
143	(1.3.1, 2.4.1)
144	(1.3.1, 2.4.3)
145	System earliest start (1.2.3.3)
146	System earliest finish (1.2.3.3)
147	System latest start (1.2.3.3)
148	System latest finish (1.2.3.3)
149	Project scheduled start (2.3.1)
150	Project scheduled finish (2.3.1)
151	Project cutoff (2.3.1)
152	Project earliest start (1.2.3.3)
153	Project earliest finish (1.2.3.3)
154	Project latest start (1.2.3.3)
155	Project latest finish (1.2.3.3)
156	System scheduled start (2.3.1)
157	System scheduled finish (2.3.1)
158	System cutoff (2.3.1)
160	Accounting period (A.16)
161	Direct cost estimated for this accounting period (1.3.2.1)
162	Overhead cost estimated for this accounting period (1.3.2.1)
163	Actual cost estimated for this accounting period (1.3.2.1)
164	Cumulative totals for the estimates
165	User-supplied estimated costs to complete an activity (2.4.5)
166	Direct cost component of the overall estimate of future activities with no user-supplied estimated cost to complete (1.3.2.1, 2.4.5)
167	Overhead cost component of the overall estimate of future activities with no user-supplied estimated cost to complete (1.3.2.1, 2.4.5)
168	Quantity of resource required during the period, expressed in measure of resource (2.4.4)
169	Quantity required per measure of resource (2.4.4)
170	Total quantity required for duration (2.4.4)
171	Total direct cost for the requirement (1.3.2.1)
172	Total overhead cost for the requirement (1.3.2.1)

A.2. BAR CHARTS (TYPES B AND J)

Bar charts showing all activities (type B) and only those activities on the critical path (type J) are available.

If none of the elements of the user-selected sort code is a time, or if one of the sort codes is an earliest time, the activities are shown in their earliest position. Positive total float is indicated where available. Positive free float is indicated where available for days not covered by total float.

Figure A–3 is an activity bar chart showing activities in their earliest position.

If one of the user-selected sort codes is a latest time, the activities are shown in their latest position. No floats are shown because float is related to an activity only in its earliest position.

Figure A–4 is an activity bar chart showing the same activities in their latest positions.

Figure A–3. Activity Bar Chart – Earliest Position (Part 1 of 2)

```
UNIVAC MANAGEMENT CONTROL SYSTEM              ***    ACTIVITY BAR CHART    ***    RUN DATE   20AUG74                          PAGE   2
TYPE B   COPIES  1   STATUS ALL                                                   REP DATES  FROM 04FEB74  TO 10MAY74
MAX TOTAL FLOAT      LEVEL CD 6                                                   SORT=115=PROJECT-NETWORK-E START
SYSTEM DESCRIPTION & CONTRACT             DEMONSTRATION OF REPORTS          S9.1

PRO P54            ACTUAL AND SCHEDULED DATES              CONT P9.1            NET SCH S 04FEB74  NET ES 04FEB74  NET LS 07FEB74
NET AN             ACTIVITY ON NODE NETWORK AN             CONT N9.1            NET SCH F 10MAY74  NET EF 07MAY74  NET LF 10MAY74
                                                                                CUTOFF    07MAR74                  NET END FLAG 0

  LEGEND:  +=POS TOT FLT   .=FREE FLT   ,=HOL/VAC   =NON-WRKG-DY   E=EARLIEST POSITION   K=CRITICAL ACTIVITY

PRO  NET  IEVENT  JEVENT  DEPT   C W C              1 MAY 74  2         3          1 JUN 74  2         3          1 JUL 74  2         3
                   OR WI         L S C   1234567890123456789012345678901123456789012345678901234567890123456789012345678901234567890
P54  AN           GJ      6868   A M 1
P54  AN           GA      6868   A M 1
P54  AN           AH      6868   A M 1
P54  AN           AB      6868   A M 1
P54  AN           BI      A5-1   4 M 1
P54  AN           JK      522B   4 M 1
P54  AN           OQ               M 1
P54  AN           YZ               M 1   +++++
P54  AN           IC      A5-1   4 M 1
P54  AN           XW               M 1
P54  AN           SU               M 1   .,.....
P54  AN           CD      522B   4 M 1
P54  AN           CK      522B   4 M 1
P54  AN           DE      CH10   4 M 1
P54  AN           WT               M 1   EE+++++++++
P54  AN           EL      CH10   X M 1
P54  AN           LF      CH10   X M 1   ++
P54  AN           FM      CH10   X M 1   EEE  EE+++
```

Figure A–3. Activity Bar Chart – Earliest Position (Part 2 of 2)

```
UNIVAC MANAGEMENT CONTROL SYSTEM            •••    ACTIVITY BAR CHART     •••    RUN DATE    20AUG74                          PAGE   1
TYPE B   COPIES  1   STATUS ALL                                                  REP DATES  FROM 04FEB74  TO 10MAY74
MAX TOTAL FLOAT      LEVEL CD 6                                                  SORT=126=PROJECT-NETWORK-L FINSH-J/WI ID
SYSTEM DESCRIPTION & CONTRACT          DEMONSTRATION OF REPORTS             59.1

PRO P54          ACTUAL AND SCHEDULED DATES            CONT P9.1                 NET SCH S 04FEB74  NET ES 04FEB74  NET LS 07FEB74
NET AN           ACTIVITY ON NODE NETWORK AN           CONT N9.1                 NET SCH F 10MAY74  NET EF 07MAY74  NET LF 10MAY74
                                                                                 CUTOFF    07MAR74                  NET END FLAG 0

  LEGEND: ,=HOL/VAC    =NON-WRKG-DY (29)L=LATEST POSITION   K=CRITICAL ACT

PRO  NET  IEVENT  JEVENT  DEPT  C W C           1 FEB 74  2                 1 MAR 74  2         3          1 APR 74  2         3
                   OR WI        L S C  12345678901234567890123456781234567890123456789012345678901123456789012345678901234567890
P54  AN           GA      6868  A M 1        LL  L,LL
P54  AN           AB      6868  A M 1              L  ,LLLL
P54  AN           BI      A5-1  4 M 1                        LLLLL  LL
P54  AN           IC      A5-1  4 M 1                                 LLL  LLLLL  L
P54  AN           AH      6868  A M 1                    LL  LLLLL  LLLLL  LLLLL  LLL
P54  AN           CD      5228  4 M 1                                              LL
P54  AN           OQ              M 1                                           LLLLL,LLLL
P54  AN           GJ      6868  A M 1                                          L  LLLLL  LLLL
P54  AN           CK      5228  4 M 1                                                LL  LLLLL  L
P54  AN           DE      CH10  4 M 1                                                KK  KKKKK  K
P54  AN           JK      5228  4 M 1                                                        L  L
P54  AN           XW              M 1                                                   LLLLLLLLLLLLLLL
P54  AN           EL      CH10  X M 1                                                            KKKK  K
P54  AN           SU              M 1                                                        LLLLLLLLLLLLLLL,,,LLLLLLLLLLL
P54  AN           LF      CH10  X M 1                                                                                LLLLL  LL
P54  AN           YZ              M 1                                                   LLLLLLLLLLLLLLLLLLLL,,,LLLLLLLLLLLLLLL
P54  AN           FM      CH10  X M 1
P54  AN           WT              M 1                                                                  LLLLL,,,LLLLLLLLLLLLLLL
```

Figure A–4. Activity Bar Chart – Latest Position (Part 1 of 2)

```
UNIVAC MANAGEMENT CONTROL SYSTEM           ***    ACTIVITY BAR CHART     ***    RUN DATE    20AUG74                      PAGE   2
TYPE B   COPIES  1   STATUS ALL                                                 REP DATES  FROM 04FEB74  TO 10MAY74
MAX TOTAL FLOAT      LEVEL CD 6                                                 SORT=126=PROJECT-NETWORK-L FINSH-J/WI ID
SYSTEM DESCRIPTION & CONTRACT          DEMONSTRATION OF REPORTS           S9.1

PRO P54             ACTUAL AND SCHEDULED DATES               CONT P9.1          NET SCH S 04FEB74  NET ES 04FEB74  NET LS 07FEB74
NET AN              ACTIVITY ON NODE NETWORK AN              CONT N9.1          NET SCH F 10MAY74  NET EF 07MAY74  NET LF 10MAY74
                                                                                CUTOFF    07MAR74                  NET END FLAG 0

 LEGEND: ,=HOL/VAC    =NON-WRKG-DY   L=LATEST POSITION   K=CRITICAL ACT

                                        C W C           1 MAY 74  2         3          1 JUN 74  2         3          1 JUL 74  2         3
PRO  NET  IEVENT  JEVENT   DEPT         L S C  1234567890123456789012345678901123456789012345678901234567890123456789012345678901234567890 1
                   OR WI
P54  AN           GA       6868         A M 1
P54  AN           AB       6868         A M 1
P54  AN           BI       A5-1         4 M 1
P54  AN           IC       A5-1         4 M 1
P54  AN           AH       6868         A M 1
P54  AN           CD       522B         4 M 1
P54  AN           OQ                      M 1
P54  AN           GJ       6868         A M 1
P54  AN           CK       522B         4 M 1
P54  AN           DE       CH10         4 M 1
P54  AN           JK       522B         4 M 1
P54  AN           XW                      M 1
P54  AN           EL       CH10         X M 1
P54  AN           SU                      M 1
P54  AN           LF       CH10         X M 1  LL
P54  AN           YZ                      M 1  LLLLL
P54  AN           FM       CH10         X M 1    L  LLLLL
P54  AN           WT                      M 1  LLLLLLLLLL
```

Figure A–4. Activity Bar Chart – Latest Position (Part 2 of 2)

A.3. ACTIVITY REPORT (TYPE C)

Figure A–5 is an activity report with dates in Gregorian date format.

Figure A–6 is the same report with dates in integer day number format.

UNIVAC MANAGEMENT CONTROL SYSTEM ••••• ACTIVITY REPORT ••••• (11) RUN DATE 20AUG74 PAGE 1
(1) TYPE C (2) COPIES (3) STATUS ALL (13) REP DATES FROM 04FEB74 (14) TO 10MAY74
(4) MAX TOTAL FLOAT (5) LEVEL CD 6 (15) SORT=112=PROJECT-NETWORK-J/WI ID
SYSTEM DESCRIPTION & CONTRACT (8) DEMONSTRATION OF REPORTS (128) S9.1

(6) PRO P54 (9) ACTUAL AND SCHEDULED DATES (129) CONT P9.1 (16) NET SCH S 04FEB74 (19) NET ES 04FEB74 (21) NET LS 07FEB74
(7) NET AN (10) ACTIVITY ON NODE NETWORK AN (130) CONT N9.1 (17) NET SCH F 10MAY74 (20) NET EF 07MAY74 (22) NET LF 10MAY74
(18) CUTOFF 07MAR74 (23) NET END FLAG 0

ACTIVITY DESCR	(31) IEVENT (32) JEVENT OR WI	(33) DEPT	(34) CL	(35) LVL	(36) MIL LVL S/F	(37) INT S/F	(38)(39)(40) WW WWC LSC	(42) DUR	(43) PCNT CMPL	(44) EARLIEST START	(45) EARLIEST FINISH	(46) LATEST START	(47) LATEST FINISH	(48) SCHED I EVENT OR WI S	(49) SDO	(50) SCHED J EVENT OR WI F	(51) SDO	(52) FLOATS SEC	(53) FLOATS TOT	(54) FLOATS FREE
WORK ITEM AB	AB	6868	A	2			5M1	5	100	11FEB74	19FEB74	15FEB74	22FEB74					3	3	0
WORK ITEM AH	AH	6868	A	3			5M1	20	85	11FEB74	12MAR74	21FEB74	20MAR74					6	6	11
WORK ITEM BI	BI	A5-1	4		5		5M1	7	100	20FEB74	28FEB74	25FEB74	05MAR74					3	3	5
WORK ITEM CD	CD	522B	4				5M1	2	0	22MAR74	25MAR74	19MAR74	20MAR74					-3	-3	2
WORK ITEM CK	CK	522B	4				5M1	8	0	22MAR74	02APR74	21MAR74	01APR74					-1	-1	4
WORK ITEM DE	DE	CH10	4	3			5M1	8	0	28MAR74	08APR74	21MAR74	01APR74	28MAR74	5			-5	-5	0
WORK ITEM EL	EL	CH10	X	2	2	4	5M1	5	0	09APR74	16APR74	02APR74	08APR74		2	08APR74		-5	-5	0
WORK ITEM FM	FM	CH10	X	1			5M1	6	0	30APR74	07MAY74	03MAY74	10MAY74					3	3	0
WORK ITEM GA	GA	6868	A	1			5M1	5	1001	04FEB74	08FEB74	07FEB74	14FEB74					3	3	0
WORK ITEM GJ	GJ	6868	A	2			5M1	10	100	04FEB74	19FEB74	15MAR74	28MAR74					29	27	12
WORK ITEM IC	IC	A5-1	4	3		5	5M1	9	0	11MAR74	21MAR74	06MAR74	18MAR74	11MAR74	6	21MAR74		-3	-3	0
WORK ITEM JK	JK	522B	4	5		5	5M1	2	0	08MAR74	11MAR74	29MAR74	01APR74		3	03APR74		17	15	20
WORK ITEM LF	LF	CH10	X	8			5M1	9	0	17APR74	29APR74	22APR74	02MAY74					3	3	0
WORK ITEM OQ	OQ						7M1	10	0	08MAR74	17MAR74	16MAR74	25MAR74					8	8	0
WORK ITEM SU	SU						7M1	27	0	21MAR74	19APR74	29MAR74	27APR74					8	8	18
WORK ITEM WT	WT						7M1	30	0	31MAR74	02MAY74	08APR74	10MAY74					8	8	5
WORK ITEM XW	XW						7M1	15	0	16MAR74	30MAR74	24MAR74	07APR74					8	8	0
WORK ITEM YZ	YZ						7M1	40	0	08MAR74	19APR74	24MAR74	05MAY74					16	16	8

Figure A–5. Activity Report in Gregorian Date Format

UNIVAC MANAGEMENT CONTROL SYSTEM ••••• ACTIVITY REPORT ••••• RUN DATE 20AUG74 (12) ZERO 01FEB74 PAGE 1

(1) TYPE C (2) COPIES (3) STATUS ALL — REP DATES FROM 3 TO 98

(4) MAX TOTAL FLOAT (5) LEVEL CD 6 — SORT=112=PROJECT-NETWORK-J/WI ID

SYSTEM DESCRIPTION & CONTRACT (8) DEMONSTRATION OF REPORTS (128) S9.1

(6) PRO PS4 (9) ACTUAL AND SCHEDULED DATES (129) CONT P9.1 (16) NET SCH S 3 (19) NET ES 3 (20) NET LS 6

(7) NET AN (10) ACTIVITY ON NODE NETWORK AN (130) CONT N9.1 (17) NET SCH F 98 (20) NET EF 95 (22) NET LF 98

(18) CUTOFF 34 (23) NET END FLAG 0

ACTIVITY DESCR	(31) IEVENT OR WI (32)	JEVENT (33)	DEPT (34)	C L	L V L (35)	MIL LVL S/F (36)	INT S/F (37)	WW WWC LSC (38)(39)	DUR (40)	PCNT CMPL (43)	EARLIEST START (44)	EARLIEST FINISH (45)	LATEST START (46)	LATEST FINISH (47)	SCHED I EVENT OR WI (48)	S D S (49)	SCHED J EVENT OR WI (50)	S D S (51)	FLOATS SEC (52)	FLOATS TOT (53)	FLOATS FREE (54)
WORK ITEM AB	AB	6868	A		3			5M1	5	100	10	18	14	21					3	3	0
WORK ITEM AH	AH	6868	A		3			5M1	20	85	10	39	20	47					6	6	11
WORK ITEM BI	BI	A5-1	4			5		5M1	7	100	19	27	24	32					3	3	5
WORK ITEM CD	CD	5228	4					5M1	2	0	49	52	46	47					-3	-3	2
WORK ITEM CK	CK	5228	4					5M1	8	0	49	60	48	59					-1	-1	4
WORK ITEM DE	DE	CH10	4		3			5M1	8	0	55	66	48	59	55	5			-5	-5	0
WORK ITEM EL	EL	CH10	X		2	2	4	5M1	5	0	67	74	60	66	2		66		-5	-5	0
WORK ITEM FM	FM	CH10	X		1			5M1	6	0	88	95	91	98					3	3	0
WORK ITEM GA	GA	6868	A		1			5M1	5	1001	3	7	6	13					3	3	0
WORK ITEM GJ	GJ	6868	A		2			5M1	10	100	3	18	42	55					29	27	12
WORK ITEM IC	IC	A5-1	4		3		5	5M1	9	0	38	48	33	45	38	6	48		-3	-3	0
WORK ITEM JK	JK	5228	4		5		5	5M1	2	0	35	38	56	59	3		61		17	15	20
WORK ITEM LF	LF	CH10	X		2			5M1	9	0	75	87	80	90					3	3	0
WORK ITEM OQ	OQ							7M1	10	0	35	44	43	52					8	8	0
WORK ITEM SU	SU							7M1	27	0	48	77	56	85					8	8	18
WORK ITEM WT	WT							7M1	30	0	58	90	66	98					8	8	5
WORK ITEM XW	XW							7M1	15	0	43	57	51	65					8	8	0
WORK ITEM YZ	YZ							7M1	40	0	35	77	51	93					16	16	8

Figure A–6. Activity Report in Integer Day Format

A.4. EVENT REPORT (TYPE D)

Figure A–7 is an event report for three I–J networks.

```
   UNIVAC MANAGEMENT CONTROL SYSTEM                 ******    EVENT REPORT     ******   (11)RUN DATE   20AUG74   (14)TO 04MAR74          PAGE    1
(1)TYPE D (2)COPIES   1 (3)STATUS ALL                                                    (13)REP DATES  FROM 31DEC73 
(4)MAX TOTAL FLOAT  (5)-LEVEL CD 6                                                    (15)-SORT=214=RANK LV-PROJECT-NETWORK
   SYSTEM DESCRIPTION 6 CONTRACT             (8)DEMONSTRATION OF REPORTS           (128)-59.1
  (6)  (7)  (55)                                                                            (37) (96) (62)                (64)         (65)
   PRO NET EVENT                    (56)EVENT DESCRIPTION                      (57)MIL (59)RANK   I    S              OCCURENCES              S                 SLACK
                                                                                    LVL      LEVEL  F    T   EARLIEST  (63)LATEST   SCHED    O   (66)SEC   (67)TOT

   INT NO1 E3           PRECEDES END OF NO1                                                   1          F   31DEC73   09JAN74                        9         9
   INT NO1 E1           START OF NETWORK NO1                                                  1          F   31DEC73   31DEC73                        0         0
   INT NO2 E4                                                                                 1          F   19JAN74   30JAN74                       10        11
   INT NO1 E2           EVENT E2 IN NO1                                                       2          F   09JAN74   09JAN74                        0         0
   INT NO1 E4           INTERFACES WITH E1 IN NO2                                             3     I    F   19JAN74   19JAN74                        1         0
   INT NO2 E1           INTERFACES WITH E4 IN NO1                                             3     I    F   19JAN74   19JAN74                        1         0
   INT NO2 E2                                                                                 4          F   29JAN74   08FEB74                       10        10
   INT NO2 E3           EVENT E3 IN NO2                                                       4          F   29JAN74   30JAN74                        0         1
   INT NO2 E5           INTERFACES WITH E1 IN NO3 AND START OF W7                             5     I    F   08FEB74   10FEB74                       -1         2
   INT NO3 E1           INTERFACES WITH START OF W7 AND E5 IN NO2                             5     I    F   08FEB74   10FEB74                       -1         2
   INT NO3 E3           EVENT E3 IN NO3                                                       6          F   21FEB74   21FEB74                       -1         0
   INT NO3 E2                                                                                 6          F   21FEB74   04MAR74                        8        11
   INT NO3 E4           END OF NETWORK NO3.                                                   7          F   04MAR74   04MAR74                       -3         0
```

Figure A–7. Event Report

A.5. PREDECESSOR-SUCCESSOR REPORT (TYPE E)

Figure A–8 is a multiproject multinetwork predecessor-successor report.

UNIVAC MANAGEMENT CONTROL SYSTEM • PREDECESSOR-SUCCESSOR REPORT • RUN DATE 20AUG74 PAGE 1
TYPE E COPIES 1 STATUS ALL REP DATES FROM 01JAN74 TO 30JUN74
MAX TOTAL FLOAT LEVEL CD 6 SORT=215=E START-PROJECT-NETWORK
SYSTEM DESCRIPTION & CONTRACT DEMONSTRATION OF REPORTS S9.1

PRO	NET	EVENT OR WI	JEVENT OR WI	DEPT	C L	D E P	LEAD OR LAG	RANK LEVEL	INT S/F	WW WWC LSC	DUR	PCNT CMPL	EARLIEST START	EARLIEST FINISH	LATEST START	LATEST FINISH	SCHED I EVENT OR WI	S D S O	SCHED J EVENT OR WI	S D F O	SEC	FLOATS TOT	FREE
INT	NO1	E1	E2			******		1		5M1	7	0	01JAN74	09JAN74	01JAN74	09JAN74					0	0	0
*SUCC		E2	E4					2	I	5M1	7	0	10JAN74	18JAN74	10JAN74	18JAN74					0	0	0
INT	NO1	E3	E4			******		1	I	5M1	7	0	01JAN74	09JAN74	10JAN74	18JAN74					7	7	7
*PRED		E1	E2					1		5M1	7	0	01JAN74	09JAN74	01JAN74	09JAN74					0	0	0
INT	NO1	E2	E4			******		2	I	5M1	7	0	10JAN74	18JAN74	10JAN74	18JAN74					0	0	0
INT	NO2	E1	E2			******		3	I	5M1	7	0	21JAN74	29JAN74	31JAN74	08FEB74					8	8	8
INT	NO2	E1	E3			******		3	I	5M1	7	0	21JAN74	29JAN74	22JAN74	30JAN74					0	1	0
*SUCC		E3	E5					4	I	5M1	7	0	30JAN74	07FEB74	31JAN74	08FEB74					0	1	1
INT	NO2	E4	E5			******		1	I	5M1	7	0	21JAN74	29JAN74	31JAN74	08FEB74					7	8	8
*PRED		E1	E3					3	I	5M1	7	0	21JAN74	29JAN74	22JAN74	30JAN74					0	1	0
INT	NO2	E3	E5			******		4	I	5M1	7	0	30JAN74	07FEB74	31JAN74	08FEB74					0	1	1
MCC	N30		W1			******		1		7M2	8	0	01FEB74	08FEB74	05FEB74	12FEB74					1	4	2
*SUCC			W7			N	0	5	I	7M2	8	0	11FEB74	18FEB74	15JUN74	22JUN74					83	124	0
*PRED			W7			X	0	5	I	7M2	8	0	11FEB74	18FEB74	15JUN74	22JUN74					83	124	0
MCC	N30		W10			******		6		7M2	10	0	01FEB74	02MAR74	01JUN74	30JUN74					79	120	120
*PRED			W7			F	0	5	I	7M2	8	0	11FEB74	18FEB74	15JUN74	22JUN74					83	124	0
MCC	N30		W13			******		6		7M2	150	0	01FEB74	30JUN74	01FEB74	30JUN74					-41	0	0
MCC	N30		W2			******		1		7M2	30	0	01FEB74	02MAR74	13FEB74	14MAR74					9	12	12
*SUCC			W7			S	0	5	I	7M2	8	0	11FEB74	18FEB74	15JUN74	22JUN74					83	124	0
MCC	N30		W3			******		1		7M2	4	0	01FEB74	04FEB74	19JUN74	22JUN74					97	138	14
*SUCC			W7			F	0	5	I	7M2	8	0	11FEB74	18FEB74	15JUN74	22JUN74					83	124	8
MCC	N30		W4			******		1		7M3	3	0	01FEB74	03FEB74	11JUN74	13JUN74					95	123	123
*SUCC			W7			X	0	5	I	7M2	8	0	11FEB74	18FEB74	15JUN74	22JUN74					83	124	0
INT	NO3	E1	E2			******		5	I	5M1	7	0	11FEB74	21FEB74	22FEB74	04MAR74					6	7	7
INT	NO3	E1	E3			******		5	I	5M1	7	0	11FEB74	21FEB74	11FEB74	21FEB74					-1	0	0
*SUCC		E3	E4					6		5M1	7	0	22FEB74	04MAR74	22FEB74	04MAR74					-1	0	0
*PRED			W7			S	0	5	I	7M2	8	0	11FEB74	18FEB74	15JUN74	22JUN74					83	124	0
MCC	N30		W11			******		6		7M2	8	0	11FEB74	18FEB74	23JUN74	30JUN74					91	132	132

Figure A–8. Predecessor – Successor Report (Part 1 of 2)

UNIVAC MANAGEMENT CONTROL SYSTEM • PREDECESSOR-SUCCESSOR REPORT • RUN DATE 20AUG74 PAGE 2
TYPE E COPIES 1 STATUS ALL REP DATES FROM 01JAN74 TO 30JUN74
MAX TOTAL FLOAT LEVEL CD 6 SORT=215=E START-PROJECT-NETWORK
SYSTEM DESCRIPTION & CONTRACT DEMONSTRATION OF REPORTS S9.1

PRO	NET	IEVENT OR WI	JEVENT OR WI	DEPT	C L	D E P	LEAD OR LAG	RANK LEVEL	INT S/F	WW WWC LSC	DUR	PCNT CMPL	EARLIEST START	EARLIEST FINISH	LATEST START	LATEST FINISH	SCHED I EVENT OR WI	S D S O	SCHED J EVENT OR WI	S D F O	SEC	FLOATS TOT	FREE
	•PRED		W1			N	0	1		7M2	8	0	01FEB74	08FEB74	05FEB74	12FEB74					4	4	2
	•PRED		W2			S	0	1		7M2	30	0	01FEB74	02MAR74	13FEB74	14MAR74					12	12	10
71	•PRED		W3			F	0	1		7M2	4	0	01FEB74	04FEB74	19JUN74	22JUN74					97	138	14
	•PRED		W4			X	0	1		7M3	3	0	01FEB74	03FEB74	11JUN74	13JUN74					95	123	123
72	MCC	N30	W7			••••••		5	I	7M2	8	0	11FEB74	18FEB74	15JUN74	22JUN74					83	124	0
	•SUCC		W10			X	0	6		7M2	30	0	01FEB74	02MAR74	01JUN74	30JUN74					79	120	120
73	•SUCC		W11			S	0	6		7M2	8	0	11FEB74	18FEB74	23JUN74	30JUN74					91	132	132
	•SUCC		W12			SN	0	6		7M2	8	0	19FEB74	26FEB74	23JUN74	30JUN74					83	124	124
	•SUCC		W13			F	0	6		7M2	150	0	01FEB74	30JUN74	01FEB74	30JUN74					-41	0	0
	•PRED		W7			N	0	5	I	7M2	8	0	11FEB74	18FEB74	15JUN74	22JUN74					83	124	0
MCC	N30		W12			••••••		6		7M2	8	0	19FEB74	26FEB74	23JUN74	30JUN74					83	124	124
	•PRED	E1	E4			••••••		5	I	5M1	7	0	11FEB74	21FEB74	11FEB74	21FEB74					-1	0	0
INT	NO3	E3	E4			••••••		6		5M1	7	0	22FEB74	04MAR74	22FEB74	04MAR74					-1	0	0

Figure A–8. Predecessor – Successor Report (Part 2 of 2)

A.6. SUMMARY ACTIVITY REPORT (TYPE G)

Figure A–9 is a summary activity report. It shows the network P54 AN (Figures A–1, A–5, and A–6) summarized to level 4.

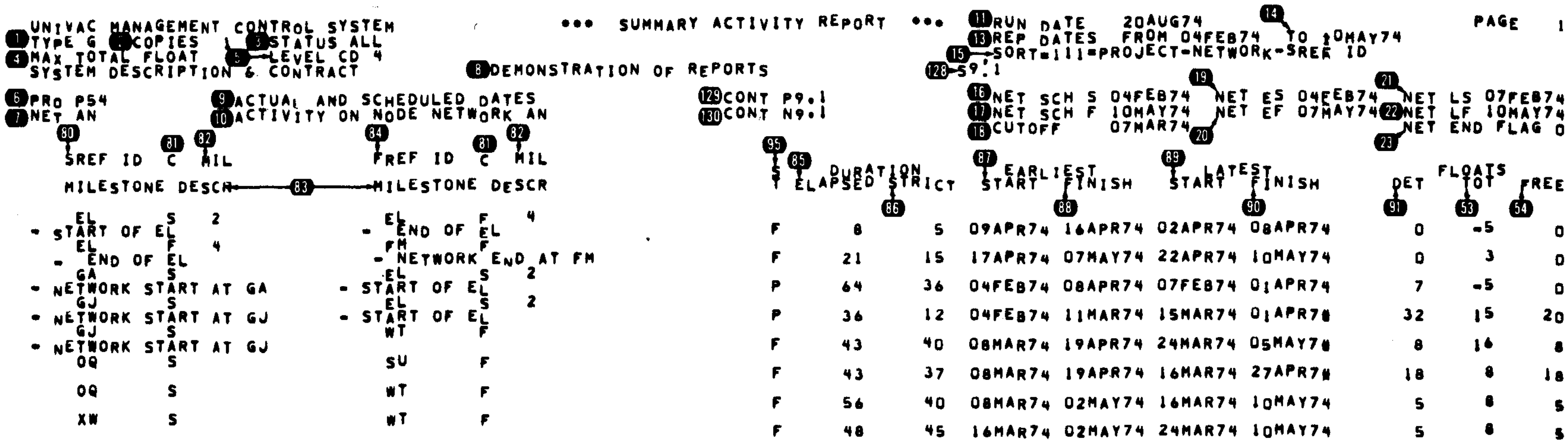


Figure A–9. Summary Activity Report

A.7. INTERFACE REPORT (TYPE I)

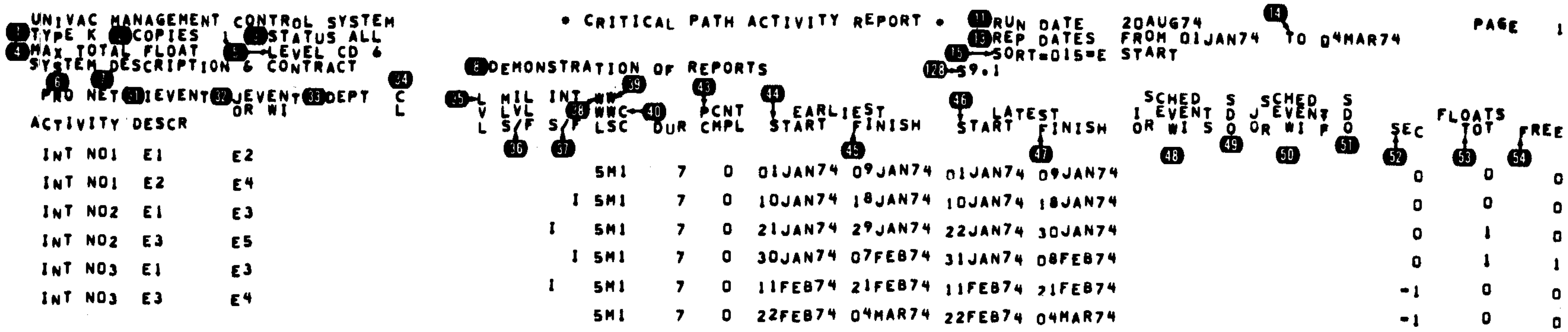
Figure A–10 is an interface report for the system shown in Figure A–2.

```
  UNIVAC MANAGEMENT CONTROL SYSTEM                     *****   INTERFACE REPORT   *****  (11)RUN DATE   20AUG74     (14)                PAGE   1
(1)TYPE I  (2)COPIES  1  (3)STATUS ALL                                                (13)REP DATES  FROM 19JAN74  TO 15JUN74
(4)MAX TOTAL FLOAT  (5)--LEVEL CD 6                                                  (15)--SORT=200=INTF ID-PROJECT-NETWORK
  SYSTEM DESCRIPTION & CONTRACT              (8)DEMONSTRATION OF REPORTS          (128)-59.1

(74)INTERF   (6)  (7)                (61)WORK (58)INT                                           START/FIN/OCCUR.                     INTERFACE
     ID      PRO NET  (60)EVENT          ITEM     FLG     EVENT OR WORK ITEM DESCRIPTION   (75)EARLIEST (76)LATEST (77)DEFL (78)EARLIEST (79)LATEST

  I1         INT NO1   E4                          I    INTERFACES WITH E1 IN NO2              19JAN74    19JAN74      0    19JAN74    19JAN74
  I1         INT NO2   E1                          I    INTERFACES WITH E4 IN NO1              19JAN74    19JAN74      0    19JAN74    19JAN74

  I2         INT NO2   E5                          I    INTERFACES WITH E1 IN NO3 AND START OF W7   08FEB74    10FEB74      0    08FEB74    10FEB74
  I2         INT NO3   E1                          I    INTERFACES WITH START OF W7 AND E5 IN NO2   08FEB74    10FEB74      0    08FEB74    10FEB74
  I2         MCC N30                  W7           S                                          11FEB74    15JUN74      2    08FEB74    10FEB74
```

Figure A–10. Interface Report (Type I)

A.8. CRITICAL PATH ACTIVITY REPORT (TYPE K)

Figure A–11 is a multinetwork critical path activity report.



```
UNIVAC MANAGEMENT CONTROL SYSTEM          • CRITICAL PATH ACTIVITY REPORT •  RUN DATE   20AUG74                    PAGE  1
TYPE K  COPIES  1  STATUS ALL                                                 REP DATES  FROM 01JAN74  TO 04MAR74
MAX TOTAL FLOAT    LEVEL CD 6                                                 SORT=D15=E START
SYSTEM DESCRIPTION & CONTRACT             DEMONSTRATION OF REPORTS            59.1
```

PRO NET ACTIVITY DESCR	I EVENT	J EVENT OR WI	DEPT	C L	L V L	MIL LVL S/F	INT S/F	WWC LSC	DUR	PCNT CMPL	EARLIEST START	EARLIEST FINISH	LATEST START	LATEST FINISH	SCHED I EVENT OR WI	S D O	SCHED J EVENT OR WI	S D O	FLOATS SEC	FLOATS TOT	FLOATS FREE
INT NO1	E1	E2						5M1	7	0	01JAN74	09JAN74	01JAN74	09JAN74					0	0	0
INT NO1	E2	E4					I	5M1	7	0	10JAN74	18JAN74	10JAN74	18JAN74					0	0	0
INT NO2	E1	E3					I	5M1	7	0	21JAN74	29JAN74	22JAN74	30JAN74					0	1	0
INT NO2	E3	E5					I	5M1	7	0	30JAN74	07FEB74	31JAN74	08FEB74					0	1	1
INT NO3	E1	E3					I	5M1	7	0	11FEB74	21FEB74	11FEB74	21FEB74					-1	0	0
INT NO3	E3	E4						5M1	7	0	22FEB74	04MAR74	22FEB74	04MAR74					-1	0	0

Figure A–11. Critical Path Activity Report (Type K)

A.9. CALENDAR (TYPE L)

Figure A–12 is a system calendar showing all the holidays and vacation days in effect during generation of all the other reports in this appendix.

If a calendar is requested with a continuity code of 1 or 5, a calendar is generated using the work week start and length in the report request and all holidays and vacations.

If a calendar is requested with a continuity code of 2 or 6, a calendar is generated for a 7-day work week with no holidays and no vacations.

If the continuity code is 3, 4, 7, or 8 a 7-day work week calendar with holidays and vacations is generated.

UNIVAC MANAGEMENT CONTROL SYSTEM *** SYSTEM CALENDAR *** RUN DATE 20AUG74 PAGE 1

EACH DATE ENTRY CONSISTS OF THREE PARTS
NUMBER OF DAYS FROM ZERO DATE
DATE IN FORM DDMM
NUMBER WORKING DAYS FROM ZERO DATE
H/V = HOLIDAY-VACATION (92)
NWD = NON-WORKING (93)

(12) REPORT ZERO DATE 01 FEB 74
WORKWEEK LENGTH 5 DAYS
WORKWEEK START MONDAY
CONTINUITY CODE 1

JANUARY 1974

SUNDAY		MONDAY		TUESDAY		WEDNESDAY		THURSDAY		FRIDAY		SATURDAY	
				-31 0101	-23	-30 0201	-22	-29 0301	-21	-28 0401	-20	-27 0501	NWD
-26 0601	NWD	-25 0701	-19	-24 0801	-18	-23 0901	-17	-22 1001	-16	-21 1101	-15	-20 1201	NWD
-19 1301	NWD	-18 1401	-14	-17 1501	-13	-16 1601	-12	-15 1701	-11	-14 1801	-10	-13 1901	NWD
-12 2001	NWD	-11 2101	-9	-10 2201	-8	-9 2301	-7	-8 2401	-6	-7 2501	-5	-6 2601	NWD
-5 2701	NWD	-4 2801	-4	-3 2901	-3	-2 3001	-2	-1 3101	-1				

FEBRUARY 1974

SUNDAY		MONDAY		TUESDAY		WEDNESDAY		THURSDAY		FRIDAY		SATURDAY	
										0 0102	0	1 0202	NWD
2 0302	NWD	3 0402	1	4 0502	2	5 0602	3	6 0702	4	7 0802	5	8 0902	NWD
9 1002	NWD	10 1102	6	11 1202	H/V	12 1302	7	13 1402	8	14 1502	9	15 1602	NWD
16 1702	NWD	17 1802	H/V	18 1902	10	19 2002	11	20 2102	12	21 2202	13	22 2302	NWD
23 2402	NWD	24 2502	14	25 2602	15	26 2702	16	27 2802	17				

MARCH 1974

SUNDAY		MONDAY		TUESDAY		WEDNESDAY		THURSDAY		FRIDAY		SATURDAY	
										28 0103	18	29 0203	NWD
30 0303	NWD	31 0403	19	32 0503	28	33 0603	21	34 0703	22	35 0803	23	36 0903	NWD
37 1003	NWD	38 1103	24	39 1203	25	40 1303	26	41 1403	27	42 1503	28	43 1603	NWD
44 1703	NWD	45 1803	29	46 1903	30	47 2003	31	48 2103	32	49 2203	33	50 2303	NWD
51 2403	NWD	52 2503	34	53 2603	35	54 2703	36	55 2803	37	56 2903	38	57 3003	NWD
58 3103	NWD												

APRIL 1974

SUNDAY		MONDAY		TUESDAY		WEDNESDAY		THURSDAY		FRIDAY		SATURDAY	
		59 0104	39	60 0204	40	61 0304	41	62 0404	42	63 0504	43	64 0604	NWD
65 0704	NWD	66 0804	44	67 0904	45	68 1004	46	69 1104	47	70 1204	48	71 1304	NWD
72 1404	NWD	73 1504	H/V	74 1604	49	75 1704	50	76 1804	51	77 1904	52	78 2004	NWD
79 2104	NWD	80 2204	53	81 2304	54	82 2404	55	83 2504	56	84 2604	57	85 2704	NWD
86 2804	NWD	87 2904	58	88 3004	59								

MAY 1974

SUNDAY		MONDAY		TUESDAY		WEDNESDAY		THURSDAY		FRIDAY		SATURDAY	
						89 0105	60	90 0205	61	91 0305	62	92 0405	NWD
93 0505	NWD	94 0605	63	95 0705	64	96 0805	65	97 0905	66	98 1005	67	99 1105	NWD
100 1205	NWD	101 1305	68	102 1405	69	103 1505	70	104 1605	71	105 1705	72	106 1805	NWD
107 1905	NWD	108 2005	73	109 2105	74	110 2205	75	111 2305	76	112 2405	77	113 2505	NWD
114 2605	NWD	115 2705	H/V	116 2805	78	117 2905	79	118 3005	80	119 3105	81		

JUNE 1974

SUNDAY		MONDAY		TUESDAY		WEDNESDAY		THURSDAY		FRIDAY		SATURDAY	
												120 0106	NWD
121 0206	NWD	122 0306	82	123 0406	83	124 0506	84	125 0606	85	126 0706	86	127 0806	NWD
128 0906	NWD	129 1006	87	130 1106	88	131 1206	89	132 1306	90	133 1406	H/V	134 1506	NWD
135 1606	NWD	136 1706	H/V	137 1806	H/V	138 1906	H/V	139 2006	H/V	140 2106	H/V	141 2206	NWD
142 2306	NWD	143 2406	H/V	144 2506	H/V	145 2606	H/V	146 2706	H/V	147 2806	H/V	148 2906	NWD
149 3006	NWD												

Figure A–12. System Calendar

A.10. COST STRUCTURE REPORT (TYPE S)

Figure A–13 is a cost structure report for a work breakdown structure. The same format is used for the organizational accounting structure.

UNIVAC MANAGEMENT CONTROL SYSTEM (1) TYPE S (2) COPIES 2 **** (101) COST STRUCTURE REPORT **** (101) WORK BREAKDOWN STRUCTURE RUN DATE 20AUG74 PAGE 1

(102) LVL	(103) CHARGE NUMBER	(104) DEPT	(105) DESCRIPTION	(106) LVL	SUMMARY CHARGE NUMBER (107)	(108) PRO	NET	IEVNT	JEVENT OR WI
1	B39		BUILD HOUSE						
2	B39CL		CONSTRUCTION	1	B39				
3	A469	6868	WORK ON HOME	2	B39CL				
3	B39P		WORK ON PROPERTY	2	B39CL				
4	A4691	6868	FOUNDATION	3	A469	KJB	02A	E106	E111
4	A4692	6868	FRAME	3	A469	KJB	02A	E111	E132
						KJB	02A	E132	E180
4	A4693	6868	SIDING & ROOFING	3	A469	KJB	02A	E120	E126
						KJB	02A	E132	E126
4	A4694	6868	INSTALL UTILITIES	3	A469	KJB	02A	E104	E106
						KJB	02A	E108	E111
						KJB	02A	E112	E133
						KJB	02A	E122	E128
						KJB	02A	E132	E112
4	A4695	6868	INSIDE WALLS	3	A469	KJB	02A	E122	E112
						KJB	02A	E132	E122
4	A4696	6868	PAINTING	3	A469	KJB	02A	E126	E130
						KJB	02A	E128	E112
4	39PL	6868	LANDSCAPE	3	B39P				
4	39PSC	6868	SITE CLEARING	3	B39P	KJB	02A	E102	E106
5	DG39P	6868	GRADING	4	39PL	KJB	02A	E130	E136
5	D39P		PAVE DRIVEWAY	4	39PL	KJB	02A	E130	E137
5	LB39P	6868	LAWN	4	39PL	KJB	02A	E130	E135

Figure A–13. Cost Structure Report for Work Breakdown Structure

A.11. FINANCIAL STATUS REPORT (TYPE U)

Figure A—14 is a page of a financial status report by work breakdown structure. A separate page is printed for each charge number on the selected level. The first entry shows the total of all costs that report, directly or indirectly, to the charge number. This is followed by a listing of all the components (subtotals) of these totals. The first set of subtotals is for the costs of all the activities which report directly to the charge number. This is followed by a series of subtotals, one for each charge number that reports directly to the subject charge number.

A separate page also is printed for each of the four internally defined pseudo charge numbers (1.3.3).

Figure A—15 is a financial status report by project-network. An entry is given for each project-network.

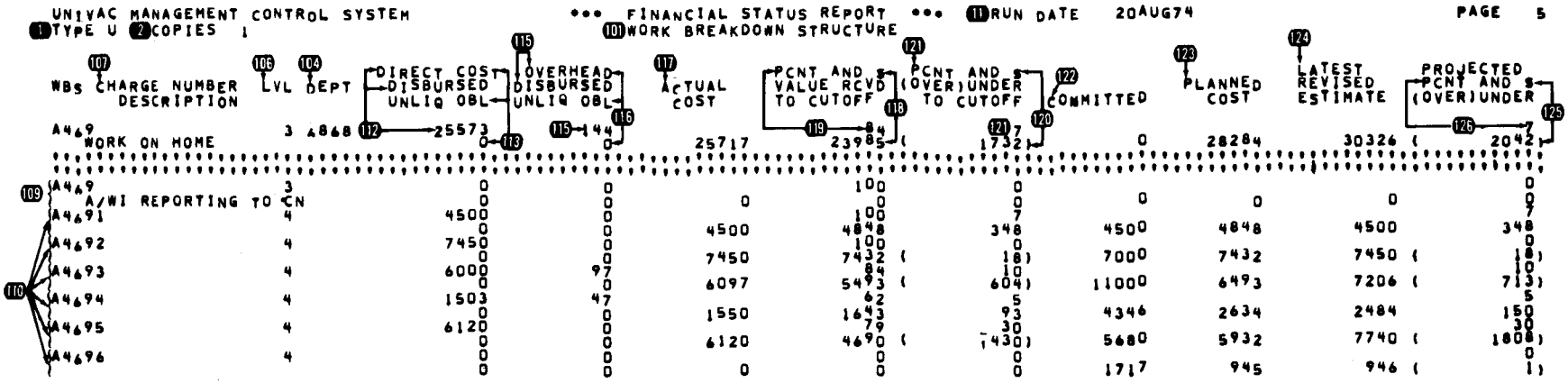


Figure A—14. Financial Status Report for Work Breakdown Structure

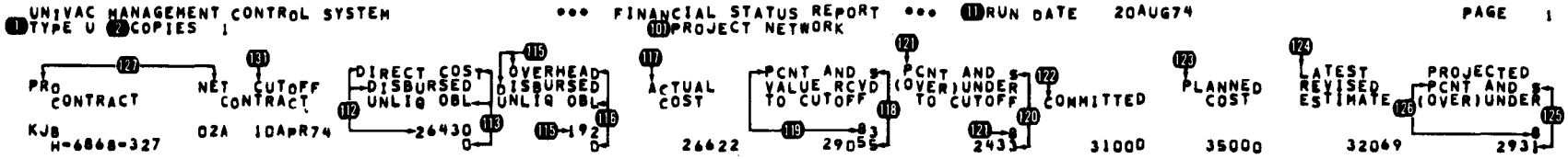


Figure A—15. Financial Status Report by Project—Network

A.12. MANAGEMENT ACTIVITY REPORT (TYPE V)

Figure A–16 is a page of a management activity report by work breakdown structure. A separate page is printed for each charge number in the structure (regardless of level). Every activity assigned to a charge number (2.4.7) is shown. The same format is used for the management activity report by organizational accounting structure.

Figure A–17 is a management activity report by project-network for one network. Every activity in the network is shown, even if it is not assigned to a charge number in either structure.

```
   UNIVAC MANAGEMENT CONTROL SYSTEM            •• MANAGEMENT ACTIVITY REPORT ••   (11)RUN DATE   20AUG74                        PAGE   8
(1)TYPE V (2)COPIES  1                      (101)WORK BREAKDOWN STRUCTURE         (15)SORT= 11=WBS CN -PROJECT-NETWORK-I EV ID
                                                        (102)       (104)            (135)
   WBS CHARGE NUMBER A4694   (33)         INSTALL UTILITIES  LVL 04  DEPT 6868  COST CUTOFF 10APR74                                  (138)
      PRO NET  IEVENT   JEVENT  DEPT   (42) (43) (44)E START (45)E FIN (112)DIRECT COST (115)OVERHEAD (117)   (136)ESTIMATED  (132)     LATEST
(108)                   OR WI                PCNT                         DISBURSED        DISBURSED       ACTUAL    COST TO      OVERALL   REVISED
     ACTIVITY DESCR                      DUR CMPL (46)L START (47)  FIN   UNLIQ OBL (113)  UNLIQ OBL (116) COST      COMPLETE     ESTIMATE  ESTIMATE

      KJB 02A  E104     E106     6868              14JAN74  15JAN74       320.00          19.20
      ERECT TEMPORARY ELECTRIC             2  100  15JAN74  16JAN74         0.00           0.00    339.20      0.00       318.84    339.20
      KJB 02A  E108     E111     6868              16JAN74  22JAN74       100.00           0.00
      OUTDOOR PLUMBING                     5  100  07FEB74  14FEB74         0.00           0.00    100.00      0.00       760.00    100.00
      KJB 02A  E112     E133     6868              23APR74  25APR74         0.00           0.00
      FINAL ELECTRICITY                    3    0  26APR74  30APR74         0.00           0.00      0.00    478.27       478.27    478.27
      KJB 02A  E122     E128     6868              09APR74  16APR74       620.00           0.00
      INDOOR PLUMBING                      5   40  12APR74  19APR74         0.00           0.00    620.00    456.00       760.00   1076.00
      KJB 02A  E132     E112     6868              13MAR74  14MAR74       463.20          27.79
      ROUGH ELECTRICITY                    2  100  24APR74  25APR74         0.00           0.00    490.99      0.00       318.84    490.99
```

Figure A–16. Management Activity Report by Work Breakdown Structure

UNIVAC MANAGEMENT CONTROL SYSTEM ** MANAGEMENT ACTIVITY REPORT ** RUN DATE 20AUG74 PAGE 1
TYPE V COPIES 1 PROJECT NETWORK SORT= 31=PROJECT-NETWORK-I EV ID

PRO KJB
NET 02A BUILD HOUSE

CONT H-6868-327

NET SCH S 01JAN74 NET ES 01JAN74 NET LS 10JAN74
NET SCH F 30JUL74 NET EF 30APR74 NET LF 30APR74
CUTOFF 10APR74 NET END FLAG 1

WBS	CHARGE NUMBER	EVENT NUMBER	EVENT OR WI OAS	DEPT CHARGE NUMBER	DUR	PCNT CMPL	E START L START	E FIN L FIN	DIRECT COST DISBURSED UNLIQ OBL	OVERHEAD DISBURSED UNLIQ OBL	ACTUAL COST	ESTIMATED COST TO COMPLETE	OVERALL ESTIMATE	LATEST REVISED ESTIMATE
							01JAN74	07JAN74	857.00	50.00				
39PSC	E102	E106	BC210H	6868	5	100	10JAN74	16JAN74	0.00	0.00	907.00	0.00	890.00	907.00
A4694	E104	E106	BCE49	6868	2	100	14JAN74	15JAN74	320.00	19.20				
A4691	E106	E111	BC31	6868	20	100	15JAN74	16JAN74	0.00	0.00	339.20	0.00	318.84	339.20
	E106	E108		6868			16JAN74	13FEB74	4500.00	0.00				
	E108	E111		6868	0	100	16JAN74	15JAN74	0.00	0.00	4500.00	0.00	4848.00	4500.00
A4694	E111	E132	BCP2A	6868	0	100	07FEB74	06FEB74	0.00	0.00	0.00	0.00	0.00	0.00
A4692	E112	E133	LBC2	6868	5	100	16JAN74	22JAN74	100.00	0.00				
A4694	E120	E126	BCE49	6868			07FEB74	14FEB74	0.00	0.00	100.00	0.00	760.00	100.00
A4693	E122	E128	HD49	6868	17	100	14FEB74	11MAR74	4300.00	0.00				
A4694	E122	E112	BCP2A	6868			15FEB74	12MAR74	0.00	0.00	4300.00	0.00	4039.20	4300.00
A4695	E126	E130	3BCP	6868	3	0	23APR74	25APR74	0.00	0.00				
A4696	E128	E112	3BCP	6868			26APR74	30APR74	0.00	0.00	0.00	478.27	478.27	478.27
A4696	E130	E137	3BCP	6868	14	50	02APR74	22APR74	1500.00	96.77				
D39P	E130	E136	BCL41	6868			02APR74	22APR74	0.00	0.00	1596.77	1108.80	2217.60	2705.57
DG39P	E130	E135	BCL41	6868	5	40	09APR74	16APR74	620.00	0.00				
LB39P	E132	E126	BCL41	6868			12APR74	19APR74	0.00	0.00	620.00	456.00	760.00	1076.00
A4693	E132	E122	BCG2	6868	7	29	09APR74	18APR74	1620.00	0.00				
A4695	E132	E112	LBC2	6868			17APR74	25APR74	0.00	0.00	1620.00	1620.00	1656.14	3240.00
A4692	E132	E120	BC31	6868	2	0	23APR74	24APR74	0.00	0.00				
A4694	E132	E112	BCE49	6868			23APR74	24APR74	0.00	0.00	0.00	315.45	315.45	315.45
					4	0	17APR74	22APR74	0.00	0.00				
							22APR74	25APR74	0.00	0.00	0.00	630.91	630.91	630.91
					2	0	25APR74	26APR74	0.00	0.00				
							29APR74	30APR74	0.00	0.00	0.00	280.00	280.00	280.00
					4	0	25APR74	30APR74	0.00	0.00				
							25APR74	30APR74	0.00	0.00	0.00	280.00	280.00	280.00
					4	0	25APR74	30APR74	0.00	0.00				
							25APR74	30APR74	0.00	0.00	0.00	280.00	280.00	280.00
					18	100	13MAR74	05APR74	4500.00	0.00				
							27MAR74	22APR74	0.00	0.00	4500.00	0.00	4276.80	4500.00
					18	100	12MAR74	04APR74	4500.00	0.00				
							19MAR74	11APR74	0.00	0.00	4500.00	0.00	4276.80	4500.00
					14	100	12MAR74	29MAR74	3150.00	0.00				
							13MAR74	01APR74	0.00	0.00	3150.00	0.00	3393.60	3150.00
					2	100	13MAR74	14MAR74	463.20	27.79				
							24APR74	25APR74	0.00	0.00	490.99	0.00	318.84	490.99

Figure A–17. Management Activity Report by Project–Network

A.13. RESOURCE RATES TABLE (TYPE Z)

Figure A–18 is a sample resource rates table.

UNIVAC MANAGEMENT CONTROL SYSTEM VER 09-43 •••• RESOURCE RATES TABLE •••• (11) RUN DATE 11AUG75 PAGE 1
(1) TYPE Z (2) COPIES 1 SORT= =RESOURC

(140) RESOURCE	(141) DESCRIPTION	COST CAT (142)	MEASURE (140)	FROM	TO	DIRECT COST PER MEASURE (143)	OVERHEAD PER MEASURE	OVERHEAD PCNT OF DIRECT
BOIL20	BIOLERMAN		SHIFT	15APR74	14APR74	0.000	0.000	0.0
						96.000	30.000	0.0
ELEC20	ELECTRICIAN		WEEK	15APR74	14APR74	0.000	0.000	0.0
						472.000	0.000	10.0
FIRE20	FIREMAN		SHIFT	15APR74	14APR74	0.000	0.000	0.0
						72.400	0.000	10.0
PIPF20	PIPEFITTER		UNIT	15APR74	14APR74	0.000	0.000	0.0
						325.000	0.000	15.0
R1	BULLDOZER	C01	SHIFT	01JAN74	31DEC73	0.000	0.000	0.0
					31MAR75	100.000	0.000	10.0
				01APR75		108.000	0.000	10.0
R10	PAINT	C02	UNIT	01APR74	31MAR74	0.000	0.000	0.0
						5.000	0.000	0.0
R11	REFUSE REMOVAL	C03	WEEK	01JAN74	31DEC73	0.000	0.000	0.0
						10.000	0.000	0.0
R2	DRIVER	C01	HOUR	01JAN74	31DEC73	0.000	0.000	0.0
						8.500	0.000	0.0
R3	ROOFER	C01	HOUR	01JAN74	31DEC73	0.000	0.000	0.0
						9.400	0.000	6.0
R4	PLUMBER	C01	HOUR	02JAN74	01JAN74	0.000	0.000	0.0
						9.500	0.000	0.0
R5	PAINTER	C01	HOUR	04FEB74	03FEB74	0.000	0.000	0.0
				05DEC75	04DEC75	9.300	0.000	6.0
				05DEC76	04DEC76	9.850	0.000	9.0
						10.100	0.000	9.0
R6	CARPENTER	C01	HOUR	10FEB74	09FEB74	0.000	0.000	0.0
						9.300	0.600	0.0
R7	MASON	C01	HOUR	01JAN74	31DEC73	0.000	0.000	0.0
						9.600	0.500	0.0
R8	LANDSCAPER	C01	HOUR	01APR74	31MAR74	0.000	0.000	0.0
						8.000	0.750	0.0
R9	CEMENT	C02	UNIT	01JAN74	31DEC73	0.000	0.000	0.0
						15.000	0.000	0.0

Figure A–18. Resources Rates Table

A.14. PROJECT-NETWORK REPORT (TYPE A)

Figure A—19 is a sample project-network report.

```
UNIVAC MANAGEMENT CONTROL SYSTEM          PROJECT  NETWORK  REPORT      (11)RUN DATE  14JUL75          PAGE   1
(1)TYPE A (2)COPIES  1

SYSTEM:        (8)DESCRIPTION:                                                    CONTRACT:(128)
        DATES: SCHEDULED START(136) 05APR74   CUTOFF(138) 12AUG74   EARLIEST START(145) 24APR72   LATEST START(147) 16JUL74
               SCHEDULED FINISH(137)31DEC74                        EARLIEST FINISH(146)28FEB76   LATEST FINISH(148)31DEC74

PROJECT: MCS(6)  DESCRIPTION:(9)                                                  CONTRACT:(129)
        DATES: SCHEDULED START(149) 05APR74   CUTOFF(151) 13JUL74   EARLIEST START(152) 24APR72   LATEST START(154) 16JUL74
               SCHEDULED FINISH(150)31DEC74                        EARLIEST FINISH(153)28FEB76   LATEST FINISH(155)31DEC74

NETWORK: NT1(7)  DESCRIPTION:(10)                                                 CONTRACT:(130)
        DATES: SCHEDULED START(16) 15APR74    CUTOFF(18) 09JUN74   EARLIEST START(19) 15APR74   LATEST START(21) 24JUL74
               SCHEDULED FINISH(17)31DEC74                         EARLIEST FINISH(20)12AUG74   LATEST FINISH(22)31DEC74

NETWORK: NT2     DESCRIPTION:                                                     CONTRACT:
        DATES: SCHEDULED START   22APR74   CUTOFF    09JUN75   EARLIEST START   26APR74   LATEST START   05AUG74
               SCHEDULED FINISH  31DEC74               EARLIEST FINISH  07JUL75   LATEST FINISH  31DEC74

NETWORK: NT3     DESCRIPTION:                                                     CONTRACT:
        DATES: SCHEDULED START   22APR72   CUTOFF    22APR73   EARLIEST START   24APR72   LATEST START   16JUL74
               SCHEDULED FINISH  31DEC74               EARLIEST FINISH  18JUL74   LATEST FINISH  22AUG74

NETWORK: NT4     DESCRIPTION:                                                     CONTRACT:
        DATES: SCHEDULED START   05APR74   CUTOFF    28FEB76   EARLIEST START   05APR74   LATEST START   13AUG74
               SCHEDULED FINISH  31DEC74               EARLIEST FINISH  28FEB76   LATEST FINISH  31DEC74

NETWORK: NT5     DESCRIPTION:                                                     CONTRACT:
        DATES: SCHEDULED START   05APR74   CUTOFF    02MAY74   EARLIEST START   05APR74   LATEST START   08AUG74
               SCHEDULED FINISH  31DEC74               EARLIEST FINISH  08AUG74   LATEST FINISH  19DEC74
```

Figure A—19. Project-Network Report

A.15. RESOURCE REQUIREMENTS REPORT (TYPE R)

Figure A–20 shows a resource requirements report for a single resource. Figure A–21 shows a resource requirements report sorted by project network.

```
 UNIVAC MANAGEMENT CONTROL SYSTEM                    • RESOURCE REQUIREMENTS REPORT  •  (11)RUN DATE    14JUL75                                       PAGE   1
(1)TYPE R (2)COPIES   1                                                                (15)SORT= 15=RESOURC-TOT QTY

 RESOURCE(140)FIRE20  (141)FIREMAN                MEASURE(140)SHIFT   COST CATEGORY(142)E21
                                                  (43)                                                                             TOTALS FOR DURATION
  (6)  (7)    (31)     (32)JEVENT  (33)    (42)  PCNT                                                        QUANTITY       QUANTITY      DIRECT    OVERHEAD
  PRO  NET    IEVENT     OR WI     DFPT    DUR   CMPL   E START   E FIN    L START   L FIN                        (169)          (170)         (171)      (172)
                                                          (44)     (45)      (46)     (47)
  MCS  NT5                 P1      6869     15     87   05APR74  04MAY74  08AUG74  22AUG74                  5 PER SHIFT            75       3258.00     325.80
  MCS  NT6                 P1      6868     20    100   08APR74  20MAY74  22JUL74  17AUG74                  3 PER SHIFT            60       3692.40     369.24
  MCS  NT3      A1         A2      6868     15    100   24APR72  12MAY72  16JUL74  05AUG74                  3 PER SHIFT            45          0.00       0.00
  MCS  NT6                 S1      6868     14      0   19JUL74  01AUG74  11DEC74  24DEC74                  3 PER SHIFT            42       3040.80     304.08
  MCS  NT3      A2         A3      6968     13    100   15MAY72  31MAY72  06AUG74  22AUG74                  3 PER SHIFT            39          0.00       0.00
```

Figure A–20. Resource Requirements Report for a Single Resource

```
 UNIVAC MANAGEMENT CONTROL SYSTEM                    • RESOURCE REQUIREMENTS REPORT  •  (11)RUN DATE    14JUL75                                       PAGE   1
(1)TYPE R (2)COPIES   1                                 PROJECT NETWORK                (15)SORT= 31=PROJECT-NETWORK-I EV ID

(6)PRO  MCS  (9)→                                                                   NET SCH S  05APR74   NET ES 05APR74   NET LS 08AUG74
(7)NET  NT5  (10)→                                                                  NET SCH F  31DEC74   NET EF 08AUG74   NET LF 19DEC74
                                                                                    CUTOFF     02MAY74                    NET END FLAG 0
                          (43)
 (31)       (32)                                                                                                          TOTALS FOR DURATION
            JEVENT   (33)    (42)  PCNT                                            RESOURCE   QUANTITY          QUANTITY      DIRECT    OVERHEAD
 IEVENT     OR WI    DFPT    DUR   CMPL   E START   E FIN    L START   L FIN         (140)      (169)             (170)         (171)      (172)
                                            (44)     (45)      (46)     (47)

               P1    6868     15    87   05APR74  04MAY74  08AUG74  22AUG74        BOIL20     5 PER SHIFT          75       4320.00    1350.00
                                                                                   ELEC20     5 PER WEEK           15       6048.00     604.80
                                                                                   FIRE20     5 PER SHIFT          75       3258.00     325.80
                                                                                   PIPF20     5 UNITS               5          0.00       0.00

               S1    6868     18     0   22JUL74  08AUG74  02DEC74  19DEC74        ELEC20     4 PER WEEK           14       9408.00     940.80
                                                                                   PIPF20     4 UNITS               4       1300.00     195.00
```

Figure A–21. Resource Requirements Report Sorted by Project-Network

A.16. RESOURCE COST CATEGORY PLAN (TYPE W)

Figure A–22 shows a resource category plan.

The system cost cutoff date is used as the basis of the accounting periods. The first accounting period is from the day after the cutoff date to the end of the month. If this month is not the last month of a quarter (March, June, September, December), there is a period for each month to the end of the quarter; subsequently there are nine monthly periods. Thus, the last monthly period is always March, June, September, or December. Then there are four quarterly periods, one 12-month period, and a period for all later costs.

UNIVAC MANAGEMENT CONTROL SYSTEM — RESOURCE COST CATEGORY PLAN — PAGE 1
(1) TYPE W (2) COPIES 1 — ALL PRO-NETS IN SYSTEM — (11) RUN DATE 14JUL75 — (15) SORT= =COSTCAT
(135) COST CUTOFF 22APR73

(142) COST CATEGORY E21 ENGINEERING

(160) PERIOD	ESTIMATED THIS PERIOD			CUMULATIVE TOTALS		
	(161) DIRECT COST	(162) OVERHEAD	(163) TOTAL	DIRECT COST	(164) OVERHEAD	TOTAL
23APR73 - 30APR73	0	0	0	0	0	0
01MAY73 - 31MAY73	0	0	0	0	0	0
01JUN73 - 30JUN73	0	0	0	0	0	0
01JUL73 - 31JUL73	0	0	0	0	0	0
01AUG73 - 31AUG73	0	0	0	0	0	0
01SEP73 - 30SEP73	0	0	0	0	0	0
01OCT73 - 31OCT73	0	0	0	0	0	0
01NOV73 - 30NOV73	0	0	0	0	0	0
01DEC73 - 31DEC73	0	0	0	0	0	0
01JAN74 - 31JAN74	0	0	0	0	0	0
01FEB74 - 28FEB74	0	0	0	0	0	0
01MAR74 - 31MAR74	0	0	0	0	0	0
01APR74 - 30JUN74	111973	17407	129380	111973	17407	129380
01JUL74 - 30SEP74	74684	10084	84768	186657	27491	214148
01OCT74 - 31DEC74	0	0	0	186657	27491	214148
01JAN75 - 31MAR75	0	0	0	186657	27491	214148
01APR75 - 31MAR76	17466	2629	20095	204123	30120	234243
01APR76 -	0	0	0	204123	30120	234243

Figure A–22. Resource Cost Category Plan

A.17. FINANCIAL PLAN (TYPE X)

Figure A–23 shows a financial plan for a project-network. The financial plan report is also available for each charge number on any level of the WBS or OAS.

See A.16 for a description of the accounting periods. If the report is sorted by project network, the network cutoff date is used in place of the system cutoff date.

UNIVAC MANAGEMENT CONTROL SYSTEM *** FINANCIAL PLAN *** RUN DATE 14JUL75 PAGE 1
(1) TYPE X (2) COPIES 1 (101) PROJECT NETWORK (11) (15) SORT= =PROJECT-NETWORK

(6) PRD PCS (9)
(7) NET NTS (10)

NET SCH S 05APR74 NET ES 05APR74 NET LS 08AUG74
NET SCH F 31DEC74 NET EF 08AUG74 NET LF 19DEC74
CUTOFF 02MAY74 NET END FLAG 0

PERIOD (160)	ESTIMATED THIS PERIOD BY USER (165)	OTHER DIRECT (166)	OTHER OVHD (167)	TOTAL (163)	CUMULATIVE TOTALS USER EST	OTHER DIRECT (164)	OTHER OVHD	TOTAL
03MAY74 - 31MAY74	3	0	0	3	3	0	0	3
01JUN74 - 30JUN74	0	0	0	0	3	0	0	3
01JUL74 - 31JUL74	0	6676	733	7409	3	6676	733	7412
01AUG74 - 31AUG74	0	4032	403	4435	3	10708	1136	11847
01SEP74 - 30SEP74	0	0	0	0	3	10708	1136	11847
01OCT74 - 31OCT74	0	0	0	0	3	10708	1136	11847
01NOV74 - 30NOV74	0	0	0	0	3	10708	1136	11847
01DEC74 - 31DEC74	0	0	0	0	3	10708	1136	11847
01JAN75 - 31JAN75	0	0	0	0	3	10708	1136	11847
01FEB75 - 28FEB75	0	0	0	0	3	10708	1136	11847
01MAR75 - 31MAR75	0	0	0	0	3	10708	1136	11847
01APR75 - 30JUN75	0	0	0	0	3	10708	1136	11847
01JUL75 - 30SEP75	0	0	0	0	3	10708	1136	11847
01OCT75 - 31DEC75	0	0	0	0	3	10708	1136	11847
01JAN76 - 31MAR76	0	0	0	0	3	10708	1136	11847
01APR76 - 31MAR77	0	0	0	0	3	10708	1136	11847
01APR77 -	0	0	0	0	3	10708	1136	11847

Figure A–23. Financial Plan for a Project-Network

A.18. RESOURCE REQUIREMENTS PLAN (TYPE Y)

Figure A–24 shows a resource requirements plan for the use of a resource by a single project-network. The report is also available for the use of a resource by all the project-networks in the system.

```
 UNIVAC MANAGEMENT CONTROL SYSTEM                 ** RESOURCE REQUIREMENTS PLAN **  (11)RUN DATE   14JUL75                  PAGE  1
(1)TYPE Y (2)COPIES  1                                  PROJECT NETWORK             (15)SORT= 2 =PROJECT-NETWORK-RESOURC

(6)PRO MCS (9)-->
(7)NET MTS (10)-->                                                                   NET SCH S 05APR74  NET ES 05APR74  NET LS 08AUG74
                                                                                     NET SCH F 31DEC74  NET EF 08AUG74  NET LF 19DEC74
 RESOURCE(140)ELEC20  (41)ELECTRICIANS     MEASURE (140)WEEK   COST CATEGORY(142)F21  CUTOFF    02MAY74                    NET END FLAG 0
```

PERIOD (160)	ESTIMATED THIS PERIOD QUANTITY (168)	ESTIMATED THIS PERIOD DIRECT COST (161)	ESTIMATED THIS PERIOD OVERHEAD (162)	ESTIMATED THIS PERIOD TOTAL (163)	CUMULATIVE TOTALS QUANTITY (164)	CUMULATIVE TOTALS DIRECT COST (164)	CUMULATIVE TOTALS OVERHEAD (164)	CUMULATIVE TOTALS TOTAL (164)
03MAY74 - 31MAY74	2	1344	134	1478	2	1344	134	1478
01JUN74 - 30JUN74	0	0	0	0	2	1344	134	1478
01JUL74 - 31JUL74	8	5376	538	5914	10	6720	672	7392
01AUG74 - 31AUG74	6	4032	403	4435	16	10752	1075	11827
01SEP74 - 30SEP74	0	0	0	0	16	10752	1075	11827
01OCT74 - 31OCT74	0	0	0	0	16	10752	1075	11827
01NOV74 - 30NOV74	0	0	0	0	16	10752	1075	11827
01DEC74 - 31DEC74	0	0	0	0	16	10752	1075	11827
01JAN75 - 31JAN75	0	0	0	0	16	10752	1075	11827
01FEB75 - 28FEB75	0	0	0	0	16	10752	1075	11827
01MAR75 - 31MAR75	0	0	0	0	16	10752	1075	11827
01APR75 - 30JUN75	0	0	0	0	16	10752	1075	11827
01JUL75 - 30SEP75	0	0	0	0	16	10752	1075	11827
01OCT75 - 31DEC75	0	0	0	0	16	10752	1075	11827
01JAN76 - 31MAR76	0	0	0	0	16	10752	1075	11827
01APR76 - 31MAR77	0	0	0	0	16	10752	1075	11827
01APR77 -	0	0	0	0	16	10752	1075	11827

Figure A–24. Resource Requirements Plan for Use of a Resource by a Single Project-Network

Appendix B. Error Messages

B.1. GENERAL

This appendix lists all messages that may be printed during a management control system (MCS) execution. A description of each message is included, as well as a suggested action, if one is required.

The following error types are used to indicate the severity of error conditions:

W = Warning
: An unusual situation has been encountered which is not necessarily an error. MCS continues its execution.

E = Error
: An error has been encountered that is not severe enough to cause MCS to terminate execution but may lead to unexpected results.

F = Fatal
: An error has been encountered that prohibits MCS from producing meaningful results. MCS execution is terminated.

B.2. GENERAL AND SAVE/RESTORE MESSAGES

The messages listed in Table B–1 may be printed at various times during an MCS execution. Some inform a user of the progress of MCS execution. Others notify a user of serious internal or I/O related errors.

Table B–1. MCS General Messages (Part 1 of 2)

Prefix	Error Type	Message Text	Description	Response/Action
	N.A.	*section name* PROCESSING COMPLETED	(None)	(None)
	N.A.	****ALL MCS PROCESSING COMPLETED	All processing requested by the user has been completed without encountering a fatal error.	(None)
	N.A.	****MCS TERMINATED ABNORMALLY	A fatal error has been encountered. MCS has terminated its execution without completing all requested processing successfully.	Correct the error.
	N.A.	SAVE OF LFD MCTABLES ON LFD MCSAVE HAS STARTED	MCS has started to place control information and the contents of LFD MCTABLES on the save file.	None. If save processing is not completed (refer to next message), restore processing (3.4.6, 3.1.2) from LFD MCTABLES is valid, but restore processing from the save file is not valid.
	N.A.	SAVE OF LFD MCTABLES ON LFD MCSAVE COMPLETED	MCS has finished placing control information and the contents of LFD MCTABLES on the save file.	None. If MCS terminates (normally or abnormally) before save processing starts again, restore processing (3.4.6, 3.1.2). Using the save file as the restore file is valid, but restore processing from LFD MCTABLES is not valid.
	F	INVALID OR NONEXISTENT TABLES ON MCRESTR	The contents of LFD MCRESTR is not a complete set of data and control tables written by save processing.	Refer to 3.4.6.
	F	UNRECOVERABLE INTERNAL ERROR IF THIS ERROR OCCURS AGAIN CONTACT A UNIVAC REPRESENTATIVE	MCS has detected an illogical condition processing. A cancel dump is requested by MCS at termination.	Submit a trouble report if error persists.
	F	UNRECOVERABLE HARDWARE ERROR ON *filename*	A cancel dump is requested by MCS at termination.	Retry the run after checking the equipment involved.
	F	UNRECOVERABLE PARITY ERROR ON *filename*	A cancel dump is requested by MCS at termination.	Retry the run after checking the equipment involved.

Table B–1. MCS General Messages (Part 2 of 2)

Prefix	Error Type	Message Text	Description	Response/Action
	F	UNABLE TO RESTORE PREVIOUS TABLES	■ An R processing option was specified on the type 00 but the file LFD MCTABLES did not contain valid information created by time processing (2.1.4), or ■ Restore processing (3.4.6) was requested from a file which did not contain valid information created by save processing.	Refer to 3.1.2, 2.1.4, 3.3.2.3.
	F	INSUFFICIENT SPACE ON *filename*	MCS has attempted to write more records than will fit into the file or a disc file has not been preformatted (3.3.3). A cancel dump is requested by MCS at termination.	Increase the file size or preformat the the file. Refer to 3.3.2, 3.3.3.
	F	UNRECOVERABLE ERROR LOADING *phasename*	A cancel dump is requested by MCS at termination.	Check load library from which MCS was executed for presence of all phases of the MCS load modules. If the load library is complete, this may indicate a hardware error.
	F	FILE ASSIGNED TO TWO LFDS, VSN IS *volno* FILE-ID IS *file-id*	Each MCS file must be physically different from all other assigned to the MCS run.	Refer to 3.2.2.
P0101	F	ALL ERROR MESSAGES NOT PRINTED.	The message table has overflowed.	Correct errors reported and rerun the problem.

B.3. LABEL AND SYNTAX EDIT ERROR MESSAGES

Table B–2 lists the error messages that may be printed during label, and syntax edit processing (2.1.1). In addition to the texts shown in the table, the card on which the error occurs is printed.

Table B–2. Syntax Editing Errors (Part 1 of 2)

Prefix	Error Type	Message Text	Description	Response/Action
E0001	F	FIELD IN COL *xx* IS INVALID	The indicated field on the type 00 card is invalid.	Refer to 3.1.2.
E0002	F	FIELD IN COL *xx-xx* IS INVALID	See E0001.	See E0001.
E0003	F	LABEL ERROR FOR *filename*	The label on the file is not the same as the label indicated on the 00 card.	Refer to 3.1.2, 3.4.7
E0006	F	MCTABLES NOT RESTORED WHEN STEP OPTION IS *x*	Restore processing is available only for step options blank and T.	Refer to 3.4.6.
E0007	F	REQUIRED FILE NOT PROVIDED. LFD=*filename*		Refer to 3.3.2.
E0009	F	INVALID OR NONEXISTENT DATA BASE ON MCOLDDB	The contents of LFD MCOLDDB is not the result of MCS data base generation processing.	Refer to 3.3.2.5.
E0010	F	A DISC FILE IS REQUIRED FOR LFD=*filename*		Refer to 3.3.2.3 and 3.3.2.6.
E0011	F	A TAPE FILE IS REQUIRED FOR LFD=FOR09		Refer to 3.3.2.7.
E0101	F	IDENTIFIER FIELD IN COL *xx-xx* IS INVALID		Refer to 2.3, 2.4, 3.1, and 3.2.
E0102	F	IDENTIFIER FIELD IN COL *xx-xx* IS BLANK		See E0101.
E0103	F	UPDATER FIELD IN COL *xx-xx* IS INVALID		See E0101.
E0104	F	FIELD IN COL *xx-xx* IS INVALID		See E0101.
E0105	F	CARD TYPE IS INVALID	None	Refer to Table 2–1.
E0106	F	TYPE 00 CARD MUST BE FIRST IN MCS DATA	The type 00 card, if provided, must immediately follow the start-of-data (/$) card.	Refer to 3.1.2.
E0107	F	INCONSISTENT FIELDS *xx-xx, xx-xx, xx-xx*	The contents of the identified fields are incompatible.	See E0101.

Table B–2. Syntax Editing Errors (Part 2 of 2)

Prefix	Error Type	Message Text	Description	Response/Action
E0108	F	INSUFFICIENT FIELDS SUPPLIED		See E0101.
E0201	F	DUPLICATE IDENTIFICATION	The identification information on this card is the same as that on another card input with the execution of MCS.	Locate the duplicate. Remove one of the cards with the duplicate identification and resubmit the job.

B.4. DATA BASE CREATION OR MODIFICATION ERROR MESSAGES

Table B–3 lists the error messages that may be printed during data base creation or modification (2.1.2). In addition to the texts shown in the table, the data base record that produced the error is printed.

Table B–3. Data Base Creation or Modification Errors

Prefix	Error Type	Message Text	Description	Response/Action
M0101	F	EXISTING DATA TO BE UPDATED NOT FOUND	An input card could not be matched with a record on LFD MCOLDDB.	Check record code and identifier fields.
M0102	F	ADD ILLEGAL -- EXISTING FIELD NON-BLANK	An input card requests the addition of a field, but the matching field on LFD MCOLDDB is nonblank.	Use R transaction code to replace nonblank field. Refer to 2.1.2, 2.2.2.
M0103	W	DELETE ILLEGAL -- EXISTING FIELD BLANK	An input card requests the deletion of a field, but the matching field on LFD MCOLDDB is blank.	Refer to 2.1.2, 2.2.2.
M0104	F	D TRANS CODE ILLEGAL FOR THIS CARD TYPE	An input card requests an illegal D-type deletion.	Check description of card type. Refer to 2.2.2.
M0105	W	NUMBER OF D TRANSACTIONS EXCEEDS 100.		Refer to 2.2.2.
M0106	F	UPDATES ILLEGAL, MCOLDDB NOT ASSIGNED	The file LFD MCOLDDB has not been assigned. No updating is possible.	Refer to 3.3.2.5.

B.5. TABLE GENERATION ERROR MESSAGES

Table B–4 lists the error messages that may be printed during generation of the MCS internal tables from the data base (2.1.3). In addition to the texts shown in the table, the identification of the data base records causing the error is printed.

Table B–4. Table Generation Errors (Part 1 of 10)

Prefix	Error Type	Card Type	Message Text	Description	Response/Action
C4601	F	46	ACTIVITY COST PROGRESS OVERFLOW	■ The change in the actual cost of the referenced activity (as specified via a type 46 card) exceeds the maximum allowable value of 999999.99 or ■ The result of applying the change in the actual cost of the referenced activity exceeds the maximum allowable value of 999999.99. The maximum allowable value is used for further computation.	Ensure the correctness of the referenced change. If it is correct, report all costs to MCS in thousands of monetary units. Refer to 1.3.2, 2.4.5.
C4602	F	46	ACTIVITY ESTIMATED COST TO COMPLETE PROGRESS OVERFLOW	Same as C4601 for estimated cost to complete.	Same as C4601. Refer to 1.3.2, 2.4.5.
C5201	F	52	CHARGE NUMBER PLANNED COST OVERFLOW	■ The change in the planned cost of the referenced charge number (as specified via a type 52 card) exceeds the maximum allowable value of 999999999, or ■ The result of applying the change in the planned cost of the referenced charge number exceeds the maximum allowable value of 999999999.	Same as C4601. Refer to 1.3.3.1, 2.4.8.
C5202	W	52	CHARGE NUMBER COMMITTED COST OVERFLOW	Same as C5201 for committed cost.	Same as C4601. Refer to 1.3.3.1, 2.4.8.

Table B–4. Table Generation Errors (Part 2 of 10)

Prefix	Error Type	Card Type	Message Text	Description	Response/Action
C5301	F	53	NET PLANNED COST OVERFLOW	■ The change in the planned cost of the referenced network (as specified via a type 53 card) exceeds the maximum allowable value of 999999999, or ■ The result of applying the change in the planned cost of the referenced network exceeds the maximum allowable value of 999999999. The maximum allowable value is used for all further computation.	Same as C4601. Refer to 1.3.3.1, 2.4.9.
C5302	W	53	NET COMMITTED COST OVERFLOW	Same as C5301 for committed cost.	Same as C4601. Refer to 1.3.3.1, 2.4.9.
D0101	F	01	THE PROJECT IS NOT GIVEN IN THE SYSTEM.	See D4001.	See D4001.
D0102	F	01	THE PROJECT-NETWORK IS NOT IN THE SYSTEM.	See D4001 and D4002	See D4001 and D4002.
D1001	W	10	SYSTEM SCHED. START DATE IS LATER THAN SYSTEM CUT OFF DATE.	The earliest of the future activities start no earlier than the latest of the network scheduled start date and the cutoff date. Actual and in-progress activities refer to the cutoff date.	See 1.2.6, 2.3.1.
D1002	W	10	SYSTEM CUT OFF DATE IS LATER THAN SYSTEM SCHED. END DATE.	Negative slacks and floats may be reported.	See 1.2.3.4, 1.2.4, 2.3.1.
D1003	W	10	SYSTEM SCHED. START DATE IS LATER THAN SYSTEM SCHED. END DATE.	See D1002.	See D1002.
D1011	W	10	PROJECT SCHED. START DATE IS LATER THAN PROJECT CUT OFF DATE.	See D1001.	See D1001.
D1012	W	10	PROJECT CUT OFF DATE IS LATER THAN PROJECT SCHED. END DATE.	See D1002.	See D1002.
D1013	W	10	PROJECT SCHED. START DATE IS LATER THAN PROJECT SCHED. END DATE.	See D1002.	See D1002.
D1021	W	10	NETWORK SCHED. START DATE IS LATER THAN NETWORK CUT OFF DATE.	See D1001.	See D1001.

Table B–4. Table Generation Errors (Part 3 of 10)

Prefix	Error Type	Card Type	Message Text	Description	Response/Action
D1022	W	10	NETWORK CUT OFF DATE IS LATER THAN NETWORK SCHED. END DATE.	See D1002.	See D1002.
D1023	W	10	NETWORK SCHED. START DATE IS LATER THAN NETWORK SCHED. END DATE.	See D1002.	See D1002.
D1024	F	10	NETWORK SCHED. START DATE IS NOT GIVEN.	The network scheduled start date is required to accomplish earliest time processing. It may be provided on a system, project, or network level type 10 card.	See 2.3.1, 2.3.1.1.
D1025	F	10	ILLEGAL NETWORK END DATE FLAG.	None	See 2.3.1.
D1121	F	11	NETWORK TYPE 10 CARD IS MISSING.	The network referenced was not defined using a type 10 card.	See 2.3.2, 2.3.1.
D1211	F	12	THE PROJECT IS NOT GIVEN IN THE SYSTEM.	See D4001.	See D4001.
D1221	F	12	THE PROJECT IS NOT GIVEN IN THE SYSTEM.	See D4001.	See D4001.
D1222	F	12	THE NETWORK IS NOT GIVEN IN THE PROJECT.	See D4002.	See D4002.
D2001	F	20	ILLEGAL MEASURE OF RESOURCE.	None	See 2.4.1.
D2101	F	21	THE RESOURCE CODE IS NOT GIVEN IN THE SYSTEM.	The resource code referenced was not defined by a type 20 card.	See 2.4.2, 2.4.1.
D2102	F	21	NO RESOURCE CODE IS GIVEN IN THE SYSTEM.	No resource codes have been defined by type 20 cards. Therefore, all references to resource codes on other cards are illegal.	See 2.4.2, 2.4.1.
D2103	W	21	THE RESOURCE CODE BELONGS TO TWO COST CATEGORY CODES.	A resource code may belong to only one cost category.	See 2.4.2.

Table B–4. Table Generation Errors (Part 4 of 10)

Prefix	Error Type	Card Type	Message Text	Description	Response/Action
D3001	F	30	THE RESOURCE CODE IS NOT GIVEN IN THE SYSTEM.	See D2101.	See D2101, 2.4.3.
D3002	F	30	NO RESOURCE CODE IS GIVEN IN THE SYSTEM.	See D2102.	See D2102, 2.4.3.
D4001	F	40	THE PROJECT IS NOT GIVEN IN THE SYSTEM.	A project identification must be defined by using a type 10 card (project level or network level) before it may be referenced on other cards.	See 2.3.1.
D4002	F	40	THE NETWORK IS NOT GIVEN IN THE PROJECT.	A network identification must be defined by using a network level type 10 card before it may be referenced on other cards.	See 2.3.1.
D4003	E	40	ERROR IN THREE TIME ESTIMATES OF ACTIVITY DURATION.	The optimistic estimate of duration must be less than or equal to the most likely estimate of duration. The most likely estimate of duration must be less than or equal to the pessimistic estimate of duration.	See 2.3.4.
D4004	F	40	INCONSISTENCY BETWEEN NETWORK TYPE AND ACTIVITY NOTATION.	The network type is defined using a type 10 card. The start event identification must be blank for activity-on-node networks. Start event and end event identifications must be nonblank for activity-on-arrow networks.	See 2.3.4, 2.3.1.
D4005	F	40	ON A TYPE 40 CARD, THE I-EVENT AND J-EVENT IDS ARE THE SAME.	The start and end events of an activity must be different.	See 1.2.1.1.
D4101	F	41	THE PROJECT IS NOT GIVEN IN THE SYSTEM.	See D4001.	See D4001.
D4102	F	41	THE NETWORK IS NOT GIVEN IN THE PROJECT.	See D4002.	See D4002.
D4103	F	41	THE ACTIVITY IS NOT GIVEN IN THE NETWORK.	An activity must be defined by using a type 40 card before it may be referenced on other cards.	See 2.3.5, 2.3.4.
D4104	F	41	THE TYPE 41 CARD IS ILLEGAL FOR AN ACTIVITY ON ARROW.	Precedence relationships may not be specified for activities represented in I-J notation.	See 1.2.1.

Table B–4. Table Generation Errors (Part 5 of 10)

Prefix	Error Type	Card Type	Message Text	Description	Response/Action
D4105	F	41	ON TYPE 41 CARD, PREDECESSOR HAS SAME ID AS WORK ITEM IN COL 11–16.	A work item may not be a predecessor of itself.	See 2.3.5, 1.2.1.2.
D4201	F	42	THE PROJECT IS NOT GIVEN IN THE SYSTEM.	See D4001.	See D4001.
D4202	F	42	THE NETWORK IS NOT GIVEN IN THE PROJECT.	See D4002.	See D4002.
D4203	F	42	THE ACTIVITY IS NOT GIVEN IN THE NETWORK. THE MILESTONE EVENT IS NOT GIVEN IN THE NETWORK.	A work item or event must be defined using a type 40 card before it may be referenced on other cards.	See 2.3.6, 2.3.4.
D4204	W	42	SCHEDULED START DATE CONSIDERED BLANK.	A scheduled start date was specified but the scheduled date option caused the date to be ignored.	See 2.3.6.
D4205	W	42	SCHEDULED FINISH DATE CONSIDERED BLANK.	A scheduled finish date was specified but the scheduled date option caused the date to be ignored.	See 2.3.6.
D4206	F	42	THE SCHEDULED START DATE IS MISSING.	The scheduled date option specified requires that a scheduled start date be given.	See 2.3.6.
D4207	F	42	THE SCHEDULED FINISH DATE IS MISSING.	The scheduled date option specified requires that a scheduled finish date be given.	See 2.3.6.
D4208	W	42	THE SCHED. DATE IS NOT LATER THAN THE NETWORK CUTOFF DATE.	Scheduled dates should apply to future activities and events, i.e., activities and events whose earliest times are later than the network cutoff date.	See 2.3.6, 2.3.1.
D4209	F	42	SCHEDULED DATE PROVIDED, BUT SCHEDULED DATE OPTION IS MISSING	The schedule date option must be provided to indicate how the schedule date is to be interpreted.	See 2.3.6.
D4210	W	42	SCHEDULED START LATER THAN SCHEDULED FINISH. DURATION SET TO ZERO	Only a zero duration dummy activity can have its start earlier than its finish.	See 2.2.4.

Table B–4. Table Generation Errors (Part 6 of 10)

Prefix	Error Type	Card Type	Message Text	Description	Response/Action
D4211	F	42	NET TERMINAL POINT WORK ITEM HAS NOT BEEN MARKED USING A 42 CARD NET TERMINAL POINT EVENT HAS NOT BEEN MARKED USING A 42 CARD	If any terminal point of a network is identified using a type 42 card, then all the terminal points in the network must be idenfied using type 42 cards.	See 1.2.2, 2.3.6.
D4212	F	42	WORK ITEM IS MARKED INCORRECTLY AS NET TERMINAL POINT ON A 42 CARD EVENT IS MARKED INCORRECTLY AS NET TERMINAL POINT ON A 42 CARD	See 1.2.2.	See 2.3.6.
D4301	F	43	THE PROJECT IS NOT GIVEN IN THE SYSTEM.	See D4001.	See D4001.
D4302	F	43	THE NETWORK IS NOT GIVEN IN THE PROJECT.	See D4002.	See D4002.
D4303	F	43	THE ACTIVITY IS NOT GIVEN IN THE NETWORK.	See D4103.	See D4103.
D4304	F	43	THE RESOURCE CODE IS NOT GIVEN IN THE SYSTEM.	See D2101.	See D2101.
D4305	F	43	NO RESOURCE CODE IS GIVEN IN THE SYSTEM.	See D2102.	See D2102.
D4401	F	44	THE PROJECT IS NOT GIVEN IN THE SYSTEM.	See D4001.	See D4001.
D4402	W	44	THE NETWORK IS NOT GIVEN IN THE PROJECT.	See D4002. If the network referenced was excluded from processing by a type 01 card, the type 44 cards referencing it are ignored after this message is produced.	See 2.3.7.
D4403	F	44	THE INTERFACE WORK ITEM IS NOT GIVEN IN THE NETWORK. THE INTERFACE EVENT IS NOT GIVEN IN THE NETWORK.	See D4203.	See D4203.

Table B–4. Table Generation Errors (Part 7 of 10)

Prefix	Error Type	Card Type	Message Text	Description	Response/Action
D4404	W	44	THE INTERFACE HAS ONLY ONE MEMBER. THIS IS INVALID.	An interface must represent a relationship between two or more networks.	See 1.2.7.
D4405	F	44	THE WORK ITEM START OR FINISH IS A MEMBER OF MORE THAN 1 INTERFACE. THE EVENT IS A MEMBER OF MORE THAN 1 INTERFACE.	A work item start, a work item finish, or an event may belong to only one interface.	See 1.2.7.
D4406	F	44	AN INTERFACE MAY OCCUR ONLY ONCE IN A NETWORK.	Within a single network, an interface may contain only one work item start or work item finish or event.	See 1.2.7.
D4501	F	45	THE PROJECT IS NOT GIVEN IN THE SYSTEM.	See D4001.	See D4001.

Table B–4. Table Generation Errors (Part 8 of 10)

Prefix	Error Type	Card Type	Message Text	Description	Response/Action
D4502	F	45	THE NETWORK IS NOT GIVEN IN THE PROJECT.	See D4002.	See D4002.
D4503	F	45	THE ACTIVITY IS NOT GIVEN IN THE NETWORK.	See D4103.	See D4103.
D4504	F	45	CUT OFF DATE IS MISSING.	Actual and in-progress activities require that a cutoff date be given. It must be later than any actual date.	See 2.3.8, 2.3.1, 1.2.6.
D4505	F	45	ACTUAL START DATE OR FINISH DATE LATER THAN CUT OFF DATE.	Actual activities must be completed before the cutoff date. In-progress activities must be started before the cutoff date.	See 2.3.8, 2.3.1, 1.2.6.
D4506	W	45	ACTUAL START LATER THAN ACTUAL FINISH. DURATION SET TO ZERO.	Specifying an actual start date later than an actual completion date is valid only for a dummy activity, i.e., an activity whose duration is zero.	If the activity is a dummy activity, ignore the message. If not, correct the dates using a type 45 card with an R transaction code. Refer to 2.3.8.
D4601	F	46	THE PROJECT IS NOT GIVEN IN THE SYSTEM.	See D4001.	See D4001.
D4602	F	46	THE NETWORK IS NOT GIVEN IN THE PROJECT.	See D4002.	See D4002.
D4603	F	46	THE ACTIVITY IS NOT GIVEN IN THE NETWORK.	See D4103.	See D4103.
D4604	F	46	THE RESOURCE CODE IS NOT ASSIGNED TO THE ACTIVITY.	A resource requirement of an activity must be defined using a type 43 card before it may be referenced on a type 46 card.	See 2.4.5, 2.4.4.
D4605	F	46	CUT OFF DATE IS MISSING.	A network cutoff date is required when a quantity of resource is specified.	See 2.4.5, 1.3.2.2.
D4606	F	46	RESOURCE CODE MUST BE PRESENT.	None	See 2.4.5.

Table B–4. Table Generation Errors (Part 9 of 10)

Prefix	Error Type	Card Type	Message Text	Description	Response/Action
D4607	F	46	RES ID INVALID WITH MONETARY CHANGE AS EST. COST TO COMPLETE.	When specifying a change in the estimated cost to complete an activity, the resource code is valid only when a quantity of resource is given.	See 2.4.5.
D4608	F	46	THIS TYPE OF COST INVALID WHEN SPECIFYING EST. COST TO COMPL (E).	There are no direct and overhead cost subdivisions of the estimated cost to complete an activity.	See 2.4.5, 1.3.2.2.
D4609	F	46	NEW TOTAL (T) REQUIRES MONETARY AMOUNT OF CHANGE.	None	See 2.4.5.
D4610	F	46	AMOUNT OF CHANGE MUST BE MONETARY AMOUNT.	When no resource code is supplied, the amount of change must be monetary.	See 2.4.5.
D5001	F	50	THE SUMMARY CHARGE NUMBER IS NOT GIVEN IN THE SYSTEM.	The summary charge number must be defined as a charge number using another type 50 card. It must have a level number less than the charge numbers reporting to it.	See 2.4.6, 1.3.3.
D5002	F	50	THIS SUM. CH. N. LEVEL DOES NOT MATCH CH. N. LEVEL IN ANOTHER 50 CARD.	The level specified for the summary charge number is different from the level previously associated with that charge number.	See 2.4.6.
D5003	F	50	LEVEL OF SUM. CH. N. IS EQUAL TO OR GREATER THAN THAT OF CH. N.	The level of a summary charge number must be less than the level of any charge numbers reporting to it.	See 2.4.6, 1.3.3.
D5101	F	51	THE PROJECT IS NOT GIVEN IN THE SYSTEM.	See D4001.	See D4001.
D5102	F	51	THE NETWORK IS NOT GIVEN IN THE PROJECT.	See D4002.	See D4002.
D5103	F	51	THE ACTIVITY IS NOT GIVEN IN THE NETWORK.	See D4103.	See D4103.
D5104	F	51	THE CHARGE NUMBER IS NOT GIVEN IN THE SYSTEM.	A charge number must be defined using a type 50 card before it may be referenced on other cards.	See 2.4.7, 2.4.6.

Table B–4. Table Generation Errors (Part 10 of 10)

Prefix	Error Type	Card Type	Message Text	Description	Response/Action
D5105	F	51	NO CHARGE NUMBER OF THE STRUCTURE IS SPECIFIED IN THE SYSTEM.	The structure referenced has no charge numbers assigned to it by type 50 cards.	See 2.4.7, 2.4.6, 1.3.3.
D5106	F	51	THE ACTIVITY IS ASSIGNED TO TWO CHARGE NUMBERS.	An activity may be assigned to only one charge number in each type of structure.	See 2.4.7, 1.3.3.
D5201	F	52	THE CHARGE NUMBER IS NOT GIVEN IN THE SYSTEM.	See D5104.	See D5104.
D5202	F	52	THE RESOURCE CODE IS NOT GIVEN IN THE SYSTEM.	See D2101.	See D2101.
D5203	F	52	THERE IS NO SYSTEM COST CUTOFF DATE.	The system cost cutoff date is required when a quantity of resource is specified.	See 2.4.8, 1.3.2.2.
D5204	F	52	NO CHARGE NUMBER OF THE STRUCTURE IS SPECIFIED IN THE SYSTEM.	See D5105.	See D5105.
D5205	F	52	AMOUNT OF CHANGE MUST BE MONETARY AMOUNT.	None	See 2.4.8.
D5206	F	52	RESOURCE CODE MUST BE PRESENT.	None	See 2.4.8.
D5301	F	53	THE PROJECT IS NOT GIVEN IN THE SYSTEM.	See D4001.	See D4001.
D5302	F	53	THE NETWORK IS NOT GIVEN IN THE PROJECT.	See D4002.	See D4002.
D5303	F	53	THE RESOURCE CODE IS NOT GIVEN IN THE SYSTEM.	See D2101.	See D2101.
D5304	F	53	CUT OFF DATE IS MISSING.	See D4605.	See D4605.
D5305	F	53	AMOUNT OF CHANGE MUST BE MONETARY AMOUNT.	None	See 2.4.9.
D5306	F	53	RESOURCE CODE MUST BE PRESENT.	None	See 2.4.9.
D9001	F	N.A.	THERE ARE NO NETWORK TYPE 10 CARDS IN THE SYSTEM.	At least one network must be defined in the data base.	See 2.3.1.

B.6. TIME PROCESSING ERROR MESSAGES

Table B–5 lists the error messages that may be printed during time processing (2.1.4). In addition to the texts shown in the table, identification of projects, networks, activities, and events associated with the error conditions are printed.

Table B–5. Time Processing Errors (Part 1 of 4)

Prefix	Error Type	Message Text	Description	Response/Action
T0201	F	THIS ACTIVITY IS IN A LOOP.	One or more of its predecessors are also defined as its successor(s).	Eliminate the loop by modifying the network structure. If activity-on-arrow: The structure is defined by type 40 cards; if activity-on-node: The structure is defined by type 41 cards. A drawing of the network may be helpful. Refer to 1.2 through 1.2.1.2, 2.3.4, 2.3.5.
T0202	F	ERRONEOUSLY DEFINED INTERFACES CAUSE INTERFACE LOOP.	Erroneously specified event or work item or interface flag by at least one type 44 card.	Draw the interfaces between the networks involved. Replace the event or work item identifier or interface flag by the correct ones using a type 44 card. Refer to 1.2.7.2, 2.3.7.
T0601	W	ACTUAL START DATE EARLIER THAN DIRECTED BY PREDECESSOR.	According to the earliest start or finish of the predecessor(s) of the referenced activity (and the amount of lead/lag if activity-on-node) the actual start specified by a type 45 card for this activity is too early.	By using a type 45 card specify a later actual start of the referenced activity or specify earlier actual start or finish date(s) of its predecessor(s), or by a type 41 card reduce the lead or lag between it and its predecessors if activity-on-node. Refer to 1.2.3.3, 2.3.5, 2.3.8.
T0602	W	SCHEDULED DATE EARLIER THAN DIRECTED BY PREDECESSOR.	According to the earliest start or finish of the predecessor(s) of the referenced activity (and the amount of lead/lag if activity-on-node) the scheduled date specified by a type 42 card for this event or scheduled start for this work item is too early.	None, or if desired: Specify a later scheduled date by using a type 42 card for the referenced event or work item. Also consider changing the scheduled date option by changing the value in column 19. If activity-on-node the amount of lead or lag between the work item referenced and its predecessor(s) may be reduced. Refer to 1.2.3.3, 1.2.5, 2.3.5, 2.3.6.

Table B–5. Time Processing Errors (Part 2 of 4)

Prefix	Error Type	Message Text	Description	Response/Action
T0603	E	IN PROGRESS ACTIVITY FOLLOWED BY IN PROGRESS OR ACTUAL ACTIVITY.	Since the successors of the referenced activity have actually started, the referenced activity should have been actually completed.	Declare the referenced activity as completed by means of a type 45 card or declare its successors as future activities or change the activity relationships using type 40 or 41 cards. Refer to 1.2.3.3, 2.3.4, 2.3.5, 2.3.8.
T0604	E	IN PROGRESS ACTIVITY FOLLOWED BY ACTUAL ACTIVITY (DEPENDENCY F).	Since the successor work item is actually completed and there is a zero or positive finish to finish lag time between the two work items, the referenced work item should also have been completed.	Specify an actual completion date using a type 45 card for the referenced activity or delete the actual completion date(s) for its successor(s) or change the lag or type of dependency between the two work items using a type 41 card. Refer to 1.2.1.2, 1.2.3.3, 2.3.4, 2.3.8.
T0605	E	IMPLIED ACTUAL START DATE LATER THAN CUT OFF DATE.	The implied actual start date, and thereby the earliest start date, of an implied actual activity is determined by its predecessors and should be earlier than or equal to the cutoff date. The situation may have been created by specifying the cutoff date too early, or the actual dates of predecessors too late, or by the work item referenced accidently becoming implied actual because of an unrealized path between it and an actual successor.	■ Specify a later cutoff date by using a type 10 card, or ■ Specify earlier actual dates (if any) for the predecessors of the activity referenced by using type 45 cards, or ■ Change the network structure by breaking the path(s) between the activity and one or more actual successors using type 40 and 41 cards, or ■ Delete the actual date(s) (using type 45 cards) of the successor(s) that cause(s) the referenced activity to be implied actual and make it a future activity. Refer to 1.2.6, 2.3.1, 2.3.1.1, 2.3.4, 2.3.5, 2.3.8.
T0606	E	IMPLIED ACTUAL FINISH DATE LATER THAN CUT OFF DATE.	The implied actual finish date, and thereby the earliest finish, of an implied actual activity should be earlier than or equal to the cutoff date. Refer to T0605 for probable cause.	Same as T0605. Refer to 1.2.6, 2.3.1, 2.3.1.1, 2.3.4, 2.3.5, 2.3.8.

Table B–5. Time Processing Errors (Part 3 of 4)

Prefix	Error Type	Message Text	Description	Response/Action
T0607	E	E. FIN. OF IN PROGRESS ACTIVITY EQUAL TO OR EARLIER THAN CUT OFF.	The referenced activity is reported as in progress according to status #8 by using a type 45 card (see Table 2–3),but its earliest finish is equal to or earlier than the cutoff date. MCS sets the earliest finish equal to the first working day after the cut-off date, increases the activity duration accordingly and sets the percentage completed to 99%.	■ Specify a later actual start date (using a type 45 card), or ■ Increase the activity duration (using a type 40 card) so the activity earliest finish date becomes later than the cutoff date, or ■ Specify an earlier cutoff date (using a type 10 card). Refer to 1.2.6, 2.3.1, 2.3.1.1, 2.3.4, 2.3.8.
T0608	W	ACTUAL START SHOULD BE GIVEN WHEN NET SCH START LATER THAN CUT OFF.	No earliest start date was obtained for this activity because it was reported as implied actual or as actual in accordance with status #3 by using a type 45 card (see Table 2–3) and the network scheduled start date being later than the cutoff date.	Specify an actual start date by means of a type 45 card for the activity referenced or specify the network scheduled start date earlier than the cutoff date using a type 10 card. Refer to 1.2.6, 2.3.1, 2.3.1.1, 2.3.8.
T0609	W	ACTIVITY DURATION IS SET TO REMAINING DURATION PLUS ONE DAY.	The activity referenced is reported in progress in accordance with status #9 by using a type 45 card (see Table 2–3) and with an estimated time to completion longer than the original estimate of the total duration specified in a type 40 card.	Increase the total duration of the activity referenced by means of a type 40 card or reduce the estimated time to completion using a type 45 card. Refer to 1.2.6, 2.3.1, 2.3.1.1, 2.3.4, 2.3.8.
T0610	W	SCHED DATE CAUSES EARLIEST START/ OCCUR BEFORE NETWORK SCHED START.	A scheduled date with schedule date option of 6 is earlier than the network scheduled start.	Move or change the network scheduled start or the schedule date. Refer to 2.3.1, 2.3.6.
T0801	W	SCH. DATE WITH OPTION 1 IS LATER THAN DIRECTED BY SUCCESSORS.	A scheduled date with a scheduled date code of 1 is specified in a type 42 card for this event or work item. The date is later than the latest date determined by the successors of the event or work item. Note the effect this date has on event slacks (if activity-on-arrow) and activity floats.	None or, if desired, the following actions or options may be taken: 1. Actions A change to a later date of the network scheduled end date and latest finish date (using a type 10 card), or

Table B–5. Time Processing Errors (Part 4 of 4)

Prefix	Error Type	Message Text	Description	Response/Action
T0801 (cont.)				A change to a later date of the event scheduled date or work item scheduled finish date for events or work items on paths succeeding the event or work item referenced (using type 42 cards). 2. Options Reduction of the duration of some activities on the paths mentioned in 1, or Specifying an earlier scheduled date by using a type 42 card for the event or work item referenced, or Changing the scheduled date option by changing the value in column 19 of the type 42 card, or If activity-on-node, the amount of lead or lag between the work item referenced in its successors may be reduced. Refer to 1.2.3.3, 1.2.3.4, 1.2.4, 1.2.5, 2.3.1, 2.3.1.1, 2.3.4, 2.3.5, 2.3.6.
T0802	W	E. DATE LATER THAN L. DATE DIRECTED BY SUCC. (4 IN COLUMN 19 OF 42 CARD)	Note the effect on event slack (if activity-on-arrow) and on activity float when using the earliest date as the latest date, and the earliest date is later than the latest date would be if based on successors.	None or, if desired, same as 1. in T0801. Refer to 1.2.3.3, 1.2.3.4, 1.2.4, 1.2.5, 2.3.1, 2.3.1.1.
T0803	W	SCHED DATE CAUSES LATEST FINISH/OCCUR AFTER NETWORK END DATE	A schedule date option of 4 or a schedule date with schedule date option of 6 is causing a latest time after the network end date.	Move or change the schedule date option, network scheduled end date, or network end date flag. Refer to 1.2.2, 2.3.1, 2.3.6.

B.7. PASSIVE COST PROCESSING ERROR MESSAGES

Table B–6 lists the error messages that may be printed during passive cost processing (2.1.5). In addition to the texts shown in the table, identification of projects, networks, activities, charge numbers, and resources associated with the error conditions are printed.

Table B–6. Passive Cost Processing Errors (Part 1 of 4)

Prefix	Error Type	Message Text	Description	Response/Action
CRE01	W	RESOURCE REQUIREMENT COST OVERFLOW	The cost of the referenced activity resource requirement exceeds the maximum allowable value of 999999.99. The maximum allowable value is used for all further computation.	Ensure the correctness of the resource requirement or report all costs to MCS in thousands of monetary units. Refer to 1.3.2.2.
CRE02	W	RESOURCE REQUIREMENT COST OVERFLOW	Same as CRE01.	Same as CRE01.
CST01	W	CHARGE NUMBER DIRECT DISBURSED OVERFLOW	The disbursements for the direct cost of the referenced charge number exceed the maximum allowable value of 999999999. The maximum allowable value is used for all further computation.	Report all costs to MCS in thousands of monetary units or modify the cost structure. Refer to 1.3.2.1, 1.3.3.
CST02	W	CHARGE NUMBER DIRECT UNLIQUIDATED OBLIGATION OVERFLOW	Same as CST01 for unliquidated obligations for direct cost.	Same as CST01. Refer to 1.3.2.1, 1.3.3.
CST03	W	CHARGE NUMBER OVERHEAD DISBURSED OVERFLOW	Same as CST01 for disbursements for overhead costs.	Same as CST01. Refer to 1.3.2.1, 1.3.3.
CST04	W	CHARGE NUMBER OVERHEAD UNLIQUIDATED OBLIGATION OVERFLOW	Same as CST01 for unliquidated obligations for overhead costs.	Same as CST01. Refer to 1.3.2.1, 1.3.3.
CST05	W	CHARGE NUMBER ESTIMATED COST TO COMPLETE OVERFLOW	Same as CST01 for estimated cost to complete.	Same as CST01. Refer to 1.3.3.1.
CST06	W	CHARGE NUMBER DURATION COMPLETED OVERFLOW	The sum of the duration completed for all activities reporting to the charge number (directly or indirectly) exceeds the maximum allowable value of 9999999. This has no effect on any further computations or the reports.	None required.
CST07	W	CHARGE NUMBER TOTAL DURATION OVERFLOW	Same as CST06 for total duration.	None required.

Table B–6. Passive Cost Processing Errors (Part 2 of 4)

Prefix	Error Type	Message Text	Description	Response/Action
CST08	W	CHARGE NUMBER PLANNED COST OVERFLOW	The MCS computed planned cost of the charge number exceeds the maximum allowable value of 999999999. The maximum allowable value is used for all further computation.	■ Provide a planned cost for the charge number via a type 52 card, or ■ Modify the structure, or ■ Report all costs to MCS in thousands of monetary units. Refer to 1.3.3.1, 2.4.8.
CWS01	F	NO NETWORK CUTOFF DATE	A network cutoff date is required for all cost computations.	Supply a cutoff date via a network, project or system level type 10 card. Refer to 1.3.3.1, 2.3.1.
CWS02	W	ACTUAL ACTIVITY HAS ESTIMATED COST TO COMPLETE	Actual activities normally have no estimated cost to complete. The user-supplied value is used in all computations.	Modify the data base via type 46 cards so that all costs for actual activities are actual costs. Refer to 1.3.2, 2.4.5.
CWS03	W	NET PLANNED COST OVERFLOW	The MCS computed planned cost of the network exceeds the maximum allowable value of 999999999. The maximum allowable value is used for all further computation.	■ Provide a planned cost for the network via a type 53 card, or ■ Report all costs to MCS in thousands of monetary units. Refer to 1.3.2, 2.4.9.
CWS04	W	NET ESTIMATED COST TO COMPLETE OVERFLOW	The estimated cost to complete the network exceeds the maximum allowable value of 999999999. The maximum allowable value is used for all further computation.	Report all costs to MCS in thousands of monetary units. Refer to 1.3.3.1.
CWS05	W	NET TOTAL DURATION OVERFLOW	Same as CST06 for the network.	None required.
CWS06	W	NET DURATION COMPLETED OVERFLOW	Same as CST06 for the duration of all activities in the network.	None required.

Table B—6. Passive Cost Processing Errors (Part 3 of 4)

Prefix	Error Type	Message Text	Description	Response/Action
CWS07	W	NET DIRECT DISBURSED OVERFLOW	The disbursements for direct costs of all activities in the network exceed the maximum allowable value of 999999999. The maximum allowable value is used.	Same as CWS04. Refer to 1.3.3.1.
CWS08	W	NET DIRECT UNLIQUIDATED OBLIGATION OVERFLOW	Same as CWS07 for unliquidated obligations for direct cost.	Same as CWS04. Refer to 1.3.3.1.
CWS09	W	NET OVERHEAD DISBURSED OVERFLOW	Same as CWS07 for disbursements for overhead costs.	Same as CWS04. Refer to 1.3.3.1.
CWS10	W	NET OVERHEAD UNLIQUIDATED OBLIGATION OVERFLOW	Same as CWS07 for unliquidated obligations for overhead costs.	Same as CWS04. Refer to 1.3.3.1.
CWS11	W	CHARGE NUMBER TOTAL DURATION ACTIVITY OVERFLOW	Same as CST06 for the duration of all activities reporting directly to the charge number.	None required.
CWS12	W	CHARGE NUMBER PLANNED COST ACTIVITY OVERFLOW	The planned cost of all the activities reporting directly to the charge number exceeds the maximum value of 999999.99. The maximum value is used for all further computation.	Same as CST01. Refer to 1.3.3.1.
CWS13	W	CHARGE NUMBER DIRECT DISBURSED ACTIVITY OVERFLOW	Same as CWS12 for disbursements for direct costs.	Same as CST01. Refer to 1.3.3.1.
CWS14	W	CHARGE NUMBER DIRECT UNLIQUIDATED OBLIGATION ACTIVITY OVERFLOW	Same as CWS12 for unliquidated obligations for direct costs.	Same as CST01. Refer to 1.3.3.1.
CWS15	W	CHARGE NUMBER OVERHEAD DISBURSED ACTIVITY OVERFLOW	Same as CWS12 for disbursements for overhead costs.	Same as CST01. Refer to 1.3.3.1.
CWS16	W	CHARGE NUMBER OVERHEAD UNLIQUIDATED OBLIGATION ACTIVITY OVERFLOW	Same as CWS12 for unliquidated obligations for overhead costs.	Same as CST01. Refer to 1.3.3.1.

Table B–6. Passive Cost Processing Errors (Part 4 of 4)

Prefix	Error Type	Message Text	Description	Response/Action
CWS17	W	CHARGE NUMBER DURATION COMPLETED ACTIVITY OVERFLOW	Same as CST06 for all the activities reporting directly to the charge number.	None required.
CWS18	W	CHARGE NUMBER ESTIMATED COST TO COMPLETE ACTIVITY OVERFLOW	Same as CWS12 for estimated cost to complete.	Same as CST01. Refer to 1.3.3.1.
CWS19	W	ACTIVITY OVERALL ESTIMATE OVERFLOW	The overall estimate of the cost of all the resource requirements of the activity exceeds the maximum allowable value of 999999.99. The maximum value is used for all further computation.	Same as CRE01. Refer to 1.3.2.2.

B.8. RESOURCE ALLOCATION ERROR MESSAGES

(To be supplied)

B.9. REPORT GENERATION ERROR MESSAGES

Table B–7 lists the error messages that may be printed during report generation (2.1.7).

Table B–7. Report Generation Errors (Part 1 of 2)

Prefix	Error Type	Message Text	Description	Response/Action
R0101	E	PRO = PROJECT-ID REQUESTED BY TYPE 14 CARD, BUT NOT FOUND IN THE PROJECT TABLE IN MCTABLES.	A project identification must be defined by using a type 10 card.	Refer to 3.2.1, 2.3.1.
R0102	E	NET = NETWORK-ID REQUESTED BY TYPE 14 CARD, BUT NOT FOUND IN THE NETWORK TABLE IN MCTABLES.	A network identification must be defined by using a type 10 card.	Refer to 3.2.1, 2.3.1.
R0103	E	REPORT WITH INTEGER NUMBER OF DAYS IS REQUESTED BUT NO ZERO DATE IS SUPPLIED ON CARD TYPES 10, 14.	A report zero date (type 14 format 1 card) or a calendar zero date (system level type 10 card) must be supplied.	Refer to 3.2.1, 2.3.1.

Table B–7. Report Generation Errors (Part 2 of 2)

Prefix	Error Type	Message Text	Description	Response/Action
R0104	E	STATUS A (14 CARD, FORMAT 2, SEQ 02) INVALID FOR REP C WHEN SUPPRESS OPTION ON 00 CARD IS A OR B	The suppress options A and B on the type 00 card cause actual activities to be excluded from reports. Using status codes A or C on a type 14 format 2 card requests reporting of actual activities.	Refer to 3.2.2, 3.1.2.
R0105	E	NO CALENDAR REPORT ** NO CALENDAR ZERO DATE ON 10 CARD ** NO REPORT ZERO DATE ON 14 CARD FORMAT 1	None	Refer to 3.2.1, 2.3.1.
R0106	W	INSUFFICIENT SPACE ON LFD MCREPOUT ** NO FURTHER ACCESSING OF THIS FILE BY MCS IN CURRENT RUN	Reports produced prior to the printing of this message may be recovered from the file LFD MCREPOUT.	Refer to 3.3.2.6.
R0107	F	NO REPORTS AVAILABLE: MCS REQUIRES TIME PROCESSING BEFORE THE GENERATION OF ANY REPORTS	None	Supply a type 00 card with step option blank or T, and rerun MCS. Refer to 3.1.2, 1.2.
R0108	E	COST REPORTS ARE UNAVAILABLE BECAUSE COST PROCESSING HAS NOT BEEN DONE.	None	Supply a type 00 card with step option blank and rerun MCS. Refer to 3.1.2, 1.3.

Appendix C. File Formats for Report-Output-Records

C.1. GENERAL

This appendix describes the formats of records written by management control system (MCS) on the optional output disc file LFD MCREPOUT. It is processed in direct-relative mode and contains fixed-length, unblocked records of 250 bytes (3.3.2.6). Each set of report output records is written onto MCREPOUT (if the file has been assigned) and is used to produce the corresponding printed output record.

For each report requested by type 14 cards, MCS creates one or more sets of report output records. If the first sort key for a report is project-network (3.2.2.2, 3.2.4), one set is produced for each network to be reported (3.2.2, 3.2.3). For all other sorts, one set is produced for the entire report.

The day indicator specified by a type 14 format 2 card, and the number of copies specified by a type 14 format 2, 3, or 4 card, do not affect the file MCREPOUT. The file always includes only one copy of a report and contains dates as specified in Table C–1 (3.2.2, 3.2.3, 3.2.4).

MCS does not write report output records for the calendar report (type L) on MCREPOUT.

Figure C–1 illustrates the format of the file LFD MCREPOUT at the end of a run during which MCS has processed a time report request, a cost report request, and another time report request with project-network as the first sort key.

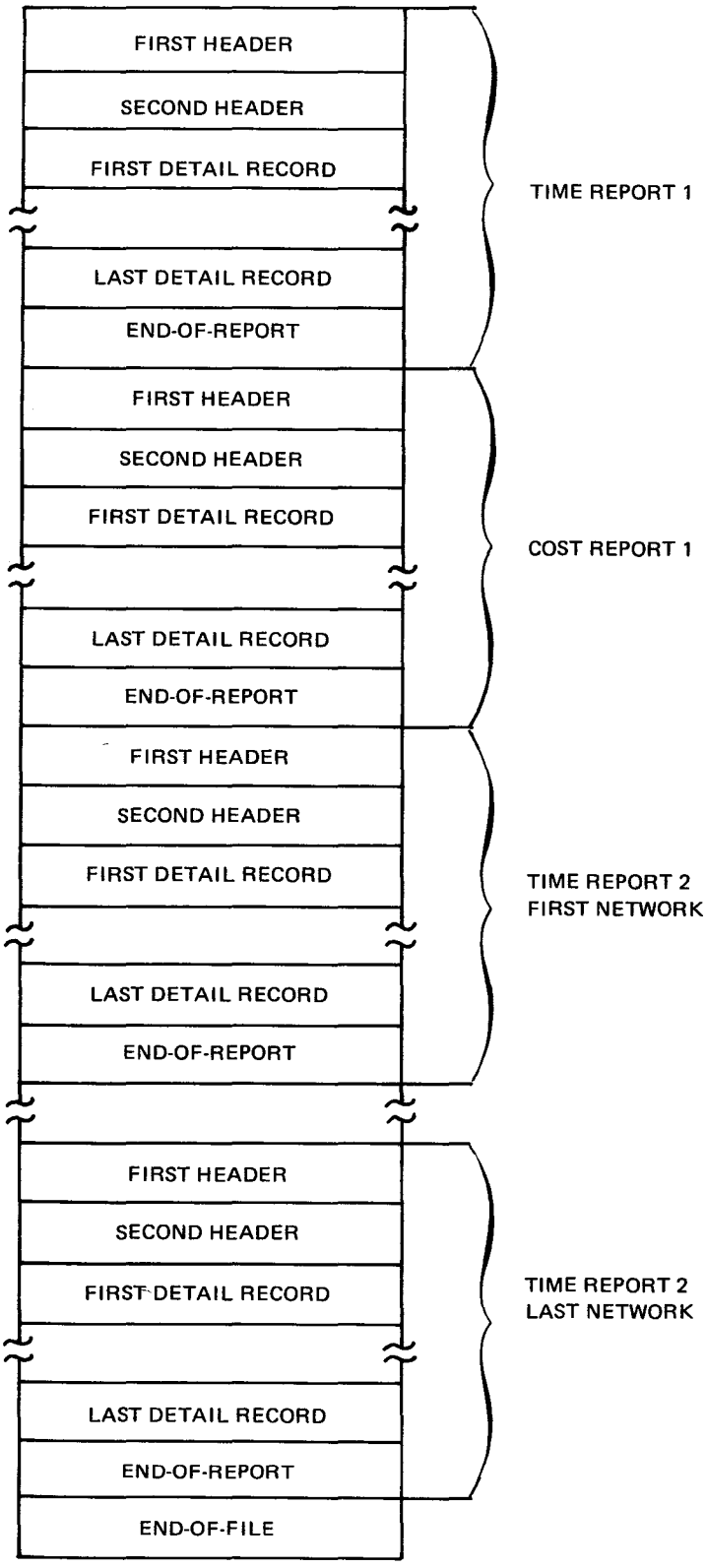


Figure C–1. A Sample Format of an LFD MCREPOUT File

C.2. RECORD DESCRIPTIONS

Each set of report output records written on the file LFD MCREPOUT contains the following types of records in the order shown:

1. First header record (Table C–1).
2. Second header record (Table C–2).
3. Time report detail records (Table C–3) or cost report detail records (Table C–4).
4. End-of-report record (Table C–5).
5. The last set of report output records is followed by an end-of-file record (Table C–6).

The following tables contain descriptions of fields within each type of record, and the contents of these fields for each report type. All dates are given in date format (3.1.1) and integer number of days from a zero date (3.2.1). If no zero date is supplied, all integer date fields are set to 0.

The following abbreviations are used in the field format column:

AN alphanumeric representation

N zoned decimal

P packed decimal

Table C–1. First Header Record (Part 1 of 2)

Character Number	Length In Bytes	Field Format	Description	Manual Reference
1–8	8	AN	Run date (dd/mm/yy)	3.2.1
9–13	5	AN	MCS – version (xx/xx)	
14–16	3	P	From-date (integer)	3.2.2
17–22	6	N	From-date (ddmmyy)	3.2.2
23–25	3	P	To-date (integer)	3.2.2
26–31	6	N	To-date (ddmmyy)	3.2.2
32–34	3	P	Report-zero-date (integer)	3.2.1
35–40	6	N	Report-zero-date (ddmmyy)	3.2.1
41	1	AN	Report type	3.2.2, 3.2.4
42–43	2	N	Number of copies of report (requested on 14 card formats 2 or 3)	3.2.2, 3.2.4
44–46	3	AN	Sort keys (14 card formats 2 or 3)	3.2.2.2
47–91	47	AN	Sort key description	3.2.2.2
92	1	AN	Status (14 card format 2)	3.2.2
93	1	AN	Milestone option	3.2.2.1
94	1	AN	Cluster code	3.2.2
95–98	4	AN	Performing department/responsible department	2.3.4
99–100	2	AN	Maximum total float	3.2.2
101	1	N	Level code	3.2.2.1
102–104	3	P	Earliest start date (integer)*	1.2.3.3
105–110	6	N	Earliest start date (ddmmyy)*	1.2.3.3
111–113	3	P	Latest start date (integer)*	1.2.3.3
114–119	6	N	Latest start date (ddmmyy)*	1.2.3.3

Table C–1. First Header Record (Part 2 of 2)

Character Number	Length In Bytes	Field Format	Description	Manual Reference
120–122	3	P	Scheduled start date (integer)*	2.3.1.1
123–128	6	N	Scheduled start date (ddmmyy)*	2.3.1.1
129–131	3	P	Cut-off date (integer)*	2.3.1.1
132–137	6	N	Cut-off date (ddmmyy)*	2.3.1.1
138	1	AN	Network end date flag*	2.3.1
139–141	3	P	Earliest end date (integer)*	1.2.3.3
142–147	6	N	Earliest end date (ddmmyy)*	1.2.3.3
148–150	3	P	Latest end date (integer)*	1.2.3.3
151–156	6	N	Latest end date (ddmmyy)*	1.2.3.3
157–159	3	P	Scheduled end date (integer)*	2.3.1.1
160–165	6	N	Scheduled end date (ddmmyy)*	2.3.1.1
166–250			Not used	

*These project-network fields are meaningful only if the report is sorted by project-network as the first sort key.

Table C–2. Second Header Record

Character Number	Length In Bytes	Field Format	Description	Manual Reference
1–3	3	AN	Project identification*	2.2.3.1
4–51	48	AN	Project description*	2.3.2
52–63	12	AN	Project contract identification*	2.3.2
64–66	3	AN	Network identification*	2.2.3.1
67–114	48	AN	Network description*	2.3.2
115–126	12	AN	Network contract identification*	2.3.2
127–174	48	AN	System description	2.3.2
175–186	12	AN	System contract identification	2.3.2
187–250			Not used	

*These project-network fields are meaningful only if the report is sorted by project-network as the first sort key.

Table C–3. Time Report Detail Record (Part 1 of 6)

Character Number	Length In Bytes	Field Format	Description	Report Types[1]								Manual Reference
				B	C	D	E	G	I	J	K	
1	1		Not used									
2	1	N	E-Report Record Type 1 = Predecessor Record 2 = Activity Record 3 = Successor Record				X					2.3.5 1.5.2
3	1	AN	Process type T = Time C = Cost	X	X	X	X	X	X	X	X	
4	1	AN	Report type	X	X	X	X	X	X	X	X	3.2.2 3.2.4
5–7	3	AN	Project identification	X	X	X	X	X	X	X	X	2.3.1
8–10	3	AN	Network identification	X	X	X	X	X	X	X	X	2.3.1
11–16	6	AN	I-event identification	X	X		X			X	X	2.2.3.2
		AN	Event identification			X			X			2.2.3.2
		AN	Summary activity start reference point identification					X				1.2.8.1
17	1	AN	Start reference point type Δ= event S = work item start F = work item finish					X				
18–23	6	AN	J-event identification	X	X		X			X	X	2.2.3.2
		AN	Work item identification	X	X		X		X	X	X	2.2.3.2
		AN	Summary activity finish reference point identification					X				1.2.8.1
24	1	AN	Finish reference point type Δ= event S = work item start F = work item finish					X				

Table C–3. Time Report Detail Record (Part 2 of 6)

Character Number	Length In Bytes	Field Format	Description	Report Types[1]								Manual Reference
				B	C	D	E	G	I	J	K	
		AN	Interface type						X			2.3.7
25–28	4	AN	Performing department	X	X		X			X	X	2.3.4
29	1	AN	Cluster code	X	X		X			X	X	3.2.2 2.3.4
30–32	3	P	Earliest start date (integer)	X	X		X	X	X	X	X	1.2.3.3
33–35	3	P	Earliest finish date (integer)	X	X		X	X		X	X	1.2.3.3
		P	Earliest occurrence (integer)			X						1.2.4
		P	Interface earliest occurrence (integer)						X			1.2.7.1.1
36–38	3	P	Latest start date (integer)	X	X		X	X		X	X	1.2.3.3
39–41	3	P	Latest finish date (integer)	X	X		X	X		X	X	1.2.3.3
		P	Latest occurrence (integer)			X						1.2.4
		P	Interface latest occurrence						X			1.2.7.1.1
42–44	3	P	Scheduled start date (integer)	X	X		X			X	X	2.3.1
		P	Scheduled occurrence (integer)			X						2.3.1
45–47	3	P	Scheduled finish date (integer)	X	X		X			X	X	2.3.1
48–50	3	P	Total float	X	X		X	X		X	X	1.2.3.4
		P	Total slack			X						1.2.4
51–53	3	P	Secondary float	X	X		X			X	X	1.2.3.4
		P	Secondary slack			X						1.2.4
54–56	3	P	Free float	X	X		X	X		X	X	1.2.3.4

Table C–3. Time Report Detail Record (Part 3 of 6)

Character Number	Length In Bytes	Field Format	Description	Report Types[1]								Manual Reference
				B	C	D	E	G	I	J	K	
57–59	3	P	Detail float					X				1.2.8.5
60–62	3	P	Activity duration	X	X		X			X	X	1.2.3.2
		P	Strict duration					X				1.2.8.4
63–65	3	P	Elapsed duration					X				1.2.8.4
66–67	2	P	Percentage complete	X	X		X			X	X	
68–70	3		Not used									
71–73	3	P	Rank	X	X	X	X			X	X	1.2.1.2
74	1	N	Activity level code	X	X		X			X	X	3.2.2.1
75	1	N	Milestone code for event or work item start or summary activity start reference point	X	X	X	X	X		X	X	2.3.6
76	1	N	Milestone code for work item finish or summary activity finish-reference point	X	X	X	X	X		X	X	2.3.6
77	1	N	Status code Event Report 1 = Actual 2 = In-progress 3 = Future Activity or Summary Activity Reports 1 = Implied actual 2 = Implied in-progress 3 = Implied future 4 = Actual 5 = In-progress 6 = Future	X	X	X	X	X		X	X	

Table C–3. Time Report Detail Record (Part 4 of 6)

Character Number	Length In Bytes	Field Format	Description	Report Types[1]								Manual Reference
				B	C	D	E	G	I	J	K	
78	1	N	Interface flag Activity Reports: FLAG = 1 if I-event or WI start is on interface Event Reports: FLAG = 1 if event is on interface	X	X	X	X			X	X	
79	1	N	Interface flag Activity Reports: FLAG = 1 if J-event or WI finish is on interface	X	X		X		X		X	
80	1	N	Scheduled Date Code Activity Reports: I-event or work item Event Reports: Event	X	X	X	X			X	X	2.3.6
81	1	N	Scheduled Date Code Activity Reports: J-Event	X	X		X			X	X	2.3.6
82–84	3	P	Interface deflection						X			1.2.7.1.2
		P	Lead-lag time				X					1.2.1.2
85	1	AN	Dependency				X					2.3.5
86	1	P	Work week length	X	X		X			X	X	2.3.1.1
87	1	N	Work week start	X	X		X			X	X	2.3.1.1
88	1	P	Continuity code	X	X		X			X	X	2.3.4
89–124	36	AN	Activity description	X	X		X			X	X	2.3.4
		AN	Work item description						X			2.3.4
89–136	48	AN	Event description			X			X			2.3.4

Table C–3. Time Report Detail Record (Part 5 of 6)

Character Number	Length In Bytes	Field Format	Description	Report Types[1]								Manual Reference
				B	C	D	E	G	I	J	K	
89–112	24	AN	Summary activity start reference point description If summary activity start reference point is an event, only first 24 characters of event description appear If summary activity start reference point is WI start or finish, this is the milestone description for that WI start or finish					X				
113–136	24	AN	Summary activity finish reference point description If summary activity finish reference point is an event, only first 24 characters of event description appear If summary activity finish reference point is WI start or finish, this is the milestone description for that WI start or finish					X				2.3.6
137–142	6	AN	Interface identification						X			2.3.7
143–162	20		Not used									
163	1	AN	Activity critical flag Y = critical activity N = not critical activity	X	X		X			X	X	1.2.3.4
164–200	37		Not used									
201–206	6	N	Earliest start date (ddmmyy)	X	X		X	X	X	X	X	1.2.3.3
207–212	6	N	Earliest end date (ddmmyy)	X	X	X	X	X	X	X	X	1.2.3.3

Table C–3. Time Report Detail Record (Part 6 of 6)

Character Number	Length In Bytes	Field Format	Description	Report Types [1]								Manual Reference
				B	C	D	E	G	I	J	K	
213–218	6	N	Latest start date (ddmmyy)	X	X		X	X	X	X	X	1.2.3.3
219–224	6	N	Latest end date (ddmmyy)	X	X	X	X	X	X	X	X	1.2.3.3
225–230	6	N	Scheduled start date (ddmmyy)	X	X	X	X			X	X	2.3.1
231–236	6	N	Scheduled end date (ddmmyy)	X	X		X			X	X	2.3.1
237–250	14		Not used									

NOTE:

1. Refer to 3.2.2 for identification of report types

Table C–4. Cost Report Detail Record (Part 1 of 5)

Character Number	Length In Bytes	Field Format	Description	Report Types [1,5]												Manual Reference
				S	U_0	U_1	U_2	U_3	V_N	V_O	V_W	W	X	Y	Z	
1–4	4		Not used													
5–7	3	AN	Project identification	X	X				X	X	X					2.2.3.1
8–10	3	AN	Network identification	X	X				X	X	X					2.2.3.1
11–16	6	AN	I-event identification	X					X	X	X					2.2.3.2
17	1		Not used													
18–23	6	AN	J-event or work item identification	X					X	X	X					2.2.3.2
24–27	4	AN	Department	X		X			X	X[4]	X[4]					2.4.6
28–29	2		Not used													
30–32	3	P	Activity earliest start date (integer)						X	X	X					1.2.3.3
		P	From date (integer)												X	2.4.3
		P	Network cutoff date (integer)		X											
		P	System cost cutoff date (integer)							4	4					2.3.1
		P	Start of accounting period (integer)													
33–35	3	P	Activity earliest finish date (integer)						X	X	X					1.2.3.3
		P	To date (integer)												X	
		P	End of accouting period (integer)													
36–38	3	P	Activity latest start date (integer)						X	X	X					1.2.3.3
39–41	3	P	Activity latest finish date (integer)						X	X	X					1.2.3.3
42–44	3	P	Activity duration						X	X	X					1.2.3.2
45–46	2	P	Percentage complete						X	X	X					
47–52	6	AN	Resource identification												X	2.2.3.3

Table C–4. Cost Report Detail Record (Part 2 of 5)

Character Number	Length In Bytes	Field Format	Description	Report Types [1,5]												Manual Reference
				S	U_0	U_1	U_2	U_3	V_N	V_O	V_W	W	X	Y	Z	
53	1	N	Resource measure 0 = unit 1 = hour 2 = shift 3 = week												X	1.3.1
54–71	18	AN	Resource description												X	2.4.1
47–70	24	AN	Charge number description	X		X				4	4					2.4.6
71–72	2	N	Level of charge number	X		X	X			4	4					2.4.6, 1.3.3.
		N	Level of WBS charge number						X							2.4.6, 1.3.3
73–90	18	AN	Charge number	X		X	X			4	4					2.4.6
		AN	WBS charge number						X							2.4.6
47–83	37	AN	Activity description							X	X					2.3.4
47–58	12	AN	Project contract		X											2.3.2
59–70	12	AN	Network contract		X											2.3.2
91	1	AN	Charge number flag [5]		X	X	X	X	X	X[4]	X[4]					
92–93	2	N	Level of subordinate charge number					X								2.4.6
		N	Level of summary charge number	X												2.4.6
		N	Level of OAS charge number						X							2.4.6
94–111	18	AN	Subordinate charge number					X								2.4.6
		AN	Summary charge number	X												2.4.6
		AN	OAS charge number						X							2.4.6
112–113	2	N	Internal charge number identification used for sorting [3]	X		X	X	X		X[4]	X[4]					
114–116	3	N	Internal charge number identification used for sorting [2,3]	X		X	X	X		X[4]	X[4]					

Table C–4. Cost Report Detail Record (Part 3 of 5)

Character Number	Length In Bytes	Field Format	Description	Report Types [1,5]												Manual Reference
				S	U_0	U_1	U_2	U_3	V_N	V_O	V_W	W	X	Y	Z	
117–121	5	P	Direct cost disbursements for charge number or network		X	X	X	X								1.3.2.1
122–126	5	P	Direct cost unliquidated obligations for charge number or network		X	X	X	X								1.3.2.1
127–131	5	P	Overhead disbursements for charge number or network		X	X	X	X								1.3.2.1
132–136	5	P	Overhead unliquidated obligations for charge number or network		X	X	X	X								1.3.2.1
137–141	5	P	Committed cost for charge number or network		X	X	X	X								1.3.3.1
142–146	5	P	Planned cost for charge number or network		X	X	X	X								1.3.3.1
147–151	5	P	Estimated cost to complete for charge number or network		X	X	X	X								1.3.3.2
		P	Quantity of resource during accounting period													
117–121	5	P	Direct cost disbursements for activity (000000.00)						X	X	X					1.3.2.1
		P	Direct cost during accounting period (000000.00)													
121–126	5	P	Direct cost unliquidated obligations for activity (000000.00)						X	X	X					1.3.2.1
127–131	5	P	Overhead disbursements for activity (000000.00)						X	X	X					1.3.2.1
		P	Overhead cost during accounting period (000000.00)													
132–136	5	P	Overhead unliquidated obligations for activity (000000.00)						X	X	X					1.3.2.1
137–141	5	P	Overall estimate for activity (000000.00)						X	X	X					1.3.2.2

Table C–4. Cost Report Detail Record (Part 4 of 5)

Character Number	Length In Bytes	Field Format	Description	Report Types [1,5]												Manual Reference
				S	U_0	U_1	U_2	U_3	V_N	V_O	V_W	W	X	Y	Z	
142–146	5	P	Estimated cost to complete for activity (000000.00)						X	X	X					1.3.2.2
		P	Estimated cost during accounting period (00000.00)													
117–121	5	P	Direct rate (000000.000)												X	2.4.3
122–126	5	P	Overhead flat rate (000000.000)												X	2.4.3
127–129	3	P	Overhead, percentage rate (000.0)												X	2.4.3
150–154	3	AN	Cost category												X	2.4.2
155–200	46		Not used													
201–206	6	N	Activity earliest start date (ddmmyy)						X	X	X					1.2.3.3
		N	From Date (ddmmyy)												X	2.4.3
		N	Network cutoff date (ddmmyy)		X											
		N	System cost cutoff date (ddmmyy)							4	4					
		N	Start of accounting period (ddmmyy)													
207–212	6	N	Activity earliest finish date (ddmmyy)						X	X	X					1.2.3.3
		N	To date (ddmmyy)												X	
		N	End of accounting period (ddmmyy)													
213–218	6	N	Activity latest start date (ddmmyy)						X	X	X					1.2.3.3
219–224	6	N	Activity latest finish date (ddmmyy)						X	X	X					1.2.3.3
225–250	26		Not used													

Table C–4. Cost Report Detail Record (Part 5 of 5)

NOTES:

1. Refer to 3.2.4 for identification of report types.

2. This number is 5 or greater for all user-supplied charge numbers. The values of this number for the internally defined pseudo charge numbers (1.3.3) are:

   1 – Costs which enter the structure at a charge number above this level.

   2 – Costs which enter the structure at a charge number on a lower level, but bypass this level.

   3 – Lower level costs which are summarized to an illegal charge number.

   4 – Costs summed to a lower level charge number which has no summary charge number.

3. All data records relating to one charge number are uniquely identified by the pair of numbers in columns 112–116. When these fields are present, all the records in a report are sorted in ascending order on columns 112–116.

4. In this report, those fields identified by 4 in types V_O and V_W are present in the first record pertaining to a charge number. Those fields identified by X in type V_O and V_W are present in all other records pertaining to a charge number. When both 4 and X appear in these columns, the fields are present in all records pertaining to a charge number.

5. The types of cost report and detail records for the U and V reports are:

   - U Report

     U_0 = The report is sorted by project-network and this is the record for one network.

     U_1 = The report is sorted by charge number and this is the master-totals-record for a new charge number.

     U_2 = The report is sorted by charge number and this is the record of totals for all activities entering the structure at this charge number.

     U_3 = The report is sorted by charge number and this is the record of totals for one directly subordinate charge number.

   - V Report

     V_N = The report is sorted by project-networks.

     V_O = The report is sorted by organizational accounting structure (OAS) charge number.

     V_W = The report is sorted by work breakdown structure (WBS) charge number.

The values of the charge number flag (column 91) are the subscripts for the types of detail records for the U and V reports.

Table C–5. End-of-Report Record

Character Number	Field Format	Description
1–7	AN	**EOR**
8–250		Not used

Table C–6. End-of-File Record

Character Number	Field Format	Description
1–16	AN	**EOF–MCREPOUT**
17–250		Not used

Appendix D. Display Order of Transactions and Data Base

The order of the sorted transaction records and the new data base as printed on user output is as follows:

type 00 card
system 01 card
system 10 card
system 11 card
system type 12 cards, in year -- month -- day order
type 14 cards, in sequence number order
type 20 cards, in resource code order
type 21 cards, one per cost category, in cost category order
type 21 cards, one per resource in a cost category, in cost category -- resource code order
type 30 cards, in resource code -- from date order
type 50 cards, in structure -- charge number order
sets of cards for each project (see a below), in project order
type 44 cards, in interface identification -- project -- network -- event or work item order
type 52 cards, in structure -- charge number -- type of change (T,+,–) order

a. The order of a set of cards for a project is as follows:

project 01 card
project 10 card
project 11 card
project 12 cards, in year -- month -- day order
sets of cards for each network in the project (see b below), in network order

b. The order of a set of cards for a network is as follows:

network 01 card
network 10 card
network 11 card
network 12 cards, in year -- month -- day order
type 40 cards, in J event or work item -- I event order
type 41 cards, in work item -- predecessor work item -- dependency order
type 42 cards, in event or work item order
type 43 cards, in J event or work item -- I event -- resource code order
type 45 cards, in J event or work item -- I event order
type 46 cards, in J event or work item -- I event -- resource code -- type of data -- type of

type 51 cards, in structure -- charge number -- J event or work item -- I event order
type 53 cards, in project -- network -- type of change (T,+,–) order

The sorted order for transactions is delete-add-replace.

Bibliography

Archibald, R.D., and Villaria, R.L. *Network-Based Management Systems (PERT/CPM).* John Wiley and Sons, Inc., 1968.

Battersby, Albert. *Network Analysis for Planning and Scheduling.* John Wiley and Sons, Inc. 1970.

Burman, P.J. *Precedence Network for Project Planning and Control.* McGraw Hill, 1972.

DOD Directive 7000.2, Department of Defense Instruction, *Performance Measurement for Selected Acquisition.* Washington, D.C., 1969.

Hoare, H.R., *Project Management Using Network Analysis.* London McGraw-Hill, 1973.

Lombaers, H.J.M., ed. *Project Planning by Network Analysis, Proceedings of the Second International Congress.* North-Holland Publishing Company, Amsterdam, Netherlands. October, 1969.

Moder, J.J., and Phillips, C.R. *Project Management With CPM and PERT.* Reinhold Corp., 1964.

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